

**DRAFT**

# **ANNUAL REPORT**

## **2015-2016**



**PAKISTAN SCIENCE FOUNDATION**  
**1 - Constitution Avenue**  
**Islamabad**



# PAKISTAN SCIENCE FOUNDATION

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## ACRONYMS

|          |   |
|----------|---|
| AGR      | Agricultural Sciences   |
| AJK      | Azad Jammu and Kashmir  |
| AKU      | Agha Khan University, Karachi   |
| B        | Balochistan   |
| BIO      | Biological Sciences   |
| BIOTECH  | Biotechnology & Genetic Engineering   |
| C        | Capital   |
| CDWP     | Central Development Working Party   |
| CEMB     | Center of Excellence in Molecular Biology, Lahore                             |
| CEME     | College of Electrical and Mechanical Engineering, Rawalpindi                  |
| CEWRE    | Center of Excellence in Water Resources Engineering, Lahore                   |
| CIIT     | COMSATS Institute of Information Technology                                   |
| COMSATS  | Commission on Science and Technology for Sustainable Development in the South |
| COMSTECH | OIC Standing Committee on Scientific and Technological Cooperation            |
| DDWP     | Departmental Development Working Party  |
| EARTH    | Earth Sciences  |
| ENG      | Engineering Sciences  |
| ENVR     | Environmental Sciences  |
| ILG      | Industrial Linkages Group   |
| KPK      | Khyber PakhtoonKhwa   |
| PU       | Peshawar University, Peshawar   |
| FJWU     | Fatima Jinnah Women University  |
| GCU      | Government College University, Lahore   |
| GU       | Gomal University, D. I. Khan  |
| KU       | Karachi University, Karachi   |
| MED      | Medical Sciences  |
| NARC     | National Agricultural Research Center   |
| NIBGE    | National Institute for Biotechnology and Genetic Engineering, Faisalabad      |
| NNSFC    | National Natural Science Foundation of China                                  |
| NSLP     | Natural Sciences Linkage Programme  |
| NSTC     | National Science and Technology Commission                                    |
| P        | Punjab  |
| P-AU     | Agriculture University, Faisalabad  |
| P-PU     | Punjab University, Lahore   |
| PHYS     | Physics   |
| PINSTECH | Pakistan Institute of Nuclear Science and Technology, Islamabad               |
| PCCC     | Pakistan Central Cotton Committee, Sakrand                                    |
| PSDP     | Public Sector Development Programme   |
| S        | Sindh   |
| SALU     | Shah Abdul Latif University, Khairpur   |
| SUIT     | Sindh Institute of Urology & Transplantation, Karachi                         |
| SU       | Sindh University, Jamshoro  |



## **EXECUTIVE SUMMARY**

### **PAKISTAN SCIENCE FOUNDATION (PSF)**

Pakistan Science Foundation (PSF) is the apex body for promotion and funding of scientific and technological research and other related activities in the country. The tasks undertaken by the Foundation for the performance of its statutory functions are divided into two broad categories viz., Science Promotion and Science Popularization. Some of these activities pertaining to above mentioned categories are undertaken by Pakistan Museum of Natural History (PMNH) and Pakistan Scientific and Technological Information Centre (PASTIC), the two subsidiary organizations of PSF, while others are performed by PSF Science Wing and are reflected as under:

### **RESEARCH SUPPORT**

To promote basic and applied research relevant to socio-economic development of the country, Research Support Programme is playing a pivotal role in the Foundation. During 2015-16, a total of 291 projects in the fields of Agricultural, Biological, Chemical, Medical, Maths & Computer, Earth, Engineering Sciences, Biotechnology and Genetic Engineering and Physics remained under consideration. Out of these, 44 were under-process projects including 15 newly approved at a total cost of Rs.32.202 million and 116 on-going research projects. An amount of Rs.11.700 million was released on account of first installments of newly approved projects. A total of 30 technical reports (semi-annual/annual/final) of on-going projects were received, of these, annual reports were sent to subject experts for evaluation and an amount of Rs.6.319 million released on account of due installments. Final technical reports of 32 on-going projects were presented to relevant Technical Committees and their accounts settled and files closed. From these completed projects, a total 57 research papers were published in different national/international journals, and 21 Ph.D. and 26 M.Phil degrees were awarded to the Research Associates enrolled under these projects.

Focusing on collaborative research and strong industrial linkages, R&D-Industry Programme is (previously called Industrial Linkages Programme, ILP) aimed to bring together researchers, end-users and the funding institutions at one platform for creating an environment of a unified approach in identifying and solving industrial problems through applied research and technology transfer mechanism. During the report period, a total of 08 research proposals were received from various organizations, out of these, 06 proposals were presented in Technical Committees, wherein, 05 were approved at a total cost of Rs.13.4

million. Currently, 09 projects are on-going and an amount of Rs.6.8 million was released on account of due instalments for smooth running of these projects. In addition, under this programme, “Invention to Innovation Summit-2016” was also organized at University of the Punjab, Lahore to establish linkage between Academia and Private Sector.

### **PAK-US NATURAL SCIENCES LINKAGE PROGRAMME (NSLP)**

#### **ENDOWMENT FUND**

PSF maintains an Endowment Fund under Pak-US Natural Sciences Linkage Programme (NSLP) to boost the research in agriculture sector of the country. During the report period, 209 concept papers/proposals remained under consideration of the NSLP. Out of these, 14 projects were presented in 01 Technical Committee meetings wherein, 03 projects were recommended for funding at total cost of Rs.8.47 million. A total 63 projects were remained on-going at different Universities and R&D Organizations across the country and 71 progress reports of these projects were received and an amount of Rs.32.10 was released on account of due installments for smooth running of these projects. During the report period, 17 projects were completed. Four projects formulation workshops were conducted at University of Poonch, Rawlakot, Government College Women University, Faisalabad, Government College University, Lahore and University of Agriculture, Peshawar.

#### **SCIENCE PROMOTION ACTIVITIES**

During the report period, an amount of Rs.1.96 million was released to various institutions for organizing 17 conferences, seminars and workshops on important scientific topics. Further, an amount of Rs.1.0 million was also released to 09 scientific societies/journals for their regular activities. However, Institutional Support and PSF Fellowships programmes were not entertained due to paucity of funds.

#### **SCIENCE POPULARIZATION**

The major functions entrusted to PSF include popularization of science, increasing science awareness and development of scientific culture in the society. During the year 2015-16, 102,273 students from 506 schools visited Science Caravan Exhibitions. The 25th Annual Intra and Inter Board Science Essay and Poster Competitions were organized amongst the students of all Boards of Intermediate and Secondary Education (BISE) of the country. Students from all over the country took part in the competitions. The theme of essay Competition was “*Is renewable energy an economically viable option for Pakistan?*” and for Science Poster Competition the theme was “*Importance of light for life*”. Thousands of

students from all over the country participated in these competitions and 117 winner students were awarded cash prizes. Popular Science magazine “*Monthly Global Science*” and Quarterly “*Urdu Science Magazine*” were distributed to 500 schools during the report period. Bimonthly Scientific Journal “The Fountain” published by The Light Publishing Turkey was also provided to Caravan offices, PASTIC offices and PMNH. A book titled; “*Transgenic Plant*” was also distributed among universities and colleges. During the report period, an amount of Rs.140,000/- was sanctioned to 02 schools and S&T organizations for strengthening of their labs and arranging their Science Popularization activities. Five Popular Science Lectures were organized on different scientific themes. PSF celebrated World Science Day on the theme “Science for a Sustainable Future”. PSF and DoST (Directorate of Science & Technology, KP) signed MoU for mutual cooperation for developing science culture in the society. Under this MoU, PSF organized four teacher training sessions on Inquiry Based Science Education in different districts of KP. The Pakistani delegation comprising seven students along with the Team Leader from PSF participated in Asian Science Camp organized at Pathumthani, Thailand.

In connection with strengthening and up-gradation of government High Schools’ labs, a need assessment survey of these schools was conducted in four districts (two advance & two backward) from each of the provinces and two from AJK and GB. Data about the status of the labs of government sector high schools will be used in preparation of a PSDP project for strengthening of science labs in the schools. In connection with enhancing the performance of Science Caravans, PSF new science caravan office has been established in the campus of Bahauddin Zakariya University, Multan.

## **INTERNATIONAL LIAISON**

In order to fulfill the mandate of establishing international liaison with counterpart organizations, Pakistan Science Foundation further enhanced its international liaison activities, by opening up new ventures of joint collaboration with brotherly nations. During the year 2015-2016 joint call for proposals was launched with National Science Foundation of China (NSFC) and Scientific and Research Council of Turkey, (TUBITAK). The calls were highly appreciated by the scientific community of both the countries.

Chairman, PSF had various meetings with international counter parts to further expand the PSF activities at international scale. Delegates of Turkmenistan and Lanzhou University, China visited PSF to chalk out the areas of joint collaboration. Chairman PSF, also visited

Iran, China and United Kingdom to attend different meetings pertaining to policy making and science popularization. A MoU for joint collaboration with Lanzhou University, China was signed to explore new horizons of mutual collaboration. PSF also organized an awareness seminar on EU- Horizon 2020 programme at University of Karachi in collaboration with European Union. A joint project with TIKa also remained in progress.

## **PLANNING AND DEVELOPMENT ACTIVITIES**

During the year 2015-16, an amount of Rs.5.3 million was allocated/released under the PSDP and spent mainly for provision of travel grants to scientists/technologists and other heads of the project. A total of 260 requests were received from scientists and technologists of the country. After comprehensive scrutiny as per eligibility criteria, 145 requests were presented in 08 meetings of Travel Grant Award Committee, whereas, 42 were recommended and 32 scientists/technologists availed the grant, and 10 could not proceed abroad due to visa problems and other reasons. An amount of Rs. 450 million was received under the on-going development project titled “Science Talent Farming Scheme (STFS) for 1800 Young Students Phase-I (Component-I)”. An amount of Rs. 64.718 Million was utilized while rest of the amount was surrendered. Funds were utilized for the monetary benefits and the additional interventions designed for the students.

## **PAKISTAN MUSEUM OF NATURAL HISTORY (PMNH)**

PMNH has four principal divisions namely Botanical Sciences, Zoological Sciences, Earth Sciences and Public Services. The first three divisions are engaged in the collection, identification and research activities pertaining to plants, animals and mineral resources of Pakistan, respectively; while the latter is responsible for mass education and popularization of natural history. During the report period, PMNH researchers conducted field work in many localities of the country throughout the year and collected thousands of specimens, and their curation, identification, preservation, cataloguing and digitization were carried out. The research work carried out in the field and labs was submitted to reputed national and international journals and some 15 research articles were published in national and international journals. PMNH researchers also produced technical reports on their collaborative research projects.

PMNH regularly organized trainings, workshops, seminars, symposiums and other educational interactive activities related to natural history, environment and Biodiversity of

Pakistan. International days were also observed including World Wildlife Day and Earth Day. PMNH also formed many national and international liaisons with the other research institutes in the country and abroad.

PMNH have informative, interactive, educative 3-dimensional dioramas and exhibits. Students of schools, colleges and universities from all over the Pakistan visited PMNH as a part of their educational tours. This year total 110,654 persons visited the museum galleries including 18,615 students, 40,099 general public 225 foreigners and 51,715 children's less than 12 years. Scientific and Technical staff of PMNH facilitated the students and researchers from the other universities and institutes by providing help in the research in the form of information, technical assistance, specimens as a loan and guidance in their research work. In addition, a number of exhibits and dioramas were upgraded and beatification of Display Galleries and outer area of the museum were enhanced many folds.

#### **PAKISTAN SCIENTIFIC AND TECHNOLOGICAL INFORMATION CENTRE (PASTIC)**

Pakistan Scientific and Technological Information Centre (PASTIC) is the premier organization in the field of S&T information dissemination in the country. During the report period. under the Document Supply Service 66758 S&T documents in print and digital form were procured and supplied to 6461 R&D workers. Whereas 742653 abstracts/references, 7906 bibliographies pertaining to all major disciplines of Science and Technology were supplied to 5578 researchers/users on their request under the Literature search and Bibliographic Information Service. PASTIC publishes an abstracting journal entitled "Pakistan Science Abstracts" (PSA) in ten different scientific disciplines as secondary source of information. During the period, 7194 abstracts were downloaded and processed for abstracting and indexing for bringing out Pakistan Science Abstracts (PSA and incorporating the same in PSA online database.

Six issues of bimonthly Trade and Technology news e-bulletin entitled "Technology Roundup" were published online. 3 Exhibitions (Invention to Innovation Summit) and 3 Symposia were organized at Lahore, Haripur & Quetta under the University Industry Partnership (UIP) Programme for building effective linkages between Universities/R&D Institutions and the Industrial Sector. A total 8778 users also visited library for reference

purpose, reading, photocopying, internet browsing and web searching. Besides, the library received 387 issues of national and international journals in exchange of Pakistan Science Abstracts and on gratis basis. 12 issues of Fresh Arrivals of PASTIC library were compiled, published and distributed within and outside the organization to PASTIC members.

Under Reprographic Services of PASTIC, 154 printing jobs of ten R&D organizations were carried out and completed. Further, a total 52 stalls and 19 awareness seminars at various departments of universities in several major cities were also organized. PASTIC liaise and collaborate with regional and international information networks agencies and also acts as the National Focal Point of those International/Regional Information Networks. PASTIC is also the national distributor of UNESCO developed library management software “WINISIS”. Under international liaison 3 officers of PASTIC availed the training under the training opportunities offered by SDC. Moreover, a project entitled “Networking and Capacity Building of Women Entrepreneurs (SMEs) of SAARC Countries” prepared and submitted in 2014-15, which was revised twice and finally approved by SAARC Development Fund (SDF). PASTIC organized 19 seminars and 22 workshops on various themes such as PASTIC Information Services, Library Management, Resource Sharing, Intellectual Property Rights, Health Awareness, Research Tools and Techniques / Citation Management (SPSS, Endnote, Mendeley, etc.). The total number of users/researchers served during the period under consideration under all categories was 20817 and total number of persons trained was 560.

## INTRODUCTION

Pakistan Science Foundation was established on June 30, 1973 under the Pakistan Science Foundation Act No. III of National Assembly (**Annexure-I**) as an autonomous body to promote and finance scientific and technological activities having a bearing on the socio-economic needs of the country. The tasks undertaken by the Foundation for the performance of its statutory functions are divided into following three broad categories:

- i) Science Promotion supports basic and fundamental as well as applied research involving researchers/academia at universities and R&D organizations focusing socio-economic needs/development of the country.
- ii) Science Popularization endeavoring to image scientific ideas to grasp the concept of fundamental science.
- iii) Science Centers to encourage all segments of society in thinking, understanding and exploring science.

Under the Act, the Foundation has been entrusted to carry out the following functions:

- i) Establishment of comprehensive scientific and technological information and dissemination centers.
- ii) Promotion of basic and fundamental research in universities and other institutions on scientific problems relevant to the socio-economic development of the country.
- iii) Utilization of the results of scientific and technological research including pilot plant studies to prove the technical and economic feasibility of processes found to be promising on a laboratory scale.
- iv) Establishment of science centers, clubs, museums, herbaria and planetaria.
- v) Promotion of scientific societies, associations and academies engaged in spreading the cause of scientific knowledge in general or in the pursuit of a specific scientific discipline or technology in particular.
- vi) Organization of periodical science conferences, symposia and seminars.
- vii) Exchange of visits of scientists and technologists with other countries.
- viii) Grant of awards, prizes and fellowships to individuals engaged in developing processes, products and inventions of consequence to the national economy.
- ix) Special scientific surveys not undertaken by any other organization and collection of scientific statistics related to the scientific efforts of the country.

The Foundation shall also:

- i) Review the progress of scientific research sponsored by it and evaluate the results of such research.
- ii) Maintain a National Register of highly qualified and talented scientists/engineers and doctors both in and outside Pakistan, and to assist them in collaboration with concerned agencies to seek appropriate employment.
- iii) Establish liaison with similar bodies in other countries.

The activities performed under the above mentioned statutory functions are as under, however, the details are given in different chapters:

## ACTIVITIES AND PROGRAMMES

The activities and programmes undertaken by the Foundation to perform its statutory functions can be divided into the following four categories:

- i. Promotion and Financing of Scientific Research in the Country and the Utilization of the Research Results.
- ii. Promotion and Popularization of Science in the Society.
- iii. International Liaison.
- iv. Establishment of Comprehensive Scientific and Technological Information Dissemination Centers.

The main functions of the Foundation i.e., research support and science popularization etc., are performed by the Science Wing of the Foundation and their detail is given as under:

**Research Support** is performing the following activities:

1. Research Support
  - a) Grants for Research Projects
  - b) Grants for Institutional Support
2. Research Evaluation
3. Promotion/funding of Scientific Societies/Learned Bodies
4. Funding of Conferences, Symposia, Seminars & Workshops
5. Travel Grants
6. International Liaison
7. Awards and Fellowships
8. Survey and Statistics
9. Scientists Pool
10. Innovations & Inventions
11. Planning and Development Programme

**Science Popularization** carries out science popularization activities including Science Caravans, Science Clubs, Science Fairs and holding of Popular Science Lectures, Workshops, Conferences and Symposia.

**Pakistan Museum of Natural History (PMNH)** is a subsidiary organization of PSF, established in 1979 to serve the national needs in the vitally important areas of research, conservation and education involving Pakistan's heritage of natural resources. The Museum is a National Repository for permanent storage of plants, animals, rocks, minerals and fossils of the country.

**Pakistan Scientific and Technological Information Centre (PASTIC)** is another subsidiary organization of PSF, performs as Scientific and Technological Information Dissemination Center with its sub offices in all provincial capitals of the country.

# **1. PAKISTAN SCIENCE FOUNDATION (PSF)**

## **1.0 RESEARCH SUPPORT**

### **1.1 Research Funding**

#### **1.1.1 Research Projects Funded**

Research Support (Science Promotion) is the principal programme of Pakistan Science Foundation for the promotion of basic and applied research relevant to the socio-economic development of the country. The criteria for funding of research projects include the availability of basic equipments and laboratory facilities, scientific and technical merit of the proposed research projects and likelihood of completion of the proposed research within the stipulated time and budget. Each proposal after examined by PSF Screening Committee is reviewed from subject experts of the particular field, and placed before the relevant Technical Committee for technical and fiscal evaluation and recommendations. The proposal, if recommended by the Technical Committee, is then submitted to PSF executive Committee for final approval.

##### **a. Under Process Projects**

During 2015-16, 291 research proposals remained under active consideration of the Foundation. Out of these, 44 projects were under process and 15 were approved at the total cost of Rs.32.202 million (**Annexure-II**). An amount of Rs.11.700/- million was released as first installments of newly approved projects.

##### **b. On-Going Projects**

During the report period, 84 research projects were remained on-going and 30 progress reports (semi annual, 1<sup>st</sup>, 2nd annual & final) were received. Semi annual reports were securitized by PSF staff, whereas, the annual and final reports after initial scrutiny were sent for evaluation to the subject experts for assessment of the interim progress of the projects. The due installments of on-going projects are released only if interim progress of the projects is satisfactory. An amount of Rs.6.139/- million released on account of due installments and evaluation fee of ongoing projects. The details of the semi-annual, annual and final reports is given at **Annexure-III**.

##### **c. Completed Projects:**

During the year, 32 research projects were completed. The subject experts evaluated final technical reports of these projects, which were subsequently placed before the respective PSF Technical Committee for consideration. After adoption of these reports by the Committees,

the accounts of these projects were settled and files closed. A list of completed projects followed by their scientific outcome is given below:

| Sr. No | Project No.                    | Project Title  |
|--------|--------------------------------|--|
| 1.     | PSF/Res/F-NIFA/Agr (310)       | Effect of Mineral and Organic Nitrogen on Yield and Nitrogen Nutrition of Deciduous Plum Fruit Orchard   |
| 2.     | PSF/Res/P-PMAS.AAU/Agr (374)   | Isolation and Identification of Plant Growth Promoting N <sub>2</sub> -Fixing Soil Bacteria using Molecular Techniques for Improving Legume-Cereal Cropping System           |
| 3.     | PSF/Res/P-UET/Agr (376)        | Assessment of Agricultural Drought Prone Areas of Pothwar and Agro-Ecological Zoning (AEZ) Using Remote Sensing Techniques   |
| 4.     | PSF/Res/P-AU/Agr (381)         | Entomopathogenic Fungi and Diatomaceous Earths for the Control of <i>Tribolium castaneum</i> (Herbst.) (Coleoptera: Tenebrionidae) on Stored Wheat                           |
| 5.     | PSF/Res/P-PMAS.AAU/Agr (395)   | Utilization of Plant Growth Promoting Rhizobacteria for the Induction of Systemic Resistance in Potato Seed Against Bacterial Rot Disease                                    |
| 6.     | PSF/Res/P-PMAS.AAU/Agr (396)   | Studies on Characterization and Management of Leaf Crinkle Virus Infecting Blackgram   |
| 7.     | PSF/Res/P-AU/Agr (405)         | Parasitoid Wasps as a Source of Novel Insecticidal Molecules   |
| 8.     | PSF/Res/P-AU/Bio (375)         | Prospects of Breeding and Culturing of <i>Channa marulius</i> by Using Different Techniques  |
| 9.     | PSF/Res/P-GCU/Bio (436)        | Enhanced Production of L-Lysine by Bacteria in Stirred Fermenter for Chick Feed Industry   |
| 10.    | PSF/Res/P-GCU/Bio (437)        | Cloning and Characterization of Alpha Amylase from <i>Thermotoga petrophilla</i> for Textile Industry  |
| 11.    | PSF/Res/P-PMAS.AAU /Bio (446)  | Biodiversity and Ecology of Bats and Rodents in the Forests and Croplands of the Potohar Plateau   |
| 12.    | PSF/Res/C-QU/Bio (455)         | Collection, Evaluation and Sustainable Utilization of Crucifer Biodiversity in Pakistan  |
| 13.    | PSF/Res/C-QU/Biotech (99)      | Cloning and Characterization of Plastic Degrading Microbial Isolates   |
| 14.    | PSF/Res/S-LUMHS/ Biotech (101) | Study of Genetic and Molecular Basis of Primary Congenital Glaucoma in Patients of Sindh   |
| 15.    | PSF/Res/S-HEJ/Chem (403)       | Design, Synthesis and Characterization of $\beta$ -octiphenyloctacix[4] Arane a Super molecular Multifunctional Pore having Practical Applications in Medicine and Mechanics |

|     |                           |   |
|-----|---------------------------|---|
| 16. | PSF/Res/C-QU/Chem (408)   | Molecularly Designed Precursors for the Chemical Vapour Deposition of Ceramic Materials   |
| 17. | PSF/Res/P-CIIT/Chem (416) | Synthesis and Characterization of Novel Composites Based on Carbon Nanotubes and Carbonated Hydroxyapatite                      |
| 18. | PSF/Res/S-HEJ/Chem (417)  | Studies on Hepatoprotective Effects of Bioactive Secondary Metabolites of Plants by using Antioxidant and Relevant Bioassays    |
| 19. | PSF/Res/C-QU/Chem (419)   | Computer Aided Identification and Synthesis of $\alpha$ -Glucosidase Inhibitors   |
| 20. | PSF/Res/S-HEJ/Chem (425)  | Synthesis of Novel Piperidine like Compounds for Anticancer Activity  |
| 21. | PSF/Res/F-UM/Chem (434)   | Efficiency of Iron Supported on Porous Material (Prepared from Peanut Shell) for Liquid Phase Aerobic Oxidation of Alcohols     |
| 22. | PSF/Res/S-SU/Chem (439)   | Gas Chromatographic Analysis of Amino Acids in Skin Samples of Psoriatic and Arsenicosis Patients                               |
| 23. | PSF/Res/S-MUET/Engg (121) | Design & Implementation of Intelligent Energy Efficient Industrial Process Control System Using Conveyor Belts via Robotic Arm  |
| 24. | PSF/Res/S-KU/Med (261)    | Computer-Aided Identification of Cholinesterase Inhibitors for the Treatment of Alzheimer's Disease and Related Dementias       |
| 25. | PSF/Res/S-KU/Med (282)    | New Approaches to Effective Pain Management: Clinical Potential of GABA Receptors Modulators in the Development of Chronic Pain |
| 26. | PSF/Res/S-AKU/Med (293)   | Association Between Neuregulin-1 Mutations and Schizophrenia in a Pakistani Population : A Case-Control Study                   |
| 27. | PSF/Res/S-KU/Med (278)    | Transcription Factor as Potential Molecular Target for Cancer Chemotherapy in Human Pancreatic & Hepatic Cancer Cell Line       |
| 28. | PSF/Res/S-AKU/Med (230)   | Evaluation of Tumor Behavior in Breast Cancer   |
| 29. | PSF/Res/C-CIIT/ Med (280) | Assessment of Genetic Risk Factors of Glaucoma  |
| 30. | PSF/Res/S-AKU/Med (336)   | Vitamin D Binding Protein (VDBP) Gene Polymorphism and <i>Diabetes mellitus</i> in a Pakistani Population                       |
| 31. | PSF/Res/P-UAAR/Med (259)  | Prevalence of Non-Alcoholic Liver Disease (NAFLD) in Local Population of Pakistani Origin                                       |
| 32. | PSF/Res/C-IBGE/Med (318)  | House Dust Mite Species and Allergen Levels in Pakistani Population: Molecular Characterization and a Phylogenetic Analysis     |

## **i) AGRICULTURAL SCIENCES**

|                         |  |
|-------------------------|--|
| <b>Project No:</b>      | <b>F-NIFA/Agr (310)</b>  |
| Project Title:          | Effect of Mineral and Organic Nitrogen on Yield and Nitrogen Nutrition of Deciduous Plum Fruit Orchard |
| Duration:               | 3-Years  |
| Date of Initiation:     | 01.07.2007   |
| Date of Completion:     | 30.06.2010   |
| Total Expenditure:      | 552,614/-  |
| Principal Investigator: | Syed Mahmood Shah  |
| Name of Institution:    | Nuclear Institute for Food and Agriculture (NIFA), Peshawar  |

### **SUMMARY:**

The integrated nitrogen management from organic and mineral fertilizers is the most desirable practice for enhancing the deciduous plum fruit orchard productivity and nitrogen use efficiency. Under this project, two field experiments (one at farmers' field and one at NIFA Research Station) were conducted during 2007-10 to study the integrated effect of organic and mineral N fertilizer on plum fruit orchards productivity, nutrients availability and soil fertility. The experimental orchards at both sites were in bearing for last 3-6 years. For each treatment two trees of uniform size and vigour were selected and each treatment was replicated three times. Before imposition of experimental treatments, composite soil and leaf samples were collected from both orchards and analyzed for various parameters. The analyses revealed that the soil of both sites were deficient in nitrogen, phosphorus, organic matter, marginal in zinc, adequate in potash, free from salinity and sodicity. The soil particles size analysis of NIFA and farmers field orchard showed textural class of clay loam and silt loam respectively. The leaf analyses of both orchards indicated that they were deficient in nitrogen, phosphorus and zinc. The potash concentration in leaf samples of farmer's field were in deficient range while K content of NIFA orchard was sufficient. After treatment application, leaf samples were collected in spring 2008 and after fruit picking in July every year from 2008 to 2010. The leaf analyses showed that nitrogen concentration in all seasons was enhanced in integrated N management treatment. Maximum N content in leaves were found in treatment received 75% nitrogen from mineral source (urea) and 25% farm yard manure (FYM) at both NIFA and farmers field (Lala Village) orchards. Likely, the N content of plum fruits samples collected during June 2008-10 at fruit picking time from both sites was also enhanced by integrated N-management. At NIFA orchard, maximum N value was recorded in treatment received nitrogen from 25% mineral (urea) + 50% FYM and 25% from

poultry manure (PM). However, at farmer field (Lala) orchard higher N-content was found in treatment-received nitrogen from 75% mineral source and 25% FYM. Higher N-content in fruit was found at NIFA orchards compared to farmer's field. The leaves analysis for other essential nutrients showed that concentration of phosphorus, potash and certain micronutrients (Zn, Cu, Fe) was also improved in integrated N management treatments compared to sole mineral N treatment. The surface soil (0 -15 cm) analyses of the experimental sites showed that organic matter and nitrogen content was higher in integrated N management treatments over control. The yield data showed that the combination of organic and inorganic fertilizer increased plum yield significantly ( $P < 0.05$ ). In over all maximum yield was obtained in two different treatments (T4: 50%N from mineral source (urea) + 25% from FYM + 25%).

|                                |  |
|--------------------------------|--|
| <b>Project No:</b>             | <b>P-PMAS.AAU/Agr (374)</b>  |
| <b>Project Title:</b>          | Isolation and Identification of Plant Growth Promoting N <sub>2</sub> -Fixing Soil Bacteria Using Molecular Techniques for Improving Legume-Cereal Cropping System |
| <b>Duration:</b>               | 3-Years  |
| <b>Date of Initiation:</b>     | 01.02.2010   |
| <b>Date of Completion:</b>     | 31.01.2013   |
| <b>Total Expenditure:</b>      | 1,872,745/-  |
| <b>Principal Investigator:</b> | Dr. Rifat Hayat  |
| <b>Name of Institution:</b>    | Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi  |

## **SUMMARY:**

The reported research project titled “Isolation and identification of plant growth promoting N<sub>2</sub>-fixing soil bacteria using molecular techniques for improving legumecereal cropping system” had been awarded by Pakistan Science Foundation during January, 2010 for the period of three years. The main activities were isolation, plant growth promoting (PGP) characterization, 16S rRNA gene sequence identification of soil and nodule bacteria and evaluation of potential plant growth promoting bacterial strain on the yield of legumes and wheat crops in rotation system. Extensive survey had carried out to collect rhizospheric soils of cereals (wheat and rice) and nodules of legumes crops (mung bean, mash bean, chick pea, lentil, soybean and groundnut) from farmer’s fields of rainfed districts like Attock, Chakwal, Rawalpindi and irrigated areas of Okara. Northern hilly areas of the country were also surveyed for collection of rhizospheric soils to get the diversity of plant growth promoting rhizobacteria (PGPR). District Lahore; Samrial, Kalashah kakoo, Sheikhpura; Muredkey and Sialkot were also surveyed for collection of rice rhizospheric

soil during this period. Soybean nodules and rhizospheric soil had also been collected from Swat, Azad Jammu & Kashmir. The bacteria were isolated from rhizospheric soil of cereals by using dilution plate technique where Phosphate Buffer Saline (PBS, 1X) was used as saline solution.

The bacteria were grown on different selective and non-selective nutrient media i.e. Tryptic Soy Agar (TSA), Burk's N-free media, Pikovskaya (PKV) agar and Nutiyal Agar in sterilized petri plates and placed in incubator at 28°C for at least 48 hours. For isolation of bacteria from legumes nodules, healthy, pink and undamaged nodules were detached from roots and surface sterilized by immersing them in 95% ethanol and 3% hydrogen peroxide followed by washing using sterilized distilled water. Nodules were crushed with blunt tipped sterilized forceps and dipped in sterile water and then one loop full of the nodule suspension was streaked on yeast mannitol (YMA) agar plates supplemented with Congo red as an indicator and placed in incubator at 28°C for at least 48 hours. After bacterial growth individual colonies were picked and streaked on plates containing specific media for purification under sterilized conditions in laminar air flow cabinet. Single colonies were repeatedly re-streaked on medium till the purified cultures were obtained and stored in glycerol (35%, w/v) stock at -80°C for further characterization. More than 300 bacterial strains were isolated and purified from collected soil and nodules samples and characterized for their plant growth promoting (PGP) activities i.e.

P-solubilization, production of auxin indole acetic acid (IAA) with and without tryptophan. Some strains were also amplified for *nifH* gene (that code for the nitrogenase reductase enzyme involved in nitrogen fixation) through PCR using reverse and forward *nifH* gene primers PolF<sub>b</sub> (TGCGAYCCSAARGCBGACTC) and PolR<sub>b</sub> (ATSGCCATCATYTCCRCCGGA). Biochemical characterizations, Gram staining, oxidase and catalase of selected plant growth promoting rhizobacteria were also done. All bacterial strains solubilized substantial quantity of inorganic phosphate. The range of P-solubilization was between 40-954 µg mL<sup>-1</sup> along with sharp decrease of broth pH. Phosphorus solubilization in broth culture was associated with significant drop in pH by the different strain from 7.0 to 3.8. Strong negative correlation between phosphate solubilization and broth pH was observed, which indicated the acidic condition required for phosphate solubilization. The ability to produce IAA in the presence and absence of L-tryptophan (0 and 500 µg mL<sup>-1</sup>) was determined. Some strains also carried *nifH* gene (+) showing their capacity of N<sub>2</sub>-fixation. PGPRs positive for siderophore production test exhibited a clear orange zone on the CAS agar medium containing plates. Besides isolation and characterization of bacterial strains, we identified the bacterial strains using the gold standard technique of 16S rRAN gene sequencing. DNA template was prepared by picking individual colony of each strain and amplification of 16S rRNA gene were carried out by PCR. PCR amplification of DNA was

done using universal primers: 9F (5'-GAGTTTGATCCTGGCTCAG-3') and 1510R (5'-GGCTACCTTGTTACGA-3').

The purified PCR product samples sent to MACROGEN, Korea (<http://dna.macrogen.com/eng>) for sequencing using universal 16S rRNA gene sequencing primers. The sequence results were blast through NCBI/Eztaxon servers and sequence of all the related species were retrieved to get the exact nomenclature of the isolates. Phylogenetic analyses were performed using bioinformatics software like MEGA-5, CLUSTAL X and BioEdit etc. Isolated strains identified belongs to different genera including *Lysinibacillus*, *Pseudomonas*, *Sphingobacterium*, *Enterobacter*, *Bacillus*, *Alcaligenes*, *Bravibacterium*, *Kosakonia*, *Cellulosimicrobium*, *Achromobacter*, *Enterococcus*, *Leclercia*, *Acinetobacter*, *Arthrobacter*, *Bacillus*, *Burkholderia*, *Kosakonia*, *Pseudomonas*, *Psychrobacter*, *Microbacterium*, *Serratia*, *Rhizobium*, *Staphylococcus*, *Chrysobacterium* and *Staphylococcus*. During this study, AM-91 identified as *Rhizobium pusense* was isolated, identified and characterized from chickpea nodule and available for the preparation of chickpea inocula on large commercial scale purely on scientific basis. DNA accession numbers of identified strains were obtained from DNA Data Bank of Japan (DDBJ). A Gram-negative novel anaerobic diazotrophic bacterium, designated NCCP-231 $\tau$  was isolated from chickpea. The 16S rRNA gene sequence similarities of NCCP-231 $\tau$  with other closely related species are around 97.852 % to *kosakonia oryzae* and 97.535% to *kosakonia arichidis*. Polyphasic taxonomic experiments were performed to validate the isolated strain in Korea Research Institute of Bioscience & Biotechnology, Republic of Korea. The colonies were round/ slightly irregular having sticky surface and opaque and elevation was convex. Diameter of colony was 0.2-4 mm and the color of colony was off white initially and turns to light yellow in older colonies. Growth occurs at pH 6-8 with optimum growth at pH 7.5 and temperature is 16-45°C with optimum growth at 28°C and. The type strain NCCP-231 grew up to 6% NaCl concentrations (w/v) on TSA (pH 7.0) at 28°C and Produced 15.40  $\mu$ g mL<sup>-1</sup> IAA and solubilized P upto 163.95  $\mu$ g mL<sup>-1</sup>.

On the basis of the phylogenetic, physiological and phenotypic analyses, NCCP-231 $\tau$  is considered to represent a novel species of the genus *Kosakonia*, for which the name *Pakistanensis kosakonia* sp. nov. is proposed. The DDBJ/EMBL/GenBank accession number of the 16S rRNA gene sequence of strain NCCP-231 is AB610883. Growth chamber, glass house and field experiments were also conducted to see the response of potential PGPR on legumes and wheat growth. PGPRs increased the biomass and grain yield of mung bean, mash bean and soybean

under all conditions as compared to un-inoculated control and in comparisons and combination with chemical fertilization. A pot experiment was also carried out on chickpea (cv. DASHT) under controlled conditions at PMAS-AAUR to investigate the beneficial effect of rhizobacterial strains on chickpea growth and N<sub>2</sub> fixation under controlled conditions. Each pot was filled with 8 kg sterile soil and 4 seeds were sown in each pot. The soil used in pot experiments was collected from the experimental field of PMAS Arid Agriculture University Rawalpindi (33° 38' 48" N, 73° 04' 59" E). Soil is sandy clay loam and belongs to Rawalpindi soil series (weak medium and coarse sun angular blocky with nearly continuous thin cutans, Typic Ustocrepts) (Eutric Cambisols, FAO; GOP, 1974). The Ph of the soil was 7.27 with 5.3 mg kg<sup>-1</sup> NO<sub>3</sub>-N and 6.1 mg kg<sup>-1</sup> of P. The inocula of each strain were prepared and experiment was replicated three times in a Complete Randomized Design (CRD). Six most promising potential PGPR strains were selected on the basis of their PGP traits during previous study and evaluated to see their beneficial effects on chick pea growth and N<sub>2</sub> fixation under controlled conditions. The strains used for chick pea inoculation includes AM-95 (*Bacillus safensis*), AM-76 (*Enterobacter cloacae*), AM-85 (*Pseudomonas beteli*), AM-91 (*Rhizobium pusense*), AM-57 (*Sphingobacterium canadense*) and AM-96 (*Pseudomonas plecoglossicida*) along with sterile soil as control. The growth parameters studied were biomass and N<sub>2</sub>-fixation of chickpea. The N<sub>2</sub>-fixation of chick pea was quantified using delta <sup>15</sup>N natural abundance technique. A finely ground sample of both chick pea and reference non legume (wheat) was sent to Stable Isotope Unit, University of Waikato, Hamilton, New Zealand for analysis of <sup>15</sup>N using an isotope ratio mass spectrometer. The <sup>15</sup>N content of the legume (chickpea) and reference plant (wheat) was determined in finally ground sample by dry Dumas combustion, followed by isotope ratio mass spectrometry. All the tested isolates exhibited notable increase in dry weight and N<sub>2</sub>-fixation of chickpea as compared to control. From this study, we further selected three most promising PGP strains for evaluation under field conditions on mung bean, mash bean and chickpea at two different locations i.e. AAUR research farm and at farmer's field Attock. Field experiments were also carried out on mash bean, mungbean and chickpea at research farm of Arid Agriculture University Rawalpindi (AAUR) and the farmer's fields at Attock to investigate the beneficial effect of *Rhizobium* and PGPRs on growth, nodulation and N<sub>2</sub>-fixation of legumes. The crops seeds were inoculated with the efficient strains. The net plot size was 5 x 2 m. The experiments were designed in randomized complete block design (RCBD) and replicated three times with the five treatments i.e. T1- Control; T2- NP @ 30-80 kg/ha<sup>-1</sup>; T3- AM-57 (*Sphingobacterium canadense*); T4- AM-96 (*Pseudomonas plecoglossicida*); T5- AM-91 (*Rhizobium pusense*). These three bacterial strains were found potential PGPR during previous characterization studies by solubilizing > 200 µg ml<sup>-1</sup> phosphorus, producing > 30 µg ml<sup>-1</sup> IAA and positive for nifH gene and NH<sub>3</sub>. Crop parameters

studied includes nodulation, biomass, grains and N<sub>2</sub>-fixation of each three crops and from two locations. N<sub>2</sub>-fixation of each legume crop was assessed both by xylem ureide analysis and  $\delta^{15}\text{N}$  natural abundance technique. These bacterial strains improved growth and N<sub>2</sub>-fixation under field conditions as compared to un-inoculated control and were found potential PGPR for further development of bio-inoculant. The gene sequences of these strains were also deposited to International gene bank repository for accession numbers. *Rhizobium pusense* was found as a unique symbiotic of chickpea and will be available as chickpea inoculants on commercial scale. On the basis of PGP traits, *Acinetobacter junii*, *Enterobacter cloacae* subsp. *Dissolvens*, *Serratia marcescens* subsp. *Sakuensis*, *Psychrobacter maritimus*, *Enterobacter kobei*, *Bacillus thuringiensis*, *Bacillus aryabhattai*, *Kosakonia arachidis*, *Bacillus cereus* and *Kosakonia oryzae* were selected to test for soybean growth and N<sub>2</sub>-fixation. Similarly, we selected *Psychrobacter maritimus*, *Staphylococcus equorum* subsp. *linens*, *Bacillus anthracis*, *Pseudomonas libanensis*, *Bacillus safensis*, *Bacillus aryabhattai*, *Serratia proteamaculans*, *Acinetobacter calcoaceticus*, *Pseudomonas koreensis* for wheat growth and yield under growth chamber experiment. Data regarding root and shoot growth was recorded and result revealed that all selected PGPR strains significantly increase root length, shoot length, dry root weight, and dry shoot weight over control (un-inoculated). On the base of crop seedling data best three growth promoting PGPRs for each crop were selected from growth chamber experiment i.e. *Psychrobacter maritimus*, *Serratia proteamaculans* and *Bacillus anthracis* was selected from wheat and *Bacillus aryabhattai*, *Enterobacter cloacae* subsp. *Dissolvens* and *Serratia sakuensis marcescens* subsp from soybean for further evaluation their impact under pot and field conditions. A pot experiment was also carried out under greenhouse controlled conditions at PMASAAUR for wheat for soybean to investigate the beneficial effect of PGPRs on wheat and soybean growth. Each pot was filled with 8 kg sterile soil and 4 seeds were sown in each pot. The soil used in pot experiments was collected from the experimental field of PMAS Arid Agriculture University Rawalpindi. Soil is sandy clay loam and belongs to Rawalpindi soil series (weak medium and coarse sun angular blocky with nearly continuous thin cutans, Typic Ustocrepts) (Eutric Cambisols, FAO; GOP, 1974) with 7.27 pH. Three strains *Psychrobacter maritimus*, *Serratia proteamaculans* and *Bacillus anthracis* for wheat and *Bacillus aryabhattai*, *Enterobacter kobei* and *Serratia marcescens* subsp. *Sakuensis* for soybean were selected for further evaluating their effect with different rates of fertilizers along with sterile soil as control. The inocula of each strain was prepared.

Experiments were designed in Complete Randomized Design (CRD) and replicated three times with the six treatment i.e. T1: Control, T2: NP @ 25-20 mg kg<sup>-1</sup>, T3: NP @ 50-40 mg kg<sup>-1</sup>, T4:

*Psychrobacter* sp. + *serratia* sp. + *Bacillus* sp., T5: *Psychrobacter* sp. + *serratiasp.* + *Bacillus* sp. + NP @ 25-20 mg kg<sup>-1</sup>, T6: *Psychrobacter* sp. + *serratia* sp. + *Bacillus* sp. + NP @ 25-20 mg kg<sup>-1</sup> for wheat and T1: Control, T2: NP @ 5-15 mg kg<sup>-1</sup>, T3: NP @ 10-30 mg kg<sup>-1</sup>, T4: *Bcillus* sp + *Enterobacter* sp+ *Serratia* sp, T5: *Bcillus* sp. + *Enterobacter* sp. + *Serratia* sp. + NP @ 5-15 mg kg<sup>-1</sup>, T6: *Bcillus* sp + *Enterobacter* sp+ *Serratia* sp + NP @ 10-30 mg kg<sup>-1</sup> for soybean. The growth parameters studied were shoot length, shoot dry weight, root length and root dry weight of soybean and wheat. Field experiments were also carried out on wheat and soybean at research farm of Arid Agriculture University Rawalpindi (AAUR). The crops seeds were inoculated with the efficient selected strains. The net plot size was 4 x 4 m. The experiments were designed in randomized complete block design (RCBD) and replicated three times. Crop parameters studied include biomass yield (t ha<sup>-1</sup>), grain yield (t ha<sup>-1</sup>), nitrogen content in straw (%) was recorded. N<sub>2</sub> fixation of soybean crop was assessed by  $\delta^{15}\text{N}$  natural abundance technique. A finely ground sample of both soybean and reference non legume (wheat) was sent to Stable Isotope Unit, University of Waikato, Hamilton, New Zealand for analysis of <sup>15</sup>N using an isotope ratio mass spectrometer. Data regarding pot and field experiment revealed that all selected PGPRs significantly increased root and shoot growth, biomass and grain yield of both crops over control along chemicals fertilizers. These results support our hypothesis that use of PGPRs or combinations of PGPRs and chemical fertilizer can enhance the nutrient use efficiency of fertilizers and crop production. We concluded that bacterial strains when inoculated to soil significantly enhanced crop growth and N<sub>2</sub> fixation in legumes and wheat as compared to uninoculated control. This increase in crop growth indicated the plant growth promoting (PGP) and plant health promoting (PHP) traits of selected strains. The selected PGPRs showed much more consistency in promoting growth and yield of inoculated crop plant even in natural environmental condition. Therefore, PGPRs with good PGP activities are good candidates for preparation of effective biofertilizer.

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| <b>Project No:</b>      | <b>PSF/Res/P-UET/Agr (376)</b>   |
| Project Title:          | Assessment of Agricultural Drought Prone Areas of Pothwar and Agro-Ecological Zoning (AEZ) Using Remote Sensing Techniques |
| Duration:               | 3-Years  |
| Date of Initiation:     | 10.12.2010   |
| Date of Completion:     | 09.06.2014 (Extended)  |
| Total Expenditure:      | 708,011/-  |
| Principal Investigator: | Dr. Ghulam Nabi  |
| Name of Institution:    | University of Engineering and Technology (UET), Lahore   |

## **SUMMARY:**

Pakistan's population is increasing rapidly and at the same time, essential natural resources, such as land and water, are declining both in quantity and quality. The productive capacity of land resources depends upon climate, soil and land form conditions. Pothwar Area extends over 2.23 million hectares (mha) in the north and central part of Punjab. It is part of Barani tract of the Province whose elevation ranges from 457 to 610m above mean sea level (msl). The Pothwar plateau comprises the districts of Rawalpindi, Attock, Jhelum and Chakwal, and it forms about 40% of the Punjab Barani (rainfed) areas.

The soils of the Barani area are virgin, fertile and are capable of producing high intensity crops. Lesser efforts can bring better results as compared to irrigated areas of the Indus Plains which have already attained a high level of intensity and yields. The Pothwar area lies in semi-arid to sub-humid zone with hot summers and cold winters. About 60% of annual rainfall occurs during the monsoon season and about 40% in the remaining period. All the area is entirely dependent upon low and sporadic rainfall.

The main Rabi (October to March) crops in the area are wheat, gram, lentil and mustered and Kharif (April to September) - groundnuts, pulses, jowar and bajra. The crop yields are generally less than half of those achieved with controlled irrigation. The annual rainfall pattern is not in accordance with the calendar of crop water requirements. The rainfall is erratic and often late and most of it falls in three months of Monsoon i.e. July to September. The uncertainty of rainfall especially, its inadequacy at the time of crops sowing reduces the whole agricultural system production to vulnerable to the vicissitudes of weather. The everlasting uncertainty of rains at the critical period during the maturity of a crop is restriction for the farmers to invest in traditional cropping pattern or to switch over to more profitable cropping system. Generally, the agricultural area under Kharif season cultivation is less with poor yield as compared to Rabi season. If rainfall is low or delayed, the farmers hardly receive the cost of their farm inputs. This situation warrants the proper preservation of available rainfall and their utilization for expansion of agriculture, aiming at socio-economic uplift of the area.

According to FAO (1996) "Agro-ecological Zoning (AEZ) refers to the division of land into smaller units, which have similar characteristics related to land suitability, potential production and environmental impact. Furthermore an Agro-ecological Zone is a land

resource mapping unit, defined in terms of climate, landform and soils, and/land cover, and having a specific range of potentials and constraints for land use”. Based on the meteorological and topographical data, the larger areas are grouped into smaller units having similar hydrological, topographic, climatic and land use characteristics called agriculture ecological zoning (AEZ). Modern tools such as remote sensing and GIS have provided new dimensions to effectively monitor and manage natural resources. It has been well conceived that these techniques has a great role in Agro Ecological Zoning (AEZ) for sustainable development due to multi-stage character of the comprehensive approach. In this context AEZ can be regarded as a set of applications, leading to an assessment of land suitability and potential productivity in terms of climate, soil and land forms condition. It is applicable in micro or local level planning mainly for rainfed agriculture. A sustainable agricultural development, planning, management is increasingly being based on agro-ecological zones. In this report land use maps, temperature maps have developed using remote sensing. Based on the research results the study area is divided into different zones and suggestions are reported to readjust the sowing time of different crops according to rainfall availability. It has concluded that sowing time of wheat crop may be shifted to December instead of November. The Rabi and Kharif crops are suggested for district Rawalpindi and Chakwal based on rainfall and crop water requirement of different crops.

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| <b>Project No:</b>      | <b>PSF/Res/P-AU/Agr (381)</b>   |
| Project Title:          | Entomopathogenic Fungi and Diatomaceous Earths for the Control of <i>Tribolium castaneum</i> (Herbst.)(Coleoptera: Tenebrionidae) on Stored Wheat |
| Duration:               | 3 Years   |
| Date of Initiation:     | 01.10.2010  |
| Date of Completion:     | 31.03.2014  |
| Total Expenditure:      | 1,399,796/-   |
| Principal Investigator: | Dr. Waqas Wakil   |
| Name of Institution:    | University of Agriculture, Faisalabad   |

## **SUMMARY:**

To accomplish the objectives of this research project, a series of bioassays were carried out during three years. The detailed survey of number of locations was conducted to explore the occurrence and diversity of entomopathogenic fungi both from the soil and stored grain insects. Among 220 soil samples 168 fungal isolates were recovered and identified with 98 from forests, 32 from vegetables, 30 from field crops and 8 from fruits orchids. The major entomopathogenic fungi recovered from these samples were *B.bassiana* , *M. anisopliae* , *P.*

*lilacinum* and *L.attenuatum*.on the other hand .195 isolates of different fungi were isolated from the cadavers of various insect species. the cadavers of *T. castaneum*(0.26%)were greatly infected with the fungi followed by *S.oryzae*(0.16%), *R. dominica* (0.10%), *C. ferrugneus* and *C. maculates* (0.08%), however, the least erefiund in *T. granarium*(0.07%). *B. bassiana* , *M. anisopliae* , *P. lilacinum* and *L.attenuatum* were the major entomopathogenic fungi isolated from the cadavers.

The geographical attributes greatly influence the occurrence of entomopathogenic fungi with highest numbers of isolates found from <600 ans<400 altitude, 33° -34' N latitude ,and 73° - 74' E longitude both from soil and insect cadavers. These entomopathogenic fungi were screened in two steps bioassays to find out most effective isolates against the adults of *Tribolium castaneum* Herbst (Coleoptere: Tenebrionidae). The pathogenicity of 38 autochthonous isolates viz. 15 isolates of *Beauveria brassiana s.l.*(ascomycota Hypocreales), two isolates of *B. brongniartii* (Saccardo) petch ,three isolates of *Lecanicillium attenuatm*, nine isolates of *Metarhizium anosopliae s.l.*(ascomycota Hypocreales),seven isolates of *Paecilomyces lilacianus* and two isolates of *Pochonia chlamydosporia* wre isolated against adults of *T. castaneum* at single dose rate  $10^9$ conidia/ml.The isolates of *B. bassiana* (WG-13,WG-16,WG-20,WG-22,WG-23 and WG-25), *M.anisopliae* (WG-25,WG-09,WG-20 and WG-23) and , *P. lilacianus* (WG-35 )exhibited >70% mortality, were considered for the further virulence studies. In a second series of bioassays four isolates (WG-25, WG-09, WG-20 and WG-23) caused highest percentage of adult mortality even after 14days at  $10^8$ conidia mg / Kg. The lethal concentration ( $LC_{50}$ ) of these four isolates were ranged from  $6.65 \times 10^3$  to  $8.10 \times 10^4$  conidia mg/ Kg with calculated time to kill 50% of test insect ranging from 4.85 to 20.28 days. Searching for promising alternative the performance of 19 DE formulations obtained from different geographical regions of the world were screened at dose rates of 200 ppm for first two and 100 ppm for third group of Des with one exposure interval. Four DE formulations (InertPMS, DiaHerb, DEBBM and DAE) caused a high percentage of adult mortality with  $LD_{50}$  less than 1.09 ppm at their highest dose rates, thus requiring lower DE concentration s to cause an approximately 100% adult mortality. The insecticidal effect of one enhanced and two commercially available diatomaceous earth (DE) formulations was checked on wheat treated grains against larvae and adults of *T.castaneum*. Three Des tested were DEA, SilicoSec and protect-It applied alone or in all possible combinations .The experiments were carried out at  $30 \pm 2^\circ\text{C}$  and  $65 \pm 5^\circ\text{C}$  r.h. while the data on progeny

emergence was observed after 60 and 90 days. Mortality of exposed adults increased with an increase in dose rate, type of Des and exposure period. DAE was most effective among all the tested DES, suppressing the progeny production regarding application methods and treated surface, dusting and jute bags were proved best inflicting greater mortality of the tested insect species. To evaluate the integrated impact of entomopathogenic fungi alone and in combination with enhanced DE bioassays were conducted.

The results revealed that the combination of DE with two entomopathogenic fungi increased the mortality rates of *T.castaneum* compared with treatments alone. *B.bassiana* and *M.anisopliae* + DAE dose combinations resulted in higher mortality of *T.castaneum* compared with other treatments at all exposure periods. Dusting proved most effective method compared to spray while jute bags and concrete were most effective surfaces. The persistence bioassays showed that the combined applications of high dose rate of *B.bassiana* with DAE exhibited greatest mortality during all the five bioassays until 120 days of grains storage. Over all, the present study clearly indicates that DE formulations and entomopathogenic fungi can be effectively used for long term protection of stored grains against *T.castaneum* and other insect pests. further research is required for the (a) field evaluation and their toxic effects on the stored grains (b) which component exhibit synergistic properties and (c) physiological basis of such type of phenomenon etc. in this way plenty of data will be generated to guide the farmers and managers to incorporate DEs and fungi for successful IPM programs of stored grains/commodities insect pests and for the development of safe commercial formulation so to lessen the reliance on residual insecticides.

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| <b>Project No:</b>      | <b>P-PMAS.AAU/Agr (395)</b>   |
| Project Title:          | Utilization of Plant Growth Promoting Rhizobacteria for the Induction of Systemic Resistance in Potato Seed Against Bacterial Rot Disease |
| Duration:               | 3 Years   |
| Date of Initiation:     | 01.10.2011  |
| Date of Completion:     | 30.09.2014  |
| Total Expenditure:      | 978,667/-   |
| Principal Investigator: | Dr. M. Inam-ul-Haq  |
| Name of Institution:    | Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi   |

#### **SUMMARY:**

Potato is ranked fourth among food crops after rice, wheat and maize. It is first among vegetables and is regarded as source of food and energy for millions of people around the

world. Unfortunately, potato is invaded by several bacteria, fungi and viruses that cause substantial losses in yield. Bacterial diseases are also major concern for the potato production along with fungal diseases. Bacterial wilt of potato caused by *Ralstonia solanacearum* and soft rot caused by *Erwinia carotovora* are posing serious threat in the field (pre-harvest) and as well as post-harvest. Bacterial wilt is also known as brown rot and causes \$ 950 million losses every year around the world. *R. solanacearum* is a complex pathogen found in every continent infecting more than 53 botanical families including potato, tomato, chillies, eggplant etc. Bacterial soft rot (*Erwinia carotovora*) is known to be major threat during storage. Eighty (80%) percent of Pakistan's potato is produced in Punjab. Due to changing weather conditions, which are becoming suitable for bacterial wilt, it is suspected that the incidence will be relatively higher as compared to previous recordings. There is no variety completely resistant to this disease, however, moderately resistant varieties are known but they are not suitable for every region. Among the variety of control measures, biocontrol offers the effective and environment friendly measure that could provide very promising results for the management of bacterial wilt of potato. Rhizobacteria as biocontrol agents not only suppress the pathogenic microorganisms but they also have the ability to prime the plant defense through activating plant defense mechanism thus helping plants to fight pathogens in a two-way defense. Current project was initiated to assess the incidence of bacterial wilt and rot diseases in Punjab and also explore the rhizobacteria having biocontrol ability. These rhizobacteria treated potato tubers having the ability to tolerate bacterial diseases will be then grown in farmers' field to limit the bacterial disease.

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| <b>Project No:</b>             | <b>P-PMAS.AAU/Agr (396)</b>   |
| <b>Project Title:</b>          | <b>Studies on Characterization and Management of Leaf Crinkle Virus Infecting Blackgram</b> |
| <b>Duration:</b>               | <b>3-Years</b>  |
| <b>Date of Initiation:</b>     | <b>01.11.2011</b>   |
| <b>Date of Completion:</b>     | <b>31.10.2014</b>   |
| <b>Total Expenditure:</b>      | <b>1,686,110/-</b>  |
| <b>Principal Investigator:</b> | <b>Dr. Muhammad Ashfaq</b>  |
| <b>Name of Institution:</b>    | <b>Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi</b>                            |

## **SUMMARY:**

Mash or Urdbean also called blackgram (*Vigna mungo* (L) Hepper) is an important pulse crop of Pakistan that is grown in both spring and summer seasons in rainfed and irrigated areas. The low yield of the crop is due to one of the biotic factors, the leaf crinkle disease, incited

by Urdbean leaf crinkle virus (ULCV), which is an important and serious disease of blackgram in Pakistan causing colossal losses in production to decrease grain yield from 35-81%, often leading to total failure of crop if infected early. Several surveys of blackgram growing areas were conducted to assess viral disease incidence, distribution of leaf crinkle disease incidence. A total of 65 mashbean and mungbean fields were visited from Sialkot, Narowal, Zafarwal, Shakargarh, Faisalabad, Bahawalpur, Bahawalnagar, Rahim Yar Khan, Bhakar Mianwali, Khushab and Layyah. From each area several fields from different locations were visited and the disease incidence was computed based on symptomology like leaf crinkling, puckering; vein thickening, upward and downward curling of leaves, stunted growth of plant and the dark green infected leaves. The ULCV disease was found everywhere in mash growing areas with varying disease incidence percentage. Highest disease incidence was calculated from Chakwal and Gujar khan areas (10-70) followed by Sialkot (10-50 %) and Mianwali (10-40) districts. A set of 5 mash bean varieties was mechanically inoculated with ULCV infected mash bean leaves sap. All the varieties were found to be susceptible. The ULCV was purified and antiserum was produced by injecting the purified virus into New Zealand rabbits 3 times at 15 days interval. The antiserum of ULCV was tested against antigens of ULCV by gel diffusion test. Different reaction rings were observed in Petri plates. The color indication was an approval sign towards the production of ULCV antiserum. Purified virus was used to characterize molecularly by isolating RNA, by using random hexamer primer for c DNA synthesis and by using degenerate primers of viruses having similar symmetry but couldn't find any positive result.

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| <b>Project No:</b>      | <b>PSF/Res/P-AU/Agr (405)</b>                                |
| Project Title:          | Parasitoid Wasps as a Source of Novel Insecticidal Molecules |
| Duration:               | 3 Years  |
| Date of Initiation:     | 15.10.2011   |
| Date of Completion:     | 14.04.2015 (extension 6-months)                              |
| Total Expenditure:      | 1,693,739/-  |
| Principal Investigator: | Dr. Zain-ul-Abdin  |
| Name of Institution:    | University of Agriculture, Faisalabad                        |

## **SUMMARY:**

Host-parasitoid associations in insects offer an impressive opportunity to identify new genes and molecules responsible for the major host alterations, which may be used to develop new insect pest control strategies. A number of antagonistic associations in insects are poorly known and under-exploited sources of novel natural compounds which can disrupt growth, development, reproduction and immune system of insect pests. Key-factors responsible for

these host pathological alterations are present in the female secretions of the parasitoid injected at oviposition, which include the venom, the ovarian fluid, and, in certain ichneumonoid wasps, also a symbiotic virus of the family Polydnviridae. As per approved PC-1 of the project, research activities of 3rd year were focused on the “Isolation of genes encoding bioactive venom components and their cloning and expression in *E. coli*.”. The Biological activity of venom was determined by Trypsin digestion, suggesting that active components of venom are proteins. As preliminary studies investigated that venom of the wasps (parasitoids) had insecticidal activities due to bioactive proteins/peptides. The venom of the wasps was further investigated for isolation of the toxic/virulent/insecticidal proteins/peptides by ammonium sulphate precipitation, gel filtration and ion-exchange chromatography. We isolated proteins/peptides from the venom of wasp *B. hebetor* with molecular masses ranging from 17 to 37 kDa respectively as determined by SDS-PAGE.

The functional analysis of the venom and its constituents has already been performed by micro injections of crude and treated venom but during report period it was specifically performed by HPLC fraction experiments. Bioactive genes were isolated from the venom blend of the wasp species *Bracon hebetor* (Say) (Hymenoptera, Braconidae) by RT-PCR. One of the venom gene “Gamma glutamyl Transpeptidases” with high BLAST homology was selected for detailed studies and isolated through PCR. Amplified products were analyzed on 1% Agarose gel electrophoresis, cloned in *E.coli* and screening of blue & white colonies of *E.coli* were performed by cloning of the isolate genes and their expression in heterologous hosts, sequenced and multialigned with the other sequences in data base. Further studies will lead to characterization of such insecticidal proteins/peptides in cell lines. Overall, the grant was found highly useful as many students completed their research work using this grant. The work has been presented in conferences/symposia and appreciated by the scientists and researchers in this area. Publications will possibly be arising out of this work in near future, thus contributing knowledge to the scientific community in capacity building and professionals involved in insect control programmes will definitely equip themselves with the knowledge of “Insect genetics”.

## ii) **BIOLOGICAL SCIENCES:**

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| <b>Project No:</b>    | <b>PSF/Res/P-AU/Bio (375)</b>  |
| <b>Project Title:</b> | <b>Prospects of Breeding and Culturing of <i>Channa marulius</i> by Using Different Techniques</b> |

Duration: 03-Years  
Date of Initiation: 01.02.2008  
Date of Completion: 31.01.2011  
Total Expenditure: Rs. 532,736/-  
Principal Investigator: Dr. Iftikhar Ahmed Jafri  
Name of Institution: University of Agriculture, Faisalabad

## SUMMARY:

For breeding purpose, fish brooders of *C. marulius* were prepared by producing natural food and balanced supplementary feed was given in earthen pond at Fisheries Research Farms, University of Agriculture, Faisalabad. The mature brooders were stocked in different ponds for breeding purpose. The maturing and fertilization of fish pond was done along with supplementary feeding. Tilapia was also introduced in one breeding pond as forage fish for *C. marulius*. During the 1<sup>st</sup> year, in breeding season, the ponds were visited daily to check the breeding of *C. marulius*. The breeding did not take place perhaps due to immaturity of fish brooders of due to introduction of tilapia in breeding ponds which disturb the breeding of *C. marulius*. In the 2<sup>nd</sup> year, the experiments of breeding were again conducted but breeding did not take place. In the 3<sup>rd</sup> year, aquatic vegetation was placed in breeding ponds as breeding place for fish brooders and in this year, some fish seed was available in the breeding ponds. For induce spawning, the fish brooder were cracked every year by pressing the bally of different brooders but the brooder were not ripe and ready for artificial breeding. To find out the best culturing techniques of *C. marulius*, different culturing experiments were conducted by stocking fish seed under different trials. These are 1) stocking in cemented tanks; 2) stocking in production ponds; 3) stocking in happas; 4) stocking in earthen ponds; 5) stocking of *C. marulius* with tilapia as forage fish and feeding trials in glass aquaria. These all trials were conducted at fisheries Research Farms, University of Agriculture, Faisalabad.

Following conclusions were drawn from the research conducted under the present project.

1. The survival and growth was only observed in the earthen ponds under different treatments and no survival of fish seed *C. marulius* was observed in cemented tanks, happas, glass aquaria and production ponds.
2. In earthen ponds, maximum survival of fish seed and maximum fish production of *C. marulius* was observed in that pond which was treated with cowdung, nitrophos and supplemented feed (animal origin) alongwith 30 tilapia as forage fish
3. In happas, 100% mortality was observed after 10 days
4. In the fish seed of *C. marulius*, cannibalism is observed up to 2-6 g

5. The fish seed of *C. marulius* was reared in nursery ponds for 3 months, before stocking in production pond.

**Project No:** PSF/Res/P-GCU/Bio (436)  
**Project Title:** Enhanced Production of L-Lysine by Bacteria in Stirred Fermenter for Chick Feed Industry  
**Duration:** 02-Years  
**Date of Initiation:** 01.07.2011  
**Date of Completion:** 31.03.2014 (extended)  
**Total Expenditure:** Rs.395,283/-  
**Principal Investigator:** Dr. Mohsin Javed  
**Name of Institution:** Govt. College University  
Lahore

### SUMMARY:

A total of 70 bacteria were isolated from different soil and damped grains (wheat and rice) samples, out of which nine bacteria were found to produce L-lysine. Out of these nine isolates, IIB-8 gave the highest yield (1.90 g/L) of L-lysine on FM-11 medium. All nine isolates were preliminary characterized morphologically and biochemically. But IIB- 08 was further used for final identification and optimization studies. On the basis of morphological, biochemical and growth characteristics, the isolate IIB-8 was identified as *Corynebacterium glutamicum*, which was confirmed by 16S rRNA gene sequence technique. *C. glutamicum* IIB-8 gave 4.59 g/L L-lysine production at pH 8.0 after 72hrs of inoculation at 30oC. Minimal concentration (0.2 mg/ml) of S-(2-aminoethyl)-Lcysteine (AEC) was estimated as growth inhibitor of this wild culture after mutation. This strain was further exposed to physical mutagens (UV & gamma irradiations) and chemical mutagens (Ethidium bromide, ethyl methyl sulphate and nitrous acid) for different time intervals in order to obtain more than 90% kill curve. Survivors after 90% kill were streaked on media plates supplemented with 2.0 mg/ml of AEC and the mutant frequency was also calculated. Fourteen different AEC resistant mutants were developed and screened for L-lysine production *C. glutamicum* IIB8UV3 gave 34% increased yield of L-Lysine as compared to wild strain. Optimization of process parameters in fermentor showed that maximum lysine (8.2 g/L) was produced at 250 rpm agitation, 1.5 vvm air, 6.0% inoculum under controlled pH conditions after 56 h of fermentation with wild culture while mutant (*C. glutamicum* IIB8UV3) gave maximum lysine yield of 19.3 g/L under optimized conditions such as 250 rpm agitation, 1.5 vvm aeration 6% inoculums with controlled pH at 7.0. Kinetic parameters ( $Q_X$ ,  $Q_S$ ,  $Q_{Lys}$ ,  $Y_{Lys/S}$ ,  $Y_{Lys/X}$  and  $q_{Lys}$ ) were found to be much higher for *C. glutamicum* IIB8UV3 as compared to *C.*

*glutamicum* IIB-8. Purity of produced lysine was confirmed by TLC and HPLC. Toxicity evaluation report showed that the produced lysine is safe for consumption by broilers. Biological evaluation of produced lysine on broiler chicks showed that broilers fed on test feed consumed less feed, exhibited more weight gain and high feed conversion ratio as compared to those fed on control diet.

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| <b>Project No:</b>      | <b>PSF/Res/P-GCU/Bio (437)</b>  |
| Project Title:          | Cloning and Characterization of Alpha Amylase from <i>Thermotoga petrophilla</i> for Textile Industry |
| Duration:               | 02-Years  |
| Date of Initiation:     | 01.07.2011  |
| Date of Completion:     | 31.03.2014 (extended)   |
| Total Expenditure:      | Rs.2,004,716/-  |
| Principal Investigator: | Prof. Dr. Ikram-ul-Haq  |
| Name of Institution:    | Govt. College University, Lahore  |

#### **SUMMARY:**

*Hyperthermophile Thermotoga petrophilla* is a potential source of a number of thermostable enzymes. However, the present research work is focused on the exploration of amylolytic potential of this hyperthermophile. For this purpose genome sequence of *T. petrophilla* (reference sequence: NC\_0094861) was accessed from NCBI genomic database. Four putative amylase gene sequences were retrieved and designated as *AmyA* (1668 bp) *Amyb* (1269 bp), *AmyC* (1326 bp) and *AmyE* (1914 bp). Using these individual target gene sequences as query, NCBI nucleotide blast and Conserved Domain Search (CDS) were carried out. The query sequences showed the homology with amylases and putative proteins coded by these genes belonged to largest superfamily *AmyAc* (cl07893) of glycoside hydrolysis (GH). Specific hit results of CDS tool showed that the  $\alpha$ -amylases catalytic domain of putative proteins encoded by *AmyA* and *AmyC* belongs to bacterial  $\alpha$ -amylases (*amyac\_bac2\_amyA*) also called 1,4-  $\alpha$ -D-glucan-4-glucanohydrolase (EC 3.2.1.1) *AmyB* putative proteins possess  $\alpha$ -amylases catalytic domain of *AmyAc\_arch\_bac\_AmyA* (cd 11313) that is orthologous to *AmyAc\_bac\_AmyA*. Whereas, specific hit results of *AmyE* showed that  $\alpha$ -amylase catalytic domain present is *AmyAc\_MTase\_N* (cd11335) that is found in maltosyltransferase.

To perform the directional cloning online software “webcutter 2” was used to determine the non-cutter restriction enzymes for each of these gene and primers were designed accordingly by using *Vector NTI Advanced*<sup>TM</sup> 10.3 *NdeI* site was introduced at 5' end of the forward

primers of AmyA, AmyC and AmyE. Whereas, and Nco1 site was introduced at 5 end of forward primer of AmyB gene. After PCR amplification, purified PCR products of 1.67 kb (*AmyA*), 1.27 kb (*AmyB*), 1.33 kb (*AmyC*) and 1.91 kb (*AmyE*) were separately ligated with linear pTZ57R/T by using T4 DNA ligase followed by transformation into competent cells of E-coli DH5 $\alpha$ . After transformation, selected white colonies for each gene were tested for the presence of pTZ57R/T+gene of insert by colony PCR. pET expression vectors i.e. pET21a(+) and pET28a(+) were used for the expression of these genes. Recombinant pTZ57R/T plasmids were isolated from PCR positive colonies of DH5 $\alpha$  stains followed by double digestion with restriction enzymes. For the pTz57R/T+*AmyA/AmyE*, restriction endonucleases *NdeI* and *HindIII* were used.

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| <b>Project No:</b>             | <b>PSF/Res/P-PMAS.AAU /Bio (446)</b>   |
| <b>Project Title:</b>          | Biodiversity and Ecology of Bats and Rodents in the Thorn F and Croplands of the Potohar Plateau |
| <b>Duration:</b>               | 03-Years   |
| <b>Date of Initiation:</b>     | 01.07.2011   |
| <b>Date of Completion:</b>     | 30.6.2014  |
| <b>Total Expenditure:</b>      | Rs. 1,455,197/-  |
| <b>Principal Investigator:</b> | Dr. Amjad Rashid Kayani  |
| <b>Name of Institution:</b>    | Pir Mehr Ali Shah University of Arid Agriculture<br>Rawalpindi                                   |

## **SUMMARY:**

Like anywhere else in the world, rats and mice cause significant damage to the agricultural crops in Potohar (wheat and groundnut crops). Attempts at eliminating these rodents from the agricultural fields by long term use of toxicants have brought serious ecological repercussions. This has led to the ecological based management of the pest populations of these small mammals to reduce damage to the field crops, orchards and stored grains. The first thing required for the ecological management of any pest species is the information on its ecology and distribution. The present study was therefore, designed to investigate the abundance, distribution and diversity of rodents and bats in the agricultural croplands and the adjoining patches of natural vegetation of thorn forests (in the form of scrub lands. The findings of this study suggested that the rodents were more common in the croplands than in their adjoining non crop areas of natural vegetation. This study eventually provides useful information about utilization of the cropping systems of Potohar by the rodents in different seasons of the year. The abundance and distribution of rodents were strongly influenced by the vegetation crops as the crop areas harbored more rodents. Also, information on the

number of rodents captured, trapping success and rodent density index for different habitats (viz. cropland, non-cropland and fallow land) is depicted. These data generate information on the spatial and temporal distribution of the rodents in three different habitat of Potohar (viz. croplands, fallow lands and non- croplands).

The estimated density index of rodents in agricultural habitat suggests a pattern of local movements between croplands/fallow land and natural vegetation. Rats and mice trapping success was more in the crops than in the non-crop areas. This rodent density index and trapping success were also high in the winter season. Perhaps the habitat type was influencing the distribution and abundance of rodents because of the differences in both shelter and food availability. Data collected showed that the rodents' density also varied with the crop growth stages. Rodent populations reached their peak when the crops were maturing, and declined after harvest. Distribution and abundance of rodents also fluctuated with the crop (wheat and ground nut) stages. This study provided us with the information about the time and place when rodents could be more vulnerable to their natural predators. Such kind of information is a pre-requisite for developing an ecological based management plan for these rodents in the agro-ecosystems of Potohar. The worldwide renowned natural enemy of rats and mice is the Barn Owl which is widely distributed in the plains of Pakistan and is a strong candidate for evolving an environment friendly method for inhibiting rodent depredations in the agroecosystem in the country. This study proposes to minimize rodent depredations in the agricultural fields of Potohar through the agency of the raptors like Barn Owl.

Data on the bats and rodents of the four districts of Potohar were collected from December 2011 to June 2013. Seventeen different sites across the five districts viz. Attock, Chakwal, Jhelum Rawalpindi and Khushab were visited 41 times in four seasons (viz. winter, spring, summer and autumn). A total of 9,800 trap nights of sampling in three habitats such as cropland, non-crop area and fallow land were completed. Cropland included 13 different types of crops viz. arugula, wheat, chickpea, cotton, berseen & oat, maize, ladyfinger, tomato, onion, groundnut, watermelon, millet & sorghum and capsicum. A total of 10 species of small mammals were trapped as 270 individuals contributing to an average trap success of 2.45 %. *Tatera indica* was the most commonly caught taxon followed by the *Mus musculus*. Data on reproductive patterns of various species of bats and rodents is also recorded. Comparative study of the cranial morphometry of different bats and rodents species is also carried out.

Bats are widely distributed and have been recorded throughout the world except the Antarctic and a few Oceanis islands. Bats belong to the order Chiroptera. This order is further divided in two suborders: Microchiroptera and Megachiroptera. Majority of the bats are insectivorous and belong to the suborder microchiroptera, whereas frugivorous bats belong to the suborder megachiroptera. One of the most important objectives of the present study was to focus on the diversity of various micro bat species inhabiting the Potohar plateau. Bats play a vital role in ecological communities and in keeping the population of night insects in balance. They are involved in pollination and seed dispersal of many tropical plants. Roosting sites of micro bats found in the study districts were searched for biodiversity analysis. For species identification bats were captured at their roost site as well in the open area where bats were flying in the evening by mist nets. These were released after recording information for their identification. However, only those specimens found dead on the sampling sites were collected and used for autopsy. A total of 88 bat Specimens was captured, 26 specimens belonged to *Scotophilus heathii* (16 females and 10 males), 45 to *Pipstrellus pipstrellus* (26 females and 19 males), 5 to *Pipstrellus javanicus* (03 females and 02 males), 3 to *Pipstrellus tenuis* (01 female and 02 males), one to *Rhinolophus Lepidus* (male) and 08 to *Megaderma lyra* (05 females and 03 males). Reproductive morphometry of male and female specimens of *Pipstrellus pipstrellus* captured during autumn and spring seasons revealed no sign of breeding.

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| <b>Project No:</b>             | <b>PSF/Res/C-QU/Bio (455)</b>   |
| <b>Project Title:</b>          | Collection, Evaluation and Sustainable Utilization of Crucifer Biodiversity in Pakistan |
| <b>Duration:</b>               | 03-Years  |
| <b>Date of Initiation:</b>     | 01.01.2012  |
| <b>Date of Completion:</b>     | 31.12.2014  |
| <b>Total Expenditure:</b>      | Rs. 1,569,040/-   |
| <b>Principal Investigator:</b> | Prof. Dr. Zabta Khan Shinwari   |
| <b>Name of Institution:</b>    | Quaid-i-Azam University<br>Islamabad  |

#### **SUMMARY:**

The project entitled “*Collection and Characterization of Crucifer Biodiversity in Pakistan*” was proposed to collect indigenous oilseed crucifer species and their wild relatives from diverse ecologies of Pakistan and to evaluate the collected germplasm for selection of promising lines having high yield potential, resistant to insects, pests and traits of economic significance to the farmers, using agro-morphological, biochemical and molecular analysis.

For this purpose a series of field activities and Lab. experimental work were conducted and the whole work completed in three years. *Germplasm Collections* -Germplasm were collected from unexplored areas of KP, Punjab and other parts of the country. More than 250 crucifer's accessions such as *Brassica rapa* (Campestris), *B. juncea*, *B. napus*, *Eruca sativa*, vegetable brassicas, and many other accessions of unknown crucifer species were collected. Most of the collections were made from 47 sites in various districts of Khyber Pakhtunkhwa and Punjab. The areas covered included Swabi, Peshawar, Kohat, Karak, Bannu, Lakki Marwat, Dera Ismail Khan, Mianwali and Talagang (Chakwal district). Collections were made at an interval of 20-30 km considering several factors.

*Agro-morphological Evaluation* -The collected crucifer germplasm were evaluated in field conditions based on agro-morphological characters. All the collected crucifers' germplasm were evaluated in the field condition phase wise i.e. sown brassica every year in the sowing season and this morphological characterization completed in three consecutive years of the project. Various agro-morphological traits such as days to flower initiation, leaf petiole length, leaf length, leaf width, siliqua main raceme<sup>-1</sup>, siliqua plant<sup>-1</sup>, 1000-seed weight, seed yield plant<sup>-1</sup> and seed yield plot<sup>-1</sup> etc. were recorded from flowering initiation till harvest of the crop. Morphological data were analysed by different statistical software such as, calculating similarity coefficients for pair wise comparisons, multivariate analysis, using computer software NTSys and Statistica for windows. On the basis of greater yield potential, seed yield per plant, 1000-seed weight, oil contents, protein contents and oleic acid four promising genotypes (25939, 25942, 25994 and 26190) have been identified for future breeding and variety development programs. Similarly accessions no. 26187 and 27460 of *Eruca sativa* were found as high lines for future use in hybridization programs.

*Biochemical Evaluation* -Genetic diversity of the collected germplasm were assessed by SDS-PAGE analysis. Genetic diversity of the collected germplasm was also assessed by SDS-PAGE technique. Different level of variation have been observed during biochemical evaluation based on total seed protein such as, 134 accessions of *Brassica carinata* and 102 accessions of *Eruca sativa* (Taramira) showed good result. Overall a low to medium level of genetic variability was observed for SDS-PAGE (single dimension). As SDS-PAGE alone did not reveal high level of genetic variability, hence 2-D gel electrophoresis along with other advanced type DNA markers and more accessions from all over the country are recommended for the future genetic evaluation.

*Molecular Evaluation* - The germplasm were also studied at the DNA level using SSR markers e.g. *Brassica carinata* and *Eruca sativa* accessions were evaluated at DNA level. Groupings of different accessions based on Molecular analysis reflected geographical similarities and suggested misidentification of certain accessions in the germplasm collection. Based on Molecular study, SSR analysis proved to be a useful tool in assessing the genetic diversity of various brassica germplasm in Pakistan.

In conclusion our this collection of indigenous oilseed crucifer species and their wild relatives from various parts of the country and their experimental evaluation screened various elite lines of crucifers with high yield potential, resistant to insects' pests and traits of economic significance to the farmers e.g., 25939, 25942, 25994 and 26190 (*Brassica carinata*) and 26187 and 27460 (*Eruca sativa*) accessions. These lines have the potential to be used for glucosinolates and erucic acid, will ultimately lead to increase oil production in the country and will reduce import bill in the future.

### **iii) BIOTECHNOLOGY & GENETIC ENGINEERING:**

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| <b>Project No:</b>      | <b>PSF/Res/C-QU/Biotech (99)</b>                                     |
| Project Title:          | Cloning and Characterization of Plastic Degrading Microbial Isolates |
| Duration:               | 02-Years   |
| Date of Initiation:     | 01.01.2012   |
| Date of Completion:     | 31.12.2013   |
| Total Expenditure:      | Rs.1,794,388/-   |
| Principal Investigator: | Dr. Muhammad Ishtiaq Ali   |
| Name of Institution:    | Quaid-i-Azam University, Islamabad                                   |

### **SUMMARY:**

The production of plastic, increasing worldwide due to its extensive domestic and commercial application in packaging, furniture, plumbing, flooring, electronics and building materials. The persistent nature of plastics makes it challenging to deal with when released into the environment as a waste. Conventional management practices of plastics waste and related products include; land filling, recycling and incineration. These practices are not eco-friendly as they release certain byproducts like toxic gases CO<sub>2</sub>, Chlorofluorocarbon, vinyl monomers and dioxins which further deteriorate in the atmosphere or terrestrial environment. The present project was planned for isolation, screening and molecular characterization of plastics degrading indigenous microbial isolates and to evaluate their degradation potential.

The Isolation and screening of the microbial isolates (fungus) has been completed. Soil burial and shake flask experiments are conducted to check their degradation potential. The fungal strains growing well in the MSM agar plate were screened for further experiments. Biomass quantification result showed Maximum growth of NZ1 and NZ4 observed till 4<sup>th</sup> week by biomass quantification experiment. Sturm test results showed an increased CO<sub>2</sub> production (13.74g/l) with fungal inoculums as compared to control (5.86g/l). Molecular identification of the selected fungal isolates was performed with ITS 1 and ITS 4 universal primer. Enzymatic characterization was done to determine the effect of crude and purified enzyme for plastic degradation. Temperature, pH, time of incubation and effect of nitrogen and carbon source were optimized for maximum enzyme yield.

Maximum enzyme production was observed at temperature (30°C), pH (6.5) after 42 days of incubation by selected four fungal strains (NZ1 and NZ4 *Aspergillus niger*, NZ6 *Asperigillus oryzae* and NZ8 *Phanerochaete chrysosporium*). Purification of enzymes was performed by column chromatography. The molecular weight estimation was carried out by sodium dodecyl sulphate polyacrylamide gel electrophoresis. A band of 46 KDa was observed for lignin peroxidases while 66KDa was observed for Laccases. The decrease in weight (0.08g) was observed in the enzymes treated PVC film then control (0.1g). The Fourier transform infrared spectroscopy of enzyme treated plastic film (PVC) revealed the structural changes as compared to control (without enzyme treatment) i.e. a new peak appeared at 3367 cm<sup>-1</sup> (Alkenyl C-H stretch). The increase in intensity of the peak at wavelength 1633 cm<sup>-1</sup> (C=C stretching vibration of aromatic ring) in treated sample then the control. Scanning electron microscopy showed the surface changes due to fungal biofilm formation for plastic degradation. Noticeable change in surface of PVC films in term of surface erosion and cracks formation on plastic surface after enzyme treatment. For cloning of ligninperoxidases laccases and manganese peroxidase the primers were designed. Molecular characterization of fungal enzymes responsible for degradation was done. On the basis of our results it can be concluded that fungal secreted lignin peroxidase and laccase enzymes has the potential for biodegradability of recalcitrant plastic waste and can be used for plastic waste treatment at large scale. Cloning of the Manganese peroxidase gene was successfully done in the *E. coli* (XLB) strains and lignin peroxidase and laccase in DH $\alpha$ 5 *E.coli* strain.

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| <b>Project No:</b>      | <b>PSF/Res/S-LUMHS/Biotech (101)</b>   |
| Project Title:          | Study of Genetic and Molecular Basis of Primary Congenital Glaucoma in Patients of Sindh |
| Duration:               | 02-years   |
| Date of Initiation:     | 01.08.2011   |
| Date of Completion:     | 31.01.2014 (Extended for six months)   |
| Total Expenditure:      | Rs.943,197/-   |
| Principal Investigator: | Dr. Ali Muhammad Waryah  |
| Name of Institution:    | Liaquat University of Medical and Health Sciences, Jamshoro                              |

#### **SUMMARY:**

Glaucoma is the second common cause of vision loss and is responsible for approximately 15% of blindness worldwide (1). It is clinically and genetically heterogeneous. Primary Congenital Glaucoma is the most common form of glaucoma in infants with an overall prevalence of 1 in 10,000 births. It causes defects of the trabecular meshwork and anterior chamber angle (2, 3). This leads to the obstruction of aqueous outflow and increased intraocular pressure (IOP) resulting in optic nerve damage leading to childhood blindness. Its occurrence is more frequent in countries where consanguineous marriages are common. To date three loci for autosomal recessive Primary Congenital Glaucoma (PCG) has been identified along with two genes by using consanguineous pedigrees. Out of these only one gene has been identified from Pakistan. In this study, these three loci known for PCG along with another locus harboring MYOC gene have been screened in our patients. Mutations in MYOC gene are involved mainly in Primary Open Angle Glaucoma (POAG) and its involvement in Primary Congenital Glaucoma is also reported. In our familial cases of PCG enrolled so far in this study, we have found patients with mixed phenotype, affected with PCG and POAG in same family. After initial screening in our patients, we have found involvement of MYOC causing PCG and PCG along with POAG in same family.

#### **iv) CHEMICAL SCIENCES:**

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| <b>Project No:</b>  | <b>S-HEJ/Chem (403)</b>  |
| Project Title:      | Design, Synthesis and Characterization of $\beta$ -octiphenyloctacix[4] Arane a Super molecular Multifunctional Pore having Practical Applications in Medicine and Mechanics |
| Duration:           | 02-Years   |
| Date of Initiation: | 01.07.2008   |
| Date of Completion: | 31.12.2010 (Extended)  |

Total Expenditure: Rs. 704,413/-  
Principal Investigator: Dr. Raza Shah  
Name of Institution: HEJ Research Institute of Chemistry International Centre  
for Chemical and Biological Sciences, Karachi

### **SUMMARY:**

The main purpose of this project is to synthesize and study highly functionalized octacalixarene p-octiphenyls molecule that are design to self-assemble into barrel-stave pores *via* non-covalent interactions such as hydrogen bonding and  $\pi$ - $\pi$  stacking which will provide access to multifunctionality, based on guest intercalation and/or coordination (e.g. ligand gated pore sensors). To recognize multifunctional pores as supramolecular hosts,[i.e. evaluation as ligand gated pores sensors for intercalating guests like nucleotides, higher aromatics(pyrene, coronnes, fullerenes), ubiquinone mimics, flavonoids], as chip for single gene sequence, while provide insight into photosynthetic process, can attract medicinal chemists for photodynamic therapy, chiroptical conductive nanomaterials, recyclable antioxidants, and so on. A numbers of compounds have been synthesized like some new calix[4]arene derivatives. All the compounds new compounds were characterized through 1 D and 2D NMR spectroscopy, Mass spectrometry, Elemental analysis etc.

**Project No:** C-QU/Chem (408)  
**Project Title:** Molecularly Designed Precursors for the Chemical Vapour  
Deposition of Ceramic Materials  
**Duration:** 2.5-Year  
**Date of Initiation:** 02.06.2008  
**Date of Completion:** 01.12.2010  
**Total Expenditure:** Rs.793,720/-  
**Principal Investigator:** Prof. Dr. Syed Tajammul Hussain  
**Name of Institution:** Department of Chemistry, Quaid-i-Azam University  
Islamabad

### **SUMMARY:**

This project was aimed at the Molecularly Designed Precursors for the Chemical Vapour Deposition of Ceramics Materials. Several precursors of general formula  $M(Ln)_x(dmae)_y$  and  $MM'(Ln)_x(dmae)_y$  where M and M' = Ba, Ti, Zn, Cu, Fe, Co and Zr while Ln = 2,4-pentanedionate, carboxylate (acetate and benzoate) and dmae = N,N-dimethylethanolate were synthesized and fully characterized by various analytical techniques such as physiochemical methods of analysis, FT-IR, multinuclear NMR, and

single crystal X-ray analysis. Thermogravimetric analysis (TGA) proved that all complexes undergo facile thermal decomposition to form mixed metal oxides. All the bimetallic precursors were tested for the deposition of thin films by aerosol-assisted chemical vapor deposition (AACVD). The SEM and EDX and XRD analyses of the thin films suggest the formation of impurity free crystallite mixtures of mixed metal oxides, which reveals that the synthesized materials have potential to use them for Chemical Vapor Deposition of pure metal particles, metal oxide or mixed metal oxides.

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| <b>Project No:</b>      | <b>P-CIIT/Chem (416)</b>   |
| Project Title:          | Synthesis and Characterization of Novel Composites Based on Carbon Nanotubes and Carbonated Hydroxyapatite                 |
| Duration:               | 02-Years   |
| Date of Initiation:     | 01.07.2011   |
| Date of Completion:     | 31.12.2013 (extended)  |
| Total Expenditure:      | Rs.1,456,009/-   |
| Principal Investigator: | Dr. Abdul Samad Khan   |
| Name of Institution:    | Interdisciplinary Research Centre in Biomedical Materials (IRCBM)<br>COMSATS Institute of Information Technology<br>Lahore |

#### **SUMMARY:**

Preparation of highly carbonated Hydroxyapatite (cHA) and carbon nanotubes (CNT) composites will help in manufacturing novel biomedical materials within Pakistan to be used in orthopedic surgeries. During proposed study optimized the wet precipitation synthesis of hydroxyapatite and carbonated hydroxyapatite to obtain thermally stable powder in the short time span of 3 min. Exposure of the reaction mixture to 1000 W microwave for 3 min furnished hydroxyapatite, which was thermally stable at temperatures up to 1200°C. Powders were analyzed for phase purity using X-ray crystallography; chemical composition was studied using Fourier transform infrared spectroscopy while particle morphology was analyzed using scanning electron microscopy. Bioactive CNT reinforced hydroxyapatite nano-composite was synthesized by in-situ precipitation for use in load bearing applications. Microwaves augment the synthesis, enhance the reaction rate, and institute energy savings. Heat and acid treated purified CNTs in microwaves were functionalized and dispersed in calcium nitrate tetrahydrate. Diammonium hydrogen phosphate was incorporated in calcium ion solution to furnish the required Ca:P ratio. Refluxing of the precursor solution was accomplished under microwaves. XRD showed the phase purity and crystallinity, FTIR spectroscopy indicates the functionalization of CNTs and SEM analysis depicts the

nanoporous nanomorphology of synthesized powder. TGA measures the thermal endurance of product, showing good CNTs retention at high temperatures (1100°C) in nitrogen ambient, otherwise they get oxidized in air in that temperature range. CNT reinforced sintered biomaterial exhibits excellent consolidation and a mechanical testing (compressive strength) were performed and found that 3% CNT in HA gave better results compared to other concentrations. The relation of between mechanical properties and sintering time is correlated by SEM.

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| <b>Project No:</b>             | <b>S-HEJ/Chem (417)</b>  |
| <b>Project Title:</b>          | Studies on Hepatoprotective Effects of Bioactive Secondary Metabolites of Plants by using Antioxidant and Relevant Bioassays |
| <b>Duration:</b>               | 02-Years   |
| <b>Date of Initiation:</b>     | 01.08.2010   |
| <b>Date of Completion:</b>     | 29.05.2013 (extended)  |
| <b>Total Expenditure:</b>      | Rs. 1,211,635/-  |
| <b>Principal Investigator:</b> | Prof. Dr. M. Iqbal Choudhary   |
| <b>Name of Institution:</b>    | International Centre for Chemical and Biological Sciences<br>Karachi   |

#### **SUMMARY:**

This study of natural products may also led to the development of new drugs as well as functional foods. *In vitro* DPPH radical scavenging (antioxidant) and hepatotoxicity (Wistar rat hepatocyte cell line, CC-1) assays and histopathological studies have been carried out on 126 medicinal plants of Pakistan and 29 secondary metabolites. The crude extracts of ninety five (95) medicinal plants and thirty one (31) dietary plants extracts exhibited a good to significant antioxidant activity in DPPH' radical scavenging assays. Thirty one common fruit extracts were screened for their antioxidant potential by using ABTS'<sup>+</sup> and DPPH' radical scavenging assays and iron chelating capacity assay. A total twenty nine (29) secondary metabolites were found to be new antioxidants in *in vitro* DPPH' radical scavenging assays. extracts of dietary / medicinal plant *Grewia asiatica L.* (Phalsa) exhibited not only good *in-vitro* radical scavenging and iron chelating activity, but also found to posses a good *in-vivo* antioxidant and hepatoprotective activity by normalizing the liver enzymes levels in animal model.

Antioxidant activity of guided isolation of fruits of plant *Grewia asiatica L.* led to the isolation of a new secondary metabolite, isorhamnetol 5-O-[6''-(3-hydroxy-3methyl glutarate)] /3-D-glucoside (19), in addition to other secondary metabolites, kaempferol 3-O-/3-D-glucoside

(20), kaempferol 3-0-a-D-rhamnoside (21), quercetin 3-0-/3. glucoside (22), quercetin 3-0-/3-D-rhamnoside (23), quercetin 30-(2 p-coumaroylglucoside) (24), myricetin 3-0-/3-D-xyloside (25), 5hydroxymethylfurfural(26), 3,4-dihydroxybenzoic acid (27), 1,5-dimethyl citrate (28), and trimethyl citrate (29). Trolox equivalent antioxidant capacity (TEAC) measurements on compounds 19-29 were also carried out and potent antioxidant activity was observed. The extract of *Pistacia vera L.* was also evaluated in *in vivo* animal model for hepatotoxicity and a good hepatoprotective activity was observed as it reduced the ALP, AST and total bilirubin levels. Plant *Grewia asiatica L.* (Phalsa) has been found to potent antioxidant and hepatoprotective and results were compiled in a patent filed in USA (13/759/820.2013). Total two hundred and twelve (212) synthetic derivatives were also identified as novel and new antioxidants through DPPH' radical scavenging assays. First ever study of Pakistan on hepatoprotective effects of dietary and medicinal plants and their secondary metabolites have been successfully completed with promising results for further research.

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| <b>Project No:</b>             | <b>C-QU/Chem (419)</b>  |
| <b>Project Title:</b>          | Computer Aided Identification and Synthesis of $\alpha$ -Glucosidase Inhibitors |
| <b>Duration:</b>               | 03-Years  |
| <b>Date of Initiation:</b>     | 01.05.2010  |
| <b>Date of Completion:</b>     | 31.10.2013 (extended)   |
| <b>Total Expenditure:</b>      | Rs.1,436,778/-  |
| <b>Principal Investigator:</b> | Prof. Dr. Farzana Latif Ansari  |
| <b>Name of Institution:</b>    | Department of Chemistry, Quaid-i-Azam University, Islamabad.                    |

## **SUMMARY:**

Human endeavour for the search of new drugs has been a centuries old exercise and man has been attempting newer protocols to achieve this objective. In this effort, he explored both natural and man-made resources for the identification of novel drugs for treating the ailing humanity. Mechanistically, both traditional and rational approaches are being used for this purpose. The former approach is in fact a hit and miss affair while the latter is indeed a more rational approach exploiting computational tools of drug designing. During the current study both these approaches have been followed. While following the first approach (Part 1), two different classes of aza-heterocycles namely, 1,4-disubstituted-1,2,3-triazoles and 2,3-dihydrobenzothiazepines were synthesized. Triazoles were synthesized by a Cu(I) catalyzed click reaction while benzothiazepines were synthesized by a [2+3] annulation of chalcones

with o-aminothiophenol. The synthesized compounds were subjected to in vitro  $\alpha$ -glucosidase inhibition studies and most of the compounds were found to have moderate to excellent activities. In a previous study, we had reported the synthesis and biological activities of benzothiazepines and their synthetic precursors i.e. chalcones. It was interesting to note that quite a few compounds were identified as dual inhibitors of  $\alpha$ -glucosidase and cholinesterase (ChE) inhibitors.

During current study, both triazoles and benzothiazepines were found to show the same dual action as  $\alpha$ -glucosidase as well as ChE inhibitors. This intriguing observation was studied computationally using Molecular Field Topolgy Analysis (MFTA) method and a common pharmacophore was identified as a rational for the bi-target action of the compounds studied. This dual inhibitory potential is expected to play an important role in the designing of new therapeutics for addressing the challenges posed by two globally prevalent diseases namely Diabetes and Alzheimer's disease. During rational drug designing (Part 2), a pharmacophore based search of novel  $\alpha$ -glucosidase Inhibitors was followed and two very well known classes of aza-heterocycles namely 3,4-dihydropyrimidines and 2,4,6-triazines were identified as leads in a virtual screening protocol. In a subsequent step, the analogs of hits identified in dry lab were synthesized in wet lab. In vitro screening of these analogs as novel  $\alpha$ -glucosidase inhibitors was conducted that led to a successful identification of novel  $\alpha$ -glucosidase inhibitors. These compounds will be subjected to in vivo screening as future study. Moreover, in silico prediction of their ADMET properties will also be carried out prior to their preliminary clinical trials as drug candidates for Diabetes and Alzheimer's disease.

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| <b>Project No:</b>             | <b>S-HEJ/Chem (425)</b>   |
| <b>Project Title:</b>          | Synthesis of Novel Piperidine like Compounds for Anticancer Activity                                      |
| <b>Duration:</b>               | 02-Years  |
| <b>Date of Initiation:</b>     | 21.09.2011  |
| <b>Date of Completion:</b>     | 20.09.2013  |
| <b>Total Expenditure:</b>      | Rs. 1,485,736/-   |
| <b>Principal Investigator:</b> | Prof. Dr. Z. S. Saify   |
| <b>Name of Institution:</b>    | H.E.J Research Institute of Chemistry, International Centre for Chemical and Biological Sciences, Karachi |

#### **SUMMARY:**

Cancer is a disease that continues as one of the leading causes of death at any age. The development of cancer is associated with fundamental genetic changes within the cell. Cancer is associated with excess cellular oxidative stress, and during treatment the addition of drug-

induced oxidative stress can limit the effectiveness of therapy and cause a number of side effects, such as fatigue, nausea, vomiting and diarrhea, as well as more serious adverse effects, including cardiomyopathy, peripheral neuropathy, hepatotoxicity and pulmonary fibrosis.

Piperidine derivatives have been reported to exhibit anti-tumor activity and a number of studies have been done to explore their effect against cancer of various origins hence, the piperidine molecule and its derivatives are considered to be pharmaceutically effective as antitumor agents. Most chemotherapeutic drugs work by impairing mitosis (cell division), effectively targeting fast-dividing cells, as these drugs cause damage to cells they are termed cytotoxic. Some drugs cause cells to undergo apoptosis (so-called "programmed cell death"). The scientists are still identifying specific features of malignant and immune cells that would make them uniquely targetable. Current cancer chemotherapeutic drugs have limited efficacy due to the fact that tumor cells are a rapidly changing target characterized by genomic instability. Unlike tumor cells, activated endothelial cells (Ices) required for angiogenesis, a process definitely crucial to tumor growth and metastasis, were originally considered to be ideal therapeutic targets free of drug resistance. The major objectives for cancer therapy are the prevention or reduction in severity of symptoms or effects of a pathological condition, including prolonging life expectancy. Treatment includes prevention of tumor growth, reduction of tumor size, enhanced tumor cell death, and increased apoptosis. The present study deals with the investigation of piperidine derivatives for anticancer activity.

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|--------------------------------|---|
| <b>Project No:</b>             | <b>F-MU/Chem (434)</b>  |
| <b>Project Title:</b>          | Efficiency of Iron Supported on Porous Material (Prepared from Peanut Shell) for Liquid Phase Aerobic Oxidation of Alcohols |
| <b>Duration:</b>               | 02-Years  |
| <b>Date of Initiation:</b>     | 01.08.2011  |
| <b>Date of Completion:</b>     | 31.07.2013  |
| <b>Total Expenditure:</b>      | Rs. 1,066,947/-   |
| <b>Principal Investigator:</b> | Dr. Muhammad Sadiq  |
| <b>Name of Institution:</b>    | Department of Chemistry, University of Malakand, Chakdra (Dir L)  |

## **SUMMARY:**

In this project activated carbon impregnated with phosphoric acid and potassium hydroxide was prepared from peanut shell. The prepared and well characterized activated carbon was preliminary used for the wastewater treatment (An efficient activated carbon for the

wastewater treatment, prepared from peanut shell), further the same activated carbon used as a support material for the catalysts such as  $\text{Fe}_2\text{O}_3/\text{AC}_{(\text{H}_3\text{PO}_4)}$  and  $\text{Fe}_2\text{O}_3/\text{AC}_{(\text{KOH})}$  (Efficiency of Iron Supported on Porous Material (Prepared from Peanut Shell) for Liquid Phase Aerobic Oxidation of Alcohols). The prepared catalysts ( $\text{Fe}_2\text{O}_3/\text{AC}_{(\text{H}_3\text{PO}_4)}$  and  $\text{Fe}_2\text{O}_3/\text{AC}_{(\text{KOH})}$ ) were investigated for liquid phase aerobic oxidation of primary alcohols (octanol to octanal, benzyl alcohol to benzaldehyde and cinnamyl alcohol to cinnamaldehyde) and secondary alcohols (cyclohexanol to cyclohexanone and isopropanol to acetone), in a batch reactor, using solvent free condition and/or eco-friendly solvents. The catalysts were characterized by SEM, EDX, XRD, FTIR, TGA/DTA, and surface area analysis. Experimental data revealed that  $\text{Fe}_2\text{O}_3/\text{AC}_{(\text{KOH})}$  was an efficient catalyst for the oxidation (dehydrogenation) of alcohol while  $\text{Fe}_2\text{O}_3/\text{AC}_{(\text{H}_3\text{PO}_4)}$  was found to show catalytic activity for both dehydration and dehydrogenation of alcohol. The catalysts were recycled by simple filtration, and used several times without any loss of catalytic activity.

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| <b>Project No:</b>             | <b>S-SU/Chem (439)</b>  |
| <b>Project Title:</b>          | Gas Chromatographic Analysis of Amino Acids in Skin Samples of Psoriatic and Arsenicosis Patients |
| <b>Duration:</b>               | 1.5-Year  |
| <b>Date of Initiation:</b>     | 28.04.2012  |
| <b>Date of Completion:</b>     | 27.04.2014 (extended)   |
| <b>Total Expenditure:</b>      | Rs. 762,380/-   |
| <b>Principal Investigator:</b> | Prof. Dr. Muhammad Yar Khuhawar   |
| <b>Name of Institution:</b>    | Institute of Advanced Research Studies in Chemical Sciences, University of Sindh, Jamshoro        |

## **SUMMARY:**

The separation and determination of nineteen amino acids were examined using trifluoroacetylacetone (FAA) or ethyl chloroformate (ECF) as derivatizing reagent and each time complete separation was obtained using either reagent, but a higher sensitivity with base line separation was obtained by two stage derivatization with FAA and ECF from the column HP-5 (30 m x 0.32 mm id) with film thickness 0.25  $\mu\text{m}$  at an initial column temperature 100° C for 2 min with ramping of 20° C/min up to 250° C with nitrogen flow rate of 3 ml/min. The detection was performed by FID. Total separation time was 10 min. The separation was repeatable with relative standard deviation (RSD) (n = 5) within 1.5-1.9% and 1.3-1.7% in terms of retention time and peak height / peak area respectively. The method was applied for the determination of amino acids from skin samples of psoriatic patients (n = II), arsenicosis patients (n = 5), normal subjects (n = 19), Pemphigus Vulgaris (n = 5), Leishmaniasis (n = 5) and eczema (n = 5) patients and variation in the contents of the amino acids was noted.

The RSDs for the determination were obtained within 3 %. GC-FID procedure is also used for the analysis of 10 amino acids from a pharmaceutical preparation (Aminess NT" tablets) and 19 free and acid hydrolyzed amino acids in jams (Apple, Mango, Strawberry and Mixed fruits), juices (Lemon and Orange) and vegetable (Kundur). An analytical method has been developed with improved sensitivity for the determination of amino acids after precolumn derivatization with trifluoroacetylacetone and isobutyl chloroformate. 20 amino acids separated completely with linear calibration range 1-10 mg/ml and limits of detection 60 - 200 ng/ml. The separation was obtained within 11 min. The method was applied for the analysis of amino acids in human skin samples after acid hydrolysis. The variation in amino acids contents were examined in the affected skin samples from pemphigus vulgaris, psoriasis, leishmaniasis and eczema patients and result were compared with unaffected skin samples from healthy volunteers. The extraction of amino acids from samples calculated by standard addition was within 95-102 % with RSIDS 1.23-6.75 %.

#### v) ENGINEERING SCIENCES

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| <b>Project No:</b>      | <b>PSF/Res/S-MUET/Engg (121)</b>  |
| Project Title:          | Design & Implementation of Intelligent Energy Efficient Industrial Process Control System Using ConveyorBelts via Robotic Arm |
| Duration:               | 2 Years   |
| Date of Initiation:     | 11.02.2014  |
| Date of Completion:     | 10.02.2016  |
| Total Expenditure:      | 1,047,255/-   |
| Principal Investigator: | Prof. Dr. Bhawani Shankar Chowdhry  |
| Name of Institution:    | Mehran University of Engineering and Technology, Jamshoro   |

#### SUMMARY:

Technological advancements in process monitoring, control and industrial automation have played a decisive role in increasing the industrial productivity and manufacturing at faster pace even than been dreamed. An ultimatum requirement of any process or system is the accurate and precise data acquisition mechanism which can be executed through diverse sensors especially for collecting, analyzing and sorting the objects and elements. Sensor data acquisition involves precision measurement and possible adjustment in motion direction, speed, angle etc. In any industrial plant the aim is to produce standard and high quality products and sell them at prices which make profit. These purposes can be achieved in a successfully designed and controlled process.

In this research project, we have proposed an Intelligent Energy Efficient Industrial Process Control System with Robotic Arm which intends to transform and modernize the industrial operations of distributions departments of the country's (Pakistan) manufacturing as well as service providing organizations. The implemented energy efficient conveyor system model will not only recognizes and sorts the objects by sensing its colour and place these objects to its destination by using Robotic vehicle but also smartly adjusts the speed of conveyor belts by recognizing the weight of object(s). The energy efficient model is based an optimal belt speed control of variable speed drive (VSD) mechanism which smartly sensing the object weight and optimally adjusting the belt speed. The proposed system optimally switches the conveyor system to on/idle/off status to minimize the energy consumption of conveyor belts. For the energy efficient model, a mathematical model of the energy efficient conveyor system is also derived by considering the different dynamic parameters. When conveyor belt is fully loaded with objects, the belt moves around with its maximum potential speed, but when conveyor belt is partially or marginally loaded or unloaded, the speed of belt is adjusted accordingly. In this way, a significant amount of energy and cost of energy can be saved. It is anticipated that, the developed intelligent energy efficient conveyor system model will not only modernize the industrial manufacturing and distribution process but will significantly reduce the energy consumption and cost and will lead to increase the life time cycle of conveyor belts.

#### **vi) MEDICAL SCIENCES:**

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| <b>Project No:</b>             | <b>PSF/Res/S-KU/Med (261)</b>   |
| <b>Project Title:</b>          | Computer-Aided Identification of Cholinesterase Inhibitors for the Treatment of Alzheimer's Disease Related Dementias |
| <b>Duration</b>                | 03-Years  |
| <b>Date of Initiation:</b>     | 01.09.2010  |
| <b>Date of Completion:</b>     | 01.05.2014 Extended (8-months)  |
| <b>Total Expenditure:</b>      | Rs.1,104,365/-  |
| <b>Principal Investigator:</b> | Dr. Zaheer ul Haq   |
| <b>Name of Institution:</b>    | Dr. Panjwani Center for Molecular Medicine and Drug Research, University of Karachi, Karachi                          |

#### **SUMMARY:**

Final technical report of three years project based on "Identification of Computer Aided Cholinesterase Inhibitors" byutilizing computational tools. In this project, Homology Modeling, Molecular Dynamic Simulation method, Molecular Docking simulation protocol,

3D-QSAR studies, and Virtual screening techniques were used. This project covered two parts: PART A) in the absence of resolved structure of Butyrylcholinesterase precursor developed three dimensional tertiary structure and after validation, refinement and minimization compared with X-RAY resolved crystal structure of Human BChE and AChE. PART B) in second phase of this project by the help of active site information we predicated novel class of inhibitors against Cholinesterase Enzyme. The goal of both studies will facilitate the rational design of more potential candidate for cholinesterase enzyme which might have better activity and in order to reduce the undesirable side effects elicited by most of the inhibitors that have been developed to date.

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| <b>Project No:</b>      | <b>PSF/Res/S-KU/Med (282)</b>   |
| Project Title:          | New Approaches to Effective Pain Management:<br>Clinical Potential of GABA Receptors<br>Modulators in the Development of Chronic Pain |
| Duration:               | 03-years  |
| Date of Initiation:     | 01.05.2011  |
| Date of Completion:     | 30.06.2014 Extended   |
| Total Expenditure:      | Rs. 1,759,373/-   |
| Principal Investigator: | Dr. Shabana Usman Simjee  |
| Name of Institution:    | HEJ Research Institute of Chemistry<br>University of Karachi, Karachi   |

## **SUMMARY:**

Although many studies have demonstrated that modulation of inhibitory amino acid systems can affect both acute and chronic pain. However, little work has been undertaken to report the influence of these modulations on the development of pain and expression of inflammatory markers in the brain. The aim of the present proposed study was to evaluate the role of amino acid neurotransmitters in the development of the chronic pain. With this aim in mind, we have commenced the study on April 2011. The model chosen for this study was adjuvant-induced arthritic (AIA) rats. We have tested GABA<sub>A</sub> and GABA<sub>B</sub> receptor agonists to screen-out the most potent agonist which exhibit anti-arthritic / anti-nociceptive activity. Among the tested compounds / drugs, Gabapentin (2-[1-(aminomethyl)cyclohexaneacetic acid) showed us a promising results both when given as a single agent therapy or in combination with low dose of indomethacin (non-steroidal anti-inflammatory drug) and therefore it was decided to take this GABA<sub>A</sub> agonist further in our study. As an indicator of disease progression, the macroscopic parameters of arthritis i.e., the body weight, quantification of the change in the paw volume and nociceptive transmission were observed and tabulated statistically. The nociceptive measurements demonstrated that unlike arthritic control rats, the animals treated

with the gabapentin (with or without indomethacin) showed a pronounced reduction of nociceptive responses to the thermal stimulation. These findings suggested that gabapentin might be effective in blocking the dorsal horn neurogenerative events induced after injection of adjuvant preparation that result in a persistent nociceptive and inflammatory state. At the end of each experimental study, brain samples were collected processed for BDNF determination. Immunohistochemical and RT-PCR analysis of the brain samples demonstrated an increased expression of BDNF in arthritic control group compared to normal control. Our results were in accord to the studies reporting the alteration in the BDNF expression as consequences of imbalance between excitatory glutamatergic and the inhibitory GABAergic system. We have observed that the treatment of gabapentin (with or without low dose of indomethacin) in arthritic rats attenuated the up-regulation of BDNF marker as compare to the arthritic control group.

The toxicity testing of gabapentin over a period of 30 days revealed no marked effects or sign of toxicity neither on the normal blood chemistry nor it has any detrimental effects on the normal functioning of the liver (measured in terms of sGPT and sGOT). The serum level of LDH and alkaline phosphatase was also within normal values which demonstrate that the treatment did not caused any obvious damage to any tissues. The gross anatomical observations were also made in case of the kidneys and liver. We did not found any patch appearance or any other signs of toxicity on the surface of these organs. Thus our study suggests that in order to control thermal hyperalgesia and inflammation associated with chronic inflammatory pain, gabapentin can be effectively used in combination with low dose of NSAIDs. This regimen can also control the level of the adverse effects which are associated with the extended use of NSAIDs. With this combination, GBP can interact synergistically to reverse hyperalgesia as well as inflammatory cascade associated with the arthritis. Therefore, the use of gabapentin in low-dose combinations with indomethacin or other NSAIDs may provide fruitful strategy for the treatment of chronic pain.

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| <b>Project No:</b>      | <b>PSF/Res/S-AKU/Med (293)</b>  |
| Project Title:          | Association Between Neuregulin-1 Mutations and Schizophrenia in a Pakistani Population : A Case-Control Study |
| Duration:               | 02-years  |
| Date of Initiation:     | 02.06.2010  |
| Date of Completion:     | 31.03.2013 Extended   |
| Total Expenditure:      | Rs.1,075,205/-  |
| Principal Investigator: | Dr. Haider Naqvi  |
| Name of Institution:    | The Aga Khan University, Karachi  |

## **SUMMARY:**

Schizophrenia is a mental disorder which runs a chronic course leading to brain dysfunction and the deterioration of personality. It affects one individual out of a hundred. Heritability and genetic risk is postulated to play a major role in the etiology of schizophrenia. NRG-1 is a susceptibility gene located on chromosome 8p and is a large gene of about 1.2 Mbp, with at least 30 exons and 9 potential promoters (Stefansson, 2002). Gene mutations, in the form of single nucleotide polymorphisms (SNPs), are known to contribute to the risk of the disorder. The aim of our study is to determine whether mutations in the NRG-1 gene are associated with schizophrenia in a sample of the Pakistani population. The study is expected to be conducted over a course of 2 years. In this report we have described the preliminary results of the study and the roadmap leading up to the conclusion of the project. The study was set-up jointly in the Department of Psychiatry and the Department of Biological and Biomedical Sciences Aga Khan University. The project oversight was provided by faculty in both the departments.

A total of DNA 630 samples (n=321 cases of schizophrenia and n= 309 controls) were collected from the Fountain House, Lahore and the Psychiatric Clinics at Aga Khan University. Among them 418 were males while 212 were females (see table for demographic work-up). The total genomic DNA was isolated and SNP8nrg433E1006 was screened by nested PCR followed by sequencing. The Neuregulin 1 (NRG1) gene sequences from patients and controls were aligned with Human NRG1-GGF2 gene sequence (Accession number NM\_013962.2), which served as a reference sequence. The single nucleotide polymorphism (SNP) G/A has been characterized at position 433 in NRG1 gene. The position 433, after aligning the NRG1-GGF2 gene, corresponded to position 92 in the alignment. We used NRG1-GGF2 sequence (position 92 in alignments) to locate SNP in the test and control groups. The test and control sequences were aligned with NRG1-GGF2 sequence using ClustalW algorithm implemented in the BioEdit software, and SNPs at position 92, in the respective test and control sequences were identified, using position 92 of the NRG1-GGF2 gene as reference (see annexure). The SNP was identified to be located on the (location) at the 92<sup>nd</sup> bp of the 163bp long amplified product. In our sample the nucleotide G was present in 62% of the cases while it was present in 30% of control subjects. Our analysis shows that the odds ratio of having the schizophrenia is 3.844.00 times higher in the presence of this SNP at the 92 bp of NRG-1 gene with the 95% CI, 2.0471 to 7.2033 and highly significant P

value, 0.0001. novel and interesting results have come forth out of cohort of ethnically diverse population. We are undertaking further analysis of the data for final publication of results in peer review journal. The work completed through this grant also opens the avenues for further research related to genetics of mental disorders.

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| <b>Project No:</b>      | <b>PSF/Res/S-KU/Med (278)</b>   |
| Project Title:          | Transcription Factors as Potential Molecular Target for Cancer Chemotherapy in Human Hepatic and Pancreatic Carcinoma Cell Line |
| Duration:               | 02-Years  |
| Date of Initiation:     | 15.10.2011  |
| Date of Completion:     | 14.10.2013  |
| Total Expenditure:      | Rs. 1,672,031/-   |
| Principal Investigator: | Dr. Huma Rasheed  |
| Name of Institution:    | University of Karachi, Karachi  |

#### **SUMMARY:**

Hepatocellular and pancreatic cancer has been spread worldwide with the increase of population and show high incidence of drug resistance upon treatment. Like other cancers it may also metastasize to different body parts. Isplatin, a broad-spectrum anti-neoplastic drug has been used for chemotherapy induces many adverse effects on body such as alopecia, bone marrow depression, renal failure etc. to avoid these adverse effects of anti-cancer drugs, the use of natural or herbal compounds is of great interest for the management and prevention these days. The naturally occurring plant derived compounds such as resveratrol, lycopene and harmaline have been reported to induce anti-cancerous and anti-proliferative actions in cancer of various origins. The m RNA was isolated from the PSN-1 and HepG2 cells treated with resveratrol, lycopene and harmaline at various concentrations. DNA was synthesized in order to carry out the quantitative real time PCR for gene expression determination. Quantitative real time PCR showed that PSN-1 and HEPG-2 cell line upon treatment with these compounds (10,50 and 100  $\mu$ M) demonstrated an altered gene expression of proto-oncogenes, c-Myc, c-Fos, c-Jun. the most potent reduction in proto-oncogene expression was demonstrated by lycopene in both cell lines. Similar results were obtained for the protein expression in western blotting studies. Hence these compounds may be beneficial to target the c-Myc, c-Fos, and c-Jun genes in patients of hepatic and pancreatic cancer to reduce the incidence of these diseases.

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| <b>Project No:</b>      | <b>PSF/Res/S-AKU/Med (230)</b>                |
| Project Title:          | Evaluation of Tumor Behavior in Breast Cancer |
| Duration:               | 02-Years                                      |
| Date of Initiation:     | 01.07.2008                                    |
| Date of Completion:     | 31.12.2010 Extended                           |
| Total Expenditure:      | Rs.924,423/-                                  |
| Principal Investigator: | Dr. Tariq Moatter                             |
| Name of Institution:    | The Aga Khan University, Karachi.             |

### **SUMMARY:**

Cyclooxygenase (COX-2), an inducible enzyme involves in the synthesis of prostaglandin and commonly over expressed in breast cancer. It is hypothesized that COX-2 plays an important role in carcinogenesis through regulation of angiogenesis. In our study, histological variables of breast cancer patients, including tumor size, tumor type, grade involvement did not show statistical significance on the other hand lymph node positive, ER and PR negativity was more concentrated in the HER2 amplified group and PR was statistically significant ( P=0.013). The frequencies of COX-2 SNPs in cases for rs689465GG, AG, AA were 68%,24% and 4% , rs689466AA, AG, GG were 74%, 12.7% and 2.7%, and rs20417GG, GC, CC were, 63.4%, 33.7%, 2.9% in breast cancer patients respectively. We observed that the frequency of rs20417 GC and CC were slightly higher in patients in comparison to control group but it was not statically significant. rs20417 GC (OR 1.4; P = 0.19) and CC (OR 3.2; P =0.079). Haplotype rs689465G -rs689466A- rs20417C (OR 2.909 CI 95%1.377-6.327, P=0.007) was more frequent in breast cancer patients versus controls and was statistically significant. All other haplotype were not associated with breast cancer risk. Pairwise linkage disequilibrium between SNPs was calculated using the online software SNPstat. The P value for SNPs rs689465 and rs20417 was 0.017, which suggested that these two SNPs are in close association; however, additional sample testing could confirm this observation. Present study suggested that COX-2 rs20417C allele and combined COX-2 SNP haplotypes have a role in breast cancer associated risk in Pakistan.

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| <b>Project No:</b>      | <b>PSF/Res/C-CIIT/Med (280)</b>                       |
| Project Title:          | Assessment of Genetic Risk Factors of Glaucoma        |
| Duration:               | 02-Years  |
| Date of Initiation:     | 01.07.2011  |
| Date of Completion:     | 30.06.2013  |
| Total Expenditure:      | Rs.1,187,720/-  |
| Principal Investigator: | Prof. Dr. Raheel Qamar                                |
| Name of Institution:    | COMASTS Institute of Information Technology Islamabad |

## SUMMARY:

Glaucoma is a genetically complex neurodegenerative disorder that results in the degeneration of the retinal nerve fiber and progressive loss of the visual field [1]. Approximately 70 million people suffer from glaucoma worldwide. Which makes it the second leading cause of irreversible blindness. As new cases continue to arise it is projected that this figure might rise to 80 million by the year 2020 [2]. Among different ethnic groups worldwide, Asian are the ones that have the highest number of individuals affected by glaucoma [3]. There are two main clinical subtypes of glaucoma, Primary Open Angle Glaucoma (POAG) and Primary angle closure glaucoma (PACG). Both these types are characterized by progressive and irreversible destruction of the optic nerve and degeneration of retinal ganglion cells (RGCs) [4]. POAG is the most common type and is characterized by trabecular meshwork degeneration leading to obstruction of the aqueous humor pathway [4]. PACG is characterized by shallow anterior chamber angle and complete or partial closure of the chamber [5].

Both these mechanisms lead to an increase in the intraocular pressure (IOP). Although several genome-wide linkage and associating studies have identified several loci, the molecular causes of glaucoma are currently poorly understood, complicating the design of therapies based on the underlying disease mechanisms [6]. In the current project we have thus attempted to understand the etiology of the disease. This was achieved by analyzing samples of different glaucoma patients and age matched controls. These samples were genotyped for 15 different single nucleotide polymorphisms. From these analyses we were able to define unique associations: including in gender, sub-type of glaucoma and ethnicity of the patients. In addition to the proposed work in the current grant we also managed to collect and analyze 30 families of congenital glaucoma, data of which are currently being analyzed and we hope to identify some novel genes from this part of our study.

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|-------------------------|---|
| <b>Project No:</b>      | <b>PSF/Res/S-AKU/Med (336)</b>  |
| Project Title:          | Vitamin D Binding Protein to (VDBP) Gene Polymorphism and <i>Diabetes mellitus</i> in a Pakistan Population |
| Duration:               | 02-Years  |
| Date of Initiation:     | 22.01.2013  |
| Date of Completion:     | 21.07.2015 Extended   |
| Total Expenditure:      | Rs.1,993,135/-  |
| Principal Investigator: | Prof. Dr. M. Perwaiz Iqbal  |
| Name of Institution:    | The Aga Khan University, Karachi.   |

## **SUMMARY:**

Recent reports have shown that vitamin D deficiency is highly prevalent in Pakistani population. There appears to be a relationship between vitamin D deficiency and type II diabetes mellitus (DM) in a number of populations in the world. Since type II DM is very common among Pakistanis, it is conceivable that vitamin D deficiency could be contributing to etiopathogenesis of this disease. The first objective of this project was to find out the frequency of vitamin D deficiency in a population of Pakistani patients with type II DM and compare it with age-matched apparently healthy controls. Vitamin D binding protein (VDBP) is a major carrier of vitamin D<sub>3</sub> and its metabolites. It is a product of Gc (group specific component) gene. Studies have shown that there is an association between VDBP (Gc) gene polymorphism with circulating levels of vitamin D<sub>3</sub>. There are only a few studies that have been carried out to investigate association between VDBP/Gc gene polymorphism and type II DM and none in South Asian region. Since association has been found mostly in non-Caucasian populations, the second major objective of the proposed study was to investigate the relationship (if any) between vitamin D status and different genotypes of VDBP gene in type II DM and healthy controls.

After obtaining the approval from the Ethics Review Committee of the Aga Khan University, 111 adult patients with type II diabetes mellitus (DM, age range 22-70 years; 75 males and 46 females) were recruited from the Endocrinology Clinics of the Aga Khan University Hospital with informed consent. Additionally, 116 age-matched (within 5 years) healthy controls were also recruited from the personnel of the Aga Khan University and other healthcare institutions in Karachi. Demographic characteristics of the two groups were determined using a questionnaire.

Ten ml fasting blood was obtained. Plasma/serum was analyzed for levels of 25-hydroxy vitamin D and other related biomarkers using kit methods. Genomic DNA was extracted from the whole blood using DNA isolation kit. Genotyping was carried out by using polymerase chain reaction followed by restriction fragment length polymorphism. Appropriate statistical tests were used to find out the percent deficiency of vitamin D in these two groups and the association of vitamin D levels and other risk factors for DM with genotypes of VDBP (Gc gene).

Vitamin D deficiency (levels < 20 ng/ml) was found to be highly prevalent in both patients and controls (41.4% and 84.5%, respectively) and was present in all major ethnic groups in the country. There appears no association between vitamin D deficiency and DM in this population. There is an association between house-hold income and vitamin D deficiency. Odds of vitamin D deficiency increase by nearly 2-fold in those individuals with house-hold income less than Rs. 50,000/- per month compared to those whose house-hold income was more than Rs. 50,000/- per month. Gc-1S is the most common allele followed by Gc-2 in Pakistani population. Among the samples analyzed so far, frequency of Gc1S-2 genotype appears to be significantly more in DM patients compared to healthy controls. Odds of having type II DM are 5-fold in females compared to males in this population. Study indicates that genetic factors contribute towards development of DM in Pakistani population. Moreover, monthly house-hold income appears to be associated with type II DM in this cohort.

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| <b>Project No:</b>     | <b>PSF/Res/P-UAAR/Med (259)</b>   |
| Project Title:         | Prevalence of Non-Alcoholic Liver Disease (NAFLD) in Local Population of Pakistani Origin |
| Duration:              | 03-Years  |
| Date of Initiation:    | 01.11.2010  |
| Date of Completion:    | 31.08.2014 Extended (10-months)   |
| Total Expenditure:     | Rs.1,668,440/-  |
| Principal Investigator | Dr. Ghazala Kokub Raja  |
| Name of Institution    | PMAS-Arid Agriculture University, Rawalpindi  |

## **SUMMARY:**

Non-alcoholic fatty liver disease (NAFLD) has been associated with several metabolic risks especially obesity and Type II diabetes (T2D) in which fat accumulates in the liver. Though NAFLD is considered benign, elevated risk phenotypes can progress it into advanced chronic liver diseases like cirrhosis/hepatocellular carcinoma. Due to rise in T2D and overweight/obesity in general Pakistani populations, present study was aimed to explore NAFLD prevalence, identify NAFLD predisposing metabolic risks and to explore their associations with disease. Population specific data (Anthropometric and biochemical tests) was collected from 1518 subjects with minor metabolic disturbances from out patients departments of local hospitals located in Rawalpindi/Islamabad, Pakistan. The comparative statistical analyses were performed to identify NAFLD predisposing risk parameters in total population and to find total as well as age and gender based disease prevalence. Frequency of major metabolic risk phenotypes were computed and their associations with NAFLD in age and gender

adjusted data were explored. Based on risk parameters, NAFLD prevalence of 11.3% was found in total study population with significant gender (12.2% in males and 10.4% in females) and age (15.8% in >40 years and 6.3% in <40 years of age) specific disease frequency trends. All NAFLD specific anthropometric and biochemical risk parameters were significantly elevated in diseased subjects as compared to those with normal levels. The age and gender adjusted association analysis of risk phenotypes with disease susceptibility also revealed highly significant correlations ( $p < 0.0001$ ). The results of present study clearly demonstrate high prevalence of NAFLD in subjects experiencing common metabolic risk phenotypes along with gender and age specific disease trends.

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| <b>Project No:</b>      | <b>PSF/Res/C-IBGE/Med (318)</b>   |
| Project Title:          | House Dust Mite Species and Allergen Levels in Pakistani Population: Molecular Characterization and a Phylogenetic Analysis |
| Duration:               | 02-Years  |
| Date of Initiation:     | 15.07.2011  |
| Date of Completion:     | 14.07.2014 Extended   |
| Total Expenditure:      | Rs.2,264,986/-  |
| Principal Investigator: | Dr. Muhammad Ismail   |
| Name of Institution:    | Institute of Biomedical and Genetic Engineering, Islamabad  |

## **SUMMARY:**

House dust mites (HDM) are microscopic arthropods inhabiting human dwellings. Active enzymes present in their faeces and other body parts are found in house dust, and have been described in many studies as a source of potent allergens causing atopic allergic diseases in human population. This study was designed to investigate the species diversity of house dust mites and the prevalence of HDM allergy in this region. Blood samples of HDM allergy patients were collected from local allergy clinics and diagnosed using the skin prick test. House dust samples were collected to isolate live dust mites and identify them taxonomically and on molecular basis. The bioinformatics resources like NCBI BLAST, UniProt, and ClustalW2 were used as tools for identification, sequence alignment and phylogeny analysis. Ligation independent cloning was used for the construction of expression vector and group 1 allergen was expressed in *E. coli*. HDM allergy was significantly higher compared to pollen and food allergies in the study region ( $p = 0.002357$ ). It is therefore important to focus research towards HDM allergy which has been ignored in the past years in Pakistan. During the course of this project approximately 9211 mites were examined out of which 8246 allergy causing Pyroglyphids were identified. *D. farinae* were the most prevalent species (61%)

followed by 29% *D. pteronyssinus*. In this study other Acarids were also found in house dust including family Cheyletidae and Orbitidae (non-allergenic) but their number did not exceed 11%. Mite counts demonstrated seasonal variations, we observed significantly high counts during monsoon season (July-August) when average temperature and percent relative humidity (%RH) is maximum. Bioinformatics analysis of group 1 allergen proteins from different mite species confirms a close evolutionary relationship between pyroglyphids and parasitic psoroptid mange mites. Recombinant Der p1 (rDer p1) gene was successfully cloned into the expression vector using LIC protocol for the first time. Reactivity of expression products (rDer p1) was demonstrated with dot blot assay and it can be used for testing HDM allergy in local allergy clinics. This is the first report on epidemiology of HDM allergy in Pothwar region.

### 1.1.2 Scientific Publications Produced through PSF Supported Projects

One of the main achievements and usefulness of any research is the publication of its results in scientific journals. Based upon the results of completed projects, 19 research papers were published in different national / international journals. Details are at **Annexure-IV**.

### 1.1.3 Higher Degrees Earned through PSF Supported Projects

One of the major goals of the Foundation is the development of scientific human resource in the country. This results in strengthening of R&D infrastructure of various scientific organizations. The Foundation has been developing scientific manpower through its research projects and the Research Associates employed in the PSF supported research projects to register for higher degrees. Following students working on PSF supported research project were awarded Ph.D/M.Phil/M.Sc. (Hons) degrees:

| S. No. | Project No.     | Name of the Researcher   | Degree awarded                                 |
|--------|-----------------|--|--|
| 1.     | P-AU/Bio (375)  | Mr. M. Nouman<br>Miss Iram Qadeer<br>Miss Faiza Rashid<br>Miss Naila Akram<br>Miss Sumaira Kulachi | M.Phil<br>M.Phil<br>M.Phil<br>M.Phil<br>M.Phil |
| 2.     | P-GCU/Bio (436) | Mr. Amjad Hussain  | Ph.D   |

|     |                               |  |  |
|-----|-------------------------------|--|--|
|     |                               | Miss Shagufta Arshad<br>Mr. M. Usman<br>Mr. M. Ayaz Ali  | Ph.D<br>M.Phil<br>M.Phil                   |
| 3.  | P-GCU/Bio (437)               | Miss Asma Zafar<br>Miss Uzma Hammeed<br>Miss Saima Nawaz<br>Miss Akza Iqbal<br>Miss Alveena Batt     | Ph.D<br>Ph.D<br>M.Phil<br>M.Phil<br>M.Phil |
| 4.  | P-PMAS.AAU /Bio (446)         | Mr. M. Bilal Anwar<br>Miss Amber Khalid<br>Miss Rukaya Naz<br>Miss Samavia Anwar<br>Miss Anum Fatima | Ph.D<br>Ph.D<br>Ph.D<br>M.Phil<br>M.Phil   |
| 5.  | PSF/Res/P-GCU/Bio (436)       | Miss Nadia Batool Zahra<br>Mr. M. Zada<br>Miss Shehla Shinwari<br>Mr. Shahid Ali Khan                | Ph.D<br>Ph.D<br>M.Phil<br>M.Phil           |
| 6.  | PSF/Res/S-LUMHS/Biotech (101) | Mr.Shakeel Ahmed Shaikh<br>Mr.Yaqoob Shahani   | Ph.D<br>Ph.D                               |
| 7.  | PSF/Res/S-HEJ/Chem (403)      | Ms. Mamoona Khatoon  | Ph.D                                       |
| 8.  | PSF/Res/C-QU/Chem (408)       | Mr. M. Ali Ahsan   | Ph.D                                       |
| 9.  | PSF/Res/P-CIIT/Chem (416)     | Mr. Ali Hassan   | M.Sc                                       |
| 10. | PSF/Res/S-HEJ/Chem (417)      | Mr. Saud Naheed<br>Ms Zunaira Khan<br>Javeria Siddiqui   | Ph.D.<br>Ph.D.<br>Ph.D.                    |
| 11. | PSF/Res/C-QU/Chem (419)       | Miss Farukh Jabeen<br>Ms. Sadaf Ikram<br>Ms. Sumera Kanwal   | Ph.D.<br>M.Phil<br>M.Phil                  |
| 12. | PSF/Res/S-HEJ/Chem (425)      | Ms. Shazia Haider  | Ph.D.                                      |
| 13. | PSF/Res/F-MU/Chem (434)       | Mr. Sajid Hussain  | M.Phil                                     |
| 14. | PSF/Res/S-SU/Chem (439)       | Subhan Ali Majidan<br>Mr. Sohail Ahmed Soomro  | Ph.D.<br>M.Phil                            |
| 15. | PSF/Res/ S-AKU/Med (242)      | Mr. Mohammad Ilyas   | M.S  |

|     |                           |   |                                  |
|-----|---------------------------|---|----------------------------------|
| 16. | PSF/Res/C-CIIT/ Med (280) | Ms. Humaira Ayub<br>Ms. Sobia Shafiq<br>Ms. Javeria Asghar<br>Ms. Sajeela Yousaf<br>Ms. Humera Ayub | M.S<br>M.S<br>M.S<br>M.S<br>Ph.D |
| 17. | PSF/Res/ S-AKU/Med (336)  | Ms. Khalida Iqbal   | M.Phil                           |
| 18. | PSF/Res/P-UAAR/Med (259)  | Ms. Masoom Fatima   | M.Phil                           |
| 19. | PSF/Res/ S-KU/Med (261)   | Ms. Uzma Mahmood  | Ph.D                             |

#### 1.1.4 R&D-Industry Programme

Focusing on collaborative research and strong industrial linkages, R&D-Industry Programme (previously called Industrial Linkages Programme) is bringing together researchers, end-users and the funding institutions at one platform for creating an environment of a unified approach to identify and solve industrial problems through applied research and technology transfer mechanism.

##### a) Under-Process Projects

During 2015-16, the following project proposals were remained under-process;

1. *“Development of Water-Proof Breathable Nanofibers Membranes for Raincoat Application”* received from Mehran University of Engineering & Technology, Jamshoro. The objective of this project is to develop a water-proof breathable nanofibre membrane for raincoat application. The textile industry would be its end-user once developed.
2. *“Development of Microbial based Feed Supplement and Evaluation of its Efficiency on Growth, Production and Health of Dairy Cattle”* received from Quaid-i-Azam University, Islamabad. The objective of this project is to introduce a feed supplement which would have positive impact on Growth, Production and Health of Dairy Cattles. M/s Shafi Resochem (Pvt.) Ltd. have consented to be its end-user once developed.
3. *“Permanent Magnet DC Generator”* from Ibn-e-Sina Institute of Technology, KRL, Islamabad.

4. *“Establishment of Model Biogas Plant for Biogas and Electricity Generation”* from Institute of Chemical Engineering & Technology, University of the Punjab, Lahore.
5. *“Utilization of Mango Kernel Starch as Biodegradable Packaging Films”* from Department of Food & Technology, University of Karachi, Karachi.
6. *“Development of an Indigenous Gasifier for Lignite Coal”* from Faculty of Engineering & Technology, Mehran University of Engineering & Technology, Jamshoro.
7. *“Design, Manufacturing and Installation of Gravitational Water Vortex Turbine at Mardan, KPK”* from Ghulam Ishaq Khan Institute of Engineering Sciences & Technology, Topi, District Swabi. This turbine would be used for electricity production through gravitational water vortex.
8. *“Enhanced Production of Protease by Using Agro-Industrial Residue and Gene Expression for Industrial Demand”* from Department of Biotechnology & Genetic Engineering, Kohat University of Science & Technology, Kohat.

**b) Projects Approved:**

1. Project entitled, *“Pilot Scale Demonstration and Popularization of Dual Technology of Bio-Geyser with Agro Waste Composting”* from Nuclear Institute of Food and Agriculture, Peshawar. This is a community based project. The raw material used in this geyser is abundantly available and the waste is used as fertilizer for crops.
2. Project entitled, *“Development of Eco-Friendly, Energy Efficient, Indigenous Sizing Machine”* from National Textile University, Faisalabad was approved by the Technical Committee on Engineering Sciences held on 14.09.2015.
3. Project entitled, *“Indigenous Development of Alumina Ceramic Faucets”* from Metallurgy Division, Dr. A. Q. Khan Research Laboratory, Kahuta, Rawalpindi was approved by the Technical Committee on Engineering Sciences held on 14.09.2015.
4. Project entitled, *“Nickel Metal Hydride (NiMH) Batteries”* from Metallurgy Division, Dr. A. Q. Khan Research Laboratory, Kahuta, Rawalpindi was approved by the Technical Committee on Engineering Sciences held on 14.09.2015.

5. Project entitled, "*Low Cost Ni-Cr based Dental Alloy Development for Commercial Usage*" from Metallurgy Division, Dr. A. Q. Khan Research Laboratory, Kahuta, Rawalpindi was approved by the Technical Committee on Engineering Sciences held on 14.09.2015.

### **c) On-Going Projects**

Following projects remained on-going during the report period with given progress;

1. Project Entitled, "*Development of Technology for the Synthesis of Pharmaceutical Raw Materials*" from PCSIR Labs. Complex, Lahore remained on-going during the report period. The First Annual Technical Report has been received. The local pharmaceutical industry is the end-user of this technology.
2. Project Entitled, "*Development of Eco-Friendly Products as Larvicidal/Insecticidal against Dengue Vector*" from PCSIR Labs. Complex, Lahore has been released an amount of Rs. 500,000/- as partial release of 1<sup>st</sup> installment. M/s Sitara Chemicals and M/s Green Environment (Pvt.) Ltd., have consented to be its end-user after successful completion. M/s Sitara Chemicals has contributed an amount of Rs. 200,000/- being 10% of the total cost of the Project. This project was undertaken by R&D-Industry Programme of the Foundation from PCSIR, Lahore through commercialization cell of Ministry of Science & Technology.
3. Project Entitled, "*Eco-Friendly Alternative Energy Source from Municipal Solid Waste*" from PCSIR Labs. Complex, Lahore remained on-going during the report period. The final technical report of this project is under review. M/s Waste Busters (Pvt.) Ltd. has consented to be its end-user and contributed an amount of Rs. 200,000/- for this Project. This project was undertaken by R&D-Industry Programme of the Foundation from PCSIR, Lahore through commercialization cell of Ministry of Science & Technology.
4. Project Entitled, "*Pilot Scale Studies and Commercialization of Indigenous Defluoridation Technology for Drinking Water*" from PCSIR Labs. Complex, Karachi remained on-going during the report period. This plant is being installed in Thar where people are facing defluoridation issue. 1<sup>st</sup> Semi-Annual Technical Report has been submitted by the P.I.

5. Project Entitled, “*Design and Fabrication of Solar Flash Desalination System under Hydrostatically Sustained Vacuum*” from Pakistan Navy Engineering College, NUST, Karachi remained on-going during the report period. The Semi-Annual Technical Report has been submitted by the P.I.
9. Project Entitled, “*Easy Maintainable Leather with Upgraded Properties through Advanced Nanomaterials*” from Leather Research Center, PCSIR Labs. Complex, Karachi remained on-going during the report period. The use of nanomaterials in leather have showed improved properties of leather, such as tensile strength, elasticity, wear resistance, stain resistant and fire resistant antimicrobial hydro etc. Aurums Chemicals Ltd., Karachi has consented to be its end-user after its successful completion.

**d) Completed Projects:**

The project entitled, “*Molecular Characterization, Mass Production and Formulation of Entomopathogenic Nematodes*” was completed. The Final Technical Report was adopted by the Technical Committee on Biological Sciences held on June 03, 2016 and subsequently, its final settlement was made and the project file has been closed.

|                        |   |
|------------------------|---|
| <b>Project No.</b>     | <b>PSF/ILP/S-KU/Bio (047)</b>   |
| Project Title          | Molecular Characterization, Mass Production and Formulation of Entomopathogenic Nematodes |
| Duration:              | 3-Years   |
| Date of Initiation:    | 02.07.2012  |
| Date of Completion:    | 30.06.2015  |
| Total Expenditure      | Rs. 5,501,200/-   |
| Principal Investigator | Prof. Dr. Shahina Fayyaz  |
| Name of Institution:   | National Nematological Research Center, University of Karachi, Karachi                    |

**SUMMARY:**

Entomopathogenic nematodes (EPNs) of the genera *Heterorhabditis* and *Steinernema* and their symbiotically associated bacteria of the genera *Photorhabdus* and *Xenorhabdus*; respectively are commercially used to control insect pests. Pakistan has a diverse climate with a number of regions that exhibit extremes in temperature and precipitation and soil samples taken from crop fields and grasslands. The survey

area covered a wide range of climate from subtropical to temperate regions. However, nematodes were recovered from all different climatic regions.

In this project survey was conducted to collect the soil from uncharted area from Biodiesel plant *Jatropha curcus* field, Pakistan state oil (PSO), Quaid-e-Azam Park and Malir, Karachi. Plant parasitic nematodes were recovered from eight samples and only one sample positive for EPNs from jatropha field. From Quaid-e-Azam Park, Karachi, Sindh, Pakistan new species *Steinernema. maqbooli* n. sp. was isolated around the roots of *Codiaeum variegatum* L. and from Malir Karachi, Sindh, Pakistan new species *Heterorhabditis. pakistanense* were isolated from Bermuda grass (*Cynodon dactylon* L.). Species were identified on the basis of molecular and morphological studies.

From Kashmir and Balochistan a total of 620 and 650 soil samples were collected, respectively. EPNs were recovered from 10% (65/648) of samples and 11.11% (50/450) of the geographical sites. Steinernematids were recovered from 84.61% (55/65) of the samples and 70% (35/50) of the geographical sites and heterorhabditids found in 15.38% (10/65) of samples and 30% (15/50) of the geographical sites of Kashmir. However, EPN were recovered from 12.19% (79/648) of the samples and 20% (90/450) from the Plateau of Balochistan. Steinernematids were recovered from 84.1% (67/79) of the samples and 61.1% (55/90) of sites and heterorhabditids were found in 15.8% (12/79) of samples and 38.8% (35/90) of the geographical sites (mainly from Winder, Hub) from geographical sites the Plateau of Balochistan, Two new species were recovered during this survey *S. balochiense* and *H. piperi* n. sp. *S. balochiense* was collected from soil samples of *Psidium guajava* (L.). This new species belongs to *carpocapsae* group. *H. piperi* n. sp. collected from a soil sample that was obtained from black pepper *Piper nigrum* L., vegetative area of Uthal, Balochistan, belongs to species in the *indica*-group. During additional survey a new species *Stienernema bifurcatum* were recovered which belongs to the '*bicornutum-ceratophorum-riobrave*' group by having two horn like structure in the labial region of infective stage juveniles. The new species is distinctly differs from other species of

the group (*S. abbasi*, *S. pakistanense*, *S. ceratophorum* and *S. riobrave*) by the presence of bifurcated gubernaculum at both proximal and distal ends and is a diagnostic character of new species.

Symbiotic bacteria of entomopathogenic nematode were identified on the basis of 16S rDNA. PAK.P.B.37, PAK.P.B.01, PAK.P.B.507 isolated from *S. bifurcatum*, *S. pakistanense* and *S. abbasi*, respectively, were genetically characterized by sequence of Accession no. KC020713, KP096497, KP096498 obtained from NCBI. Seven *Steinernema* isolates were examined using genetic analysis by ITS rDNA and 12S mtDNA. Phylogenetic analysis of these isolates was inferred by using four different methods i.e., Maximum Evolution (ME), Maximum Likelihood (ML), Maximum Parsimony (MP) and Neighbor Joining (NJ) based on the two makers. Sequence composition and phylogenetic analyses of these isolates showed closeness with *Steinernema abbasi*. On the basis of ITS rDNA region these seven Pakistani isolates were compared with seven worldwide isolates of *S. abbasi* and species of *bicornutum* group. While one isolate PAK.S.S.15 (JN599140) was analyzed using 12S mtDNA with other known species. In all four trees, isolate PAK.S.S.15 form monophyletic group with *S. abbasi* (AY944002). Phylogenetic relationships among Pakistani entomopathogenic nematode strains; steinernematids and heterorhabditid were estimated by nucleotide sequences using three molecular makers viz., Phylogenetic trees of ITS-1, 5.8S and ITS-2 rDNA (seventy nine); D2-D3 and 28S (LSU) sequences of rDNA region (fifteen) and 12S rDNA mitochondrial gene (twenty nine) were constructed to investigate the genetic diversity by using two different methods maximum parsimony (MP) and Bayesian inference (BI) in which most of them form highly to moderately supported clades. *S. bifurcatum* a heat tolerant species was also shared with Goungdong Entomological Institute, Guangzhou, China to investigate the heat tolerant effect, virulence against Pakistani and Chinese termite and also for the mass production and commercialization of biopesticide product. Results of *S. bifurcatum* against termite with comparison of Chinese isolates of EPN at 30 °C proved to be a most effective and heat tolerant species.

Cotton is the most important cash crop of Pakistan and plays a vital role in the economy of country. It is attacked by insect pests including bollworms. These pests are controlled by frequent use of pesticides. However, the indiscriminate use of synthetic pesticides has disturbed agro-ecosystem and costs over US\$ 195 million per year to the nation in terms of environmental and social costs. Pathogenicity and efficacy trials of indigenous entomopathogenic nematodes (EPNs) isolates have positive results. The number of bollworms on plants before and 24 hrs after EPN spray @ 1000 and 2000 juveniles/ml water were assessed for mortality percentage. All four species of insects, viz., *Helicoverpa armigera*, *Earias insulana*, *E. vitella* and *Pectinophora gossypiella* were found susceptible to infective juveniles of EPN species.

*Jatropha curcus* field, Pakistan state oil (PSO) was infested with termite *Coptotermes* spp., and mealybug *Paracoccus marginatus* Williams and Granara de Willink (Hemiptera: Pseudococcidae). Heavy infestation of termite (around root system) and mealybug was found on stem, leaves, flowers, fruits and on new flushes. EPN Pakistani isolate *S. bifurcatum*, PAK.P.S.37 and Chinese isolate *S. longicaudum* X-7 were effective against termite in soil and mealybug. Treated plants showed dramatically decline activity of termite and mealybug. Continues monitoring is required and for minimize damage of termite and mealybug.

Optimized method of *in vitro* production was adopted after training from Dr. Richou Han Laboratory, Guangdong Entomological Institute, Guangzhou, China. Pakistani strain was successfully mass produced and more efficient production found than soya, wheat and corn flour medium. Yields of *S. bifurcatum* Shahina *et al.*, (2014) were calculated as  $100 \times 10^6$  IJs/flask and  $180 \times 10^6$  IJs/flask of *S. maqbooli* Shahina *et al.*, (2013). Under this project visit of Chinese and Pakistani team was made for collaboration and sharing technologies between Pakistan and China (NNRC-GEI). In the completion of project two biopesticide products was prepared against vegetable pests for registration on two years trial.

### **1.1.5 Exhibition Organized:**

5<sup>th</sup> Invention to Innovation Summit-2016 was organized from March 2-3, 2016 at University of the Punjab, Lahore. Pakistan Science Foundation, University of the Punjab & Institute of Research Promotion jointly organized this summit. The industries aiming innovations in business were invited to visit and perceive new technologies and to commercialize them. An exhibition was the crux of this activity where researchers, academia personals, R&D organizations and industrialists having technologies engrossed with local R&D physically displayed their products, processes and technologies. Along-side, this summit proceeded with Technical Sessions facilitated by the R&D experts from public & private sector entities relating to different fields viz. Food Safety and Standards for Hotels & Restaurant Industry, Technologies for Mineral Based Chemicals and Material, Live Stock & Dairy, Technologies for Electrical and Communication, Business Plan Competition, Food Processing Technologies, Technologies for Agriculture Engineering, Pre-Harvesting Technologies for Agriculture Sector, Social Sector Innovation-Processes, Models and Marketing Ideas and Technologies Dyes & Pigments etc. This event is an annual activity of the joint collaboration of R&D-Industry Programme of Pakistan Science Foundation (PSF) and Pakistan Scientific & Technological Information Center (PASTIC), University of the Punjab and Institute of Research Promotion (IRP). This summit was fifth of its kind initiated way back in 2012. Hundreds of projects and technologies were displayed at the event from public and private sector. The Chairman, Pakistan Science Foundation, Vice Chancellor, University of the Punjab, Lahore, CEO, IRP and Rector, University of Management & Technology also addressed the audience regarding their vision about Invention, Commercialization and Socio-economic development through R&D.

First time, at this summit, Pakistan Science Foundation organized an exclusive session on “PSF Fund Winning Opportunities for Academia and Industry” at AL-Razi Hall, Center for Under-Graduate Studies, University of the Punjab, Lahore on 3<sup>rd</sup> March, 2016 at 09:00 a.m. This session was specially designed for the industrialists and researchers who have novel ideas but could not harness funds due to unawareness about research planning and development of project proposals.



(L to R) Dr. Mirza Habib Ali, Team Leader, R&D-Industry Programme, PSF, Prof. Dr. Akram Shaikh, Director General PASTIC, Prof. Dr. Amir Ijaz, Director, ORIC, PU, Prof. Dr. Mujahid Kamran, Vice Chancellor, PU, Prof. Dr. Muhammad Ashraf, Chairman, PSF Prof. Dr. Hasan Sohaib Murad, Rector, UMT, Mr. Abid H. K. Sherwani, CEO, IRP at 5<sup>th</sup> Invention to Innovation Summit-2016 at University of the Punjab, Lahore on March 2,

#### 1.1.6. Inventions and Innovations Programme:

The Foundation has initiated programme to translate the concepts into Innovations and Inventions and their movement toward commercialization for the benefit of the national economy. The scientists, researchers and students with innovative ideas are awarded with cash prizes. Students of different universities participate in different international events with their indigenously manufactures prototypes.

During the report period, a financial grant of Rs. 0.2 million was provided to 02 different proposals of inventions & innovations. The detail of the proposals is as under:-

- i. An amount of Rs. 100,000/- has been given to Team URBAN from Faculty of Mechanical Engineering, GIKI Institute of Engineering Sciences & Technology, Topi, District Swabi for “Designing and Fabrication of Urban Concept Car for Participation in Shell Eco Marathon, 2016”

- ii. An amount of Rs. 100,000/- has been given to the students of Pakistan Navy Engineering College, NUST, Karachi for “Designing and Fabrication of Urban Concept Car for Participation in Shell Eco Marathon, 2016”

## **1.2 Pak-US Natural Sciences Linkage Programme (NSLP) Endowment Fund**

Natural Sciences Linkage Programme (NSLP) Endowment Fund is an important component of Pakistan Science Foundation (PSF) which is aimed at enhancement of agricultural production through effective research. The outcome of this research will benefit the end user by uplifting the life standard and income of the farmers. The Fund is being managed by PSF through Board of Governors (BoG) and Fund Management Committee (FMC). The Chairman, PSF is the Chief Executive of the Programme/Fund.

### **Aims and Objectives:**

- To enhance cooperation among scientists from Pakistan and the United States of America in areas of significant mutual interests and benefits relating to natural sciences as applicable to agriculture.
- To increase the contact and collaboration among scientists and institutions of biological research, development and higher learning between the two nations.
- To provide researchers and institutions with opportunities to exchange information, ideas, skills and techniques.
- To enhance opportunities to collaborate in solving problems of common interest relating to natural sciences and to utilize special research and development facilities or opportunities available.
- To identify the researchable areas in natural sciences especially agricultural sciences with the aim to increase farmers profitability

### **Research Priority Areas**

Selected priority areas for collaboration may include, but are not limited to; Collection, Evaluation and Exchange of Germplasm, Plant Genomics, Plant Biotechnology, Stress Biology, Bio-Informatics, Application of Information Technology in Agriculture, Identification and Control of Animal/Plant Diseases, Dryland/Sustainable Agricultural Production System; Integrated Pest and Disease Management, Biotechnology, Microbiology, Agribusiness Development, Biophysics, Chemistry, Environment, Energy, Water Resource Management and Climate Change particularly with reference to Agriculture.

Project proposals which highlight main problems of agricultural sector are invited from Universities and R&D organizations across the country. Research work is emphasized on the food production & food security issues in Pakistani scenario. Currently 69 projects are being funded in different Universities and R&D organizations around the country under this

programme. Projects are received from researchers throughout the year; they undergo tough scrutiny and peer review before presenting to the Technical Committee, which comprises of eminent scientists from different specialized areas of agriculture and natural sciences. The target areas of these projects include germplasm screening of different crops, insect and pest management for the disease free crop production, nutrition management of crops and post-harvest technology. All these research issues are vital component of today's agriculture and are imperative in bringing the value added products in the market. Apart from this, many projects from specialized fields of animal sciences are also being funded. These projects include research in genetic screening of different animal breeds, feed technology and milk quality areas. In future, the fund aims to maintain focus on applied research projects related to Energy, Water resources management, Environment and Climate Change.

## **1.2.1 Activities and Programmes**

### **1.2.1.1 Research Funding**

Research funding is the principal activity of Natural Sciences Linkage Programme (NSLP) efforts are being made to establish linkages between end-users and scientists of different R&D organizations and Universities throughout the country. Projects of applied nature are selected for funding and research proposals received undergo the strict process of scrutiny before the funding. The criteria include the competence of the scientific personnel to carry out the research, institutional capabilities i.e availability of the basic equipment and laboratory facilities, scientific merit of the proposed research proposals and likelihood of completion of proposed research work within the stipulated time and funds requested. The proposals are reviewed by two Pakistani experts along with US experts. The proposals cleared by experts are placed in the Technical Committee for technical evaluation and recommendation. Technical Committee on NSLP comprises of the renowned scientists from various fields of agriculture and natural sciences. The proposals recommended by the Technical Committee are then submitted to NSLP Fund Management Committee (FMC) for administrative and budgetary approval, before the release of funds.

#### **a) Under process Projects:**

During the report period, 209 concept papers remained under consideration of the NSLP. Out of these concept papers, 14 projects were presented in one Technical Committee meeting held during the report period. Technical Committee recommended 3 new projects for funding at total cost of Rs.8.47 million. List of projects recommended for funding during the report period is given in **Annexure V**.

### **b) On-going Projects**

During the year 63 ongoing research projects and the progress reports of projects (semi annual, 1<sup>st</sup> and 2<sup>nd</sup> annual & final reports) were received. The NSLP staff scrutinized the semi annual reports before releasing of next due installment. Whereas, annual and final reports after initial scrutiny by NSLP team were sent for evaluation to the subject experts to assess the interim progress of the projects before next due installment. It is worth mentioning that due installment of the on-going projects are released only if the interim progress of the projects is rated satisfactory by the subject expert. An amount of Rs. 32.10 million was released on account of due installments of ongoing projects. A list of semiannual and annual reports is given in **Annexure VI**.

### **c) On-site Monitoring of NSLP Projects**

Natural Sciences Linkage Programme supports the scientific research throughout the country by funding projects of applied nature in different Universities and R&D organizations across the country. Technical Progress of the projects is monitored through the Semi Annual and Annual reports. Monitoring and Evaluation Wing (M&E Wing) has also been established in the Foundation for regular on-site monitoring of PSF funded projects.

During the year 2015-16 M&E Wing monitored twenty nine (29) projects being executed at different institution of Lahore, Sargodha and Faisalabad.

The monitoring team discussed the technical and fiscal issues and progress of the projects with the Principal Investigators and observed that all the projects are running smoothly without any major hurdle. Monitoring of the projects helped to improve the research quality for better results and in managing the issues related to management and execution of project. The list of projects monitored is placed at **Annexure-VII**.

### **d) Completed Projects**

During the year seventeen projects were completed. The subject experts evaluated the final technical reports of the projects which were subsequently placed before the Technical Committee for adoption. The accounts of these projects have been settled. Details of the projects along with the scientific output are given below.

**Project No.**

Project Title:

**PSF/NSLP/P-AU (235)**

Comparative Susceptibility of Some  
Indigenous Breeds of Goats to  
Gastrointestinal Parasitism

|                         |                                       |
|-------------------------|---------------------------------------|
| Duration:               | 2-Years                               |
| Date of Initiation:     | 15.5.2013                             |
| Date of Completion:     | 15.5.2015                             |
| Total Expenditure:      | 2,986,156/-                           |
| Principal Investigator: | Prof. Dr. Muhammad Nisar Khan         |
| Name of Institution:    | University of Agriculture, Faisalabad |

### **SUMMARY:**

Gastrointestinal (GI) parasitism remains a major constraint associated with the production of small ruminants under grazing/browsing conditions. The GI parasitism control strategies that usually adapted are chemotherapy, vaccination, pasture exposure, ethnoveterinary practices, pasture and grazing management, but all these have their own limitations such as anthelmintic resistance (AR), drug residues, cost of purchase, efficacy and environmental concerns. Genetic selection of lines or breeds of hosts (e.g goats) is a complementary tool used to control GI parasitism globally. In this research project, three commonly reared goat breeds named: Teddy, Beetaland Dera Din Pannah (DDP) were evaluated for their susceptibility towards artificial infection of *Haemonchus (H.) contortus*. A total of 72 goats were selected (24 from each breed). Experimental goats that were free from any GI infection were further exposed to artificial infection challenge with L<sub>3</sub>larvae. Animals were kept in controlled environment throughout the experiment. Faecal samples were collected from experimental goats on weekly basis and screened for egg count post infection (PI).

In conclusion, three different goat breeds showed different response towards *H. contortus* infection. Ultimately, this variation in response will formulate the base of selective breeding of resistant goat breeds. Selected breeding of resistant breed (Teddy) in the area will definitely enhance the economy of the herd owners in terms of negligible parasitic infections, cutting off treatment cost, low morbidity/mortality and high production. In the light of outcomes of present research, it can be recommended that selective breeding of parasite resistant goats should be carried out at rural as well as commercial level.

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| <b>Project No.</b>  | <b>PSF/NSLP/P-UAAR (147)</b>   |
| Project Title:      | Biotreatment of Industrially Discharged Azo Dye Contaminants Using Bioaugmentation |
| Duration:           | 3-years  |
| Date of Initiation: | :15.12.2011  |
| Date of Completion: | 14.12.2014   |
| Total Expenditure:  | 2,872,774/-  |

Principal Investigator:  
Name of Institution:

Dr. Azeem Khalid  
PMAS Arid Agriculture University,  
Rawalpindi

### **SUMMARY:**

Several dye contaminated wastewater and sludge samples were collected during the 1st year from the industrial outlets and wastewater streams of three districts (Faisalabad, Sheikhpura and Rawalpindi) of province Punjab. The wastewater and sludge samples were analyzed for pH, electrical conductivity (EC), total dissolved solids (TDS) and color intensity. A total of 374 bacterial isolates were obtained from wastewater, soil and sludge samples through enrichment technique. This study clearly illustrated that the selected strains had the potential to degrade different types of azo dyes and their metabolic products in textile effluents. During the final year of the project, a treatment strategy for industrial use was developed using bioreactors containing pyrolyzed carbon (biochar) as a support matrix for bacteria that can degrade azo dyes. Various feedstock materials were evaluated. Experiments with a continuous flow bioreactor using dye-degrading strain inoculated onto the biochar were performed. To demonstrate the practical application and benefit of biotreatment technology, experiments were performed to evaluate the impact of treated and untreated dye contaminated water on crop plants. Different levels (0 to 1000 mg l<sup>-1</sup>) of dyes or mixture of different dyes were used for irrigation purpose.

The results of pot experiments on maize showed that the plants irrigated with treated dye water showed significantly better growth at different concentration of dye than untreated control. The results also revealed that irrigation of maize plants with treated dye-contaminated water significantly increased the root growth, shoot growth and plant biomass compared with untreated plants. Another experiment was performed on pea plants. The results indicated that the selected bacterial strains were very effective in improving the shoot and root length and plant biomass of pea plants when irrigated with treated wastewater compared to untreated control. Similarly in another experiment the effect of treated and untreated dye wastewater irrigation was evaluated on plant growth and biomass yield of tomato plant. Maximum biomass production was obtained upon application of treated dye contaminated water (600 mg/L dye) as compared to control. The irrigation with treated water also increased the root and shoot growth as compared to plants irrigated with untreated water at different concentration of reactive black-5 azo dye. These findings imply that the dye degrading bacterial cultures may have a practical application for the recycling of industrial wastewater that could be used as an irrigation source for different crop plants.

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| <b>Project No.</b>      | <b>PSF/NSLP/P-LPRI (151)</b>   |
| Project Title:          | Sero-Prevalence and Molecular Diagnosis of Caprine Mycoplasmosis in Different Districts of Punjab” |
| Duration:               | 2-Years  |
| Date of Initiation:     | 20.07.2012   |
| Date of Completion:     | 19.07.2014   |
| Total Expenditure:      | Rs.1.694 million   |
| Principal Investigator: | Dr. Waseem Shahzad   |
| Name of Institution:    | Livestock Production Research Institute, Bahadur nagar, Okara                                      |

### **SUMMARY:**

The objectives of this project were to study the sero-prevalance of *Mycoplasma capricolum* subspecies *capripneumoniae* (Mccp) . To achieve these objectives, five goat populated districts such as Okara, Lahore, Faisalabad, Pakpatan, Bahawalpur and four Govt. Livestock Research Institutes such as Livestock Production Research Institute Bahadurnagar Okara, Research & Development Center Rakh Khare Wala district Layyah, Barrani Livestock Production Research Institute, Kherimorat district Attock and Livestock Experiment Station Rakh Ghulama District Bhakkar were probed for the collection of different nature of samples from the Contagious Caprine Pleuropneumonia (CCPP) suspected goats. For sero-prevalence study a total of 364 serum samples from suspected goats were collected from the project areas for detection of antibodies against Mccp by using cELISA kit. Thirty one samples out of 364 (8.52 %) were found positive for antibodies against Mccp. This is the first report about the prevalence of antibodies against Mccp by using cELISA in Pakistan. Latex Agglutination test was also conducted for sero-diagnosis of Mccp. A total of 577 serum samples were collected from the project areas for detection of antibodies against Mccp by Latex Agglutination Test kits. Two hundred eighty seven samples out of 577 (49.74) were found positive for antibodies against Mccp indicating a high and alarming prevalence of antibodies against Mccp.

For molecular diagnostic study a total of 1759 samples of different nature such as nasal swabs, pleural fluid, lung tissue, synovial fluid, lacrimal and milk samples were collected and were processed for isolation, identification and molecular diagnosis by using polymerase chain reaction (PCR) test. Out of 1759 samples, 570 samples showed turbidity in broth cultures and out of these 570 samples, 394 showed colonial growth on plates. Clones were prepared and then subjected to Polymerase Chain Reaction (PCR) for the Genus specific and

other identification of *Mycoplasmas*. This is the first report about the molecular diagnosis and prevalence of *M. agalactiae* in different districts of Punjab Pakistan. Furthermore to control the *Mycoplasma* originated respiratory disease in goats, the antimicrobial sensitivity test on field isolates of goats *Mycoplasma* indicated the high sensitivity to Tylocine drug.

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| <b>Project No.</b>      | <b>PSF/NSLP/P-FCCU (186)</b>   |
| Project Title:          | Subterranean Termite Management through Baiting Technology without Environmental Contamination |
| Duration:               | 3-Years  |
| Date of Initiation:     | 01-06-2012   |
| Date of Completion:     | 31-05-2015   |
| Total Expenditure:      | Rs.2,648,832/-   |
| Principal Investigator: | Dr. Khalid Zamir Rasib, Associate  |
| Name of Institution:    | F.C. College University, Lahore  |

#### **SUMMARY:**

Termites are social insects of the order Isoptera with about 3000 species in 281 genera (fifteen subfamilies and seven families. Termites are predominantly distributed in tropical environment, with the highest species richness in equatorial rainforest, and generally declining with increasing latitude. Termites are often separated into two groups, “higher termites” and “lower termites”. The group known as the “higher termites” (Termitidae), which makes up 75% of all termite species, has only bacteria present in the gut. In the “lower termites” protozoan symbionts can be found in the gut in addition to bacteria. These symbionts help with the digestion of cellulose. The lower termites are generally more primitive, having simple galleries but not well formed nests (with the exception of a few Australian Coptotermes (Rhinotermitidae) which have mounds for nests). Some have colonies without true workers, and generally eat only wood. Unlike higher termites, INTRODUCTION 2 lower termites usually occur in more temperate latitudes. Higher termites (Termitidae) are much more diverse ecologically. While some still consume wood, others have evolved different diets of herbage, grass, dung, humus, fungus, lichens, or organic material in soil.

The higher termites rely either on internal digestion with gut bacteria or external digestion in fungus combs (Edwards and Mill, 1986). The higher termites often build large nests or mounds, and are common in tropical areas, but are rare or absent in temperate climates. Termite families differ in the venation of the wings, soldier head capsule structure, and

worker gut structure. There has been a progressive simplifying of the venation in more evolved groups, so the Termitidae have the simplest wings, while the Mastotermitidae have very complex wing venation (Ferreira et al., 2013). Termites become economically important pests when they started to destroy the wood and wooden products of human homes, building materials, forests, agriculture crops and other commercial products (Monica et al., 2009). The major mound building termite species like *Odontotermes obesus* Rambur, *O. redemanni* Wasmann, *O. wallonesis* Wasmann, *O. horni* Wasmann, *Heterotermes indicola* Wasmann, *Coptotermes kishori*, *C. heimi* Wasmann, *Microtermes obesi* Holmgren, *Trinervitermes biformis* Wasmann and *Microcerotermes beelsoni* Snyder attack the bark and heart wood of standing trees such as *Butea monosperma* (Lam.) Taub., *Dipterocarpus indicus* Bedd., *Eucalyptus* sp., *Pterocarpus marsurpium* Roxburgh, *Santalum album* L., *Shorea robusta* Roth., *Terminalia bellirica* (Gaertn.) Roxb. *Swietenia macrophylla* King., *Dalbergia sissoo* Roxb., *Pinus wallichiana* A. B. Jacks., *Tectona grandis* Linn., *Toona cilita* M. Rome. *Haldina cordifolia* (Roxb.) Ridsdale etc. (Rajagopal, 2002; Remadevi et al., 2005) Baiting has been promoted as a desirable method of termite pest control. It is lauded as environmentally sound as it uses very small amounts of insect specific toxicants that are administered in localized baits that are targeted at the pest species (i.e. not large amounts of toxicants spread over large areas around a house).

However, in order for baiting to work successfully, termites must find and consume the bait matrix and for the toxicant contained therein to be transferred back to the nest. These requirements are not inconsequential: a successful baiting programme can take up to nine months. The current study focusing on the effect of toxicants i.e. fipronil and imidacloprid on the population size of both termites under lab and field conditions. The effect of Bait design and applications by employing combinatorial treatments on the survival and consumption of wood by highly destructive *O.obesus* and *C.heimi*. Influence of biotic and abiotic factors on termites activities. The wood was used in combinatorial treatments with sub lethal doses of imidacloprid and fipronil, Attractants (sugarcane baggase+ agar) and conidial concentration of *M. anisophilae* to improve the efficacy of bait matrix. The aim of the current project is to develop bait which has ability to control termites completely instead of eliminating it from specific area so through inspection of selected areas in order to investigate the consumption of bait by termites indicates its effectiveness and commercial applications.

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| <b>Project No.</b>      | <b>PSF/NSLP/P-PCSIR (195)</b>   |
| Project Title:          | Biosynthetic Pathway and the Appearance of Anthocynins in small Tropical Fruits of Nutraceutical Significance Grown in Pakistan |
| Duration:               | 3-years   |
| Date of Initiation:     | 01-06-2012  |
| Date of Completion:     | 31-05-2015  |
| Total Expenditure:      | Rs. 2.551 million   |
| Principal Investigator: | Dr. Asma Saeed  |
| Name of Institution:    | PCSIR Laboratory Complex, Lahore  |

### SUMMARY:

Several tropical fruit trees and shrubs, such as *Syzygium cumini* (Jamun) of Family Myrtaceae, *Grewia asiatica* (Falsa) of Family Tiliaceae, and *Morus nigra* (Shah-tut black) of family Moraceae are grown in Pakistan for their delicious fruits. These are traditionally used for several health benefits in the local medicinal systems. These seasonal fruits are available for only a short period of time and cannot be consumed during off-seasons because of their perishable nature and small shelf-life. Several naturally existing flavonoids present in small fruits have gained fundamental significance due to their nutraceutical properties. These flavonoids are strong antioxidant capable of scavenging free radical (R<sup>\*</sup>) and reactive oxygen species (ROS), therefore, possess anti-inflammatory, antiallergic, hepatoprotective, antithrombotic, antiviral and anticarcinogenic activities. Of these flavonoids, anthocyanins is an emerging class of compounds associated with distinct fruit colours (red, blue and purple) having several therapeutic benefits, for the treatment of cancer, diabetes, cardiovascular problems, and several other chronic diseases. Biochemical composition of flavonoids shows that these are the glycosides of polyhydroxy and polymethoxy derivatives of 2-phenylbenzopyrylium or flavylum salts.

The climatic conditions of Pakistan are favourable for the growth of variety of seasonal fruits. Small fruits like *Syzygium cumini* (Jamun), *Grewia asiatica* (Falsa) and *Morus nigra*, *Morus macroura* and *Morus alba* (Kalla-toot/black-mulberry, Pakistan-mulberry/Himalayan-mulberry and Safaid-toot/white-mulberry, respectively) of the family Moraceae appear on the plants for a short time thus available for a period of 1-2 months for consumption. The fruits are highly perishable and have shelf-life of only 2-3 days. These short seasoned fruits have remained little explored for the presence, identification, characterization, and quantification of anthocyanins, particularly with reference to their respective biosynthetic pathways. Most

of the reported studies are limited to their total quantity present in fully matured fruit. Knowledge of different anthocyanins present at different maturity stages of these fruits is non-existent. The full spectrum of anthocyanins in these fruits is also not well known. Knowledge of the developmental stages for the appearance of anthocyanins, is expected to be useful for understanding the mechanism and the end-compound anthocyanin appearance in these fruits. The study is expected to be further useful for the development of modified packaging systems, which will be useful for extending their shelf-life, their storage period, and for exploiting their export potential.

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| <b>Project No.</b>      | <b>PSF/NSLP/S-KU (240)</b>  |
| Project Title:          | Studies on Modification and Food Applications of Modified White Sorghum ( <i>Sorghum bicolor</i> ) Starch |
| Duration:               | 2-Years   |
| Date of Initiation:     | 01-02-2014  |
| Date of Completion:     | 31-01-2015  |
| Total Expenditure:      | Rs.1.243 million  |
| Principal Investigator: | Prof. Dr. Abid Hasnain  |
| Name of Institution:    | University of Karachi, Karachi.   |

#### **SUMMARY:**

Starch is a biopolymer widely used in food and non-food industries. Commercially, starches are extracted from corn, potato, cassava, wheat and rice grains. Pakistan is an agricultural country, still we spent around 58 million US dollars to import starches. There is only one country currently in Pakistan extracting starch on commercial scale from corn grains. Therefore, the aim of the research project was to isolate starch from indigenous sources. Sorghum is a drought tolerant crop and is extremely feasible for a country like Pakistan facing acute water shortage. The second objective of the study was to go for value addition of starch through chemical modifications. Chemical modifications are done to increase versatility of starches for food applications. Due to chemical modifications shear stability, thickening and gelling capability, increased. Secondly, the separation of water from sauces, puddings, custards spreads observed on refrigerated storage scientifically termed as syneresis was significantly reduced owing to these chemical modifications. Currently, no work has been done on chemical modification of starch on commercial scale in Pakistan. The third and last objective of the study was to derive useful products from these native and chemically modified white sorghum starches.

During the present study starch was successfully isolated from white sorghum grains via wet milling procedure and the yield was around 45-50%. For value addition different chemical modifications were performed namely, Octenyl succinylation, Crosslinking, Hydroxypropylation starch, acid-thinning, acetylation and succinylation. Dual chemical modifications were also performed on starches namely: acetylation+crosslinking, Hydroxypropylation+ crosslinking and acidthinning+succinylation. Acid-thinning significantly improved the gelation characteristics of starch for use in confectionery products. Succinylation, acetylation and hydroxypropylation significantly reduced the syneresis phenomenon in starch gels. Also clarity of starches was significantly improved. Octenyl succinic anhydride was used as a fat replacer to produce low fat mayonnaise. The low fat mayonnaise produced had very similar textural and sensory characteristics. The OSA starch successfully replaced 75% fat content in mayonnaise. Biodegradable films were also prepared from native and chemically modified starches using casting method.

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| <b>Project No.</b>      | <b>PSF/NSLP/KP-KUST (298)</b>  |
| Project Title:          | Biological Control of <i>Haemonchus contortus</i> by Fungal Antagonists in Small Ruminants |
| Duration:               | 1-year   |
| Date of Initiation:     | 01.09.2014   |
| Date of Completion:     | 31.08.2016   |
| Total Expenditure:      | 1.802 million  |
| Principal Investigator: | Dr. Baharullah Khattak   |
| Name of Institution:    | Kohat University of Science & Technology, Kohat.   |

#### **SUMMARY:**

Gastrointestinal parasites are the most serious obstacle to production and are the greatest economic constraint of grazing livestock in Pakistan, especially in the small ruminants. *Haemonchus contortus* is the most important and highly pathogenic nematode parasite of small ruminants. The proposed project deals with the biocontrol capabilities of different fungi against various stages of *H. contortus*. Initially, faecal samples were collected from rectum of the randomly selected small ruminants i.e sheep and goats. Eggs and juveniles of *H. contortus* were extracted from the faecal samples. Fungi was isolated from these samples and identified with identification key. After that, these fungi was evaluated in vitro for their parasitism on eggs and juveniles of *H. contortus*. The fungal cultures were subjected to ranges of temperatures and pH levels. The selected fungi with biocontrol potential was grown on various growth media and mass cultured on different substrates. Commercial formulations

of the fungal isolates was prepared for the effective control of *H. contortus*. The proposed study will help us understand the interaction of fungal biocontrol agents and *H. contortus* and will have a very deep and long lasting impact on Human Resource Development.

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| <b>Project No.</b>      | <b>PSF/NSLP/KP-UM (432)</b>  |
| Project Title:          | Physiological and Molecular Investigation for the Development of Phyto Extraction Technology for Remediation for Heavy Metal Contaminated Soil |
| Duration:               | 1-year   |
| Date of Initiation:     | 15.12.2014   |
| Date of Completion:     | 14.12.2015   |
| Total Expenditure:      | 1,183,648/-  |
| Principal Investigator: | Dr. Fazal Hadi   |
| Name of Institution:    | University of Malakand, Lower Dir.   |

#### **SUMMARY:**

Heavy metals are among the highly toxic pollutants present in the environment. Cadmium (Cd) is a hazardous heavy metal and its presence in soil is a serious threat to sustainable agriculture and environment. Contaminated food is the major source of Cd entrance into human body. Cadmium can severely affect almost all the vital organs of human body especially liver and kidney. Pollution of soil, especially agricultural fields contaminated with toxic heavy metals has become a global problem and demands economic, efficient and environment friendly remediation technologies. Phytoextraction is a plant based technology for the decontamination of polluted soil and water. It is an economic, solar driven, and environment friendly technology. In present study, physiological, biochemical and molecular characteristics of cadmium uptake and accumulation in *Ricinus communis* plant was studied for the development of phytoextraction technology

In first experiment, physiological and biochemical analysis were made with objectives; to find out the effect of Molybdenum (Mo 0.5, 1.00 and 2.00 ppm) on Cd phytoextraction and concentration of endogenous proline, phenolics and photosynthetic pigments in *Ricinus communis* plant grown in Cd (25, 50 and 100 ppm) contaminated soil. Molybdenum was applied as foliar spray, soil addition and seed soaking. Foliar spray of Molybdenum highly increased the Cd uptake and accumulation in plant. Seed soaking and foliar spray of molybdenum highly increased the biomass, concentration of free proline and total phenolics as compared to control plants. Positive correlations of proline and phenolics with Cd

accumulation were found in roots and leaves; suggesting a significant role of proline and phenolics in Cd phytoextraction. In second experiment, molecular investigation was carried out with objectives (1) To find out the presence of DREB-1A, DREB-1B, DREB-1F and CBF like genes in *Ricinus communis* plant (2) To evaluate the effect of molybdenum and cadmium on expression of these genes (3) To correlate the expression of genes with Cd accumulation, free proline and total phenolics concentration in plants. Molybdenum was applied as foliar spray (0.5, 1, 2 ppm) while Cd (50 ppm) was added to soil. cDNA was synthesized through reverse transcriptase (RT) PCR. Polymerase chain reaction (PCR) from genomic DNA and cDNA with genes specific primers were performed. Results confirmed the presence of DREB-1A, DREB-1B, DREB-1F and CBF like genes in *R. communis*.

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| <b>Project No.</b>      | <b>PSF/NSLP/S-KU (140)</b>  |
| Project Title:          | Assesment of Groundwater Quality and Soil Salinity in Parts of Thatta District, Sindh: Impact of Recent Floods on Agricultural Productivity and Options to Manage Salinity in Irrigated Lands |
| Duration:               | 2-years   |
| Date of Initiation:     | 16-08-2011  |
| Date of Completion:     | 31-07-2014  |
| Total Expenditure:      | 3,038,321/-   |
| Principal Investigator: | Prof. Dr. Viqar Husain  |
| Location of project:    | University of Karachi, Karachi  |

#### **SUMMARY:**

The study area covering about 900 sq. in the coastal parts of Shah Bandar, Keti Bandar, Ghora Bari, Kharo-Chan and Mirpur Sakro Tehsils of Thatta district. Present study was aimed at analyzing soil and water samples collected in the Post- and Pre-monsoon seasons of the years of 2011-2013 for their physico-chemical parameters to explain spatial and temporal variations in the soil and groundwater salinity and their impact on agriculture in the area. This study also included the types of crops cultivated and availability of canal water in the area and assessing the impact of floods of 2010 and 2011 on soil and groundwater salinity. Other objectives included recommending soil reclamation methods and other measures to increase crop yield and farmers income. Forty five sites were selected for soil and groundwater sampling. In order to evaluate the quality of soil different numbers of shallow groundwater were collected from available sources (shallow handpump wells) during Post-2011, Pre-2012,

Pre-2013 and Post-2013 respectively. The groundwater samples were collected at 18-50 ft depth following the same grid pattern.

Results show that soil salinity of coastal areas varies from area to area and season to season. It was maximum during Pre-monsoon than Post-monsoon season due to severe arid climatic conditions, low rainfall, shortage of canal irrigation water and capillary action of salty groundwater from shallow depth. Present findings also reveal that soil salinity depends on annual rainfall, evaporation and availability of canal water. During monsoon and flood period, soil gets enough water while, salinity decreases as rain/flood water dilutes the concentration of salts in the soil. The spatial mapping of soil salinity/sodicity in the study area comprising of Shah Bandar, Keti Bandar, Kharo Chan, Ghora Bari and Mirpur Sakero Tehsils has been carried out. The soil samples were collected in Pre and Post monsoon seasons of 2011-2013. The spatial distribution of soil salinity and sodicity has been discussed Tehsil and Season wise with the help of GIS maps. Soil salinity and sodicity concentrations are categorized as *High* (50 dS/m), *Medium* (20 dS/m) and *Low* (1.0 dS/m) in these maps.

**Project No.**

**PSF/NSLP/S-SAU (142)**

Project Title:

Study of the Long Term Impact of Farmer's Field School for Cotton Regarding Integrated Pest Management Practices in Sindh & Punjab Provinces of Pakistan

Duration:

2-years

Date of Initiation:

01-06-2012

Date of Completion:

31-05-2014

Total Expenditure:

Rs.1,531,14/-

Principal Investigator:

Dr. Zaheeruddin Mirani

Name of Institution:

Sindh Agriculture University, Tandojam

**SUMMARY:**

The National IPM program was one of major attempt to introduce Integrated Pest Management in the country during the years 2001-2004 and 2004-2009 in various crops and fruits including cotton crop. A unique model of Extension "Farmer Field School" was introduced in the country. The program during the years 2001-2004 trained a total of 425 IPM facilitators, majority of them belonged to agricultural extension staff, researchers, and farmers. A total of 525 crop season long FFS were conducted in Punjab, Sindh, and Balochistan. About 13000 farmers attended these schools. The NatIPM program provided an opportunity to the farmers to be self-decision makers. The program used capacity

development activities, enhancement workshops, farmers' congress, workshop on community and leadership management were organized (GoP, 2009).

Various impact assessment studies (Ahmad, I. (2002), Ahmad, L, Poswal, M.A., Soomro, M.H., and Yasmin, T. (2001), Khan, A; and Ahmed, I. (2005)) were carried out to show the program's effectiveness on various aspects including pesticide consumption, cost of production, pesticide import, agro-ecological, etc. However, it also had been hypothesized that the long-term impact of the NatIPM would occur over a period of time based on the involvement in the agricultural and rural development activities. Little has been done to describe and assess the long-term impact of the program on participants knowledge about IPM, problem solving skills, and changes farmers made in their attitude and behavior. Velsor (1998) presented a model of "Domains of Impact". He indicated five possible areas of change in an individual or group(s) due to the development efforts. He mentioned that it is not necessary that any one kind of development experience affects all the domains, which instead depends on the program objectives or intentions. In addition, he argued persuasively that although a development experience has an immediate affect (change in knowledge and self-awareness), other effects often occur over time (e.g. master of complex skills, and change in behavior). His model presents a continuum from the immediate effect to long term period time effect caused by an intervention.

**Project No.**

Project Title:

Duration:

Date of Initiation:

Date of Completion:

Total Expenditure:

Principal Investigator:

Name of Institution:

**PSF/NSLP/P-NIAB (164)**

Development of High Yielding and Disease Resistant Hybrids of Tomato

3-Years

01-06-2012

31-12-2015

Rs.3,199,826/-

Dr. Muhammad Yussouf Saleem

Nuclear Institute for Agriculture and Biology,  
Faisalabad

**SUMMARY:**

Tomato is grown in different parts of Pakistan in different growing seasons. It suffers from low to high environmental stresses like temperature, frost and humidity mainly responsible for the incidence of fungal and viral diseases. Diseases like early blight (EB), late blight (LB), cucumber mosaic viruses (CMV) and lack of varieties resistant to such diseases are some of the major limiting factors of low productivity of tomato in Pakistan. Farmers rely mainly on chemical control and cultural practices for the management of blight and CMV.

However, transfer of resistance into elite hybrids/cultivars is a principal and dynamic way to address these problems. The current project was awarded in 2012 to develop high yielding and disease resistant local hybrids of tomato. Hybrids are generally 3-4 times high yielder than open pollinated varieties.

Five promising lines were screened as tolerant to EB out of 105 lines through detached and whole plant assay. In addition to be tolerant to EB, these lines and a male sterile line showed tolerance to LB confirmed by DNA markers. Using these and other inbred lines, a number of high yielding hybrids tolerant to LB and EB were developed and evaluated at NIAB, Faisalabad as well as by Vegetable Research Institute, Faisalabad and its substations in different growing areas of Punjab, independently in competitive multi-location trials of 2013-14 and 2014-15. A low tunnel assay to distinguish late blight resistant and susceptible genotypes even for screening a large number of genotypes or segregating populations was also developed under this project. Low tunnel assay is highly efficient, simple and cost effective technique with minimum requirements of space, facility and pathogen inoculums. To the best of our knowledge, it is not an established technique in use for the same purpose anywhere. Current study has expounded sets of a number of disease resistant and high yielding general combiners/heterotic patterns to be used for hybrid breeding/cultivar development.

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| <b>Project No.</b>      | <b>PSF/NSLP/P-AU (175)</b>   |
| Project Title:          | Physical Forms of Feed & Feeding Regimes as a Measure to Combat the Environmental Stress and its Effect on Growth, Performance and Meat Quality in Goats |
| Duration:               | 2-years  |
| Date of Initiation:     | 01-06-2012   |
| Date of Completion:     | 31-05-2014   |
| Total Expenditure:      | 2,178,516/-  |
| Principal Investigator: | Prof. Dr. Muhammad Younas  |
| Name of Institution:    | University of Agriculture, Faisalabad  |

#### **SUMMARY:**

The objective of the current Project was to study the effect of various physical forms of feed under high input feeding system as a tool to combat the heat stress conditions in an effort to improve the quality and quantity of the goat meat. Total 108 animals with 54 Beetal and 54 Teddy were used in this experiment at GLF, Rakh Ghulaman, District Bhakkar and LES,

Allahdad Jahania, District Khanewal. The feeding experiments were done from July to November. The data were collected on feed intake, weight gain, body measurements, physiological norms, slaughter and carcass traits etc. Weather data was obtained from Pakistan Meteorological Department of the respective nearby locations. The feed was procured from the private feed mills after providing them the required formulation at Rakh Ghulaman during Phase I while feed was formulated and processed to make mash at Animal Nutrition Feed Mill Unit, at UAF then transported to Nice Feeds, Faisalabad for making pellets and crumbs during Phase II at LES, Allahdad. At the end, total 24 animals were slaughtered with 6 Teddy and 6 Beetal from each location. The results showed that the positive interaction of breed and physical form of feed for average daily gain and average daily feed intake. These results were supported by increase in blood metabolites readings.

However, the physical form of feed and breed were not interacted to environmental condition of locations. It is concluded that physical form of feed and breed were responsible for the improvement in the growth performance of the animals. Beetal and Teddy breeds performed better on pellets, however, Beetal preferred crumbs more than mash form while Teddy did not like crumbs. It is thought both breeds may have different choice of size of the pellets/crumbs. The slaughter traits also followed the same trend. However, the sensory evaluation score and other carcass traits were better for Teddy than Beetal. Teddy with the mash form had shown better preferences by the technical sensory panel while Beetal fattened with the pellets from did show the best carcass attributes. It is further concluded that the physical form of feed had interaction with the breeds. So the detailed research is required for knowing the particle size of feed for both breeds. For Beetal breed, the pellets were the best choice for fattening while for Teddy, pellets and mash forms. The genotype variation masked the location effect because the animals belonged to two different flock pertaining to Farms. So, it is recommended to use the animal of one flock for such studies and shift them to different places would be better option for study the impact of environmental conditions.

|                     |  |
|---------------------|--|
| <b>Project No.</b>  | <b>PSF/ NSLP/KP-NIFA (202)</b>   |
| Project Title:      | Development of Locally Adapted Canola ( <i>Brassica napus</i> ) F1 Hybrid using Induced Mutations and double Haploidy Techniques |
| Duration:           | 3-years  |
| Date of Initiation: | 01-06-2012   |
| Date of Completion: | 31-05-2015   |

|                         |   |
|-------------------------|---|
| Total Expenditure:      | 1,050,857/-   |
| Principal Investigator: | Mr. Iftikhar Ali  |
| Name of Institution:    | Nuclear Institute for Food & Agriculture,<br>Tarnab, Peshawar |

### **SUMMARY:**

Pakistan with the population of more than 190 million needs about 3.5 million tones vegetable oil for human consumption and 2.82 million tones vegetable oil of Rupees 210 billion was imported and about 0.700 million tones was locally produced to meet the local requirements during Rabbi 2013-14. There is less established cropping system for oilseed crops in the country. Currently, 0.59 million ha of the total cropped area under oilseed crops. Big gaps exist between potential yield and national average yield of various oilseed crops. About 65 to 75% of the yield potential has not yet been achieved in oilseed crops. Rapeseed and mustard are important species grown as oilseed crops in Pakistan. These species are rich source of oil and contains 42-48% good quality oil. In addition, its meal has 38-40% protein which has a complete profile of amino acids including lysine, methionine and cystine. The oil from canola quality rapeseed varieties is superior for human consumption and meal is an excellent feed for animals and birds especially poultry.

The major objective of the project was the development of Cytoplasmic Male Sterile (CMS) lines in rapeseed (*Brassica napus* L.) through the use of induced mutations and in vitro culture. The research activities initiated during June 2012 and rapeseed mutant generation (M<sub>1</sub>) was raised in field at HARS, Kaghan. The subsequently segregating M<sub>2</sub> populations of 10 genotypes were developed during Rabi 2012-13 at experimental fields of NIFA, Peshawar. Assessment of radio-sensitivity, frequency, effectiveness, and efficiency of the gamma mutagenesis was made through genetic analysis of M<sub>1</sub> and M<sub>2</sub> populations during the first year of the project. Gamma rays successfully induced male sterility in rapeseed plants at all levels of irradiation. Induced variability for male sterility was observed through chlorophyll/morphological mutations in M<sub>2</sub> population generations. The maximum successful F<sub>1</sub> crosses were achieved in crosses between sterile mutants of Abasin-95 and parent Abasin-95. The crosses between sterile and fertile mutant sister plants produced lower seeds as compared to crosses with initial parental cultivars. Analysis of segregation of induced male sterility in rapeseed (*Brassica napus* L.) genotypes was investigated. Genetic progeny tests in F<sub>1</sub> developed from crosses of sibs (M<sub>2</sub> mutant fertile plant) or initial parental genotypes demonstrated that various segregation ratios of male sterility were induced by gamma

mutagenesis. Four mutant pollen parents (sibs) segregated in 1:1 or 0:1 segregation ratio with more than 50% male sterility. This manner of segregation indicated that these four mutant pollen parents possessed sterility/partial sterility maintainer genes (msms) and these maintainer mutant rapeseed lines are good candidate for the development of potential CMS rapeseed lines through cross breeding. Seven mutant pollen parents also expressed partial sterility with a range 20 to 36 % male sterility and confirmed maintainer gene in their nuclei.

All the F1 crosses with initial parents produced plants with a range of 84 to 100% male fertility while two sib pollen mutant parents produced fertile plants with a 96% male fertility. These two sib mutant lines expressed the presence of MsMs genes in their nucleus. The both mutant sib could be used as potential restorer rapeseed lines as these genotypes indicated presence of nuclear genes responsible for male fertility. All the nine F1 progenies were observed as fit for segregation 3:1 ratio in F2 under the present studies and determined the presence of one mutated gene msms in selected genotypes. The presence of mutated genes confirmed the efficiency and effectiveness of gamma rays mutagenesis for induction of male sterility in rapeseed.

The development of doubled haploid plantlets was achieved through the experiments of Isolated Microspore Culture (immature pollen grains). Obvious differences in ability to produce haploid embryos and to regenerate haploid shoots were found between the thirteen (13) tested rapeseed genotypes. Genotypes Hayola-405, NR-23/09 and Durr-e-NIFA induced high frequency of embryos. Genotypes evaluated for the induction of callus demonstrated that only six out of the thirteen induced callus. Genotypes NIFA-Gold, Hayola-401, NR-23/09 and Hayola-405 induced higher frequencies for callus induction as compared to other genotypes. In case of shoot regeneration genotypes Hayola-405 and NR-23/09 both produced plantlets regeneration with higher frequencies. Genotypes Hayola-405, NR-23/09, Hayola-401 and NIFA Gold were found better responsive and embryogenic genotypes for in vitro regeneration of rapeseed plants through isolated microspore culture techniques.

**Project No.**

**PSF/NSLP/P-AU (245)**

Project Title:

Effect of Protein, Probiotics, Vitamin-C & E, on Semen Quantity & Quality, Health Biomarkers and Immunological Status of Retired Male Layer Breeders after Molting

Duration:

1-Year

|                         |                                       |
|-------------------------|---------------------------------------|
| Date of Initiation:     | 07-01-2013                            |
| Date of Completion:     | 06-01-2014                            |
| Total Expenditure:      | Rs. 2,090,756/-                       |
| Principal Investigator: | Dr. Tanveer Khaliq, Department of     |
| Name of Institution     | University of Agriculture, Faisalabad |

## **SUMMARY:**

In most of the agriculture based-countries like Pakistan, animal production is considered as the backbone of the economic infrastructure. In poultry industry, economic crisis are increased by bird cullings and time spent in rearing new chicks after the completion of production age of older flock which can be avoided by the induction of molting in birds at the end of their production cycle to rejuvenate their reproductive system. Merging the phenomenon of molting with supplementation of useful feed additives in post molt birds enhances the individual benefits of both techniques. Though studies have been conducted on assessment of useful effects of different supplements on overall health status of post molt layer, broiler and broiler breeders yet almost no research work was available from the literature archives on layer breeders. Therefore, the current research was designed to evaluate the beneficial effects of different dietary supplements including vitamin E, vitamin C, probiotics, 12% crude protein diet and combination of all these treatments on semen quantity and quality, health biomarkers and immunological status of post molt White Leghorn male layer breeders. For this purpose 270 commercially available male layer breeders at the age of 59 weeks were acquired and undergone Zn-induced molting after which they were given supplemented feed.

Results obtained after biochemical and statistical analysis showed that vitamin C and vitamin E significantly improved overall health status including health biomarkers, liver enzymes, protein profile, hormonal profile, lipid profile, mineral profile and immunological status of birds. Vitamin C and particularly vitamin E also enhanced reproductive performance of male layer breeders. Birds given vitamin C and vitamin E treatments showed improved semen volume, sperm motility, sperm concentration, eggs hatchability percentage and a lesser DNA damage. Other treatments like probiotics and 12% CP diet also helped improving some of health indicators yet the results were not as significant as that of vitamin C, vitamin E and combination treatments. Hence it can be easily concluded from the overall results that vitamin E and vitamin C must be added in feed of retired post-molt White Leghorn layer breeder males to have a good recovery from stress period caused by the molting

phenomenon. Merging the phenomenon of molting with that of supplementation of these vitamins gives much better results than that of molting alone. This would surely increase productive and reproductive life span of male breeder birds which will make breeder farming economical.

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| <b>Project No.</b>      | <b>PSF/NSLP/P-PU (53)</b>   |
| Project Title:          | Natural compounds from allelopathic Trees as Antifungal Agents against <i>Ascochyta rabiei</i> (PASS) |
| Duration:               | 3-Years   |
| Date of Initiation:     | 01-07-2009  |
| Date of Completion:     | 30-06-2012  |
| Total Expenditure:      | Rs.2.551 million  |
| Principal Investigator: | Dr. Arshad Javaid   |
| Name of Institution:    | University of the Punjab, Lahore  |

#### **SUMMARY:**

Chickpea (*Cicer arietinum* L.) is an important proteinacious food crop. *Ascochyta rabiei* (Pass.) Lab., the cause of blight disease, is the major biotic factor that limits chickpea productivity worldwide. The disease causes 20-25% yield loss in chickpea annually and may cause total failure to the crop under epidemic conditions. The most important control measure of this disease is the use of resistant varieties, but the resistance does not last long. Chemical control is also effective but it leads to health hazards. The alternative way to control the chickpea blight is the use of natural products and their synthetic analogues.

The present study was, therefore, designed to seek natural antifungal compounds from allelopathic trees for the management of *A. rabiei*. In screening bioassays, in vitro antifungal activity of different parts of four allelopathic trees viz *Melia azedarach* L., *Syzygium cumini* (L.) Skeels, *Eucalyptus citriodora* and *Alstonia scholaris* was evaluated against *A. rabiei* using water, ethanol and n-hexane as extracting solvents. The results of the present study indicate that allelopathic tree species possess substantial antifungal properties. Especially the antifungal constituents of *M. azedarach* leaves can be exploited for the management of *A. rabiei*. Among the five isolated compounds from *M. azedarach* leaves, four showed their antifungal activity. Especially the compound  $\beta$ - amyryn was very effective with MIC value of as low as 0.0156 mg mL<sup>-1</sup>. Structure of this compound can be used as an analogue for the preparation of a nature friendly fungicide for the control of one of the most destructive fungal pathogens of chickpea.

|                         |   |
|-------------------------|---|
| <b>Project No.</b>      | <b>PSF/NSLP/F-CIIT(51)</b>                                  |
| Project Title:          | Wheat Improvement by the use of Targeted Genomic Approaches |
| Duration:               | 3-Years   |
| Date of Initiation:     | 01-11-2010  |
| Date of Completion:     | 30-03-2014  |
| Total Expenditure:      | Rs. 1.928 million   |
| Principal Investigator: | Prof. Dr. Mohammad Maroof Shah                              |
| Name of Institution:    | COMSATS Institute of Information Technology, Abbottabad     |

### **SUMMARY:**

Wheat is the single most important crop plant species feeding majority of human population around the globe. Improvement in wheat is hampered by the complexity in ploidy level and large genome size. Chromosomal manipulation led the wheat researchers and scientist to target wheat genome directly for its improvement. The current project aims at targeting winter wheat improvement for winter and or semi-winter regions through its genome utilization using a battery of conventional and biotechnological tools. Winter wheat exotic and indigenous parental populations, chromosome substitution lines, exotic wheat lines and populations of known or unknown lineage, with winter and spring checks were subjected to evaluation for agronomic traits and molecular marker based screening for genes controlling important traits of winter and semi winter habits, grain quality, and biotic stresses. While collecting data the main focus was on grain yield, adaptation, early maturity, plant stature, mineral uptake, grain quality, and leaf rust resistance.

DNA based molecular work was focused at genotypic screening of the lines and subsequent selections (marker assisted selection-MAS) for key traits such as vernalization (Vrn), grain protein content (NAM-BI), Glutenin Proteins (Glu1), Leaf rust resistance (Lr9, Lr10, Lr58) genes. The markers used were of the mentioned genes and were designed using available sequence information from the wheat MAS data bases. A total of 11 wheat genotypes were identified as the most useful set of germ plasm with desired agronomic traits coupled with DNA markers associated with genes.. All these wheat genotypes showed presence of genes in combinations (at least 3 genes per genotype). The same germ plasm was found promising for agronomic traits either from previous work and or from the field evaluation. Almost all lines/parents showed significant differences.

|                         |   |
|-------------------------|---|
| <b>Project No.</b>      | <b>PSF/NSLP/C-IU (249)</b>  |
| Project Title:          | Molecular Characterization and Antibiotic Susceptibility Testing of <i>Clostridium perfringens</i> Local Isolates from Healthy and Diseased Animals |
| Duration:               | 2-Years   |
| Date of Initiation:     | 19.9.2013   |
| Date of Completion:     | 19.9.2015   |
| Total Expenditure:      | Rs.3,805,415/-  |
| Principal Investigator: | Dr. Zahid Iqbal   |
| Name of Institution:    | Isra University, Islamabad  |

### **SUMMARY:**

*Clostridium perfringens* is an important pathogen that provokes numerous different diseases in humans and other animals especially enterotoxemia in sheep and goats. There are various methods for the bacterial identification and characterization, many of which are labor-intensive, time-consuming and expensive also with low sensitivity and specificity. The aim of this research project was to isolate and characterize different types of *C. perfringens* using PCR molecular method. Based on molecular this characterization, a very useful data has been generated on microbial population heterogeneity. After this baseline information, another objective was to prepare candidate vaccine strains has also been achieved that would be helpful in the eradication of this disease (enterotoxemia) by formulating a new oil based vaccine using these vaccine candidate strains. For this study, fecal samples were randomly collected from healthy and diseased sheep and goats from different districts of Punjab province, Pakistan.

After processing and culturing of samples, the produced colonies were morphologically studied; Gram's staining was conducted and the genera of these bacteria were identified through biochemical tests. DNA extracted from biochemically characterized bacteria was subjected to genotyping by using Multiplex PCR with specific primers. Genotyping of isolated strains revealed that 87% of characterized samples were type A while 13% were type D. Types B, C and E were not found in any of the characterized samples. The results of our study indicated that only type A and D were prevalent in these areas of Punjab province, Pakistan. Antibiotic susceptibility test results showed that penicillin G, rifampin and ceftiofur were the most effective antibiotics against *C. perfringens*. On the basis of results of this study, we strongly recommend that a new oil based vaccine should be developed using locally prevalent strains.

|                         |  |
|-------------------------|--|
| <b>Project No.</b>      | <b>PSF/NSLP/C-NARC (213)</b>   |
| Project Title:          | Investigation on Fertility-Related Biomarkers in Buffalo Semen to Reduce Male Factor Loss (MFLs) |
| Duration:               | 3-Years  |
| Date of Initiation:     | 01.01.2012   |
| Date of Completion:     | 31.05.2015   |
| Total Expenditure:      | Rs. 3,963,210/-  |
| Principal Investigator: | Dr. S. Murtaza Hasan Addrabi   |
| Name of Institution:    | Animal Sciences Institute, NARC, Islamabad   |

### **SUMMARY:**

Quality of frozen semen is one of the most influential factors to establish a reasonable conception rate in the farm animals. Although male factors have been long recognized, it is only recently that scientific advances have allowed insight into specific causes and effects of male factors as a cause of significant loss in fertility. However, exploitation of these advances has largely yet to occur in buffalo AI services. Therefore, the present study was designed to test the selected biomarkers for assessment of fresh and cry preserved semen to reduce male factor-losses (MFLs) in buffalo AI during low and peak breeding seasons. Semen was collected from five adult Nili-Ravi buffalo bulls during May-June (low breeding season) and October-November (peak breeding season) with artificial vagina at 42°C. Qualifying ejaculates having >70% sperm motility and  $>0.5 \times 10^9$  sperm/ml concentration from each bull were diluted either in PBS-0.1% BSA (fresh) or Tris-citric acid egg yolk glycerol (TCA; frozen-thawed) extender.

The experiments were repeated for six times during the respective season. Bull effect on semen quality parameters (biomarkers) at post-dilution (fresh) and after thawing (freezing) was subjected to ANOVA. Tukey's test was applied to compare the means. Data regarding *in vivo* fertility were analyzed with Chi square test. Pearson's correlation coefficients were determined to provide a linear association between semen quality parameters and *in vivo* fertility. Step forward multiple regression analysis was used to determine the prognostic values of semen quality parameters for *in vivo* fertility as a dependent variable. The level of significance was  $P < 0.05$ . In conclusion, buffalo bulls differed when tested by applying the selected biomarkers of fertility in fresh and frozen-thawed semen during low and peak breeding seasons. The present study identified the potential sperm quality parameters that could serve as biomarkers of fertility in water buffalo semen during respective breeding season to reduce

male-factor losses. Moreover, the prognostic values of buffalo sperm quality parameters as predictors of *in vivo* fertility were better for frozen-thawed semen compared to fresh semen.

#### **1.2.1.2 Scientific Publications and Patents Produced through PSF Funded Projects**

One of the main achievements and usefulness of any research is the publication or patents of its results in scientific journals. Based upon the results of research projects twenty five (25) research papers were published in peer review journals the details of which are given at **Annexure VIII**.

#### **1.2.2 Project Formulation Workshops**

Four Project Formulation Workshops were organized to enhance the capacity of the researchers for writing project proposals. The workshops were organized at University of Poonch, Rawalakot on September 02-03, 2015, Government College University for Women, Faisalabad on January 20-21, 2016, Government College University, Lahore on March 30-31, 2016 and The University of Agriculture, Peshawar on April 27-28, 2016.

#### **1.2.3 Meetings of Fund Management Committee of NSLP**

During the year one meeting of the Fund Management Committee (FMC) was held on 04.11.2015 to review the financial matters of NSLP. The meeting was chaired by the Chairman, PSF/Chief Executive, NSLP and attended by members of the Fund Management Committee. The FMC approved budgets of seven new projects of worth Rs.19.70 Million, recommended by the NSLP Technical Committee.

#### **1.2.4 Meetings of Technical Committee of NSLP**

During the year 2015-16 one meeting of the Technical Committee (TC) was held on 10.05.2016 for technical evaluation the projects to be funded. The meeting was chaired by the Chairman, PSF/Chief Executive, NSLP and attended by the renowned scientists related to agriculture and natural sciences. A total of 14 new projects were presented to the Technical Committees out of which 03 projects were recommended for funding.

## 1.3 SCIENCE PROMOTION

### 1.3.1 Institutional Support Programme

One of the functions of the Foundation is to support the emerging R&D Organizations/Universities to strengthen their laboratories. During the report period, no case was entertained due to shortage of funds.

### 1.3.2 Financial Assistance for Holding Science Conferences, Seminars, Symposia and Workshops

Another function of the Foundation is to provide funding for holding conferences/seminars/symposia/workshops etc. In 2015-16, an amount of Rs.1.96 million was released to various institutions for organizing 17 conferences, seminars and workshops on important scientific topics. The detail is listed below:

| Sr. No | Title of Conference   | Name of Organizers   | Amount Released (Rs.) |
|--------|---|--|-----------------------|
| 1.     | 2 <sup>nd</sup> International Conference on Engineering Sciences (ISES-2015) on December 2-3, 2015 at University of the Punjab Lahore                             | Prof. Dr. Mahmood Saleem, Institute of Chemical Engineering & Technology, University of the Punjab, Lahore                                   | 100,000/-             |
| 2.     | International Workshop on Entrepreneurship, technology and Institutional Sustainability in Higher Academia on December 19, 2015 at Pearl Continent Hotel Karachi. | Prof. Dr. Rasool Bux Mahar, US-{CASW, MUET, Jamshoro   | 100,000/-             |
| 3.     | 5 <sup>th</sup> Invention to Innovation Summit on January 5-6, 2016 at NED University, Karachi.   | Mr. Abid H. K. Shirwani, CEO, Institute of Research Promotion, Suit No. 11,17 <sup>th</sup> Floor, Central , Barket, New Garden Town, Lahore | 100,000/-             |
| 4.     | International Conference of Biochemistry, Biotechnology and Biomaterials (ICBBB-2016) on February 22-24, 2016 at University of Agriculture Faisalabad             | Prof. Dr. Muhammad Asgher, Chairman Department of Biotechnology University of Agriculture, Faisalabad  | 200,000/-             |
| 5.     | 1 <sup>st</sup> Advances in Cancer and Haematology Conference on January 30-31, 2016 at Khyber Medical University, Peshawar                                       | Dr. Yasar Yousafzai, Institute of Basic Medical Sciences Khyber Medical University, Hayatabad Peshawar                                       | 100,000/-             |

|     |   |  |           |
|-----|---|--|-----------|
| 6.  | One Day International Symposium on Rural Advisory Services in Pakistan in the Scenario of Information Communication Technology (ICTS) on January 13,2016 at University College of Agriculture University of Sargodha. | Prof. Dr. Zafar Iqal<br>Principal, University<br>College of Agriculture<br>University of Sargodha<br>Sargodha.   | 100,000/- |
| 7.  | 2 <sup>nd</sup> National Conference on Metallurgy and Materials. on March 22 <sup>nd</sup> 2016 at Mehran University Auditorium Jamshoro  | Prof. Dr. M. Moazam<br>Baloch, Department of<br>Metallurgy and Materials<br>Engineering, Mehran<br>University of Engineering<br>and Technology, Jamshoro | 100,000/- |
| 8.  | Major Environmental Constraints to Plants: Assessment & Reclamations. on March 28-30, 2016 at Government College University Faisalabad.   | Dr. Naeem Iqbal<br>Associate Professor<br>Government College<br>University<br>Faisalabad   | 200,000/- |
| 9.  | Recent Advance & Challenges in Molecular Biology, biochemistry and Applied Biotechnology on July 25-28, 2016 at COMSATS Institute of Information Technology Abbottabad Campus   | Dr. Jamshed Iqbal Head,<br>Center for Advanced Drug<br>Research, COMSATS<br>Institute of Information<br>Technology, Abbottabad.                          | 100,000/- |
| 10. | 11 <sup>th</sup> International Symposium on Analytical and Environmental Chemistry on March 7-8, 2016 at National Centre for Excellence in analytical Chemistry of University of Sindh, Jamshoro                      | Prof. Dr. Tufail Hussain<br>Sherazi<br>National Centre for<br>Excellence in analytical<br>Chemistry of University of<br>Sindh, Jamshoro                  | 100,000/- |
| 11. | Innovation and Commercialization Success and Challenges in Biotechnology on March 01,2016 at National Institute for Biotechnology and Genetic Engineering Jhang Road Faisalabad.                                      | Dr. Farooq Latif Deputy<br>Chief Scientist National<br>Institute for Biotechnology<br>and Genetic Engineering<br>(NIBGE), Faisalabad                     | 60,000/-  |
| 12. | 1 <sup>st</sup> International Conference on Advancement in Biotechnology on March 30-31, 2016 at Government College Women University, Faisalabad  | Prof. Dr. Naureen Aziz<br>Qureshi<br>VC Government College<br>Women University,<br>Faisalabad  | 200,000/- |
| 13. | Algal Collection and Bio-Fuel Production on April 12-13, 2016 at Phycology Lab, Department of Botany, GC University, Lahore   | Dr. Ghazala Yasmeen Butt,<br>Chairperson, Department of<br>Botany, GC University,<br>Lahore  | 100,000/- |

|               |   |   |                    |
|---------------|---|---|--------------------|
| 14.           | Science Communication on May 18, 2016 at Hazara University, Mansehra  | Dr. Mohammad Ilyas, Assistant Professor, Centre for Human Genetics, Hazara University, Mansehra     | 100,000/-          |
| 15.           | Hydroponics Agriculture: Way Forward to Food Security on March 23, 2016 at PMAS-Arid Agriculture, University, Rawalpindi  | Prof. Dr. Khalid Saifullah Khan, Director ORIC, PMAS=Arid Agriculture, University, Rawalpindi       | 100,000/-          |
| 16.           | Biodiversity Awareness Through Science Communication. on May 22, 2016, at Department of Botany, University of Science & Technology, Bannu.                          | Dr. Faizullah, Assistant Professor, Department of Botany, University of Science & Technology, Bannu | 100,000/-          |
| 17.           | 27 <sup>th</sup> National and 5 <sup>th</sup> International Chemistry Conference. on August 22-25, 2016, Department of Chemistry, University of Malakand, Chakdara. | Prof. Dr. Rashid Ahmed, Chairman, Department of Chemistry University, of Malakand Chakdara.         | 100,000/-          |
| <b>Total:</b> |   |   | <b>1,960,000/-</b> |

### 1.3.3 Financial Support to Scientific Societies for Holding Scientific Conferences and Publication of Scientific Journals

The Foundation provides funds for Scientific Societies for holding their regular conferences, meetings and publication of scientific journals in various disciplines. During the period, an amount of Rs.1.0 million was released to 09 societies/journals:

| Sr.No | Name of the Society  | Title of Activity   | Funds Released (Rs) |
|-------|--|---|---------------------|
| 1.    | Annual Grant –in-aid to Zoological Society of Pakistan for the year of 2016. | Prof. Dr. A. R. Shakoori, Distinguished National Professor, President Zoological Society of Pakistan.                       | 200,000/-           |
| 2.    | Annual Grant –in-aid to Botany Society of Pakistan for the year of 2016.     | Prof. Dr. Anjum Parveen, Secretary/Treasure, Pakistan Botanical Society.  | 200,000/-           |
| 3.    | Pakistan Thalassaemia Welfare Society  | Lt. Gen. Faheem Ahmad Khan, President Pakistan Thalassaemia Welfare Society Opposite Rawalpindi Medical College, Rawalpindi | 100,000/-           |

|    |   |   |           |
|----|---|---|-----------|
| 4. | Pakistan Society of Nematologists                 | Prof. Dr. Shahina Fayyaz<br>General Secretary Pakistan<br>Society of Nematologist,<br>National Nematological<br>Center Karachi. | 100,000/- |
| 5. | Pakistan Association of<br>Advancement of Science | Prof. Dr. Saleem<br>Chaudhary, Secretary<br>General, Pakistan<br>Association of<br>Advancement Science<br>Lahore.               | 100,000/- |
| 6. | Islamic Society of Statistical<br>Sciences        | Prof. Dr. Munir Ahmad,<br>Funding/President Patron,<br>Islamic Society of<br>Statistical Sciences<br>Lahore.                    | 100,000/- |

### Scientific Journals

| S.No         | Name of the Journal                                   | Correspondence<br>Address   | Funds Released<br>(Rs) |
|--------------|---|---|------------------------|
| 1.           | Pakistan Oral & Dental Journal                        | Prof. Dr. Ahmad Iqbal,<br>Editor, Pakistan Oral &<br>Dental Journal Islamabad   | 100,000/-              |
| 2.           | Pakistan Journal of Pharmaceutical<br>Sciences (PJPS) | Prof. Dr. Iqbal Azhar,<br>Editor-in-Chief, PJPS &<br>Dean, Faculty of<br>Pharmacy &<br>Pharmaceutical Sciences,<br>University of Karachi,<br>Karachi. | 60,000/-               |
| 3.           | Farming Outlook                                       | Dr. Muhammad Tahir<br>Saleem, Editor, Farming<br>Outlook Street 39, I-8/2,<br>Islamabad   | 40,000/-               |
| <b>Total</b> |   |   | <b>1,000,000/-</b>     |

### 1.3.4 Awards and Fellowships

PSF provides a limited number of research fellowships to those M.Phil and PhD scholars who do not have any other source of income. During the year, no new request was accepted because of shortage of funds.

### **1.3.5 Financial Support for Scientific Survey**

The Foundation also provides funds for the scientific surveys to collect data on important scientific issues/problems. During the year, no new request was entertained because of shortage of funds.

## **2.0 SCIENCE POPULARIZATION**

The need of promotion and popularization of science and technology for economic growth and improving the quality of life of a nation can never be denied. Although, an irrational use of science and technology has also contributed to the current environmental, social and economic problems faced by humanity in the 21<sup>st</sup> century. The dream of scientific and technological development leading to economic self-reliance cannot come true unless all the segments of the society realize the importance of science and technology. Popularization of science through non-formal science education activities can play an important role for creating science awareness among the masses. There is a need to initiate sustainable and mega programs for motivating the students of our formal schools to study science from the grass roots level.

Under the action plan of the National Science Policy 1984 and National STI Policy 2012, the Government has assigned the task of popularization of science at grass roots level to Pakistan Science Foundation. Most of the PSF science popularization programs were initiated in 1987-88. These programs are organized outside the formal education system particularly for the motivation of the students towards science education. The primary objective of the activities is to increase society's awareness of science. Popularization of Science is broadly understood as the system of measures aimed at the dissemination, appropriation and valuing of science and technology goods, which include critical thought, ideas and values, the history and sociology of scientific knowledge, how science is practiced, and the results of scientific research and technological development. It aims to involve individuals in the excitement of Science, in order to increase the public understanding of science through the use of interactive exhibits and every day life examples. Science Popularization enables people to see the link between science and technology that has penetrated into every aspect of our life.

To achieve the objective of enhancing science awareness, PSF is undertaking a number of programs including:

- Science Caravan (Mobile Science Exhibition)
- Establishment of Science Centre, Museums, Herbaria & Planetaria
- Strengthening of the Laboratories of Govt. High Schools of rural areas
- Organization of S&T Fairs and Traveling Expos
- Organizing Science Poster, Essay and Quiz Competitions
- Holding Popular Science Lectures
- Donation of Popular Science Magazines and Scientific Books to Schools Universities and S&T Organizations
- Preparation and Dissemination of Scientific Literature in the form of leaflets, posters, booklets and brochures
- Financial Assistance for Science Popularization activities of the other organizations
- Use of Inquiry Based Science Education “la main a la pate”-LAMAP for motivation of students towards science education
- Establishment of Science Clubs in High Schools
- Participation of Pakistani students in International moots

These activities play a significant role in capacity building of the students for adapting and thinking upon the modern scientific inventions and technologies. In addition, popularization of science also helps to enhance personal satisfaction and self-esteem in the population. At present, with the growing importance of science and technology in all arenas of social life, the popularization of science is increasingly becoming significantly strategic issue. Detail of the activity is given below;

## **2.1 Science Popularization Activities**

### **2.1.1 Science Caravans (Mobile Science Exhibition)**

Science Caravans are meant for organizing Mobile Science Exhibitions for the students and general public. Science Caravan is a specially designed truck which carries a consignment of scientific and technological concepts displayed through simple exhibits, colorful diagrams, photographs, specimens along with their write-ups, inflatable Planetarium system and working models on various subjects. The science exhibition is installed in a central school/college and the students from the neighboring schools as well as general public visit these exhibitions. The visits are arranged in collaboration with the relevant Directorate of Education. Through these exhibitions, efforts are made to develop the skills of students to think and solve every day problems by application of science and technology in their daily life.

All narration are bilingual (Urdu and English) and accompanied with simple illustrations. Microscopes, computers, laser holograms and working models reflecting various phenomena of physics, chemistry, mathematics and biology through simple exhibits, Planetarium/film

shows are the main components of Caravan Exhibitions. At present nine Science Caravan Units are in operation. Eight units are stationed in the four provinces (two for each) and one is stationed at Islamabad. All Caravan Units continued their activities throughout the report period and organized Caravan Exhibitions in various schools countrywide. Summary of exhibitions is given below:

**Summary of Exhibitions by PSF Science Caravans**

| <b>Caravan Unit</b>                    | <b>No of Schools covered</b> | <b>No of students &amp; teachers/general Public</b> |
|--|------------------------------|---|
| Federal Unit                           | 111                          | 21,375  |
| KPK Units                              | 141                          | 26,327  |
| Punjab Units                           | 34                           | 15,101  |
| Sindh Units (Sukkur, Tandojam)         | 136                          | 25,874  |
| Balochistan Units (Quetta, Jaffarabad) | 84                           | 13,596  |
| <b>Total</b>                           | <b>506</b>                   | <b>102,273</b>                                      |

Detail of the Caravan Exhibitions carried out by all Caravan units is placed at **Annexure-IX**.

**2.1.2 25<sup>th</sup> Intra & Inter Board Science Essay and Poster Competitions**

Organizing Science Essay & Poster Competitions is regular and very successful activity of the Foundation. PSF in collaboration with all Boards of Intermediate and Secondary Education (BISE) of the country organizes the competitions among the students of high schools every year. So far the Foundation has conducted 25 Essay & Poster contests in which thousand of students have participated from all over the country.

In the first phase, the Boards of Intermediate & Secondary Education arrange Science Essay and Poster Competition within their jurisdiction on the theme approved by PSF and submit the results of the Intra Board level to the Foundation. After receipt of the results from all Boards, PSF organizes “Inter Board Contest” (the final) at PSF Head Office, Islamabad each year. Judges consisting of professors, scientists and artists evaluate the essays and posters received from all over the country for best three positions (winner of the winners). To encourage the students, PSF awards merit certificates and cash prizes to the winner students. The amount of prize money for the best three students of Intra Board level is Rs.5, 000.00, Rs.3,000.00 & Rs.2,000.00 and that for Inter Board level (Final) is Rs.10,000.00, Rs.6,000.00 and Rs.4,000.00 respectively.

This year the theme of the Essay Competition was “*Is renewable energy an economically viable option for Pakistan?*” and for Science Poster Competition the theme was “*Importance*

*of light for life*". Thousands of students from all over the country participated in these competitions and 117 winner students were awarded cash prizes. Detail of the winner students is placed at **Annexure-X and XI** respectively.

### **2.1.3 Donation of Scientific Literature to High Schools**

Donation of Popular Science Magazines and Scientific Books is one of the regular and important activities for science popularization. Popular Science magazines "Monthly Global Science" and Quarterly "Urdu Science Magazine" were distributed to 500 schools during the report period. Bimonthly Scientific Journal "The Fountain" published by The Light Publishing Turkey was also provided to Caravan offices, PASTIC offices and PMNH. A book titled; "Transgenic Plants" was also distributed among universities and colleges.

### **2.1.4 Financial Assistance to High Schools and Other Organizations**

In addition to its own Science Popularization activities, PSF provides financial assistance to high schools/other institutions for their science propagation activities. PSF also helps the schools in strengthening of the Science Laboratories. During the report period, an amount of Rs.140,000/- was sanctioned to 02 schools and S&T organizations for strengthening of their labs and arranging their Science Popularization activities **Annexure-XII**.

### **2.1.5 Popular Science Lectures**

Pakistan Science Foundation arranges series of lectures where eminent Scientists and educationists express themselves for the benefit of the audience Comprising scientists, scholars, students and the general public as one of its mandatory functions. During the current year 05 Popular Science Lectures were organized on different scientific themes; Every discovery creates new questions and we have to find the answer of these questions; says Dr. Nargis Mavalvala. PSF is working for better future of science and technology (S&T) in the country and promote science at grass-root levels by organizing different activities to create young leaders amongst scientists for steering the nation towards socio-economic development and prosperity, said Secretary Science and Technology Fazal Abbas Maken.

He was addressing as the Chief Guest at a Popular Science lectures titled "*Detecting Gravitational Waves; Now we can hear the Universe*" by Dr. Shaukat Hameed Khan, Coordinator General, COMSTECH and on "Gravitational Waves- From Prediction to Detection" Dr. Ashafaq Ahmed, Director, National Center for Physics. The event was organized by PSF on its premises under its popular science lecture series. The Secretary,

MoST appreciated the role of PSF in organizing a valuable lecture on the recent discovery in the world which is the major breakthrough in the field of Astrophysics.

A large number of students, teachers and scientists from various scientific institutions of the twin cities attended this interactive lecture. At present, the discovery of gravitational waves, predicted by Albert Einstein in 1916, is the most famous scientific achievement prevailing around us. The most important aspect in this discovery is the involvement of a Pakistani Scientist Dr. Nergis Mavalvala, Professor at Massachusetts Institute of Physics, USA. She is one of the key researchers who detected gravitational waves. These lectures will help to, popularize the new discovery in the field of Astrophysics and motivate Pakistani scientific community to achieve excellence in Science & Technology.

Dr. Nargis also interacted with the scientific community through video link and shared his educational background and experiences from Pakistan with the audience. She also briefed the audience about the discovery, and her role in the team who worked for this milestone discovery. In her closing remarks, she thanked PSF and Ministry of Science Technology for their efforts and said that every discovery creates new questions and we have to find the answer of these questions. For this we need consistent research.

Dr. Muhammad Ashraf, Chairman, Pakistan Science Foundation while welcoming audience said that in the coming years PSF is envisioned for greater interactions between researchers and industry for commercialization of research results and indigenous technology development, improved agricultural practices/capacity building of farmers for enhancement of agriculture production and food security in Pakistan, motivation of youth towards S&T, promotion of innovative projects by young scientists/ participation of students at International forums, establishment of Science Centers & Museum, Strengthening of Research & Display activities of PMNH, enhanced electronic connectivity of PSF with scientific community through automation of research activities, propagation of science through print & electronic media, declaration of PASTIC as National Repository of all S&T publications of the country / Optimum usage of ICTs for information retrieval and dissemination and international linkages with Foundations, Academies, Science Centres, Museums & International bodies around the world. Dr. Ashraf also talked to Dr. Nergis and invited her to visit Pakistan to share her ideas and achievements with the Pakistan Scientific community and students.

- **Simple diet, lifestyle key to heart diseases prevention: Gen. Dr. Kayani**

Maj. General Dr. Azhar Mahmood Kayani, Executive Director, Rawalpindi Institute of Cardiology delivered a lecture on “Prevention of Heart Diseases” at Pakistan Science Foundation (PSF) under its Popular Science Lecture Series on April 26<sup>th</sup>, 2016. A large number of scientists from different organizations, teachers and students attended the lecture. PSF Chairman Prof. Dr. Muhammad Ashraf (S.I.), ECO Science Foundation (ECO-SF) President Dr. Manzoor H. Soomro and PSF former Chairman Dr. Misbahuddin Sahmi were also present on this occasion.

Gen. Dr. Kayani in his comprehensive lecture discussed in detail, heart diseases, symptoms, causes, diagnosis and treatment. He said heart disease is number one killer in the world and 80 per cent of these deaths occur in South Asia only as arteries of people living in this part of the globe are narrow. He said categories of heart diseases include arteries blockage, valves blockage, heart muscles damage and problem in electrical system of heart. Dr. Kayani said that heart diseases can occur at any age due to smoking, mental stress, fatness and diabetes. He said damages caused by diabetes, high blood pressure, smoking, obesity, lack of exercise, high cholesterol and stress are reversible and can be prevented through healthy lifestyle and controlled diet. Speaking about rules and regulations to prevent heart diseases he said that learn to say no to diet that causes heart problems, learn to laugh loud, apologize on mistake and count upto 10 before exploding due to anger. He stressed on consuming diet based on vegetables, pulses and fruits and avoid fried foods teas and soda drinks. Speaking on this occasion, PSF Chairman Prof. Dr. Muhammad Ashraf (S.I.), called upon the scientists to tackle the issue of pesticides’ hazardous effects on vegetables and fruits. He stressed the need to use organic vegetables

#### **2.1.6 World Science Day for Peace and Development Celebrations:**

The WSD is observed all over the world on November 10 and PSF observes this day every year in a befitting manner. PSF in collaboration with other organizations like UNESCO, Intel, and Federal Directorate of Education organized various activities for students and scientists to commemorate the world science day like Convention of Scientists, Science Caravan Exhibitions, Panel Discussions on TV and Prize Distribution to the winners of PSF Annual Inter Board Science Essay and Poster Competitions etc. The theme selected by UNESCO for this year was “Science for a Sustainable Future”. Federal Secretary, Ministry of Science & Technology Mr. Fazal Abbas Maken, Ms. Beverly Jones, Representative UNESCO, Prof. Dr.

Manzoor H. Soomro, President, ECOSF shared their views. Students from different schools of Islamabad also displayed their projects. Medals, cash prizes and certificates were also distributed among the winners of PSF's 24th Science Essay & Poster Competitions, Intel ISEF and ASC. Science Caravan Units also celebrated the day.

**Sukkur** Science Caravan Sukkur Unit arranged speech competition on 13<sup>th</sup> November, 2015 at Govt. (Boys) Higher Secondary School (GHSS), Shahdad Kot. Mr. Irfan Ahmed, Assistant Director, Science Caravan unit Sindh Sukkur, Mr. Mohammad Mahmood Baloch, Incharge, Govt. Boys Higher Secondary School Shahdad Kot, Mr. Abdul Hakeem Brohi DEO, teachers, students (Boys) attended this program. At the end winner students were awarded cash prizes.

**Peshawar** Science Caravan Peshawar Unit arranged speech competition on "Science for a sustainable future" at GHS, No.1, Bannu on 10.11.2015. Three topper students in speech competition were awarded cash prizes and appreciation certificates.

**Tandojam** Speech competition among the students was organized at Govt. Boys High School, Badin on 14.11.2015. In which students, teachers and education officers also participated. Cash prizes were distributed among the students.

**Quetta** Science Caravan Quetta Unit arranged an Intra High Classes Speech Competition on "Sustainable Future for all" at IQRA Residential High School, Quetta on occasion of World Science Day on 10.11.2015. The chief guest, Mr. Allah Dad Khan Niazi, Principal IQRA Residential High School appreciated this speech competition organized by PSF, Quetta. He said that the competition is a great opportunity for the students to get knowledge about sustainable future using the best way of science and technology. The cash prizes were distributed by the chief guest amongst the position holders.

**Jaffarabad** Science Caravan Jaffarabad Unit arranged Speech and essay writing competitions on the occasion of World Science Day among the students of schools of Usta Muhammad. Cash prizes were distributed among the winner students as decided by Jury of the competitions.

### **2.1.7 Inquiry Based Science Education Programme in Pakistan**

PSF has initiated Inquiry Based Science Education Program in collaboration with Academy of Sciences France, Embassy of France in Pakistan, and Federal Directorate of Education. In this regard, number of training workshops and review meetings were conducted time to time.

PSF in collaboration with ECOSF conducted the training sessions at PAEC Education Centre, Chashma. PSF and DoST (Directorate of Science & Technology, KP) signed MoU for mutual cooperation and development of science culture in the society. Under this MoU, PSF organized four teacher training sessions on Inquiry Based Science Education in different districts of KP. In addition, training sessions were also conducted during Science Caravan Exhibitions, more than 500 teachers got benefit from these workshops.

## **2.1.8 New Activities and Future Plans**

### **Participation of Pakistani Students in International Scientific Forum**

PSF has the mandate to popularize and promotion of science at grassroot level in every corner of the country. Capacity building of Pakistani youth and sponsoring them for participation in International Scientific events is one of the important activities of the Foundation. PSF, being a focal organization for ASC coordinated with the organizers for participation of Pakistani students in ASC-15. This year Asian Science Camp was organized at Pathumthani, Thailand.

The idea of ASC was proposed after the Lindau Science Meeting 2005 by Prof. Yaun-Tseh Lee, the 1986 Nobel Laureate in Chemistry and Prof. Masatushi Koshiha 2002 Nobel Laureate in Physics to enlighten Science Talented Youth. The ASC International Advisory Committee approved that Thailand should host the ASC in 2015. ASC-2015 was 9<sup>th</sup> in the series. Following successful camp at Taipei (2007), Bali (2008), Tsukuba (2009), Mumbai (2010), Daijeon (2011), Jerusalem (2012), Tasukuba (2013) and Singapore 2014, the Asian Science Camp 2015 (ASC 2015) was held from August 2 to 8, 2015 at the Convention Center and Sirindhorn Science Home at the Thailand Science Park, National Science and Technology Development Agency (NSTDA) in Pathumthani. More than, 270 students from 29 Asian countries participated in ASC-2015.

The Pakistani delegation comprising seven students along with the Team Leader Dr. Naushaba Atta, PSO, PSF left for Thailand on 1<sup>st</sup> August, 2015. Prior to their departure for Thailand, a send off/orientation session was held at PSF on 1<sup>st</sup> August, 2015 in which PSF high officials, eminent scientists and educationists shared their experiences with the students and guided them for the intended visit. The students enthusiastically participated in the forum.

The students participated in the ASC-15 Camp are: Asad Jamil, Danial Amin, Maryam Khan, Muhammad Shoaib Butt, Aamir Zaryab, Hamna Ashraf and Muhammad Farhan Uddin Salik. The Asian Science Camp was inaugurated by Her Royal Highness Princess Maha Chakri Sirindhorn on 3<sup>rd</sup> August, 2015. She delivered a keynote address highlighting the importance of science education. Afterwards, the formal sessions of the Camp started. The Camp included seven plenary lectures by the Nobel Laureates, Panel Discussion, Group discussions and Poster presentations. The Students were encouraged to ask questions or discuss with lecturers at every scientific session in ASC-2015. The best question in each session was selected by the lecturer and declared for the “Best Question Award”. The prizes were given away to the selectees at the end of each day during the ASC-15.

The students also prepared posters based on the information the students obtained through the lectures and presentations. At the Poster Presentation session, the committee members closely observed all the posters and appreciated students’ presentations. The committee selected 18 most creative posters for the poster awards, including 3 Gold Awards, 3 Silver Awards, 9 Bronze Awards and 3 Honorable Mentions. Four Pakistani students won these awards. In addition, cultural activities were also arranged including cooking, flower making, pattle folding, boxing, dancing and cloth dying for the participants.

The closing ceremony was held on 7<sup>th</sup> August, 2015. At the occasion, the winners of the Best Question Awards and Poster presentations were announced. All the participants were also awarded certificates. By the Grace of Almighty Allah, the Pakistani students were able to win six awards as per detail given below;

- Ms. Maryam Khan won the Best Question Award and Honorable Poster Mention
- Danial Amin got Best Question Award and Bronze Poster Award
- Muhammad Shoaib Butt and Aamir Zaryab won Bronze Poster Award

### **2.1.9 Need assessment survey of Science Labs across the country**

PSF is actively engaged in promotion and popularization of science in the country. In addition to providing support to the universities for scientific researchers, PSF has been arranging a number of activities of creating science awareness at grass roots level including science fairs and exhibition, travelling expos, essay competitions, training on inquiry based science education, strengthening of science labs and many others. In this regard the Foundation has established a network of 09 Science Caravan offices & Centers across the

country. In connection with strengthening and up-gradation of govt. high schools' labs, PSF conducted need assessment survey of govt. high schools four districts (two advance & two backward) from each of the provinces and two from AJK and GB. Data about status of the labs of government sector high schools will be used in preparation of a PSDP project for strengthening of science labs in the schools. PSF Science Caravan and PASTIC staff conducted the survey.

#### **2.1.10 Establishment of Science Caravan Office at BZU, Multan**

In connection with enhancing the performance of Science Caravans, PSF new science caravan office has been established in the vicinity of Baha uddin Zakariya University, Multan. Prof. Dr. Muhammad Ashraf (S.I) Chairman, PSF inaugurated the unit on April 1<sup>st</sup> 2016. Prof. Dr. Tahir Amin, VC, BZU was the guest of honour at the occasion. All Deans and Directors of BZU and PSF Officer were also present. VC, BZU congratulated PSF Authorities for establishment of resource centres for S&T awareness of southern Punjab. He said this centre will be a source of inspiration for students and teachers. Prof. Dr. Tahir Amin Vice Chancellor BZU-Multan presented momento to Prof. Dr. Muhammad Ashraf. Dr. Ashraf thanked the management of BZU University for their support in establishing science caravan and PASTIC office in their premises.

#### **2.1.11 Participation in Pakistan Governance Forum/Expo 2015**

Ministry of Science and Technology put a joint stall of all its daughter organizations in an event titled “2<sup>nd</sup> Pakistan Governance Forum/Expo 2015” organized by Ministry of Planning, development and reform on 31<sup>st</sup> Dec, 2015 at International Islamic University, Islamabad. MoST designated PSF as Focal organization to coordinate with S&T organizations of MoST for setingup a stall in the event. The stall showed achievements in provision of good governance services and reforms during the past two and half year of this present government. A project titled “Science Talent Farming Scheme”, recently approved as project of PSDP being executed by PSF was highlighted in the stall and get warm appreciation from the general public/visitors. The forum/expo aims to provide a roundup of government achievements in various areas of governance; chalking out a plan of action for high priority reform initiatives for 2016 and provide opportunities for ministries/federal agencies to showcase their achievements/services being provided. It also act as a platform for various stakeholders to come together and share their experiences for mutual collaboration. The Federal Minister for Planning, development and reform, Federal Secretary of MoST, The

Chairman, PSF and Member Finance, PSF visited the stall. A large number of students, researchers, politicians, government officers and general public visited the stall.

#### **2.1.12 Future Plans/Targets**

- Transformation of Existing Caravan into Mobile Science Talent Farming Labs
- Organizing International Traveling Expo on Climate Change in Pakistan (in collaboration with French Embassy, Pakistan)
- International Training Workshops on IBSE
- Implementation of IBSE at Provincial level
- Foreign Trainings of PSF officers
- Strengthening of Science Centre, Faisalabad
- Establishment of Science Centres and Science Clubs
- Enhancement of all Science Popularization activities in collaboration with National and International S&T Organizations

### **3.0 PLANNING AND DEVELOPMENT ACTIVITIES**

#### **3.1 Activities under Development Budget**

##### **3.1.1 (a) On-going Development Project**

##### **i. Participation of Scientists and Technologists in International Science Conferences, Seminars, Workshops and Trainings Abroad (Phase II)**

An amount of Rs. 5.532 million was received under the on-going development project titled “Participation of Scientists and Technologists in International Science Conferences, Seminars, Workshops and Trainings Abroad (Phase II)” and the same was utilized for payment of travel grants to scientists/technologists for their participation and presentation of research papers in international forums/attending training courses, and other miscellaneous expenses.

##### **ii. Science Talent Farming Scheme (STFS) for 1800 Young Students Phase-I (Component-I)**

An amount of Rs. 450.00 million was received under the on-going development project titled “Science Talent Farming Scheme (STFS) for 1800 Young Students Phase-I (Component-I)”. An amount of Rs. 64.718 Million was utilized while rest of the amount was surrendered. Funds were utilized for the monetary benefits and the additional interventions designed for the students.

##### **3.1.1 (b) Activities under Non-Development Budget:**

Compilation of reports, presentations/comments on various S&T documents and replies to the National Assembly / Senate Questions.

### **3.1.2 Activities under Development Budget:**

#### **a) On-going Development Projects:**

##### **i) Participation of Scientists and Technologists in International Science Conferences, Seminars, Workshops and Trainings Abroad (Phase II)**

The project is aimed at providing financial assistance to Pakistani scientists, technologists, doctors and engineers working in R&D organizations and educational Institutions. The objectives of the project are as under:

- To provide financial assistance to Pakistani Scientists, Technologists, Doctors and Engineers working in R&D organizations and educational institutions as well as Ph.D students for,
  - i. participation and presentation of research papers in International Conferences, Seminars & Workshops abroad;
  - ii. attending short term (1-2 weeks) specialized training course or obtaining training on specialized laboratory equipment in laboratories of the advanced countries;
  - iii. undertaking part of research work for which facilities are not available in Pakistan,
- To keep Pakistani scientists and technologists updated about the latest research trends & techniques, enable them to share their experiences, exchange views with scientists in advanced countries.

During the year 2015-16, an amount of Rs.5.32 million was allocated / released under the PSDP and spent mainly for provision of travel grants to scientists/technologists/ other heads of the project. A total of 260 requests were received from scientists and technologists of the country. After comprehensive scrutiny as per eligibility criteria 145 requests were presented in 08 meetings of Travel Grant Award Committee (TGAC). A total of 115 requests were dropped due to non-confirmation to the eligibility criteria, non-provision of requisite documents by the scientists. Out of the 145 requests presented to the TGAC, only 42 were recommended by the committee whereas 32 scientists/technologists availed the grant (**Annex-XII**) and 10 could not proceed abroad due to visa problems and other reasons. However, 103 requests were not recommended by the Committee. The project has been completed on 30<sup>th</sup> June 2016 as per its mandated objectives. Case for the conversion of the

project activities to recurring side has been taken up with MoST in December 2015 as per directives of the DDWP forum. However, PC-IV with the achievements made till December 2015 was forwarded to Ministry of Planning, Development and Reforms in May 2016 as per their instructions.

**ii) Science Talent Farming Scheme (STFS) for 1800 Young Students Phase-I (Component -I)**

The project is included in the Vision-2025 of the Government of Pakistan. Science Talent Farming Scheme (STFS) is an important component of Vision 2025 which emphasizes on developing a competitive knowledge economy through value addition and improvement in the quality of science and technology education particularly in the Natural Sciences and Mathematics.

The project was approved in principle by the CDWP meeting held on 9<sup>th</sup> June 2015. The CDWP forum gave the directions to establish the “National Science School” within the premises of the Federal Capital having boarding facilities on the pattern of Cadet College for continuous support and grooming of the capable students having aptitude towards science education. The project is focused on capacity building of the young students through additional interventions in their formal education and developing critical thinking instead of rote learning. A total of 600 students of 1<sup>st</sup> year will be selected during the implementation period (two years) of the project through 3<sup>rd</sup> Party Evaluation like specialized written/ screening test, Computer based IQ test and presentation / interview. These students will carry out their studies up to F.Sc level in the specialized selected colleges along with the special interventions designed for them under the project.

Each year 300 science students who have passed their SSC examination from Government schools, with 60% marks in general and 70% or above marks in Science subjects, will be selected for their 1st year college studies (F.Sc level). However, after the establishment of the “National Science School” the selection of the students will be made on continuous basis by selecting students of 8<sup>th</sup> class each year for completion of their studies up to F.Sc level. Finally, out of the 300 students who will complete their F.Sc studies from Science Talent Farming Scheme (Phase-I by PSF), 150 potential students will move for their BS /M.Phil leading to Ph.D studies both for indigenous as well as foreign universities by the Higher Education Commission (HEC) in Phase-II of the project.

### **Project Objectives:**

Primarily, the project is meant to achieve knowledge based economy through capacity building of the youth, having aptitude towards science education. Major objectives of the STFS are;

- i. To identify the young students, interested and passionate towards science education through appropriate selection criteria like 3<sup>rd</sup> Party evaluation via written test, computer based IQ test and interview.
- ii. To groom and support the selected students all the way to the highest degrees by progressively exposing them to advancements in science and mathematics through inquiry based learning approach.
- iii. Purchase of land and hiring of consultant for establishment of the National Science School for continuous support of the selected students up to F.Sc level.
- iv. To provide opportunities to the toppers from the selected students for visit to the world leading science and technology institutions and universities.
- v. To arrange training sessions for students / teachers on Inquiry Based Science Education (IBSE).
- vi. The long run objective of the project is to create a nationwide pool of science popularizers.

During FY 2015-16, following achievements were made under the project

- 300 students were selected by the 3<sup>rd</sup> party evaluation including written test through a testing agency, computer based IQ test and interview while monetary benefits were given to 289 students.
- Launching Ceremony and Orientation Session of Science Talent Farming Scheme (STFS) was held on 20<sup>th</sup> July, 2016 at Islamabad. Prof. Dr Ahsan Iqbal, Minister for Planning, Development and Reforms, Mr. Rana Tanveer Hussain, Federal Minister for Science & Technology, Mr. Fazal Abbas Maken, Secretary Ministry of Science and Technology, Prof. Dr. Muhammad Ashraf, Chairman PSF and Project Director Mr. Hasnat Ahmed Qureshi were present in the event. The ceremony was attended by first batch of STFS 300 students, STFS Management, and Heads of S&T organizations.
- PSF organized a summer camp on 17-22 July 2016 at Hill View Hotel Islamabad for grooming and capacity building of the students. In this camp various activities like Inquiry Based Science Education Workshop, presentations by eminent scientists, visit to S&T organizations and universities were conducted. Students interacted with the

scientists and researchers at Pakistan Institute of Nuclear Science and Technology (PINSTECH), National Agriculture Research Council (NARC), National Centre for Physics (NCP), National Institute of Vacuum Science and Technology (NINVAST), National University of Sciences & Technology (NUST), Pakistan Museum of Natural History (PMNH), Pakistan Scientific and Technological Information Center (PASTIC), Pakistan Science Foundation (PSF) and Pakistan Academy of Sciences (PAS). During the visits, students were briefed about the research projects and major achievements made by these organizations and they were also brought to various laboratories and different experimental techniques and equipment were introduced to them.

- One of the major activities envisioned under STFS project is to provide the opportunity to 25 top students to visit S&T Organizations and Universities /Labs of other countries. The activity, on one hand gave healthy competition to the students and on the other hand developed their inter-personal skills and capabilities. During the financial year 2015-16, twenty five (25) students were selected on the basis of their academic qualifications, performance in the scientific aptitude test, computer based IQ test and interview. The candidates were selected as per federal govt. quota system. The students visited the different educational places at Singapore and Malaysia from 3<sup>rd</sup>-13<sup>th</sup> August 2016. During the visit, NUS High School of Mathematics & Science at Singapore and one North Festival (Science & Technology Expo) at Fusionpolis, Singapore“Creating Possibilities for the Future” were visited. While Langkawi Research Centre (PPL), National University of Malaysia-Langkawi, UNESCO Global Geopark, Langkawi, Petrosains Discovery Centre Kuala Lumpur, Aquarium, Petrosains Discovery Centre Kuala Lumpur, Perdana School of Science, Technology and Innovation Policy, National Planetarium, Malaysia-Japan International Institute of Technology (MJIT) and Putrajaya International Convention Centre were visited by the students during their stay at Malaysia.
- As per scope of the PC-I, mobile science caravan of Federal Unit has been re-fabricated and transformed into “Mobile Science Talent Farming Lab”. The new lab is equipped with latest equipment, computers, LEDS with touch screen for interactive learning of students. The talent farming lab now can accommodate 15-20 students at a time for telecasting the presentations and scientific videos.
- Meetings of the Inter-Ministerial Steering Committee and Executive Committee were held to obtain necessary procedural approvals.

- The process for identification of land for National Science School was initiated.
- Tendering / procurement of the project equipment, furniture and vehicle were completed.
- Advertisement for the recruitment of the staff was published in the national dailies and scrutiny of the applications in process has been completed and short-listing of the candidates is under process.

Details of the expenditure made under various heads of the project is given at **Annexure-XIII**.

### 3.1.3 New Development Project Submitted to MoST

PC-I of following PSDP projects were submitted to MoST for the consideration/approval of DDWP / CDWP forum.

(Rs in Million)

| Project Title  | Duration  | Amount    | Status   |
|--|-----------|-----------|--|
| Completion of the remaining Six Blocks and Strengthening of Research & Display activities of the Pakistan Museum of Natural History (PMNH) Islamabad | 24 months | 10233.711 | The PC-I was submitted to MoST in May 2015. P&D Cell MoST raised some observations and the PC-I was revised and submitted to MoST in April 2016 for the consideration of CDWP forum.   |
| Popularization of Science through Mass Media: Strengthening of PSF Science Media Cell  | 24 months | 57.621    | The PC-I was submitted to MoST in August 2015. Views/comments of the two reviewers were satisfactorily justified. MoST advised to make the MoU to be signed between PSF and National Press Club (NPC) as part of the PC-I. Signing of MoU is in process. |

|  |           |          |  |
|--|-----------|----------|--|
| Identification and Strengthening of Key Scientific Laboratories of Pakistan  | 24 months | 57.528   | The PC-I was submitted to MoST in December 2015. In response MoST was of the view that Federal Secretary MoST has desired to identify and strengthen the key scientific laboratories in high schools therefore PC-I may be amended accordingly. A fresh PC-I has been prepared for the key scientific laboratories in the Government high schools and submitted to MoST. |
| Identification and Strengthening of Key Science Laboratories in Government High Schools at Tehsil level across the Country | 24 months | 2826.743 | The PC-I has been prepared for the implementation of the policy action of the National ST&I Policy 2012. The PC-I has been forwarded to MoST in May 2016 for the consideration of the CDWP forum.  |

### **3.1.4 Activities under Non-Development Budget:**

#### **Submission of important reports to MoST/ Planning Commission:**

- ✓ Fixing of Targets and Submission of Regular Report on Achievements of the organizations
- ✓ Monthly Progress Report (Short Term and Long Term Targets/Action Plan)
- ✓ Sustainable Development Goals (SDGs)
- ✓ Analysis/ Recommendations for Cabinet Committee on Restructuring (CCOR)
- ✓ Implementation Status of Vision 2025
- ✓ Acquisition of Land for PSF Science Centre/ Museum at Jhang / Chiniote
- ✓ Resolution No. 220 regarding Establishment of Natural Science Museums moved by Senator Karim Ahmed Khawaja
- ✓ Government Mid-Term Performance Review
- ✓ Key Performance indicators (KPIs)

- ✓ Public Sector Development Programme (PSDP) 2016-17 and Projections for 2017-18 & 2018-19
- ✓ Formulation of Policy on Science & Technology Park
- ✓ Preparation of Annual Plan 2016-17

### **Technical Views/ Comments on the PC-Is received from MoST**

Technical views/comments on the following projects were submitted to MoST.

- Public Training Program and Promotion of PCRET Products/ Services for Accelerating the Penetration of Renewable Energy Technologies in Pakistan
- Construction of Faiz Ahmed Faiz Library, F-10, Islamabad
- Establishment of National Curriculum Council (NCC) Secretariat
- Capacity Building of Teachers Training Institutions & Training of Elementary School Teachers in Balochistan
- Prime Minister's Merit Scholarships for Top Position Holders enrolled at Pakistani Universities (HEC)
- National Innovation Award
- Establishment of SMART Schools

### **MoU's processed with concerned National bodies**

- MoU for Establishment of Science Centre at Karakoram International University (KIU), Gilgit-Baltistan between PSF and KIU
- MoU between Pakistan Museum of Natural History (PMNH), Islamabad and Education Department, Govt. of Sindh
- MoU between PSF and National Press Club Islamabad

## **4.0 INTERNATIONAL LIAISON ACTIVITIES OF PSF:**

Pakistan Science Foundation (PSF) has the mandate to establish liaison with similar bodies in other countries. During the year 2015-2016, International Liaison activities were further strengthened and new collaborations were doubled along with pursuance of previous international activities.

### **4.01 Memorandum of Understanding between Pakistan Science Foundation and Lanzhou University, China**

A Memorandum of Understanding (MoU) for bilateral cooperation between Pakistan Science Foundation (PSF) and Lanzhou University, China was signed on September 29,

2015 at PSF. Chinese delegation was led by Prof. Dr. Wang Cheng, President, Lanzhou University, China.

Under the MoU, Lanzhou University agreed to establish scientific and technological collaboration which would be of mutual advantage to both Institutions. To strengthen collaboration, both institutions agreed for active research collaboration in the fields of Natural and Physical Sciences. The bilateral collaboration will be established for reciprocal advantage, allowing the possibility of defining other research areas by mutual consent. In order to achieve the aims, collaboration will be strengthened through exchange of visits of experts, sharing of information, documentation, scientific publications and study meetings.



*Chairman, PSF and president, Lanzhou University signing the MoU. Federal Minister for Science and Technology Rana Tanveer Hussain and others witness signing of MoU by PSF Chairman Prof. Dr. Muhammad Ashraf and Lanzhou University China, President Prof. Dr. Wang Cheng*

#### **4.02 Awareness Seminar on EU Horizon-2020 at University of Karachi**

Pakistan Science Foundation (PSF) organized one day “Awareness Seminar on EU Horizon-2020 Programme” in collaboration with European Union Delegation to Pakistan and University of Karachi at University of Karachi on August 19<sup>th</sup>, 2015 for scientists and researchers of Sindh Province to take maximum benefits from this vital opportunity. The

seminar was attended by faculty members of the universities and Scientists from various universities and other R&D organizations of Sindh.

His Excellency Stenfano Gatto, Acting EU Ambassador for Pakistan was invited as the Chief Guest on this occasion. Prof. Dr. M. Qaiser, Vice Chancellor, University of Karachi and Prof. Dr. Muhammad Ashraf, Chairman PSF were also present. On the event, notable dignitaries, faculty members of the universities and scientists from various universities and other R&D organizations of Sindh were present. Mr. Denis Dambois, European Union Counselor, Scientific Affairs based at New Delhi office India, through video link emphasized on the dire need of innovative research for the developing nations.

H.E. Steafano Gatto, Acting Ambassador of EU in Pakistan expressed his views about the Awareness Seminar on Horizon 2020 at University of Karachi and said that European Union is a strong and diversified political institution. He further, congratulated Pakistan Science Foundation for organizing this seminar and thanked University of Karachi for hosting it.



*Chairman PSF, Dr. Muhammad Ashraf, H.E Mr. Stenfano Gatto, Acting EU Ambassador for Pakistan and Prof. Dr. M. Qaiser, Vice Chancellor, University of Karachi during the Seminar*



*H.E Mr. Stenfano Gatto, Acting EU Ambassador for Pakistan addressing the audience of EU , Seminar on Horizon - 2020 at University of Karachi on August 19, 2015*

#### **4.03 Collaborations/Meetings with Similar Stakeholders:**

##### **Meeting with Turkmenistan Delegation**

A 3-member high level delegation of Turkmenistan called on Pakistan Science Foundation (PSF) chairman Prof. Dr. Muhammad Ashraf (S.I.) on 14.11.2015 to discuss the avenues of joint cooperation between Pakistan and Turkmenistan for development of science.

The delegation comprised Turkmenistan Deputy Minister of Education, Turkmenistan Ambassador *H.E.* Atadjan Movlamov and Director of Turkmenistan National Institute of Manuscript, Dr. Ashyrov Annagurban. Senior officers from Ministry of Science and Technology, Ministry of Inter-Provincial Coordination and PSF were also present. During the meeting, Chairman, PSF briefed the delegation about PSF mandate, programmes and international liaison with S&T organizations of many countries. He informed that PSF has signed MoUs of cooperation with leading S&T organizations of China, Turkey and USA etc.



*Chairman, PSF during the meeting with Turkmenistan delegation on 14.11.2015.*

#### **4.04 PSF and Turkish Experts Visit NIFA**

A team of experts from PSF and Turkish Cooperation and Coordination Agency (TIKA) visited Nuclear Institute for Food and Agriculture (NIFA) on September 8, 2015 to examine Biogyser developed by NIFA Scientists. PSF team included Dr. S. Lal Shah, Director, PSD and Dr. Mirza Habib Ali, Director, Research Support, while TIKA team comprised of Mr. Mustafa Giray Tezel, Coordinator, Mr. Onur Ozturk, Deputy Coordinator and Engr. Muhammad Usman, Consultant (Waste to Energy). The team was briefed about the activities at NIFA and was given detailed demonstration about the working of Biogyser by Dr. Wisal Muhammad, Head Soil Science Division. The Turkish team appreciated the efforts of NIFA scientists in developing low cost, simple and potentially very effective technology for the benefit of community.



*PSF and NIFA officers along with experts from TIKA, Turkey at Nuclear Institute for Food and Agriculture (NIFA), Peshawar*

#### **4.05 Consultative Meeting on Girls Science Clubs and Female Participation in STEM Subjects in Pakistan**

Chairman PSF Prof. Dr. Muhammad Ashraf and Dr. Mirza Habib Ali, Director, Research Support visited British Council offices in United Kingdom from May 20-26, 2016 to attend the Consultative meeting on Girls Science Clubs and Female participation in STEM subjects in Pakistan.

The meeting was aimed to devise strategies to increase the girls enrolment in STEM subjects, STEM refers to as; Science Technology, Engineering and Mathematics. The current findings indicate that there is reluctance on the part of girls to choose STEM field due to social norms like parental expectation and resources, teacher expectations, extended family pressure, social status, career prospects, socially unacceptable aspects and safety, family obligations, necessity of travel and poor subject knowledge among teachers.



*Chairman PSF, Prof. Dr. Muhammad Ashraf and Director, Research Support/ International Linkages with British Council representatives at University of Bradford, UK*

#### **4.06 Call for Joint Proposals:**

##### **i. Call for Joint Proposals with China**

Pakistan Science Foundation (PSF) and National Natural Science Foundation of China (NNSFC) signed a MoU on 30th of October, 1992 for joint research activities. In order to further strengthen the ties between Pakistan and China, and to take maximum benefit from the experience of Chinese Scientists, Pakistan Science Foundation launched call for joint proposals with NSFC, China on 28.12.2015. The call was launched after a long process of discussing the modalities of funding in details with Chinese counter parts.

The call received positive response from scientists and as a result of this joint call, more than 200 proposals were received on key issues faced by both countries. Joint proposals were invited under Engineering Sciences, Earth Sciences and Agriculture & Biotechnology. After the completion of review process a total of 14 projects will be funded.

**ii. Call for Joint Proposals with (TUBITAK) Turkey**

The Scientific and Technological Research Council of Turkey (TÜBİTAK) is the leading agency for management, funding and conduct of research in Turkey. PSF signed MoU for joint cooperation with TUBITAK on September 17, 2013. Call for joint proposals with TUBITAK was launched on 01.07.2015, as a result of calls and more than 100 proposals were received. The proposals went through the PSF scrutiny process for finalization. In this connection the meeting of “PSF Adhoc Committee for Screening of Research Proposals received under PSF-TUBITAK Joint Initiative” was held on 06.01.2016 to examine the technical merit of project proposals submitted for financial support under PSF-TUBITAK Joint Initiative. The projects upon completion are expected to bring viable results beneficial for both countries.

**4.07. International Participation and visits:**

- i.** Chairman, Pakistan Science Foundation, Prof. Dr. Muhammad Ashraf participated in the “Stake holder consultation Meeting on the Current State and upcoming Challenges in Biosphere Management” in Tehran, Iran from October 04-06, 2015. The objectives of the meeting were to improve the capacities of local biosphere reserve managers and coordinators in Iran.
- ii.** Chairman PSF, Prof. Dr. Muhammad Ashraf visited Lanzhou University, China from 11.04.2016 to 15.04.2016 to discuss the modalities for the establishment of “Institute of Dry land Agriculture” at University of Sargodha.
- iii.** Prof. Dr. Muhammad Ashraf, Chairman, PSF participated in “The 2<sup>nd</sup> Forum on China-South Asia Technology Transfer and Collaborative Innovation” from June 12-16, 2016 at Kunming, China. Purpose of this Forum is to improve communication, coordination and collaboration among the science and technology by setting up “Innovation incubators” at each major institution of Science and Technology and Medicine to help entrepreneurs and Technology Parks to facilitate and strengthen Academia- Industry R&D Linkage.

**II. PAKISTAN MUSEUM OF NATURAL HISTORY  
(PMNH)**



Pakistan Museum of Natural History (PMNH), a subsidiary organization of Pakistan Science Foundation. It has four principal divisions namely, Botanical Sciences Division, Zoological Sciences Division, Earth Sciences Division and Public Services Division. The first three divisions are engaged in the collection, identification and research activities related to plants, animals, fossils, rocks and minerals resources of Pakistan respectively; while the latter is responsible for mass education and popularization of natural history.

## **1.0 Natural History Research**

Pakistan Museum of Natural History (PMNH) has four principal divisions namely Earth Sciences Division, Botanical Sciences Division, Zoological Sciences Division and Public Services Division. First three scientific divisions are engaged in the collection, identification and research activities pertaining to plants, animals, fossils and mineral resources of Pakistan, while the fourth one is responsible for mass education and popularization of natural history through various displays, exhibits and dioramas. Researchers of PMNH carried out extensive field works from the Coast of Arabian Sea to the Alpine regions, roamed through barren areas for the collection of Flora & Fauna, Rocks, Fossils and minerals not only for research work but also for the purpose of education because education is also one of the main objectives of PMNH. For this purpose, PMNH regularly organized trainings, workshops, seminars, symposiums and other educational interactive activities related to natural history, environment and Biodiversity of Pakistan. International days also been observed. PMNH has formed many national and international liaisons with the other research institutes in the country and from abroad. Due to these collective efforts of scientific and technical staff of PMNH and relations with other research institutions, PMNH has 650,000 natural history specimens in its repositories. Research outcome of these field works and National and International projects are published in the form research papers in reputed national and international journals.

### **1.1 Botanical Sciences Division**

#### **1.1.1 Field Work:**

- Dr. Syed Aneel Gilani guided the BSD field visit for the collection of the medicinal plants from Southern Punjab for the display at BSD. PMNH
- BSD scientists visited Muzaffarabad, Mirpur and Sind area for the collection of higher and lower plants specimens for the higher and lower plants herbarium respectively.

### 1.1.2 Laboratory Work:

- BSD Curated 6500 higher plant, 560 micro fungi and 410 algal samples.
- Identification of 34 specimens of higher plant herbarium from Chakwal of the Pakistan for the M.Phil research of the M.Phil students from University of Sargodha by Dr. S. Aneel Gilani. The specimens to be submitted to PMNH herbarium by the student after the submission of the thesis.
- Identification of 20 specimens of higher plant herbarium from Chakwal of the Pakistan. Re-arrangement and data entering of 200 Higher Plants specimens consisting of the herbarium almirahs from 01 to 38 under the supervision of Dr. S. Aneel Gilani (in charge Higher plant herbarium).
- Identification of 30 specimens of higher plant herbarium from various areas of the Pakistan along with the guidance of the 05 M.Phil students from University of Sargodha under the supervision of Dr. S. Aneel Gilani.
- Collection of 80 higher plants specimens from the field work at Bahawalpur and collected 80 specimens along with natural photography with discussion and consent from Dr. S. Aneel Gilani and Dr. Sumaira. The field work was conducted by the team consisting of Mr. Jamshed and Mr. Shabir.
- Identification of 70 specimens of higher plant herbarium from various areas of the Pakistan especially Baluchistan and GB along with 30 plant samples of Ph.D scholar Mr. Zakaraya (from PMAS Arid University Rawalpindi) from AJK for completion of the Ph.D research work in collaboration with Dr. S. Aneel Gilani.
- Collection of 10 macro fungi specimens from Islamabad along with 242 higher plants specimens from Neelum valley and Muzaffarabad along with 20 hybrid varieties of the *Morus* species collected from Sericulture Centre at Pathika on way to Neelum valley and deposited at the higher plants herbarium.
- The collection of Freshwater algae from Kotli Poonch River, 40 samples brought by Mr. Imran on 29-11-2015 along with microphotography 40 samples from collection on 22-11-2015.
- Indigenous plant of different districts of southern Punjab 1) Layah 2) Vehari 3) Bahawalpur 4) Cholistan received in BSD.

### **1.1.3 National Collaborative Projects:**

- Worked as Co-PI of NSLP funded project, “Mosquito Fauna of Pothwar Region: a resource-based approach” being executed at PMAS- Arid Agriculture University, Rawalpindi.

### **1.1.4 Publications**

- Sabina Mubarik, Ikramullah Khan, Rabia, Asma Memon, Ghazala Shaheen and Hashmatullah (2015). Pak. J. Weed Sci. Res., 21(2): 173-180.
- GhazalaShaheen, MudassirAsrarZaidi, Afroz R. Khan, Muhammad Anwer, Muhammad Javed Khan, PariGul, Masom Fatima (2015). Int. J. Pharm. Sci. Res., 34(1), Pages: 27-30
- Dr. Syed Aneel Ahmad Gilani (Associate Curator, BSD) Presented the research paper as guest speaker at the 5th National Conference on the "Trends towards Biodiversity Conservation in Pakistan" from 2-4 Aug-2015 at University of Peshawar, Baragali Summer Campus. He presented his research paper on the floral diversity of Cholistan and its impact in the livelihood of the indigenous people.
- Ahmed I., Qureshi R.A., Leghari M.K., Potter D., Gilani S.A., Khan A.M., Ahmad M and Zafar M. 2016 “Phycological Diversity and Taxonomic Studies of Algal Species from the River Sawan, Rawalpindi, Pakistan”. (Vol. 46, 1 | Jan 2016- Feb 2016. ISSN: 00068241. Pretoria, South Africa
- Kakar, K.U., Ullah R., Nawaz Z., Ishtiaq M., Ullah F., Gilani S.A., Shaheen R., Satti K. and Qureshi R.A. 2016. “Palynological Studies of Genus Draba L. (Brassicaceae) From Pakistan”. BAOJ Biotech 2016, 2: 2 (2: 009). BAOJ Biotech, an open access journal Volume 2; Issue 2; 008.

### **1.1.5 Seminars/Trainings/Workshops/Organized:**

- Organized workshop on “Mushrooms Hunting Cultivation and Cooking” from 10-11<sup>th</sup> April 2016 at Audio Video Hall, PMNH.

### **1.1.6 Seminars/Trainings/Workshops/ Attended:**

- Dr. Ismail attended the Launching Ceremony of E-Pakistan Vision-2025 on December 14, 2015 at Jinnah Convention Center, Islamabad organized by Pakistan Institute of ICTs for Development (PIID). The main purpose of the event was to

promote the use of ICTs in Public and Private Sector Organizations for the last five years and after sufficient outreach at gross root level in different parts of Pakistan.

- Dr. M. K. Leghari (DG. PMNH) and Dr. Syed Aneel Ahmad Gilani attended the Phycological Workshop 2016 entitled Algal Collection & Bio- fuel Production, as invited participant and specialist on 12-13 April 2016 at Department of Botany GC University Lahore.
- Dr. S. Aneel Ahmad Gilani attended the 2nd International Symposium on Biodiversity of Pakistan as invited / guest speaker at Peshawar University campus Baragali, Distt. Abbottabad from 22-24 May, 2016.

#### **1.1.7 National/international collaboration /Liaison**

- Collaboration with QadirBux Farm Faisalabad for establishment of live cactus diorama at PMNH.
- National Agricultural Research Centre Islamabad.
- QadirBux Farm Faisalabad for establishment of live cactus diorama at PMNH
- Department of Botany University of Haripur
- Liaison has been established with Snow leopard foundation Pakistan, PMAS Arid Agriculture University Rawalpindi and National Agricultural Research Centre Islamabad for the collaborative research and display activities.

#### **1.1.8 Services Rendered to Other Organizations**

- Dr. S. Aneel Gilani facilitating 3 M.Phil students from University of Sargodha as research supervisor and 2 M.hil students as co-supervisor at Atta-ur-Rehman Institute of Biological Sciences NUST.
- BSD officers facilitated the personal from leather industry for the guided visit to the PMNH display galleries and herbaria.
- Dr. Leghari facilitated three students of M.Phil from INAM University, collection from Sohan River, Nullah of Rawal Dam on 9-11-2015, fresh water Algal species.
- Dr. Leghari received PhD thesis from Quaid-e-Azam University, Islamabad as External examiner to conduct oral defence of Ph.D thesis entitled “The importance of pharmacological and medicine.

- Dr. S. Aneel Gilani facilitated and guided 5 M.Phil Botany students from INAMS University of Sargodha and 02 M.Phil students from NUST for their M.Phil research.
- Facilitated the 100 students of M.Sc, M.Phil and Ph.D from University of AJK along with 5 faculty members at the PMNH display galleries and BSD herbaria for their official visit to PMNH on 18-12-2015.
- Cactus display in progress by the BSD scientists supervised by Dr. M. Ismail Bhatti.
- Provided internship training, guided geological field tours to more than 280 students of Department of Geology, University of Haripur, University of Azad Jammu and Kashmir, University of Swabi and Bahria University.
- Dr. Syed Aneel Gilani working as convener of the PMNH reports writing committee, PMNH verification committee and member of the PMNH display committee. Dr. S. Aneel Gilani guided 4 M.Phil students of the University of Sargodha for their M.Phil research at BSD. PMNH.
- Dr. S. Aneel Gilani attended the meeting of the Executive Committee (STFS) held on 19th of January 2016 at PSF as in charge PMU-STFS PSF. He has verified and finalized the list of 300 students all across the country for the final selection of the STFS students.
- Dr. Ismail Bhatti Working as Node Manager GBIF.

## **1.2 Earth Sciences Division**

### **1.2.1 Field Work:**

- Ten days paleontological fieldwork in District Jehlum and Mianwali. 06-10-2015 to 16-10-2015,
- Twelve days geological fieldwork in Sindh areas (north of Laki Range), 23-11-2015 to 05-12-2015.
- Ten days geological fieldwork in Samana Range, Kohat area, 30-10-2015 to 9-11-2015.

### **1.2.2 Laboratory Work:**

- ESD collected 1902 geological specimens catalogued 4780 specimens and digitized 2870 specimens.

### 1.2.3 Publications

#### **International:**

- ElkeSchneebeli-Hermann, Wolfram M. Kürschner, Hans Kerp, Benjamin Bomfleur, Peter A. Hochuli, Hugo Bucher, David Ware, GhazalaRoohi, 2015. Gondwana Research, volume 27, issue 3, pp. 911 – 924.

#### **National:**

- Ghazala Roohi, Syed Mahmood Raza, Abdul Majid Khan, Rana Manzoor Ahmad and Muhammad Akhtar. 2015. Pakistan J. Zool., vol. 47(5), pp. 1433-1443.
- AamirYaseen, Kamran Mirza, ShahidJamilSameeni ,SajjadKaramat, Sakander Ali Baig and Saif- Ur- Rehman (2015). Sci. Int. (Lahore), 27(2), 1315-1319.ISSN 1013-5316; CODEN: SINTE
- Khalid A. Mirani,Munsif H. Channa, M. AkramQureshi and M. Shahid,. 2015, pub SPE/PAPG Annual Technical Conference, PAPG - ATC # 011-15, 326-343pp.

#### **Articles/Abstracts/Posters:**

- One article published in Weekly Technology times. One submitted to PSF for publish.
- Three abstracts published in International Conference on Earth Science Pakistan, Baragali Summer Campus, University of Peshawar
- Prepared brochure on “Baluchitherium the largest land mammal in the world”.

### 1.2.4 Seminars/Symposia/Trainings/Workshops Organized

- Provided Internship training to 40 Students of Department of Geology, University of Haripur about Rock and Mineral Identification, Petrography and Paleontology In three groups during their summer Vacations in the month of July and August 2015.
- Workshop organized “Gemology and modern techniques of Lapidary and celebration of International Earth Day 2016”.
- Provided guided field work in Salt Range area (Eastern, Central and Western) with the 83 students (BS Geology IV Semester) and newly appointed Faculty of Department of Geology, University of Haripur from 09-03-2015 to 13-03-2015.
- Provided guided field work in Azad Kashmir area with the 59 students (BS Geology II Semester) and newly appointed Faculty of Department of Geology, University of Haripur from 20-04-2015 to 24-04-2015.

- Provided internship training, guided geological field tours to more than 280 students of Department of Geology, University of Haripur, University of Azad Jammu and Kashmir, University of Swabi and Bahria University.
- ESD Scientists working as co-supervisor of BS students of Haripur Hazara University for preparation his final research thesis in the light of MoU signed between two departments.
- Supervised 02 MS students Mr. Zafar Iqbal and Mr M. Adnan Khan for their research work on “Sedimentation and Petrography of Nagri and Dhok Pathan Formation” of Department of Geology, University of Azad Jammu and Kashmir, Pakistan.
- Supervising 03 Groups (15 Students) of BS-Geology from Department of Geology, University of Haripur for their research work related to Vertebrate Paleontology, Sedimentology and Biostratigraphy.

#### **1.2.5 Seminars/Symposia/Trainings/Workshops Attended**

- Dams and its importance” by Mr. Mudassar Iqbal, Senior Geologists, WAPDA.
- “Sediments washing techniques for Micro Vertebrate Fossils Recovery” by Dr. Iqbal Umar Cheema, Ex-Director, ESD.

#### **1.2.6 National/International Collaboration/Liaison**

- Early Triassic Biostratigraphy and carbon isotope stratigraphy of Salt Range, Pakistan, in collaboration with institute at Museum of Paleontology of the University of Zurich (PIMUZ), Switzerland **(second phase)**.
- “Collision Granites of Pamir and Pakistan” between Institute of Geology, Earthquake Engineering and Seismology, Academy of Sciences of the Republic of Tajikistan (ASRT) and the Pakistan Museum of Natural History (PMNH)
- “Zhob Dinosaur Track Way Reconstruction” between PMNH and Plaeostreet, Warsaw, Poland.

#### **1.2.8 Display Work**

- Completed and installed new write-ups of Baluchitherium and Rock Garden.
- Preparation of PMNH Water Lily Pond Display.
- Preparation of bilingual writes up of Minerals Display in Mineral Diorama of Tethys gallery.
- Up gradation of Paleogallery display.

### 1.3. Zoological Sciences Division

#### 1.3.1 Field Work

- A joint team of ZSD scientist and French researcher from French Entomological Society, Paris carried out a one month long field work at Deosai National Park, Skardu, from 15th June-15th July, 2015. The team successfully returned with high altitude butterflies and other insects.
- A field work was carried out for the collection of Schenids and other fishes from Sindh Coast (KetiBander, Ibrahim Hayderi, Korangi Creek, Sand spit, Hawks Bay and Hub River Estuaries) from 10th September 2015 to 20th September 2015.
- Carried out local fieldwork in Sara-e-Karbooza, Islamabad area on 22nd March 2016 for the collection of Carabidae specimens.
- Carried out follow up visit (14.10.2015 and 20.10.2015) to expedite the endorsement process of the dossier of Palas Valley Biosphere Reserve at Khyber Pakhtunkhwa Environment Department and Khyber Pakhtunkhwa Forest Department
- A fifteen days field work carried out for the collection of Ground Beetles of Chitral (GaramChashma, Buni, Mastuj, Barir valley and MadakLasht) and Swat (Ushu Forest, Mahudand, Gabral, Kumrat, Malamjabba, Marghzar and Charbagh) areas from 20th August 2015 to 3rd September 2015.

#### 1.3.2 Laboratory Work

1. ZSD collected, preserved and catalogued 4500 specimens.
2. Preservation of 11 large mammals (Wolf, Lion, Urial, Black Buck, Deer and Nilgai) was done. These specimens were donated by Islamabad Zoo and Wildlife National Parks.
3. Prepared head trophies of Ibex, Deer, Urial and Nilgai
4. Stuffed the donated specimens of Languor, Ostrich, Peacock and Pigeons.
5. One large Python was collected from vicinity of Islamabad. The specimen was processed for stuffing.
6. Worked on identification of different sub species *Parnassiushardwickii* (Papilionidae: Lepidoptera). The study resulted in identification of three sub species.
7. Worked on identification of Nawab Butterflies Genus *Polyura* sp. (Nymphalidae: Lepidoptera). The study resulted in identification of new records from Pakistan. Also prepared digital photographs of the new records

8. Worked on the identification, diagnostic characters and morphometric measures of the Genus *Brachinus*, Genus *Pheropsophus* and Genus *Mastax* of Carabid collection of ZSD insect repository
9. Prepared 50 macro photographs of Eleven species for publication.
10. Completed work on identification of *Anthia (Pachymorpha) sexguttatamannerheimi* and *Anthia (Pachymorpha) sexguttataafghana* from the Carabid collection of insect repository.
11. Worked on the identification of genus *Calasoma* (Carabidae: Coleoptera)

### **1.3.3 National Research Projects**

- Meeting with a delegation of Khyber Pakhtunkhwa Department of Wildlife headed by Safdar Ali Shah, Chief Conservator Wildlife and two other officers for technical input of PMNH on establishment of School of Taxidermy, Natural History Museum and Jurassic Park at provincial capital Peshawar.

### **1.3.4 Collaborative Research Projects**

- Prepared four concept notes for UNDP on Biosphere Reserves
- Submitted a project for seeking assistance for Japan Embassy
- A joint team of ZSD scientist and French researcher from French Entomological Society, Paris carried out a one month long field work at Deosai National Park, Skardu, from 15th June-15th July, 2015. The team successfully returned with high altitude butterflies and other insects.
- Submitted a project “Ground Beetles (Carabidae: Coleoptera) Fauna of Ziarat Juniper Forests, Ziarat-Balochistan” to UNESCO MAB Programme for 2016 MAB Young Scientist Awards.
- Revised JAICA project

### **1.3.5 Publications**

Schutze M.K., Aketarawong N., Amornsak W., Armstrong K.F., Augustinos A., Barr N., Bo W., Bourtzis K., Boykin L.M., Cáceres C., Cameron S.L., Chapman T.A., Chinvinijkul S., Chomič A., De Meyer M., Drosopoulou E.D., Englezou A., Ekesi S., Gariou-Papalexiou A., Hailstones D., Haymer D., Hee A.K.W., Hendrichs J., Hasanuzzaman M., Jessup A., Khamis F.M., Krosch M.N., Leblanc L., Mahmood K., Malacrida A.R., Mavragani-Tsipidou P., McInnis D.O., Mwatawala M., Nishida R., Ono H., Reyes J., Rubinoff D.R., San Jose M., Shelly T.E., Srikachar S. Tan K.H., Thanaphum S., UlHaq I., Vijaysegaran S., Wee S.L., Yesmin F., Zacharopoulou A.

and Clarke A.R. 2015. Synonymization of key pest species within the *Bactrocera dorsalis* species complex (Diptera: Tephritidae): taxonomic changes based on 20 years of integrative morphological, genetic, behavioural, and chemoeological data. *Systematic Entomology*.40 (2):456-471. (onlinedoi: 10.1111/syen.12113:1-16).

- Schutze, M.K., Mahmood, K., Pavasovic, A., Bo, W., Newman, J., Clarke, A.R., Krosch, M., and Cameron, S. 2015. One and the same: integrative taxonomic evidence that the *Bactrocera invadens* (Diptera: Tephritidae), is the same species as the Oriental Fruit Fly *Bactrocera dorsalis*. *Systematic Entomology*. 40(2):472-486. (online DOI: 10.1111/syen.12114:1-15).
- Abbas M., Bai M and Yang X. (2015) Study on dung beetles (Coleoptera: Scarabaeidae: Scarabaeinae) of northern Pakistan with a new record from Pakistan. *Entomotaxonomia* 37(4): 257–267.
- Mahmood, K & Mishkat Ullah. 2015. Sheikh Buddin National Park Seeking Attention of the Policy Makers. *Weekly Technology Times*. Vol. 6 Issue 49. Page No. 2. (December 7-13, 2015).
- Mishkat Ullah, Muhammad Naeem, Khalid Mahmood and Muhammad Ather Rafi (2016). On the collection of specimens of Sub-family Brachininae (Carabidae: Coleoptera) from Northern Pakistan with four new records and a new combination. In, *Zootaxa* (submitted).
- Amir S. A., Siddiqui P. J. A. and Masroor R. (2016) Finfish diversity and seasonal abundance in the largest arid mangrove forest of the Indus Delta, Pakistan” to the *Journal of Marine Biodiversity* (submitted).
- Amir S. A., Panhwar S. K., Khan F., Siddiqui P. J. A. and Rashid S. 2015. Age, growth and reproductive biology of Goldlined Seabream *Rhabdosargus sarba* (Pisces: Sparidae) in Pakistan. (*Indian Journal of Geo-Marine Sciences*) (submitted).
- Khanum F., Amir S. A., Siddiqui P. J. A. and Shehnaz Rashid (2016). Diet content analysis of three sparid species of family sparidae from the coastal waters of Pakistan” In *Applied Ichthyology* (submitted).

### **1.3.6 Seminars/Symposia/ Trainings/Workshops Organized**

ZSD scientists provided 10 days basic zoological techniques training provided to thirteen student of Department of Wildlife Management, University of Haripur from 26th August 2015 to 4th September 2015. Their faculty members also accompanied during technical sessions.

- Dr. Muhammad Rafique, delivered a presentation on “Impact of Hydro Power Projects on Fisheries Resources” at Department of Fisheries Government of Punjab, KallarKahar, District Chakwal on 30th December 2015.
- Dr. Muhammad Rafique, delivered a lecture on “Underwater imaging of Fish Fauna” at School of Electrical Engineering and Computer Sciences, NUST, Islamabad on 24th February 2016.
- Provided hands on training to different school and university students regarding zoological specimens collection and preservation during practical demonstration at PMNH stall during Biodiversity & Livelihood Exhibition on Day 02-June, 2016.
- Prepared five charts of species of special concern regarding awareness and highlighting the importance of biodiversity.
- Organized 3rd National MAB Committee Meeting on 10th December 2015
- Organized 3<sup>rd</sup> March 2016 World Wildlife Day at PMNH.
- To celebrate International Biodiversity Day, ZSD staffs collaborated with 16 other organizations for putting their stalls in Biodiversity & Livelihood Exhibition on 2nd June 2016.

### **1.3.7 Seminars/Symposia/ Training/Workshop Attended**

- Dr. Muhammad Rafique, attended 4th World Congress of Biosphere Reserve at Lima, Peru from 14th -17th March 2016. He also delivered a lecture on “Review of Biosphere Reserve in Context of LalSuhanra Biosphere Reserve”.
- Dr. Muhammad Rafique, participated in international workshop on “Good practices for Aquatic Biodiversity Baseline Determination and Monitoring Protocols for Hydropower Projects” from 10th -11th April 2016 at Kathmandu, Nepal. The meeting was organized by International Finance Corporation (a subsidiary organization of World Bank)
- Dr. Muhammad Rafique participated in “2nd Meeting of Green Climate Fund (GCF Board), Pakistan” on 18th April 2016 at Pearl Continental Bhurban.

### **1.3.8 National/international collaboration /Liaison**

- Dr. Mohammad Rafique, Country Focal Person MAB-Pakistan participated in “Stakeholder Consultation Meeting on the Current State and Upcoming Challenges in Biosphere Management in Iran” from 4-7.10.2015.

- ZSD Officers along with other committee members conducted series of meeting to actualize the EXPO to be held during “OIC Summit on S&T and 15th COMSTECH General Assembly”

### **1.3.9 Services Rendered to Other Organizations**

- Guided M.Phil/PhD students regarding their synopsis/research on different zoological sciences groups.
- Prepared SOP’s of zoological collection and preservation
- Worked on promotion policy of PMNH/PSF
- Identified of fruit flies samples received from International Atomic Energy Agency (IAEA).

## **1.4 PUBLIC EDUCATION AND DISPLAY (Public Sciences Division)**

### **1.4.1 Exhibits developed/organized**

- Prepared various design proposals of “OIC Summit Logo” and presented to the Secretary MoST& COMSTECH authorities.
- Displayed PMNH educational stall in the exhibition organized by CDA on the occasion of “Tree Planting Ceremony” at Park Enclave near ChakShahzad, Islamabad.
- Designed Planetarium Dom outer surface paintwork design for Science Center Faisalabad.
- Operational Manager, PSD visited Tando Muhammad Khan, Sindh along-with Director General, PMNH for establishment of Science & Natural History Museum. The feasibility of museum discussed in detail with representatives of Govt. of Sindh.
- Installed “Interactive Floor System” equipment at Display Hall for visitors on temporary basis.
- Completed VOG interior paint work.
- Urdu Web page link up-loaded on PMNH Web.
- Designed VOG Canopy (for paint work)
- Designed, prepared and installed display (Urdu & English) timing board
- Designed, prepared and installed indication Sign Polls for offices and display galleries along-with banners.
- Provided services to the MoST for preparation of S&T float for 23rd March parade 2016 and prepared initial design proposal of the float.

- Operational Manager and Sr. Modeler, PSD visited Science Center Faisalabad for assessment/evaluation of repair and renovation work, in this regard a formal meeting was convene with Chairman, PSF to discuss various matters related to Science Center Displays, especially the paint work Planetarium Dom in this regard a report was also submit.
- Iron grill for parking areas was prepared, painted and installed.
- Prepared and installed 02 parking boards.
- Painted boundary wall under Blue Whale Skelton, 03 fiberglass canopies, doors of ESD, D.G, Admin and accounts offices and basement corridor.
- Replaced English & Urdu write-ups in VOG and Paleo galleries.
- Carried out composing and layout designing of PSF Newsletter from July 2015 to February 2016.
- Prepared glass encasing, base and foreground of “Crocodile Exhibit”
- Renovation work of Audio Visual Hall is completed.
- Designed Add “Funding Opportunities for Innovative Scientists & Technologists” under Natural Sciences Linkage Programme of PSF.
- Designed commemorative Postage Stamp and Coins regarding “Extension of Pakistan Continental Shelf” for MoST
- Designed a new *Baluchitherium* brochure.
- Design of new PMNH brochure.
- Establish a new Pond for Lotus Plant
- Designed Banners, Certificate, Invitation card, Shield for the Biodiversity Day celebrations Activities (Inaugural Ceremony, Exhibition and students competitions).
- Designed Backdrop 20x5 ft. for PMNH stall installed at Biodiversity exhibition.
- Prepared Souvenirs for VIP’s regarding Biodiversity Day.
- Prepared layout design of Biodiversity Exhibition.
- Supervised for preparation of Biodiversity Exhibition stalls.
- Prepared project “Digitization of PMNH Display Galleries” and submitted to ICT for funding.
- Prepared iron structure for background panaflex fixing for PMNH stall and banners etc regarding Bio-day activates.
- Provided Services: PA system, IT Support and Photography in Audio Visual Hall for organizing Speech and Art Competition Ceremony and during the Speech

Competition among the students regarding Biodiversity Day celebration activity on 24-05-2016.

#### **1.4.2 Number of Visitors to Display Galleries**

- During the year various schools, colleges, universities and general public from all over the country have visited PMNH display galleries. A total 110654 person visited the museum galleries including 18615 students, 40099 general public 225 foreigners and 51715 children's less than 12 years.

#### **1.4.3 Educational Services**

- Director, PSD attended various meetings with; Secretary MoST, Chairman, PSF, D.G, PMNH, Departmental Promotion Committee, PMNH and participated in ECO Science Foundation's meeting of Scientists/Experts of ECO Member States to prioritize Focus Areas for Research Funding under ECOSF S&T Fund, Technical Audit Committee.
- Provided Services: PA system, IT Support, and Photography in Audio Visual Hall for organizing two days Workshop on Mushrooms Hunting, Cultivation and Cooking on 11-04-2016.
- Provided Services: PA System, IT Support and Photography in Audio Visual Hall for organizing one day Training Workshop on "Techniques of Lapidary" and Celebrating International Earth Day on 21-04-2016.
- Provided visitor's data to the Pakistan Bureau of Statistics, Social Statistics Section 21-Statistics House, Mauve Area I&T Center, G-9/1, Islamabad on monthly basis.
- Provided Services: PA system, IT Support, and Photography in Audio Visual Hall for organizing Lecturer of Mary E. Barkworth on 19-05-2016.
- PSD officers and staff worked as member of different committees for organizing Inaugural Ceremony and Biodiversity exhibition regarding Biodiversity Day Celebration activities.
- In the summer season PMNH has open the Display Galleries for its visitors from 8:00 am to 8:00pm (this expanded time has been arranged in two equal shifts).
- PMNH Display Centre remained open for public during the Eid holidays

#### **1.4.4 Important Visits to PMNH**

- Facilitated the PMNH galleries visit for US Embassy Islamabad official on 30.10.2015

- Facilitated the PMNH galleries visit of high level Chinese high level media delegation on 24.11.2015
- Facilitated the PMNH galleries visit for former Chairman Dr. N. M. Butt on 23<sup>rd</sup> December 2015
- Visit of Delegation from Tajikistan and Media Delegation from China to PMNH on 24-11-2015.
- Educated 06 different groups of visitors about PMNH and its role in the country.
- ECOSF BOT members visited PMNH display galleries in August 2015.
- A Chinese delegation headed by President of Lanzhou University, China, Prof. Dr. Wang Cheng visited PMNH display galleries on September 30, 2015.
- A Turkish delegation visited PMNH display galleries on 15-10-2015.
- American Embassy Pakistan delegation visited PMNH display galleries on 30.10.2015.
- Secretary MoST visited PMNH display galleries on 16-11-2015.
- A Chinese media person's delegation visited PMNH display galleries on 24-11-2015.
- Senator Ch. Tanveer Khan visited PMNH display galleries on 27-11-2015.
- Ambassador of Republic of South Korea H.E. Dr. Song Hong Hwan and other official of Korean Embassy visited PMNH display galleries on 03-03-2016.
- Prof. Xianglga Li, Zanzhou University P.R. China visited PMNH displays on 23-04-2016.
- Michel Nehuet, French Consul visited PMNH displays on 30-04-2016.
- Mary E. Barkwortha American scientist visited PMNH display galleries on 19-05-2016.
- Ambassador of Portugal H.E. Joao Sabido Costa and Federal Minister for Higher Education and Research, Togo, Mr. Broom are visited PMNH display galleries on June 2, 2016; both are here to attend the Biodiversity Day Celebrations Activities as a Chief Guest.



### **III. PAKISTAN SCIENTIFIC & TECHNOLOGICAL INFORMATION CENTRE (PASTIC)**



PASTIC is an ISO 9001: 2000 Certified S&T Information Provider and is the oldest organization in the field of S&T information management and dissemination serving as a gateway for access to and delivery of global S&T information. It caters to the information needs of the researchers in all areas of Science and Technology as well as social sciences. Users of PASTIC services include researchers, academicians, scientists, engineers, entrepreneurs & the industry. Collaboration with different organizations and agencies enhances the scope of information that is offered to clients and helps PASTIC to respond to the diverse needs of a broad community of users.

PASTIC National Centre is housed in its own building at Quaid-e-Azam University Campus, Islamabad with comprehensive information resources in different fields of Science and Technology. Its six Sub-Centres are working in different cities, viz. Karachi, Lahore, Peshawar, Quetta, Faisalabad and Muzaffarabad all have access to global information resources for disseminating of information to their users. The total sanctioned strength is 164 including Scientific, Technical and Administrative Staff including the sub-centers.

## **1.0 Aims & Objectives**

- To acquire, process and disseminate scientific and technological information to the researchers.
- To facilitate scientific, technological, agricultural, and industrial development by providing timely access to relevant information.
- To develop human resource in the field of library and Information Management.
- To compile & publish Reference Information publications for ready reference of R&D community.
- To develop inter-library cooperation and resource sharing at national level.
- To promote technologies, products & processes of local industry/SMEs.
- To develop collaborations with national & international information networks/ organizations.

## **2.0 Activities and Services**

PASTIC is a multidisciplinary national S&T information centre and its services and activities are aimed at fulfilling the needs of its users by providing the latest or the required information in all fields of Science & Technology. These services indirectly

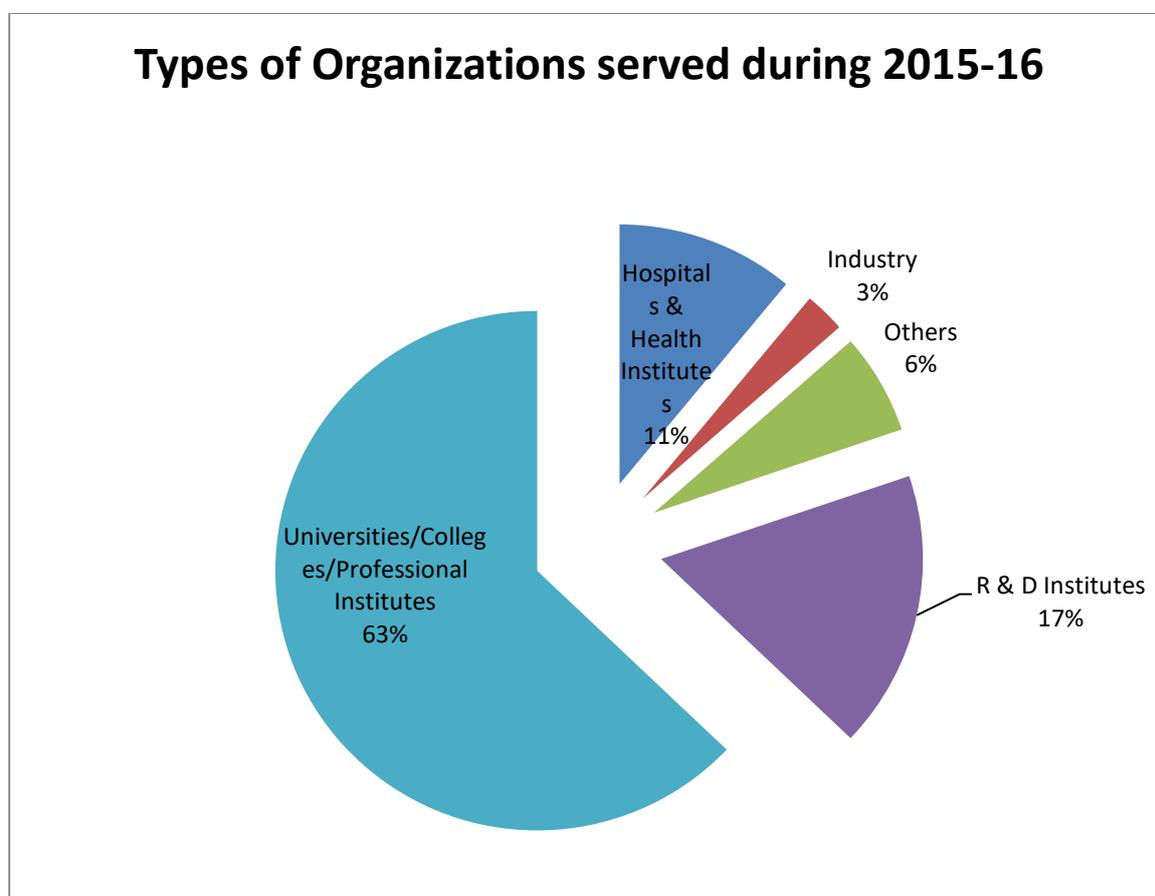
contribute to the Socio-economic development of the country. The Services provided and activities undertaken during the period, July 2015 to June 2016 are briefly described below:

## 2.1 Document Procurement and Supply Service

Under the Document Procurement and Supply Service, requests were received from 6461 individuals of R&D organizations for supply of full text research articles, conference papers, reports, etc. A total of 66758 documents in print and digital form were acquired either from local sources or from abroad, and supplied during the year 2015-16.

For acquisition of documents from within the country, the Union Catalogue of the S&T libraries of Pakistan compiled by PASTIC, resources of LEJ-HEJ and HEC were mainly used.

For foreign procurement of articles mainly the National Library of Medicine, USA, National Library of Australia and NISCAIR, India were used. To expedite the procurement process PASTIC uses e-mail contacts so that information delivery is quick and delays are minimized. Major break up of the types of user organizations is as follow:



## **2.2 Bibliographic Information Service/Literature Search**

Literature search is carried out for searching articles/abstracts/references by using online databases for supply to users on their request according to their research topics. A total of 742653 abstracts/references, 7906 bibliographies on various S&T topics were supplied to 5578 researchers and other users during the period under review.

PASTIC has access to international online bibliographic and full text databases through subscription and agreements with some organizations like HEJ and HEC. The subscription of following bibliographic databases was renewed for 2016-17 for strengthening the bibliographic information service and information resources of PASTIC.

1. Wilson Applied Science and Technology (Full Text)
2. Biological & Agricultural Index Plus
3. Wilson Social Sciences (Full Text)
4. Green file
5. Library & Information Science and Technology Abstracts

The following online digital resources of other organization are accessible by PASTIC and are used for this service.

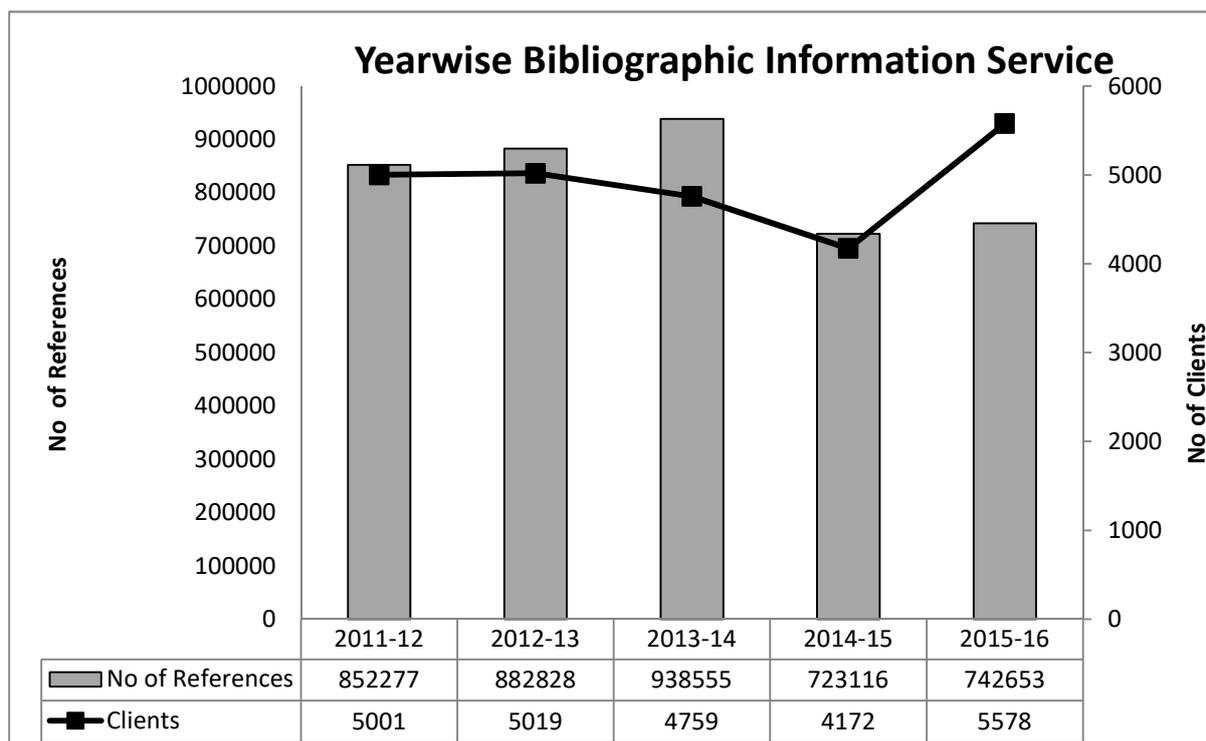
### **a) HEC Digital Library Resources**

1. Wiley-Blackwell Journals
2. Taylor & Francis Journals
3. Springer
4. Project Muse

### **b) LEJ Resources, Karachi (Under MoU)**

1. Science Direct
2. Science Finder

The graphic representation of bibliographic information service showing the progress for the last five years is given below.

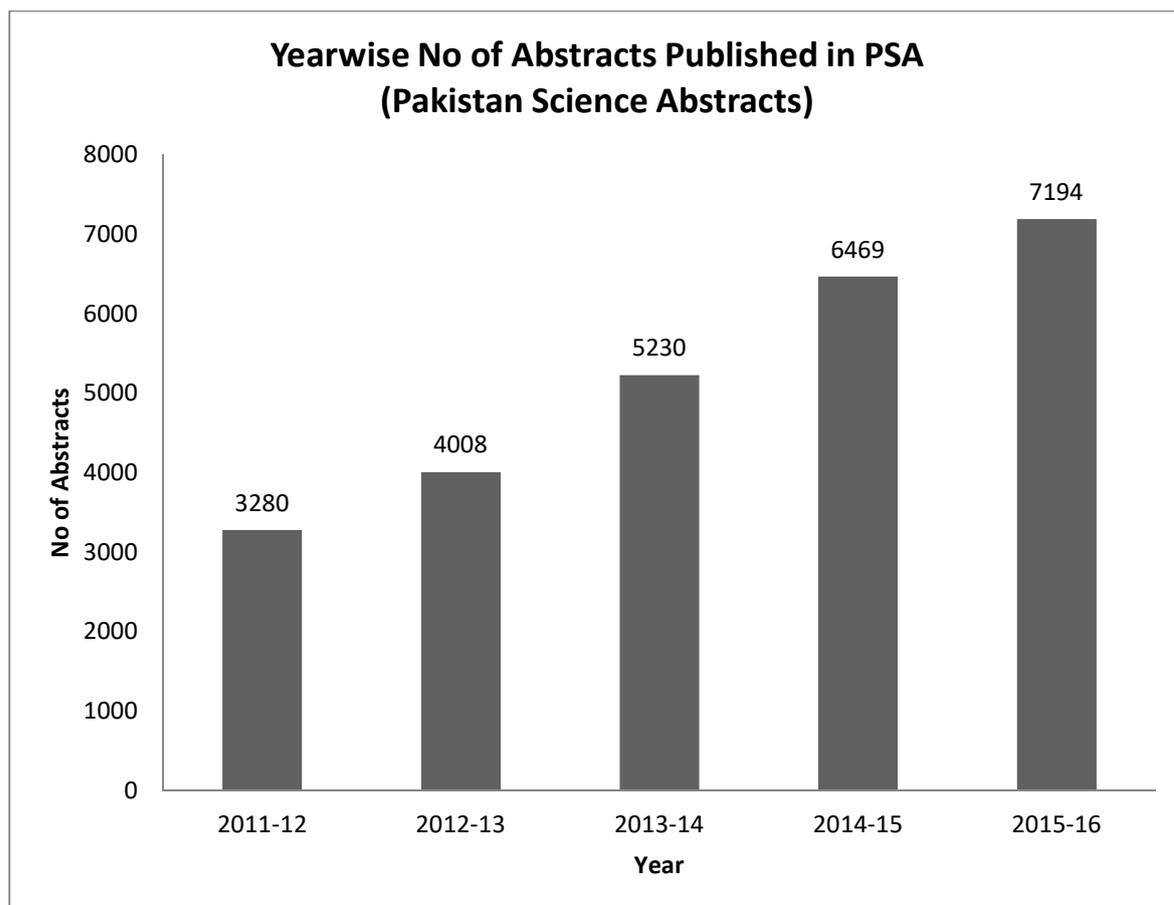


### 2.3 Abstracting and Indexing Service

#### *Pakistan Science Abstracts (PSA)*

PASTIC provides abstracting and indexing service by publishing an abstracting journal entitled “Pakistan Science Abstracts” in ten different scientific disciplines, which serves as a secondary information source to give support to research and development activities in the country. The scientific information generated in Pakistan or abroad and published in Pakistani S&T journals is documented in the form of abstracts along with detailed author index and keyword index in this secondary journal.

An online application for Pakistan Science Abstracts (PSA) database has been developed for provision of abstracting and indexing service and publishing the Pakistan Science Abstracts. During the period under consideration all processing of collecting, formatting, indexing, composing and proofreading of 7194 abstracts for digitization of old record and importing of abstracts into the PSA database was carried out. Downloading and processing of abstracts for the year 2016 remained in progress.



#### **2.4 Primary Scientific Journal Launched**

PASTIC has launched a primary scientific journal, namely, Pakistan Journal of Computer Science and Information System. This initiative of PASTIC was aimed at providing a platform for researchers and professionals of Computer Science & Engineering, Information and Communication Technologies (ICTs), Information Systems and Library & Information Science for sharing and disseminating their research findings by publishing their original and cutting edge research. This is a peer reviewed open access journal intended to publish highly quality papers on theoretical development as well as practical applications in all fields of Computer Science and Engineering, ICT and Information Science. The journal also publishes new attempts on emerging topics /areas, reviews and short communications.

In this regard all the activities such as processing for bringing out the journal online, survey and identification of subject experts, constitution of editorial board, panel of reviewers, correspondence with subject experts, editorial board members, reviewers, preparation of terms of reference of editorial board, preparation of template of journal, preparation of review criteria, review forms, call for papers, preliminary review of papers, etc. for bringing

out this primary journal were carried out. In response of call for papers 15 articles were received for publishing in the first issue of journal. The research articles received are under process of review by local and international reviewers. The journal will be brought out after completion of this review process.

## **2.5 Technology Information Service**

This service is meant for dissemination of Technological Information Services to R&D Workers, Engineers, Entrepreneurs, SMEs and the Industrialists. The aim is to facilitate growth, potential and competitiveness among SMEs at national and international level, build effective coordination between R&D Sector and Industry for enhancing innovations, competitiveness and development & promotion of indigenous technologies. During 2015-16 the following activities were carried out.

- PASTIC in collaboration with Institute of Research Promotion (IRP), PSF, Haripur University and PCST organized 5<sup>th</sup> Invention to Innovation Summit, at Haripur University on November 3-4, 2015.
- One day symposium was organized by PASTIC during 5<sup>th</sup> Invention to Innovation Summit, at Haripur University held from November 3-4, 2015.
- PASTIC participated in “Invention to Innovation Summit 2016”, which was jointly organized by PASTIC, IRP, Pakistan Science Foundation and University of the Punjab from March 2-3, 2016 at Punjab University, Lahore.
- One day symposium was organized during Invention to Innovation Summit 2016”, by PASTIC, IPR, Pakistan Science Foundation and University of Punjab held from March 2-3, 2016 at Punjab University, Lahore.
- PASTIC in collaboration with IRP, PSF, University of Balochistan and PCST organized “Invention to Innovation Summit,” at University of Balochistan from May 4-5, 2016.
- One day symposium was organized during “Invention to Innovation Summit,” by IRP, PSF, University of Balochistan and PCST held at University of Balochistan from May 4-5, 2016.
- A bimonthly Trade and Technology news bulletin entitled “Technology Roundup” was regularly published and six issues of this news bulletin were brought out online.

## **2.6 PASTIC National Science Reference Library**

PASTIC National Science Reference Library is aimed at providing reference and referral services to the users and strengthening of all the services of PASTIC particularly document supply service, bibliographic information service, abstracting and indexing service, technological information service, etc. In this context strengthening of library resources, acquisition of published library material and library automation activity remained in progress.

During 2015-16, 8778 users/researchers visited PASTIC library for reference purpose, reading, photocopying and internet browsing. Besides, the library received 387 issues of different national and international journals, 39 miscellaneous documents, reports, etc. All this library material was processed and shelved for use. 12 issues of the library bulletin “Fresh Arrivals” of PASTIC library were regularly published on monthly basis during the period under review and distributed among relevant circles.

## **2.7 Reprographic Service**

The Reprographic Section of PASTIC has facilities ranging from photocopying to offset printing for its own printing requirements and for providing printing services to other S&T organizations. During the year 2015-16, 154 printing jobs were carried out for 10 R&D organizations.

## **2.8 I.T ACTIVITIES**

The following activities were undertaken by the IT team of PASTIC.

- PASTIC IT Training Lab Renovated (furniture purchase/networking, etc.).
- Submitted ICT proposal on revised format, entitled “Development of Indigenous Library Automation Software with Centralized and Distributed Repository Features”.
- Application was developed for File Tracking System and training was provided to officers.
- PSF projects database was uploaded on PSF website.
- Dummy printing of PSF Annual Reports (4 years).
- Website maintenance/ Translation of PASTIC web content into Urdu was undertaken.
- Management of PASTIC online Journal

- Training support services (Lab maintenance, resource person)
- Wireless Internet services to National and Sub-center (with Static IP)
- Data entry of different in-house databases was carried out.

### **3.0. International Liaison**

PASTIC is the National Focal Point of some Regional/International Information Centres and Networks viz. WHO/CEHANET, IFAP and National distributor for UNESCO developed library management software WINISIS and IDAMS. Under international liaison activities, a project namely “Networking and Capacity Building of Women Entrepreneurs (SMEs) of SAARC Countries” prepared and submitted in 2014-15 was revised and was approved by SAARC Development Fund (SDF) during 2015-16. Now funding is awaited for execution of the project. Also two officers of Mehran University of Engineering & Technology, Jamshoro and three officers of PASTIC were sent for international training under the training opportunity is offered by SAARC Documentation Centre (SDC). Under bilateral cooperation, S&T cooperation proposals were prepared for cooperation with counterpart organizations in the field of Information Exchange with Italy & Korea and forwarded to MoST

### **4.0 PASTIC Information Service Stalls at The Doorstep of Users**

52 PASTIC Service Stalls were arranged at Faisalabad, Peshawar, Karachi, Quetta, Muzaffarabad (AJK), Islamabad and Lahore at various departments of different Universities and R&D Institutions on different occasions. The aim of organizing the service stalls was to provide S&T information services at the doorstep of the Universities and other institutions to facilitate faculty members, researchers and R&D workers. Detail of these Stalls is as follows:

#### **FAISALABAD**

| <b>Sr.#</b> | <b>Date</b>      | <b>Venue</b>  |
|-------------|------------------|---|
| 1.          | 15-16 Sept.2016  | Main library, University of Agriculture, Faisalabad                   |
| 2.          | 11-12 Nov., 2016 | Faculty of Agriculture, University of Agriculture, Faisalabad         |
| 3.          | 18-11-15         | Faculty of Animal Husbandry, University of Agriculture, Faisalabad    |
| 4.          | 26-11-15         | Faculty of Veterinary Sciences, University of Agriculture, Faisalabad |

|     |                 |   |
|-----|-----------------|---|
| 5.  | 03-12-15        | National Institute of Food Science & Technology, Faisalabad               |
| 6.  | 6-7 April, 2016 | Faculty of Agriculture, University of Agriculture, Faisalabad             |
| 7.  | 12-04-16        | Faculty of Veterinary Sciences, University of Agriculture, Faisalabad     |
| 8.  | 12-04-16        | Faculty of Agriculture Engineering, University of Agriculture, Faisalabad |
| 9.  | 22-04-16        | National Textile University, Faisalabad                                   |
| 10. | 26-04-16        | Govt. College Women University, Faisalabad                                |
| 11. | 28-04-16        | Govt. College Women University, Faisalabad                                |
| 12. | 17-05-16        | UET, Faisalabad Campus, Faisalabad  |

### **PESHAWAR**

| <b>Sr.#</b> | <b>Date</b> | <b>Venue</b>   |
|-------------|-------------|--|
| 13.         | 28-08-15    | Department of Bioinformatics, Shaheed Benazir Bhutto Women University, Larama Campus, Peshawar |
| 14.         | 02-09-15    | Haripur University, Haripur  |
| 15.         | 12-04-16    | Institute of Chemical Sciences, University of Peshawar   |
| 16.         | 10-05-16    | Institute of Biotechnology & Genetic Engineering, The Agriculture University, Peshawar         |
| 17.         | 11-05-16    | Amir Muhammad Khan Campus-Mardan, The Agriculture University, Peshawar                         |

### **KARACHI**

| <b>Sr.#</b> | <b>Date</b>             | <b>Venue</b>  |
|-------------|-------------------------|---|
| 18.         | 28-08-15                | Department of Chemistry, University of Karachi, Karachi           |
| 19.         | 08-09-15                | NED University, Karachi   |
| 20.         | 01-10-15                | Shaikh Zaid Institute, University of Karachi, Karachi             |
| 21.         | 27-10-15                | Dr. Essa Laboratory & Diagnostic Centre, Karachi                  |
| 22.         | 15-12-15 to<br>17-12-15 | LEJ National Science Information Centre, Univ.of Karachi, Karachi |
| 23.         | 01-02-16                | Ziauddin University, Clifton Campus, Karachi                      |
| 24.         | 04-02-16                | Pakistan Medical Association, Karachi                             |
| 25.         | 16-02-16 to<br>18-02-16 | University of Sindh, Jamshoro                                     |
| 26.         | 23-02-16                | Baqai Institute of Diabetology & Endocrinology, Karachi           |
| 27.         | 24-02-16                | Department of Mathematics, University of Karachi, Karachi         |

|     |          |  |
|-----|----------|--|
| 28. | 01-03-16 | Habib University, Karachi                                |
| 29. | 11-03-16 | Dow University of Health Sciences, Karachi               |
| 30. | 07-04-16 | New Port institute of Communication & Economics, Karachi |
| 31. | 25-04-16 | Aligarh Institute of Technology, Karachi                 |
| 32. | 26-04-16 | Dr Essa's Laboratories & Diagnostic Centre, Karachi      |
| 33. | 02-05-16 | Sir Syed University of Engineering & Technology, Karachi |
| 34. | 05-05-16 | Expo Center, Karachi                                     |

### **QUETTA**

| <b>Sr.#</b> | <b>Date</b> | <b>Venue</b>                                 |
|-------------|-------------|--|
| 35.         | 07-07-15    | Sardar Bahadur Khan Women University, Quetta |

### **MUZAFFARABAD**

| <b>Sr.#</b> | <b>Date</b> | <b>Venue</b>  |
|-------------|-------------|---|
| 36.         | 12-10-15    | University of Azad Jammu & Kashmir, Muzaffarabad (Main Campus), Muzaffarabad. |
| 37.         | 19-04-16-   | Medical College, Muzaffarabad.  |

### **ISLAMABAD**

| <b>Sr.#</b> | <b>Date</b>             | <b>Venue</b>   |
|-------------|-------------------------|--|
| 38.         | 02-12-15                | PASTIC, Islamabad  |
| 39.         | 17-03-16                | University of Engineering & Technology, Taxila               |
| 40.         | 21-03-16 to<br>22-03-16 | Quaid-i-Azam University, Islamabad                           |
| 41.         | 22-03-16                | Fatima Jinnah Women University, Rawalpindi                   |
| 42.         | 27-04-16                | Central Library, International Islamic University, Islamabad |
| 43.         | 05-05-16                | Central Library, International Islamic University, Islamabad |

### **LAHORE**

| <b>Sr.#</b> | <b>Date</b>             | <b>Venue</b>                                       |
|-------------|-------------------------|--|
| 44.         | 27-08-15                | Department of Botany, University of Punjab, Lahore |
| 45.         | 16-11-15 to<br>17-11-15 | PCSIR Laboratories Complex, Lahore                 |

|     |          |   |
|-----|----------|---|
| 46. | 16-02-16 | Government College University, Lahore           |
| 47. | 17-02-16 | University of Engineering & Technology, Lahore  |
| 48. | 18-02-16 | Lahore College for Women University, Lahore     |
| 49. | 24-02-16 | University of Management and Technology, Lahore |
| 50. | 02-03-16 | University of the Punjab, Lahore                |
| 51. | 03-03-16 | University of the Punjab, Lahore                |
| 52. | 19-05-16 | Information Technology University, Lahore       |

## 5.0 Human Resource Development

Another important activity of PASTIC is to impart training to information professionals and researchers through workshops / seminars on topics such As Computer Applications for Library Automation, Information Management, Searching Techniques, Research Tools & Techniques, IPRs, etc. In addition PASTIC also organizes Awareness Seminars about PASTIC Services. Following training workshops / seminars were organized during the report period.

### 5.1 Trainings/Workshops/Seminars/Symposia/Meetings Organized:

- PASTIC organized its Annual Review Meeting on May 31, 2016, which was attended by all Dy Directors and Asst. Directors of PASTIC Sub-centers and all officers in National Center.
- PASTIC-Quetta organized one day PASTIC Awareness Seminar at Department of Zoology, University of Baluchistan, Quetta, on August 25, 2015
- PASTIC-Faisalabad organized one day Workshop on IPR in collaboration with Government College Women University, Faisalabad and IPO-Pakistan at GCWU, Faisalabad on August 28, 2015.
- PASTIC-Peshawar organized one day Workshop on “Bio-safety and Assessment in Agriculture Research” in collaboration with National Academy of Young Scientists (NAYS) and Agriculture University, Peshawar at Agriculture University, Peshawar on September 1st, 2015.
- PASTIC-Peshawar organized one day Workshop on “Promotion of Bio-Safety Measures for Researchers” in collaboration with National Academy of Young Scientists (NAYS) and Haripur University at Haripur University, Haripur on September 2<sup>nd</sup>, 2015.
- PASTIC-Karachi organized one day PASTIC Awareness Seminar at Nazir Hussain University, Karachi on September 17, 2015.

- PASTIC-Muzaffarabad organized a three days workshop on “Easy Way of Library Automation & Digitization” in collaboration with AJK University at Muzaffarabad from October 02-04, 2015.
- PASTIC, Islamabad organized a three days basic Hands-on Training Workshop on “Research Tools and Techniques” at PASTIC National Centre, Islamabad from 14-16 October, 2015.
- PASTIC, Islamabad arranged one day PASTIC Services Awareness Seminar at IT Lab, PASTIC, Islamabad, on October 22, 2015.
- PASTIC-Peshawar organized one day Breast Cancer Awareness Seminar in collaboration with IRNUM Hospital, Peshawar at IRNUM on October 27, 2015.
- PASTIC- Peshawar organized one day Breast Cancer Awareness Seminar in collaboration with IRNUM Hospital Peshawar at ABASYN University, Peshawar on October 30, 2015.
- PASTIC-Islamabad arranged one day orientation seminar about PASTIC Services on November 03, 2015 for the students of Department of Strategic Studies, Quaid-i-Azam University at IT Lab, PASTIC, Islamabad.
- PASTIC-Faisalabad organized one day Workshop on IPRs in collaboration with Government College University, Faisalabad and IPO-Pakistan at GCU, Faisalabad on 6<sup>th</sup> November, 2015.
- PASTIC-Quetta organized one day PASTIC Services Awareness Seminar for celebrating World Science Day at Sardar Bhadur Khan Women’s University, Quetta on November 17, 2015.
- PASTIC-Islamabad organized one day training workshop on “Reference Management with Mendeley” from November, 25-26 2015 at PASTIC National Centre, Quaid-e-Azam University Campus, Islamabad.
- PASTIC-Islamabad organized one day Training Workshop on “Key Performance Indicators” for the Officers of PASTIC, PSF and PMNH at PASTIC National Centre, Islamabad on November 26, 2015.
- PASTIC-Peshawar organized one day Training Workshop in collaboration with NCE in Physical Chemistry, University of Peshawar, Peshawar on “Research Tools & Techniques: Citation Management using MENDLEY” on December 14, 2015 at NCEPC-UOP, Peshawar.
- PASTIC-Karachi organized a three days Training Workshop in collaboration with Latif Ebrahim Jamal National Science Information Center, International Center for Chemical and Biological Sciences (ICCBS), University of Karachi on Library Automation Package by using KOHA ILS at HEJ, Karachi from December 15-17, 2015.

- PASTIC-Faisalabad organized one day workshop in collaboration with IPO-Pakistan at Islamia University, Bahawalpur on February 03, 2016.
- PASTIC-Peshawar organized one day Health Awareness Seminar on “Causes, Symptoms & Early Treatment of Cancer” in collaboration with the National Academy of Young Scientists & IRNUM Hospital on February 17, 2016 at NIFA, Peshawar.
- PASTIC-Islamabad organized three day basic hands-on training workshop on “Research Tools and Techniques” from 24-26 February, 2016 at PASTIC, Islamabad.
- PASTIC-Lahore organized one day workshop on “Managing Intellectual Property Rights and Commercialization of Academic Results Patents” in collaboration with South Asia Triple Helix Association (SATHA) University of Management Technology (UMT) and Institute of Research Promotion (IRP) at University of Management Technology, Lahore on February 24, 2016.
- PASTIC-Karachi organized one day seminar on “Emerging Importance of Intellectual Property Rights in Knowledge Society” in collaboration with Office of Research and Graduate Studies, Aga Khan University, Karachi (AKU) at AKU on March 09, 2016.
- PASTIC-Peshawar organized one day workshop on “Intellectual Property Rights (IPRs): Drafting and Filing of Patent Applications” in collaboration with PFI, Peshawar & IPO Pakistan on March 15, 2016.
- PASTIC-Islamabad organized one day PASTIC awareness seminar at University of Engineering & Technology, Taxila on March 17, 2016.
- PASTIC-Faisalabad organized one day workshop on IPRs in collaboration with the Muhammad Nawaz Shareef University of Agriculture, Multan (MNSUAM) and IPO-Pakistan at MNSUAM, Multan, on March 22, 2016.
- PASTIC-Islamabad organized one day PASTIC awareness seminar at Fatima Jinnah Women University, Rawalpindi on March 22, 2016.
- PASTIC-Faisalabad organized one day workshop in collaboration with Pakistan Science Foundation (PSF), The University of Faisalabad and Lyallpur Library Association (LLA) on Library Automation Package using KOHA at The University of Faisalabad , on April 16, 2016.
- PASTIC-Peshawar organized one day workshop in collaboration with ORIC- Gomal University, D .I. Khan and SATHA at Gomal University, D.I. Khan on April 19, 2016.
- PASTIC-Faisalabad celebrated “World Book and Copyright Day” in collaboration with National Textile University, Faisalabad at NTU-Faisalabad on April 22, 2016.
- PASTIC-Karachi organized one day awareness seminar on PASTIC activities at Dr Essa’s Laboratories & Diagnostic Centre, Karachi on April 26, 2016.

- PASTIC-Islamabad organized one day seminar on PASTIC activities at Central Library, International Islamic University, Islamabad on April 27, 2016.
- PASTIC-Peshawar organized one day seminar on PASTIC activities at Agriculture University Peshawar during Project Formulation Workshop of PSF from April 27-28, 2016.
- PASTIC-Karachi organized one day awareness seminar on PASTIC activities at Sir Syed University of Engineering & Technology, Karachi, May 02, 2016.
- PASTIC-Islamabad conducted three days training for PASTIC, PMNH and PSF officers on Software for File Tacking in May 2016 at PASTIC Lab.
- PASTIC-Islamabad organized one day awareness seminar on PASTIC activities at International Islamic University Islamabad, May 05, 2016.
- PASTIC-Peshawar organized one-day workshop on Bio-safety in collaboration with National Academy of Young Scientists (NAYS) at Institute of Biotechnology & Genetic Engineering (IBGE), University of Peshawar, Peshawar on May 10, 2016.
- PASTIC-Islamabad organized two-day workshop on "Make Your Research Life Easier with Mendeley Tool" in collaboration with Department of Computer Science & Software Engineering, IIUI at IIU, Islamabad from May 11-12, 2016.
- PASTIC-Faisalabad organized one-day workshop on IPRs in collaboration with the Faculty of Veterinary Sciences, BZU-Multan and IPO-Pakistan at BZU, Multan, on May 11, 2016.
- PASTIC-Peshawar organized one-day workshop in collaboration with National Academy of Young Scientists (NAYS) at Amir Muhammad Khan Campus-Mardan, University of Peshawar, on May 11, 2016.
- PASTIC-Lahore organized one day awareness seminar on Mendeley PASTIC activities at Information Technology University, Lahore on May 19, 2016.
- PASTIC-Quetta organized one day awareness seminar on PASTIC activities at University of Baluchistan, Quetta on May 27, 2016.
- PASTIC organized one day seminar on "Library Resource Sharing in the ICT Era" on June 1<sup>st</sup>, 2016 at PASTIC National Centre, Quaid-e-Azam University Campus, Islamabad.

## **5.2 Meetings/Workshops/Trainings/Seminars Attended**

- Prof. Dr. Muhammad Akram Sheikh, Director General, PASTIC/Member Science-PSF attended a Third Open House at HITEC University, Taxila on July 28, 2015.

- Ms. Nageen Aniuddin, Director, PASTIC attended the 7th ORIC Forum Meeting on Intellectual Property at International Islamic University, Islamabad on October 01, 2015.
- Prof. Dr. Muhammad Akram Shaikh, Director General, PASTIC/Member Science, PSF attended National Human Resource Development Plan (2015-2025) visualizing Socio-Economic Development of Pakistan at HEC, Islamabad on October 13, 2015.
- Prof. Dr. Muhammad Akram Shaikh, Director General, PASTIC/Member Science, PSF participated as an Expert in Meeting of the Board of Studies in Computer Systems Engineering of the Islamia University of Bahawalpur, Bahawalpur on October 28, 2015.
- Dr. Muhammad Ashraf Chairman, PSF held a review meeting of PASTIC officers on November 12, 2015 at PASTIC.
- Ms. Saima Saddique Tariq, Editor, PASTIC attended a meeting at Rawalpindi Chamber of Commerce and Industry at RCCI, Rawalpindi on December 01, 2015.
- Mr. Muhammad Aqil Khan, Additional Director, (STI), PASTIC attended a meeting of the Technical Working Group (TWG) of the Directorate of Scientific Information of National Agricultural Research Centre at NARC, Islamabad on 18.12.2015.
- Ms. Saima Saddique Tariq, Editor, PASTIC held a meeting with President, Women Chamber of Commerce & Industry (WCCI), Islamabad on January 19, 2016.
- PASTIC Sub-Centre Karachi arranged First Meeting of ORIC Heads of Sindh Region on May 25, 2016 at Karachi sub center Karachi. PSF/PASTIC took this Initiative to build & strengthen Academia-Industry Collaboration.
- PASTIC Annual Review Meeting for 2015-2016 was organized on May 31<sup>st</sup>, 2016.
- Dr. Saima Huma Tanveer, Sr. Scientific Information Officer, PASTIC attended one day Public Private Dialogue on Institutional and Policy reform for Export Success” at Marriott Hotel, Islamabad on July 29, 2015. The event was organized by Pakistan Institute of Trade and Development, Ministry of Commerce, Islamabad.
- Mrs. Rahila Khurram, Scientific Information Officer, PASTIC attended two days seminar on “Women Empowerment” at Pakistan Manpower Institute, Islamabad from February 9-10, 2015.
- PASTIC sub center, Lahore arranged computer based IQ Test/Interview for Science Talent Forming Scheme at Computer Department, COMSATS Lahore Campus on October 10, 2015.

- Mr. Faisal Hilal, Acting Assistant Director (STI), PASTIC Sub Center, Quetta conducted Computer Based IQ Test/Interview for Science Talent Forming Scheme at PASTIC Sub Center, Quetta on October 10, 2015.
- Prof. Dr. Muhammad Akram Shaikh, Director General, PASTIC/Member Science, PSF attended a Ceremony of National Foundation Day and the Armed Forces Day of Republic of Korea on October 15, 2015.
- Prof. Dr. Muhammad Akram Shaikh, Director General, PASTIC participated in “2015 KISTEP-ISTIC S&T Policy Innovation Training Programme for High Level Policy Makers at Seoul, Korea on November 23-27, 2015.
- Prof. Dr. Muhammad Akram Shaikh, Director General, PASTIC participated in 6th KOICA Club Conference at Seoul, Korea from November 30 to December 05, 2015.
- Mr. Muhammad Ayub Dogar, Sr. Scientific Information Officer attended a 5-day training course on “Data Collection Tools & Methods for Planning, Monitoring and Evaluation” at Pakistan Planning & Management Institute (PPMI), Islamabad from January 4-8, 2016.
- Dr Maryum Ibrar Shinwari attended 5th International and 14th National Conference of Botany organized by Pakistan Botanical Society at University of Karachi, Karachi from January 15-18, 2016.
- Mr. Shahid Iqbal, Superintendent (Admin), PASTIC attended a four days training course on “Managing Legal Affairs/Issues in Government Departments” at Pakistan Planning and Management Institute (PPMI), Islamabad on January 19-22, 2016.
- Dr. Maryam Ibrar Shinwari, Sr. Scientific Information Officer, PASTIC attended four days training on “Primavera: Project Management Software” at PPMI, Islamabad on February 16-19, 2016.
- Prof. Dr. Muhammad Akram Shaikh, Director General, PASTIC attended three days International Conference on “14th Public Communication of Science and Technology (PCST)” at Istanbul, Turkey from April 26-28, 2016.

## **6.0 Miscellaneous Activities**

- Orientation Sessions about PASTIC and its services for the students and faculty members of Sindh Agriculture University, Tandojam and Islamia University, Bahawalpur were organized at different times during the year.
- Under the directives of Ministry of Science and Technology, Key Performance Indicators (KPIs) of the organization and all the officers of BS-17 and above were developed for measuring and improving its performance in line with Guidelines provided by MoST.

- Data collection of “Completed and On-going Projects of Universities and R&D organizations” and of “Scientists, Engineers and Doctors” was continued for the development of the databases on these topics. During the period under review 3887 records were entered in the R&D Projects Database and 10381 records were entered in the Scientists, Engineers and Doctors Database.
- PASTIC participated in “World Science Day” celebrations and “World Cancer Day” by organizing PASTIC Stalls and awareness seminars in different cities.
- PASTIC coordinated in bringing out PSF monthly Newsletter. PASTIC also assisted PSF in collection of material for the PSF Science Magazine.
- PASTIC Prepared Annual plans, compiled brief for Finance Minister’s Budget Speech for 2016 and the Year book 2015-16.
- Compiled briefs /reports for MoST on the following:
  - 1) 19th Annual Session of UN Commission on Science & Technology.
  - 2) Govt. Mid-Term Review
  - 3) PASTIC Relevance to Sustainable Development Goals
  - 4) OIC 10 year Programme of Action.
  - 5) Principles of Policy.
  - 6) Establishment of Technology Park in Islamabad.
  - 7) Starred & Un-starred National Assembly and Senate Questions
- Prepared a justification for Enhancement of Budget for PASTIC Functions
- Prepared Work Distribution of PASTIC Officers & Staff of all Sections.
- PASTIC has strengthened liaison with local Universities/R&D Organizations by identifying focal persons for collaborations and a meeting session was held with librarians of Islamabad-Rawalpindi region for developing a Library Consortium.

The Director PASTIC authored an Article on “Science Diplomacy around the World” which was published in Technology Times in November 2015.

### **6.1 Important Visits**

- Mr. Fazal Abbas Mekan, Secretary, MoST, Ministry of Science & Technology visited PASTIC on May 18, 2016.
- Prof. Dr. Muhammad Ashraf, Chairman, PSF, visited PASTIC sub centers, Faisalabad and Karachi on September 19, 2015 and January 15, 2016.

### **6.2 PASTIC Membership**

2364 new members joined PASTIC and were added to PASTIC Services Users Membership Database

## IV. ORGANIZATION AND ADMINISTRATION

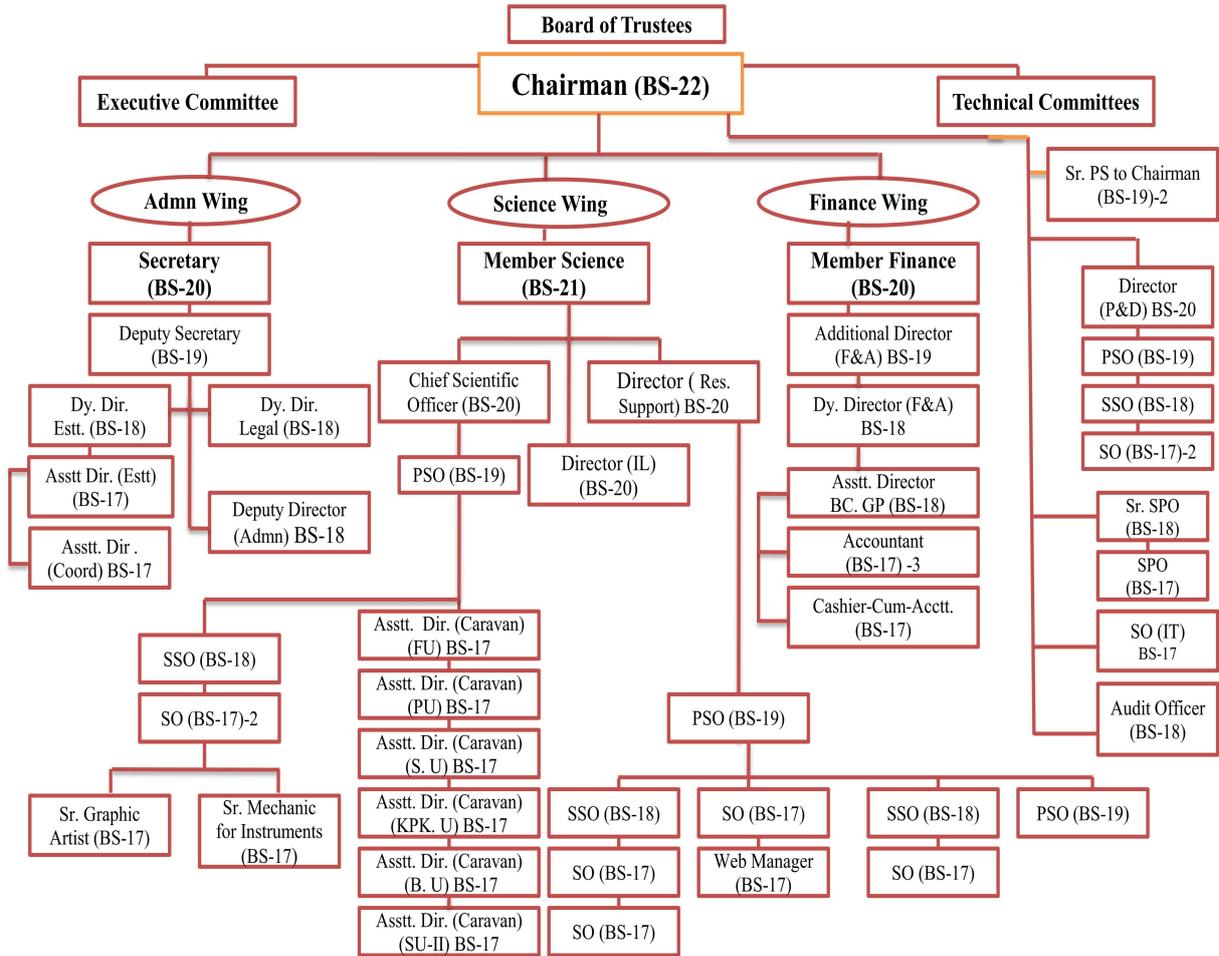
The organizational structure of Pakistan Science Foundation, Pakistan Museum of Natural History and Pakistan Scientific & Technological Information Centre is given in the forthcoming pages. The staff position in the Foundation, PMNH and PASTIC during the report period is as under:

### 1.0 PSF Sanctioned Posts and Organizational Chart

| Sr. No | Name of Post                         | BPS     | Total |
|--------|--------------------------------------|---------|-------|
| 1.     | Chairman                             | 22      | 1     |
| 2.     | Member Science                       | 21      | 1     |
| 3.     | Member Finance                       | 20      | 1     |
| 4.     | Secretary                            | 20      | 1     |
| 5.     | Director (P&D)                       | 20      | 1     |
| 6      | Chief Scientific Officer             | 20      | 1     |
| 7.     | Director (RS)                        | 20      | 1     |
| 8.     | Director (IL)                        | 20      | 1     |
| 9.     | Additional Director (F&A )           | 19      | 1     |
| 10     | Principal Scientific Officer         | 19      | 3     |
| 11.    | Deputy Secretary                     | 19      | 1     |
| 12.    | Sr. PS to Chairman                   | 19      | 2     |
| 13.    | Sr. Scientific Officer               | 18      | 4     |
| 14.    | Sr. Science Promotion Officer        | 18      | 1     |
| 15     | Dy. Director (F&A )                  | 18      | 1     |
| 16.    | Dy. Director (Admn/Estt )            | 18      | 2     |
| 17.    | Internal Audit Officer               | 18      | 1     |
| 18     | Asstt. Director (Finance)            | 18      | 1     |
| 19.    | Dy. Director (Admn)                  | 18      | 1     |
| 20.    | Dy. Director (Legal)                 | 18      | 1     |
| 21     | Scientific Officer                   | 17      | 8     |
| 22.    | Scientific Officer (IT)              | 17      | 1     |
| 23.    | Asstt. Director (Estt.)/Coordination | 17      | 2     |
| 24     | Accountant                           | 17      | 3     |
| 25     | Asstt. Director (Caravan)            | 17      | 6     |
| 26.    | Science Promotion Officer            | 17      | 1     |
| 27.    | Web Manager                          | 17      | 1     |
| 28.    | Sr. Graphic Artist                   | 17      | 1     |
| 29.    | Sr. Mechanic for Instruments         | 17      | 1     |
| 30     | Cashier-cum-Accountant               | 17      | 1     |
| 31.    | Asstt. Scientific Officer            | 16      | 11    |
| 32     | Superintendent                       | 17      | 1     |
| 33     | Audit & Accounts Assistant           | 16      | 2     |
| 34     | Graphic Artist                       | 16      | 1     |
| 35.    | Asstt. Private Secretary             | 16      | 10    |
| 36.    | Photographer                         | 16(S.S) | 1     |

|                                   |                             |            |            |
|-----------------------------------|-----------------------------|------------|------------|
| 37.                               | Planetarium Assistant       | 16(S.S)    | 5          |
| 38.                               | Driver-cum-Mechanic         | 16(S.S)    | 6          |
| <b>Sub Total (i):-</b>            |                             |            | <b>89</b>  |
| 39.                               | Science Assistant (Caravan) | 14         | 13         |
| 40.                               | Science Assistant           | 14         | 5          |
| 41.                               | Technical Assistant (IT)    | 14         | 1          |
| 42.                               | Assistant                   | 14         | 6          |
| 43.                               | Stenotypist                 | 14         | 2          |
| 44.                               | Planetarium Assistant       | 11         | 4          |
| 45.                               | Driver-Cum-Mechanic         | 11         | 3          |
| 46.                               | Calligrapher                | 11         | 1          |
| 48.                               | UDC                         | 9          | 6          |
| 49.                               | Carpenter                   | 9/11       | 1          |
| 50.                               | LDC/Typist                  | 7          | 8          |
| 51.                               | Electrician                 | 7/11       | 1          |
| 54.                               | Driver/D.R                  | 4/5/6/7/11 | 18         |
| 55.                               | DMO                         | 6          | 1          |
| 56.                               | Naib Qasid                  | 1/2/3/4    | 19         |
| 57.                               | Mali                        | 1/2/3/4    | 3          |
| 58.                               | Caravan Attendant           | 1/2/3      | 9          |
| 59.                               | Security Guard              | 1/2/3/4    | 16         |
| 60.                               | Sanitary Worker             | 1/2/3      | 4          |
| <b>S. Total (ii):-</b>            |                             |            | <b>121</b> |
| <b>G. Total ((I) &amp; (ii):-</b> |                             |            | <b>210</b> |

**PAKISTAN SCIENCE FOUNDATION  
ORGANIZATIONAL CHART**



## 2.0 PMNH Sanctioned Posts and Organizational Chart

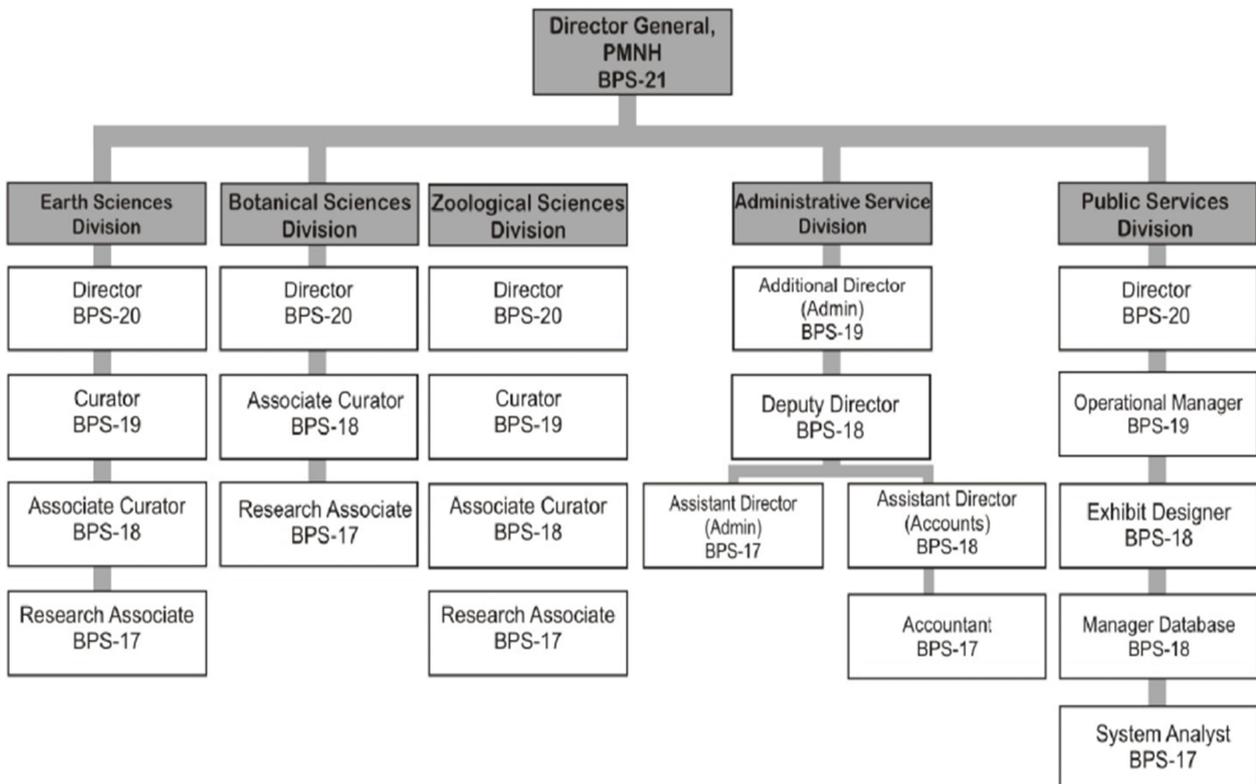
| Sr. No.              | Designation                       | BPS | Number of Posts |           |           |
|----------------------|-----------------------------------|-----|-----------------|-----------|-----------|
|                      |                                   |     | No. of Posts    | Filled    | Vacant    |
| 1.                   | Director General                  | 21  | 1               | -         | 1         |
| 2.                   | Director                          | 20  | 4               | 2         | 2         |
| 3.                   | Curator                           | 19  | 2               | 2         | -         |
| 4.                   | Operational Manager               | 19  | 1               | -         | 1         |
| 5.                   | Associate Curator                 | 18  | 10              | 5         | 5         |
| 6.                   | Exhibit Designer                  | 18  | 1               | -         | 1         |
| 7.                   | Deputy Director (Admin)           | 18  | 1               | 1         | -         |
| 8.                   | Assistant Director (Accounts)     | 18  | 1               | -         | 1         |
| 9.                   | Manager Data Base                 | 18  | 1               | -         | 1         |
| 10.                  | Assistant Director (Admin)        | 17  | 1               | 1         | -         |
| 11.                  | Accountant                        | 17  | 2               | 1         | 1         |
| 12.                  | Research Associate                | 17  | 18              | 12        | 6         |
| 13.                  | System Analyst                    | 17  | 1               | 1         | -         |
| 14.                  | Librarian                         | 16  | 1               | 1         | -         |
| 15.                  | PA to D.G                         | 16  | 1               | 1         | -         |
| 16.                  | Sr. Modeler                       | 16  | 1               | 1         | -         |
| 17.                  | Superintendent                    | 16  | 1               | 1         | -         |
| 18.                  | Assistant Research Associate      | 16  | 2               | 2         | -         |
| 19.                  | Casting Staff                     | 16  | 1               | 1         | -         |
| 20.                  | Teacher Guide                     | 16  | 1               | 1         | -         |
| 21.                  | Associate Artist                  | 16  | 2               | -         | 2         |
| 22.                  | Taxidermist                       | 16  | 2               | -         | 2         |
| 23.                  | Fossil Technician                 | 16  | 1               | -         | 1         |
| 24.                  | Assistant Private Secretary       | 16  | 3               | 3         | -         |
| 25.                  | Accounts Assistant                | 16  | 1               | 1         | -         |
| 26.                  | Calligrapher                      | 16  | 1               | 1         | -         |
| <b>Total Officer</b> |                                   |     | <b>62</b>       | <b>38</b> | <b>24</b> |
| 27.                  | Children Education Programer      | 15  | 1               | 1         | -         |
| 28.                  | Office Assistant                  | 14  | 1               | 1         | -         |
| 29.                  | Purchase Assistant                | 14  | 1               | 1         | -         |
| 30.                  | Computer Operator                 | 14  | 1               | 1         | -         |
| 31.                  | Data Control Assistant            | 14  | 1               | -         | 1         |
| 32.                  | Sr. Skeleton Preparator           | 14  | 1               | 1         | -         |
| 33.                  | Sr. Drying & Fumigating Assistant | 14  | 1               | -         | 1         |
| 34.                  | Repository Assistant              | 14  | 2               | -         | 2         |
| 35.                  | Sr. Collection Incharge           | 14  | 2               | 2         | -         |
| 36.                  | Sr. Incharge Embalming            | 12  | 1               | 1         | -         |
| 37.                  | Drying & Fumigating Assistant     | 12  | 1               | -         | 1         |
| 38.                  | Collection Incharge               | 12  | 2               | 1         | 1         |
| 39.                  | Photographer                      | 11  | 1               | -         | 1         |
| 40.                  | Carpenter                         | 9   | 1               | 1         | -         |
| 41.                  | Museum Guide                      | 9   | 2               | -         | 2         |
| 42.                  | U.D.C                             | 9   | 2               | 2         | -         |
| 43.                  | Store Keeper                      | 9   | 1               | 1         | -         |

|                                   |                    |   |            |            |           |
|-----------------------------------|--------------------|---|------------|------------|-----------|
|                                   |                    |   |            |            |           |
| 44.                               | Electrician        | 7 | 1          | 1          | -         |
| 45.                               | Painter            | 7 | 1          | 1          | -         |
| 46.                               | Tracer             | 7 | 1          | 1          | -         |
| 47.                               | L.D.C              | 7 | 2          | 2          | -         |
| 48.                               | L.M.O              | 7 | 1          | -          | 1         |
| 49.                               | Skelton Preparator | 7 | 1          | 1          | -         |
| 50.                               | Field Assistant    | 5 | 12         | 12         | -         |
| 51.                               | Dispatch Rider     | 4 | 1          | 1          | -         |
| 52.                               | D.M.O              | 4 | 1          | 1          | -         |
| 53.                               | Driver             | 4 | 5          | 5          | -         |
| 54.                               | Security Guard     | 1 | 14         | 10         | 4         |
| 55.                               | Naib Qasid         | 1 | 7          | 7          | 0         |
| 56.                               | Sanitary Worker    | 1 | 5          | 5          | -         |
| 57.                               | Gardener           | 1 | 1          | 1          | -         |
| 58.                               | Helper             | 1 | 5          | 4          | 1         |
| <b>Total Staff</b>                |                    |   | <b>80</b>  | <b>65</b>  | <b>15</b> |
| <b>Total Officers &amp; Staff</b> |                    |   | <b>142</b> | <b>103</b> | <b>39</b> |

# PAKISTAN MUSEUM OF NATURAL HISTORY

## ORGANIZATIONAL CHART

2015 - 2016

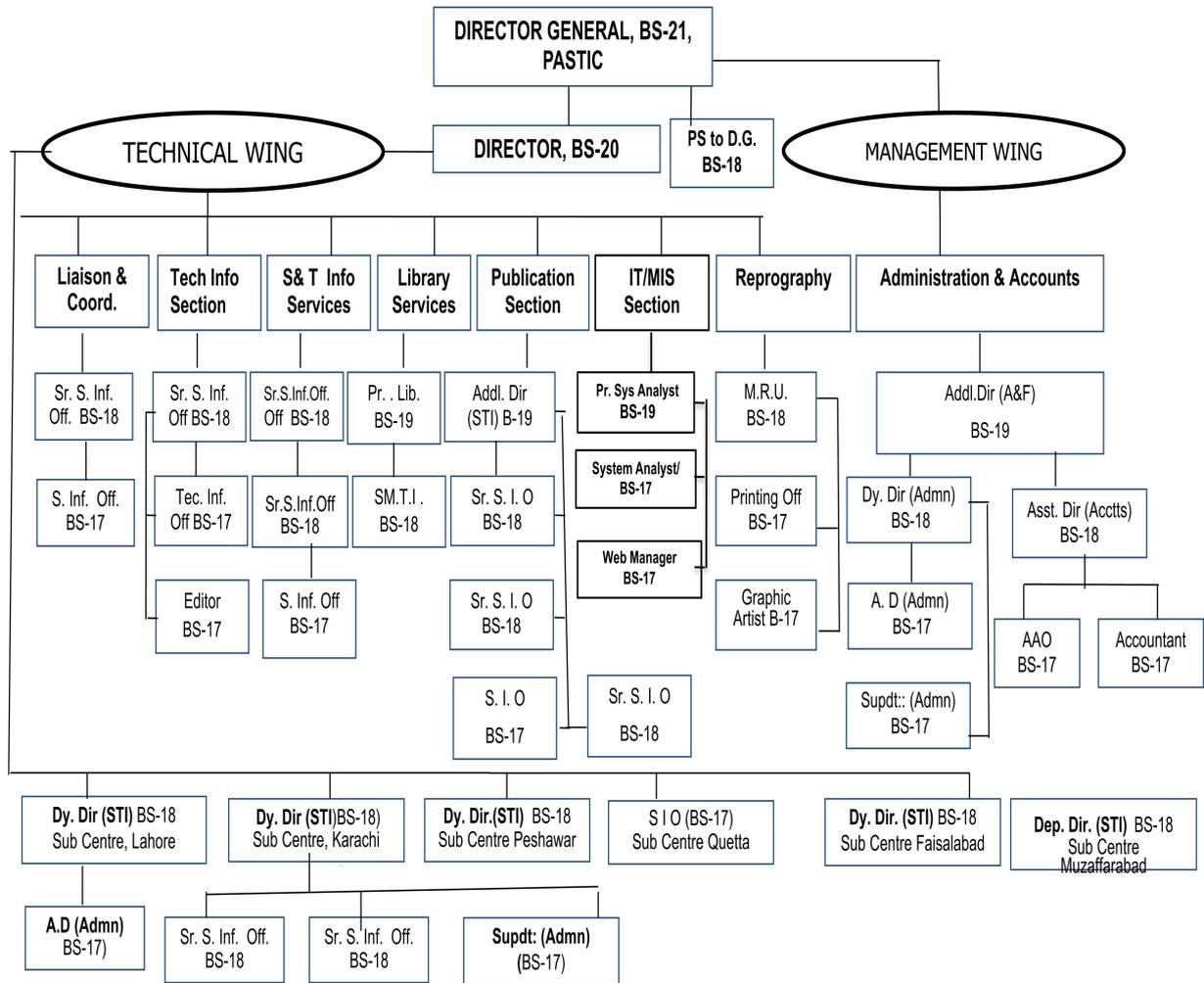


**PASTIC Sanctioned Posts and Organizational Chart**

| Sr.#             | BS | Designation                                | Number of Posts |           |          |
|------------------|----|--|-----------------|-----------|----------|
|                  |    |  | Total           | Filled in | Vacant   |
| 1                | 21 | Director General                           | 1               | 1         | 0        |
| 2                | 20 | Director                                   | 1               | 1         | 0        |
| 3                | 19 | Additional Director (A&F)                  | 1               | 1         | 0        |
| 4                | 19 | Additional Director (STI)                  | 1               | 1         | 0        |
| 5                | 19 | Principal System Analyst                   | 1               | 1         | 0        |
| 6                | 19 | Principal Librarian                        | 1               | 1         | 0        |
| 7                | 18 | Deputy Director (STI)                      | 5               | 5         | 0        |
| 8                | 18 | Manager Reprographic Unit                  | 1               | 1         | 0        |
| 9                | 18 | Senior Scientific Information Officer      | 9               | 8         | 1        |
| 10               | 18 | Deputy Director (Admin)                    | 1               | 1         | 0        |
| 11               | 18 | Assistant Director (Accounts)              | 1               | 1         | 0        |
| 12               | 18 | PS to D.G                                  | 1               | 1         | 0        |
| 13               | 18 | Senior Manager Technology Information      | 1               | 1         | 0        |
| 14               | 17 | Scientific Information Officer             | 3               | 2         | 1        |
| 15               | 17 | System Analyst                             | 1               | 1         | 0        |
| 16               | 17 | Web Manager                                | 1               | 1         | 0        |
| 17               | 17 | Printing Officer                           | 1               | 0         | 1        |
| 18               | 17 | Graphic Artist                             | 1               | 1         | 0        |
| 19               | 17 | Assistant Director (Admn)                  | 2               | 2         | 0        |
| 20               | 17 | Technology Information Officer (Marketing) | 1               | 0         | 1        |
| 21               | 17 | Editor                                     | 1               | 1         | 0        |
| 22               | 17 | Assistant Accounts Officer                 | 1               | 1         | 0        |
| 23               | 17 | Accountant                                 | 1               | 1         | 0        |
| 24               | 17 | Superintendent (Admin)                     | 2               | 2         | 0        |
| 25               | 16 | Assistant Scientific Information Officer   | 3               | 1         | 2        |
| 26               | 16 | Assistant Documentation Officer            | 1               | 1         | 0        |
| 27               | 16 | Assistant Programmer                       | 2               | 1         | 1        |
| 28               | 16 | Assistant Web Manager                      | 1               | 1         | 0        |
| 29               | 16 | Assistant Manager Reprographic Unit        | 1               | 0         | 1        |
| 30               | 16 | Assistant Printing Officer                 | 5               | 4         | 1        |
| 31               | 16 | Assistant Private Secretary                | 2               | 2         | 0        |
| 32               | 16 | Assistant Accounts                         | 1               | 1         | 0        |
| <b>Sub Total</b> |    |  | <b>56</b>       | <b>47</b> | <b>9</b> |

| Sr.#               | BS | Designation                   | Number of Posts |            |           |
|--------------------|----|-------------------------------|-----------------|------------|-----------|
|                    |    |                               | Total           | Filled in  | Vacant    |
| 1                  | 15 | Senior Data Control Assistant | 2               | 1          | 1         |
| 2                  | 14 | Data Control Assistant        | 7               | 6          | 1         |
| 3                  | 14 | Layout Artist                 | 1               | 1          | 0         |
| 4                  | 14 | Marketing/Field Assistant     | 1               | 0          | 1         |
| 5                  | 14 | Graphic Assistant             | 1               | 0          | 1         |
| 6                  | 14 | Senior Offset Printer         | 2               | 0          | 2         |
| 7                  | 14 | Assistant                     | 7               | 6          | 1         |
| 8                  | 14 | Stenotypist                   | 2               | 2          | 0         |
| 9                  | 12 | Library Assistant             | 1               | 1          | 0         |
| 10                 | 12 | Data Entry Operator           | 2               | 0          | 2         |
| 11                 | 11 | Technician                    | 1               | 1          | 0         |
| 12                 | 11 | Offset Printer                | 3               | 2          | 1         |
| 13                 | 11 | Technical Assistant           | 1               | 0          | 1         |
| 14                 | 11 | Senior Carpenter              | 1               | 1          | 0         |
| 15                 | 9  | Upper Division Clerk          | 9               | 8          | 1         |
| 16                 | 7  | Electrician                   | 1               | 1          | 0         |
| 17                 | 7  | Assistant Offset Printer      | 2               | 2          | 0         |
| 18                 | 7  | Lower Division Clerk          | 11              | 8          | 3         |
| 19                 | 7  | Driver                        | 1               | 1          | 0         |
| 20                 | 6  | Driver                        | 1               | 1          | 0         |
| 21                 | 5  | Bindery Assistant             | 2               | 2          | 0         |
| 22                 | 5  | Driver                        | 2               | 2          | 0         |
| 23                 | 5  | Offset Machine Assistant      | 1               | 1          | 0         |
| 24                 | 4  | Drivers                       | 4               | 4          | 0         |
| 25                 | 4  | Duplicating Machine Operator  | 1               | 1          | 0         |
| 26                 | 4  | Dispatch Rider                | 1               | 1          | 0         |
| 27                 | 3  | Head Mali                     | 1               | 1          | 0         |
| 28                 | 3  | Record Sorter                 | 1               | 1          | 0         |
| 29                 | 4  | Photo Attendant               | 1               | 1          | 0         |
| 30                 | 3  | Patent Attendant              | 1               | 1          | 0         |
| 31                 | 3  | Security Guard                | 5               | 5          | 0         |
| 32                 | 3  | Qasid                         | 8               | 8          | 0         |
| 33                 | 2  | Qasid                         | 1               | 1          | 0         |
| 34                 | 2  | Photo Attendant               | 1               | 1          | 0         |
| 35                 | 2  | Patent Attendant              | 1               | 1          | 0         |
| 36                 | 2  | Library Attendant             | 2               | 2          | 0         |
| 37                 | 1  | Bindery Helper                | 1               | 1          | 0         |
| 38                 | 1  | Sanitary Workers              | 3               | 3          | 0         |
| 39                 | 1  | Mali                          | 2               | 2          | 0         |
| 40                 | 1  | Security Guard                | 3               | 3          | 0         |
| 41                 | 1  | Naib Qasid                    | 9               | 9          | 0         |
| <b>Sub Total</b>   |    |                               | <b>108</b>      | <b>93</b>  | <b>15</b> |
| <b>GRAND TOTAL</b> |    |                               | <b>164</b>      | <b>140</b> | <b>24</b> |

## ORGANIZATIONAL STRUCTURE OF PASTIC



## **V. PHOTO GALLERY AND PRESS CLIPPING**

## **1.0 PSF Photo Gallery & Press Clippings**



*Federal Minister, Ministry of Science and Technology Chairing the Board of Governors Meeting of NSLP held on 11.01.2016*



*Participants of the Project Formulation Workshop at GCWU, January 20-21, 2016, Faisalabad*



*Member Finance PSF, Mr. Hasnat Ahmed Qureshi distributing certificates to the participants of Project Formulation Workshop at GCU, Faisalabad*



*PSF Monitoring team discussing PSF Funded Projects at NIAB, Faisalabad*



*Principal Investigator briefing PSF monitoring team about PSF funded project at PCSIR Labs., Lahore*



*The Chairman PSF, Vice Chancellor University of Poonch During the Project Formulation Workshop*



*Chairman PSF, Prof. Dr. Muhammad Ashraf addressing participants of Project Formulation Workshop at University of Poonch*



*The Vice Chancellor Govt. College Women University, Faisalabad attending session of Project Formulation Workshop*



*Pakistani students presenting their posters during ASC-15, Thailand*



*Group photo of Pakistani delegate with eminent Physicist, Prof. Hitoshi Murayama during ASC-15, Thailand*



*Mr. Fazal Abbas Maken, Federal Secretary MoST distributing medals and certificates among winners of PSF Competition on occasion of World Science Day.*



*Winners students with Mr. Fazal Abbas Maken, Federal Secretary MoST, Dr. Muhammad Ashraf, Chairman PSF, Ms. Vibeke Jensen, Representative/Director UNESCO, Dr. Manzoor H. Soomro, President ECOSF, Prof. Dr. Aslam Baig, HI, SI, TI, National Centre for Physics and Dr. S.T.K Naeem, Consultant, COMSTECH on WSD-2015.*



*Hands on activities being performed by Teachers under IBSE at PAEC, Chashma*



*IBSE Teachers Training workshop at Swat in collaboration with DoST*



*Mr. Ahsan Iqbal, Federal Minister for Planning, Development and reform is being briefed about MoST activities at its Stall on 2nd Governance Expo*



*Hands on activities performed by students and teachers under IBSE at GGHSS, Skardu*



*IBSE training session at Amir Public School, Barrian, Distt. Neelum AJK*



*Prof. Dr. Muhammad Ashraf (S.I) Chairman, PSF and Prof. Dr. Tahir Amin Vice Chancellor BZU-Multan on April 1st 2016*



*Maj. General Dr. Azhar Mahmood Kayani, Executive Director, Rawalpindi Institute of Cardiology delivering a lecture on "Prevention of Heart Diseases" at Pakistan Science Foundation (PSF) under its Popular Science Lecture Series on 26-04-2016.*



*Mr. Fazal Abbas Maken, Secretary, MoST addressing the audience during the lecture on Gravitational waves*



*Glimpse of PSF's 25<sup>th</sup> Science Poster Competition at BSE, Karachi*



*PSF's 25<sup>th</sup> Science Essay Competition at BISE, Kohat*



*Students being briefed during caravan exhibition arranged by Sukkur Unit*



*Science Documentary arranged by Peshawar Unit*



*Students are briefed about scientific model in a exhibition arranged by Tandojam Unit*



*Visitors are briefed in a exhibition arranged by Pujab Unit Faisalabad*



*Students performing hands on activities during caravan exhibition*



*Students being briefed about Science Caravan activities in a exhibition arranged by Jaffarabad Unit*



*Planetarium Show arranged by Federal Unit*



*Planetarium Show arranged by Multan Unit*



*Planetarium Show arranged by Balochistan Unit*



*Lecture on water arranged by Science Caravan Jaffarabad Unit*



*Mr. Fazal Abbas Maken, Secretary, MoST along with Prof. Dr. Muhammad Ashraf, Chairman PSF and STFS Project Director Mr. Hasnat Ahmed Qureshi visiting STFS Mobile Lab*



*Exterior View of "Mobile Science Talent Farming Lab"*



*Federal Minister for Science and Technology Rana Tanveer Hussain, Prof. Ahsan Iqbal, Minister for Planning, Development and Reforms and Prof. Dr. Muhammad Ashraf, Chairman PSF during launching ceremony of Science Talent Farming Scheme (STFS)*



*Prof. Ahsan Iqbal, Minister for Planning, Development and Reforms addressing during the launching ceremony of Science Talent Farming Scheme*



*STFS students visiting a lab in a scientific organization during Summer Camp*



*Group Photo of STFS students in front of PSF Building*



*Students performing hands on activities under IBSE during STFS Summer Camp*

# The Nation

MUHARRAM 29, 1437  
THURSDAY,  
NOVEMBER 12, 2015

## S&T only solution to sustainable development: Speakers

OUR STAFF REPORTER  
ISLAMABAD

To create awareness and encourage students towards scientific education and research with a view to sharing ideas between the scientists and students, Pakistan Science Foundation (PSF) in collaboration with UNESCO Islamabad and ECO Science Foundation (ECOSF), organized a convention of scientists to mark the World Science Day 2015 here.

Officials and representatives of the Ministry of Science and Technology, PSF, ECOSF, UNESCO, and representatives from academia and research institutions in Pakistan attended the event.

Fazal Abbas Maken, Federal Secretary Science and Technology, who was the chief guest, in his remarks highlighted the importance of science and technology and said that the objective of World Science Day was to renew the national, as well as international commitment to use science and technology for national development and achieving peace by appropriate use of its applications.

He underlined the importance of the theme of WSD-2015, as declared by UNESCO "Science for a Sustainable Future", and mentioned that creating knowledge and its applications by using science helped us to find solutions to today's acute economic, social and environmental challenges to achieve sustainable development.

In her remarks, Vibeke Jensen, Director UNESCO, Islamabad, said that the World Science Day for Peace and Development

is an occasion for us to remember that the science should be at the service of humanity as a whole, and should contribute to providing everyone with a deeper understanding of this planet and its people.

Prof. Dr. Ashraf, Chairman PSF, in his welcome remarks said that PSF is playing a key role in promotion of science education at different levels in the country. It holds the honor of celebrating World Science Day every year to honor the efforts of Pakistani scientists and students working for the attainment of national goals, despite limited resources available to them, he added.

He informed the audience that PSF through its various programmes is striving to educate young children across the country about the basic scientific concepts and their applications. PSF is the only government organization in the country working for the dissemination of scientific knowledge in the rural areas of the country he said, adding that for this purpose, PSF operates through science caravans which are equipped with basic scientific gadgets.

Speaking at the convention, Dr. Manzoor Soomro, President ECOSF, highlighted the aims and objectives of the regional organization. He said that ECOSF was created to promote science in Economic Cooperation Organization (ECO) member countries and Pakistan is one of its important members.

Eminent scientists of Pakistan, Prof. Dr. Aslam Baig, HI, SI, TI, National Centre for Physics and Dr. S.T.K. Naem, Consultant, COMSTECH also spoke on this occasion.

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پاکستان کے روزنامہ سرگرمیہ

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باقاعدہ تصدیق شدہ شہادت

THE DAILY JANG RAWALPINDI

روزنامہ

جنگ راولپنڈی

ہفت روزہ

پہلی سیر غلیل الرحمن

جماعت 29 نومبر 1437 12 نومبر 2015ء تک 2072 پ

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LOCAL EDITION THURSDAY NOVEMBER 12, 2015

پانچ روزہ پیش ہیں، وفاقی سیکرٹری سائنس

اسلام آباد (اے پی پی) سائنس کی اہمیت کو اجاگر کرنے اور اس کے پر امن استعمال کے فروغ کیلئے پاکستان سائنس فاؤنڈیشن میں ماہی ان دن برائے سائنس 2015 کے موقع پر کنوینشن کا انعقاد کیا گیا۔ تقریب کے مہمان خصوصی وفاقی سیکرٹری برائے سائنس و ٹیکنالوجی فضل عباس مکن تھے۔ کنوینشن سے خطاب کرتے ہوئے وفاقی سیکرٹری فضل عباس مکن نے کہا کہ دنیا کو پائیدار ترقی حاصل کرنے کیلئے اقتصادی، سماجی اور ماحولیاتی چیلنج درپیش ہیں۔ بریجنگ پاکستان کی وزارت سائنس و ٹیکنالوجی، پاکستان سائنس فاؤنڈیشن کے جنرل مین کے صدر ڈاکٹر اشرف، ای سی او سائنس فاؤنڈیشن کے صدر ڈاکٹر منو نے بھی کنوینشن سے خطاب کیا اور سائنس کی ترقی اور اس کے پر امن استعمال کیلئے اقدامات تجویز کیے۔

# The Nation

MUHARRAM 27, 1437  
TUESDAY,  
NOVEMBER 10, 2015

## CELEBRATING WORLD SCIENCE DAY FOR PEACE & DEVELOPMENT

### ■ GUEST COLUMN

Science was born with the emergence of human curiosity about nature and has undergone many evolutionary phases in its philosophy and methodology from classical antiquity to modern times.

Pakistan Academy of Sciences (PAS) is the supreme professional scientific body with an advisory and consultative status to the government. For decades, PAS President Dr Anwar Nasim through his unique concept of non-governmental individual (NGI), as opposed to enhancing science awareness in Pakistan. In a recent contribution he provided yet another insight into a familiar work by Michael Hart 'The 100: A Ranking Of The Most Influential Persons In History'. Of the 100 people identified by Hart, Dr Anwar Nasim has tabulated that the greatest number of individuals (36) whose contributions, through the centuries, made a difference in this world were none other than scientists and inventors.

This stands to underscore not only the piv-

otal role science continues to play in human affairs but also the necessity for sustained mass awareness about how individual scientists and inventors can develop a science-conscious society.

Recognising the centrality of science in modern human life, the UNESCO in 2001 proclaimed the World Science Day for Peace and Development to be celebrated every year on November 10. On this day, through a multitude of activities, several governments renew their commitment to support scientific research, increase national spending on science, and take new initiatives in association with schools, universities, industry, and social organizations.

UNESCO DG Inna Bokova in her message for this year's celebrations reminded that "science stands ... as a force for positive transformation and a development multiplier. All governments recognise today the power of science to provide key answers for the better management of water, for the conservation and sustainable use of the ocean, for the protection of ecosystems and biodiversity, to tackle climate change and disasters, to foster innovation and to eliminate

poverty and reduce inequality. To make the most of this power, we need to understand more clearly the global landscape of science and we need better tools to monitor progress."

Given the abysmal state of scientific productivity in Pakistan, plagiarism rampant among both students and faculty at many universities, outmoded science syllabi, and inadequate infrastructure, one is prompted to ask what is there to celebrate in the name of science.

In fact, Pakistan is not alone in this highly unsatisfactory state of national science: the entire Muslim world is at the lowest rung of global scientific productivity. In a report from Pakistan Council for Science and Technology, published two months ago, it was observed that "most of the OIC countries are spending much less on education and R&D than recommended by UNESCO for the developing countries."

But all is not lost for Pakistan, at least for this year. In July, Pakistan won the associate membership of the European Organisation for Nuclear Research (CERN). Pakistani scientists stand to benefit from this new era of coopera-

tion with CERN by participating in its governance. It offers them training opportunities at a world-class institution and there can be chances for industrial collaboration.

In line with the concept of NGI and barely a week before the World Science Day, another son of the soil, Dr. Zabta Khan Shinwari, a biotechnologist, was awarded the coveted UNESCO Avicenna prize for ethics in science. He received this prize for his commitment to ethically responsible research.

The winning the CERN membership and the Avicenna prize gives us confidence to celebrate science with the hope that we move from isolated incidents to a holistic and inclusive culture of science. Our real celebration, though, lies in displaying the courage to celebrate those individual scientists of our nation upon whose shoulders we stand today. A genuine celebration of science would come when we pay our moral debt to those whom we have sent to oblivion - at our own peril.

—The writer Dr. Munawar A. Anees is an acclaimed science educator, creative writer and social critic.

ABC CERTIFIED اسلام آباد، لاہور اور کراچی سے بیک وقت اشاعت

Daily JEHAN PAKISTAN

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جلد نمبر 21 جمعرات 29 نومبر 2015ء 12:00 تا 29 اکتوبر 2015ء 292 صفحات 16 قیمت 12 روپے

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روزنامہ دنیا اسلام آباد

جلد نمبر 21 جمعرات 29 نومبر 2015ء 12:00 تا 29 اکتوبر 2015ء 250 صفحات 16 قیمت 12 روپے

فون نمبر: 051-2891802 فیکس نمبر: 051-2891814

**سائنس کلچر کے فروغ کیلئے یونیسکو سے معاہدہ طے پا گیا، ڈاکٹر اشرف سائنس ٹیچر، ایب میں طلباء کو سائنس فروغ دینے کا آغاز کر دیا، جہان پاکستان سے گفتگو**

اسلام آباد (ڈیلیٹ) ماہر سائنس ڈاکٹر اشرف سائنس فاؤنڈیشن کے چیئر مین ڈاکٹر اشرف نے کہا ہے کہ پاکستان کے دینی علما میں سائنس

کے فروغ کیلئے یونیسکو کے ساتھ معاہدہ طے پا گیا ہے جس کو عملی جامہ دینے کے لئے 16 اکتوبر کا آغاز کیا جائے گا۔ (ڈیلیٹ 28)

ڈاکٹر اشرف نے کہا کہ جہان پاکستان سے خصوصی گفتگو کے دوران اس معاملے سے ادر سے لے دینی علما کو سائنس اہمیت دینے کے لئے سائنس ٹیچر کے فروغ دینے کا فیصلہ کیا ہے اس میں سائنس ٹیچر سائنس کا وہاں سائنس ٹیچر رولڈ فیروز میں ملنا اور سائنس ٹیچر کے فروغ دینے کے لئے یونیسکو کے ساتھ کام کا آغاز کیا جائے گا۔ (ڈیلیٹ 28)

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**پائیدار ترقی کیلئے سائنس کا مناسب استعمال ناگزیر ہے، فضل میمن ترقی کیلئے سماجی و ماحولیاتی چیلنجز درپیش ہیں، عالمی یوم سائنس پر کنوینشن سے خطاب**

اسلام آباد (ڈیلیٹ) وفاقی سکریٹری وزارت سائنس اینڈ ٹیکنالوجی فضل میمن نے کہا ہے کہ سائنس کا مناسب استعمال پائیدار ترقی کا واحد حل ہے اس وقت دنیا کو منیچر اور پائیدار ترقی کیلئے اقتصادی، سماجی اور ماحولیاتی چیلنجز درپیش ہیں موجودہ دور میں ان مسائل کے حل کیلئے بین الاقوامی اداروں کا باہمی تعاون درکار ہے اور اس سلسلے میں یونیسکو اہم کردار ادا کر سکتی ہے۔ ان خیالات کا اظہار پاکستان سائنس فاؤنڈیشن میں عالمی یوم سائنس 2015 کے موقع پر سائنسدانوں کے متفقہ کنوینشن سے خطاب کرتے ہوئے کیا۔ اس موقع پر یونیسکو پاکستان کی ڈائریکٹر وائیکنی جنیس، پاکستان سائنس فاؤنڈیشن کے چیئر مین پروفیسر ڈاکٹر اشرف، ای سی او سائنس فاؤنڈیشن کے صدر ڈاکٹر منظور محمدی موجود تھے۔ اس کے علاوہ تقریب میں تعلیمی اور سماجی حلقے اور ان کے سینئر سائنسدانوں اور طلبہ و طالبات نے شرکت کی۔ یہ تقریب پاکستان سائنس فاؤنڈیشن نے یونیسکو پاکستان، اقتصادی تنظیم برائے تعاون سائنس فاؤنڈیشن اور وزارت سائنس و ٹیکنالوجی کے تعاون سے منعقد کی۔ سائنس فاؤنڈیشن کے صدر ڈاکٹر منظور نے بھی خطاب کیا، آخر میں وفاقی سکریٹری فضل میمن نے مختصر سائنسی مقالوں میں نمایاں پوزیشن لینے والے طلبہ میں انعامات اور تادقیہ کیے۔



# The Frontier Post

International English daily published from Peshawar, Islamabad, Lahore, Quetta & Karachi

MUHARRAM-UL-HARAM 29, 1437 ---THURSDAY, NOVEMBER 12, 2015

ISLAMABAD EDITION

## Meeting held to observe World Science Day

ISLAMABAD (APP): To create awareness and encourage students towards scientific education and research with a view of sharing ideas between the scientists and students UNESCO, Pakistan Science Foundation (PSF) and ECO Science Foundation (ECOSF) jointly organized a meeting of scientists on the occasion of World Science Day.

The theme for this year is "Science for Sustainable Development." In this context various awareness raising activities supported by ECO Science Foundation have also been organized by the PSF Science Caravans across the country.

Officials and representatives of the Ministry of Science and Technology, PSF, ECOSF, UNESCO, and representatives from academia and research institutions in Pakistan attended the event. Dr. Muhammad Ashraf, Chairman, Pakistan Science Foundation in his welcome remarks extended his grat-

itude to UNESCO for its continuous support and execution of science programmes that would help in the attainment of Sustainable Development Goals (SDGs). He said that PSF is playing a key role in promotion of science education in the country such as annual celebration of World Science Day, dissemination of scientific knowledge in the rural areas through its seven science caravans centers equipped with basic scientific gadgets. He said that the foundation with its broad mandate, including school education and strengthening of university laboratories and research programmes have produced many valuable results and MS and PhD scholars. In her remarks, Vibeke Jensen, Representative and Director UNESCO Pakistan said that World Science Day for Peace and Development is an occasion to remember that the sciences should be at the service of humanity as a whole, and should contribute to providing

everyone with a deeper understanding of this planet and its people. She said that science education and research capacity need to be built to allow countries to develop their own solutions to their specific problems.

UNESCO provides countries with guidance in developing or revising their national Science Technology and Innovation (STI) policies and in strengthening national capacities in science education and research.

"On this day, let's commit to creating a scientifically literate, knowledge society for all, with sustainable development as a fore most priority", she said.

Fazal Abbass Maken, Federal Secretary, Ministry of Science and Technology who was the chief guest said that World Science Day is aimed at renewing national and international commitment to use science and technology for national development and achieving peace by appropriate use of its applications.





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چیف ایڈیٹر: ڈاکٹر جبار خٹک

جلد 17 قیمت 5 روپے اتوار 15 نومبر 2015ء، بھارتی 2 نومبر 1437ھ نمبر 309

**گورنمنٹ اسکول میں سائنس فاؤنڈیشن کی 10 روزہ نمائش**

نمائش کا مقصد جزل، بائیولوجی اور سولر سٹم سے طلبہ طالبات کو آگاہ کرنا ہے، عرفان شیخ سائنس ڈس کے حوالے سے تقریری مقابلاً، یسٹی گسی نے چینی پوزیشن حاصل کر لی

شہدادکوٹ (تمائمہ انجم) شہدادکوٹ کے گورنمنٹ کے منتقلی کی جس سے خطاب کرتے ہوئے نمائش کا افتتاح ہوا، ہائی اسکول میں پاکستان سائنس باستان سائنس کا وہاں سکر کے اسٹنٹ ڈائریکٹر عرفان شیخ کی جانب سے دس روزہ سائنس نمائش کا افتتاح ہوا، شہدادکوٹ میں سائنس نمائش کا مقصد چارٹر اور سائنٹفک موبی کے ذریعے جزل اہتمام کیا گیا۔ پاکستان سائنس کاروان کی سائنس نمائش کا مقصد چارٹر اور سائنٹفک موبی کے ذریعے جزل کے دوران اسکول میں ایک تقریبی سائنس نمائش زیر سائنس، بائیولوجی اور سولر سٹم کے متعلق طلبہ مہارت کی ای اویسیٹری (سٹی) شہدادکوٹ مہاراجہ اعلیٰ تعلیم کے حوالے سے خطاب کرتے ہیں۔

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اقانہ تصدیق شدہ شاعت پاکستان کے روزنامہ سیریا

**جنگ کوئٹہ**

روزنامہ

پانی پور، خیبر پختونخوا

جلد 45 جمعہ المبارک 28 جب المرجبہ 1437ھ 06 مئی 2016ء نمبر 127

**بلوچستان کے پسماندہ علاقوں میں سائنسی شعور بڑھانے کی خاطر**

کوئٹہ (جنگ) بلوچستان کے پسماندہ علاقوں میں سائنسی شعور بڑھانے کی خاطر سائنس اور سولر سٹم سے متعلق ایک نمائش کا افتتاح ہوا، ہائی اسکول میں پاکستان سائنس باستان سائنس کا وہاں سکر کے اسٹنٹ ڈائریکٹر عرفان شیخ کی جانب سے دس روزہ سائنس نمائش کا افتتاح ہوا، شہدادکوٹ میں سائنس نمائش کا مقصد چارٹر اور سائنٹفک موبی کے ذریعے جزل اہتمام کیا گیا۔ پاکستان سائنس کاروان کی سائنس نمائش کا مقصد چارٹر اور سائنٹفک موبی کے ذریعے جزل کے دوران اسکول میں ایک تقریبی سائنس نمائش زیر سائنس، بائیولوجی اور سولر سٹم کے متعلق طلبہ مہارت کی ای اویسیٹری (سٹی) شہدادکوٹ مہاراجہ اعلیٰ تعلیم کے حوالے سے خطاب کرتے ہیں۔

14

سائنس نمائش

گورنمنٹ اسکول میں سائنس فاؤنڈیشن کی 10 روزہ نمائش کا افتتاح ہوا، ہائی اسکول میں پاکستان سائنس باستان سائنس کا وہاں سکر کے اسٹنٹ ڈائریکٹر عرفان شیخ کی جانب سے دس روزہ سائنس نمائش کا افتتاح ہوا، شہدادکوٹ میں سائنس نمائش کا مقصد چارٹر اور سائنٹفک موبی کے ذریعے جزل اہتمام کیا گیا۔ پاکستان سائنس کاروان کی سائنس نمائش کا مقصد چارٹر اور سائنٹفک موبی کے ذریعے جزل کے دوران اسکول میں ایک تقریبی سائنس نمائش زیر سائنس، بائیولوجی اور سولر سٹم کے متعلق طلبہ مہارت کی ای اویسیٹری (سٹی) شہدادکوٹ مہاراجہ اعلیٰ تعلیم کے حوالے سے خطاب کرتے ہیں۔



بلوچستان کے پسماندہ علاقوں میں سائنسی شعور بڑھانے کی خاطر سائنس اور سولر سٹم سے متعلق ایک نمائش کا افتتاح ہوا، ہائی اسکول میں پاکستان سائنس باستان سائنس کا وہاں سکر کے اسٹنٹ ڈائریکٹر عرفان شیخ کی جانب سے دس روزہ سائنس نمائش کا افتتاح ہوا، شہدادکوٹ میں سائنس نمائش کا مقصد چارٹر اور سائنٹفک موبی کے ذریعے جزل اہتمام کیا گیا۔ پاکستان سائنس کاروان کی سائنس نمائش کا مقصد چارٹر اور سائنٹفک موبی کے ذریعے جزل کے دوران اسکول میں ایک تقریبی سائنس نمائش زیر سائنس، بائیولوجی اور سولر سٹم کے متعلق طلبہ مہارت کی ای اویسیٹری (سٹی) شہدادکوٹ مہاراجہ اعلیٰ تعلیم کے حوالے سے خطاب کرتے ہیں۔

قسم ہر قلم کی اور جو کچھ لکھتے ہیں، القرآن

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عالمی صحافتی اوصاف کا علمبردار

**اوصاف اسلام آباد**

روزنامہ

چیف ایڈیٹر: سید سجاد خان

جلد 17 ہمارے ذمہ 20 نومبر 2015ء 19 مئی 2012ء نمبر 365

گورنمنٹ گراؤنڈ اسکول میں سائنس ورکشاپ کا اہتمام

گورنمنٹ گراؤنڈ اسکول میں سائنس ورکشاپ کا اہتمام کیا گیا، ورکشاپ میں سائنس اور سولر سٹم سے متعلق ایک نمائش کا افتتاح ہوا، ہائی اسکول میں پاکستان سائنس باستان سائنس کا وہاں سکر کے اسٹنٹ ڈائریکٹر عرفان شیخ کی جانب سے دس روزہ سائنس نمائش کا افتتاح ہوا، شہدادکوٹ میں سائنس نمائش کا مقصد چارٹر اور سائنٹفک موبی کے ذریعے جزل اہتمام کیا گیا۔ پاکستان سائنس کاروان کی سائنس نمائش کا مقصد چارٹر اور سائنٹفک موبی کے ذریعے جزل کے دوران اسکول میں ایک تقریبی سائنس نمائش زیر سائنس، بائیولوجی اور سولر سٹم کے متعلق طلبہ مہارت کی ای اویسیٹری (سٹی) شہدادکوٹ مہاراجہ اعلیٰ تعلیم کے حوالے سے خطاب کرتے ہیں۔



## **2.0 PMNH Photo Gallery**





*American Delegation during their visit to PMNH on 30-10-2015*



*American Delegation during visit to PMNH on 30-10-2015*



*Chinese Media Persons Visited PMNH on 24-11-2015*



*Chinese Media persons visited PMNH on 24-11-2015*



*Delegation visit headed by Dr. Ashiq on 17-02-2016*



*Delegation visited with Dr. Mirza Habib Ali on 18-02-2016*



*Dr. Mary E. Barkworth lecture and visit of displays on 19-05-2016*



*Gujranwala school visited PMNH on 11-11-2015*



*Inaugural ceremony and exhibition and visits regarding bioday 6-7-2016*



*Inaugural ceremony, exhibition and visits regarding bioday 6-7-2016*



*Inaugural ceremony, exhibition and visits regarding bioday 6-7-2016*



*Inaugural ceremony, exhibition and visits regarding bioday 6-7-2016*



*Art competition on 24-05-2016*



*Prof. Dr. Akram Sheikh during the inegral/closing ceremony of Art competition*



*Art competition on 24-05-2016*



*Student participating in Art competition on 24-05-2016*



*Participants of the Art competition on 24-05-2016*



*Turkish delegation visited PMNH 15-10-2015*



*Secretary MoST visit on 5-4-2016*



*Secretary MoST visit on 5-4-2016*



*Secretary MoST visit to PMNH on 16-11-2015*



*Secretary MoST visit to PMNH on 16-11-2015*



*Senator Ch. Tanveer visited PMNH display galleries on 27-11-2015*



*Visit of Dr. David Sarmiento-Castillo on 4-3-2016*



*World Science Day participant*



*World Science Day 11-11-2015*



*World Science Day 11-11-2015*



*World wildlife day celebration on 3-3-2016*



*World wildlife day celebration on 3-3-2016*



## **3.0 PASTIC Photo Gallery and Press Clipping**





*Federal Secretary visiting the Library of PASTIC*



*Inaugural ceremony of 1<sup>st</sup> Invention to Innovation Summit 2016 at Quetta*



*Secretary MoST, Mr. Fazal Abbas Maken inaugurating the 5th Invention to Innovation Summit at Haripur University*



*Prof. Dr. Muhammad Akram Shaikh, DG, PASTIC, Muhammad Aqil Khan, Addl., Director (STI), Dr Raja Razi-ul-Hussnain, Addl. Director (A&F), Syed Habib Akhter Jaffri, Principal Librarian during the Inaugural Ceremony of the workshop on SPSS.*



*Prof. Dr. Muhammad Akram Shaikh, D.G., PASTIC giving Introductory Remarks during Inaugural ceremony of the workshop at AJK University, Muzaffarabad*



*Prof. Dr. Muhammad Akram Shaikh, Director General, PASTIC giving introductory remarks to the participants of the seminar at AKU, Karachi*



*Prof. Dr. Muhammad Akram Shaikh, D. G, PASTIC giving Introductory Remarks about the IPR workshop at GC Women University, Faisalabad*



*Prof. Dr. Muhammad Akram Shaikh, D.G, PASTIC/Member Science-PSF giving the Introductory Remarks to the participants of workshop at IUB, Bahawalpur*



*Prof. Dr. Muhammad Ashraf, Chairman PSF delivering talk during Inaugural Session of 5<sup>th</sup> Invention to Innovation Summit, 2016 at University of Punjab, Lahore*



*Prof. Dr. Muhammad Ashraf, Chairman-PSF, distributed shields among the participants & speakers of the workshop on IPR at GC Women University, Faisalabad*



*Prof. Dr. Javed Ashraf, V.C., Quaid e Azam University, Prof. Dr. Muhammad Ashraf, Chairman, PSF, Dr. Muhammad Akram Shaikh, D.G., PASTIC, Dr. Shahid Soroya, D.G., Punjab Higher Education Commission at the Inaugural Ceremony of the Seminar on "Library resource sharing in ICT era" at PASTIC*



*Prof. Dr. Muhammad Ashraf, Chairman, Pakistan Science Foundation and Prof. Dr. Tahir Amin Vice Chancellor, BZU-Multan inaugurating the new office of PASTIC & Science Caravan at BZU-Multan*



*Ms. Nageen Ainuddin, Director PASTIC, distributing certificates to the participants of the Training Workshop on MENDLEY*



*Participants receiving certificate from Ms. Nageen Ainuddin, Director, PASTIC, on closing ceremony of the Training Workshop on SPSS*



*Ms. Nageen Ainuddin, Director, PASTIC, delivering key note address at Workshop on MENDLEY at Lahore*



*Students, Researchers & Faculty Members participating in a walk on World Book Day at Faisalabad*



*Mr. Habib Akhtar Jaffri, Principal Librarian, PASTIC, delivering a lecture during KOHA workshop at ICCBS, University of Karachi*



*Mrs. Kausar Sohail, Senior Scientific Information Officer, PASTIC, delivering a presentation on PASTIC at IIU, Islamabad*



*Mr. Muhammad Khalid, Deputy Director (STI), Karachi Sub Center delivered a presentation to students during PASTIC awareness seminar at Nazeeer Hussain University, Karachi*



*Mrs. Ghazala Yasmin, Deputy Director, PASTIC Peshawar, delivering the presentation about PASTIC S&T Services at The University of Agriculture, Peshawar*



*Dr. Maryum Ibrar Shinwari, Sr. SIO-PASTIC giving training on Research tool "MENDELEY" at IIU.*



*Prof. Dr. Muhammad Ashraf, Chairman, PSF, reviewing the performance and activities of PASTIC during second session of Annual review meeting (2015-16)*



*Muhammad Usman, Web Manager, PASTIC giving presentation on the File tracking software to the officers of PASTIC*



*PASTIC Services Stall at International Islamic University, Islamabad*



*PASTIC Services stall at Department of Physiology, University of Karachi*



*Researchers and students visited PASTIC Services Stall at University of Punjab, Lahore*



*Students visited the PASTIC Services Stall at Agriculture University, Faisalabad*



*PASTIC Services Stall at Institute of Chemical Sciences, University of Peshawar*





# نواز وقت " 09/02/16

# " جنگ " 09/02/16

کے ساتھ ساتھ اس موقع پر دیگر اہم کارکنوں کی بھی تعریفیں کی گئی ہیں۔ ان کا ذکر بھی یہاں کیا جا رہا ہے۔

پاکستان کے اس موقع پر دیگر اہم کارکنوں کی بھی تعریفیں کی گئی ہیں۔ ان کا ذکر بھی یہاں کیا جا رہا ہے۔



**پاکستان کے اس موقع پر دیگر اہم کارکنوں کی بھی تعریفیں کی گئی ہیں۔ ان کا ذکر بھی یہاں کیا جا رہا ہے۔**

پاکستان کے اس موقع پر دیگر اہم کارکنوں کی بھی تعریفیں کی گئی ہیں۔ ان کا ذکر بھی یہاں کیا جا رہا ہے۔

پاکستان کے اس موقع پر دیگر اہم کارکنوں کی بھی تعریفیں کی گئی ہیں۔ ان کا ذکر بھی یہاں کیا جا رہا ہے۔

پاکستان کے اس موقع پر دیگر اہم کارکنوں کی بھی تعریفیں کی گئی ہیں۔ ان کا ذکر بھی یہاں کیا جا رہا ہے۔

# " خبریں " 09/02/16

# " اوصاف " 09/02/16



پاکستان کے اس موقع پر دیگر اہم کارکنوں کی بھی تعریفیں کی گئی ہیں۔ ان کا ذکر بھی یہاں کیا جا رہا ہے۔

پاکستان کے اس موقع پر دیگر اہم کارکنوں کی بھی تعریفیں کی گئی ہیں۔ ان کا ذکر بھی یہاں کیا جا رہا ہے۔

**پاکستان کے اس موقع پر دیگر اہم کارکنوں کی بھی تعریفیں کی گئی ہیں۔ ان کا ذکر بھی یہاں کیا جا رہا ہے۔**

پاکستان کے اس موقع پر دیگر اہم کارکنوں کی بھی تعریفیں کی گئی ہیں۔ ان کا ذکر بھی یہاں کیا جا رہا ہے۔



پاکستان کے اس موقع پر دیگر اہم کارکنوں کی بھی تعریفیں کی گئی ہیں۔ ان کا ذکر بھی یہاں کیا جا رہا ہے۔

پاکستان کے اس موقع پر دیگر اہم کارکنوں کی بھی تعریفیں کی گئی ہیں۔ ان کا ذکر بھی یہاں کیا جا رہا ہے۔

پاکستان کے اس موقع پر دیگر اہم کارکنوں کی بھی تعریفیں کی گئی ہیں۔ ان کا ذکر بھی یہاں کیا جا رہا ہے۔

پاکستان کے اس موقع پر دیگر اہم کارکنوں کی بھی تعریفیں کی گئی ہیں۔ ان کا ذکر بھی یہاں کیا جا رہا ہے۔

## نیشنل ٹیکسٹائل یونیورسٹی میں کتاب کا عالمی دن منایا گیا

فیصل آباد (سٹی رپورٹر) نیشنل ٹیکسٹائل یونیورسٹی فیصل آباد میں گزشتہ روز "کتاب کا عالمی دن" بھرپور طریقے سے منایا گیا اور اس سلسلہ میں یونیورسٹی کے شعبہ لائبریری اور پبلک کے باہمی اشتراک سے لائبریری سے آڈیو ریم تک (صفحہ 11 بقیہ نمبر 14)

کتاب میلہ

14

واک کا اہتمام کیا گیا۔ ریڈیکٹر پروفیسر ڈاکٹر تنویر حسین نے واک کا افتتاح کیا جبکہ طلباء و طالبات کی کثیر تعداد نے شرکت کی۔ واک کے اختتام پر آڈیو ریم میں سیمینار بھی منعقد ہوا جس کے مہمان خصوصی ڈاکٹر تنویر حسین تھے۔ اس موقع پر مسز ظفر جاوید ڈین فیکلٹی آف انجینئرنگ اینڈ ٹیکنالوجی، پروفیسر ڈاکٹر محمد اشفاق رجسٹرار، ذبح اللہ خان کنٹرولر امتحانات، مشتاق احمد چیف لائبریرین، محمد حسین ڈائریکٹر پبلک نے بھی خیالات کا اظہار کیا۔

**WORLD BOOK DAY:** The World Book Day was ob-

served in the National Textile University on Friday under the auspices of Library Section of the NTU and Pakistan Scientific and Technological Information Centre (PASTIC). A seminar under the chairmanship of Rector NTU Dr Tanvir Hussain was also held in the varsity auditorium. The moot was attended by Zafar Jawed, Dean, Faculty of Engineering and Technology, Prof Dr Muhammad Ashfaq, Registrar, Zabiullah Khan, Director Students Affairs, and the academic staff and students. Earlier, a walk led by Rector NTU Prof Dr Tanvir Hussain was also held. Addressing the participants, the NTU Rector stressed the need of inculcating the habit of book reading to improve our knowledge. He was in favour of holding national book fair to promote book culture, saying book are good friends and reading builds one's good character.

"THE NEWS", Saturday, April 23, 2016

"DAILY JANG", Saturday, April 23, 2016

## کتاب کے قومی دن پر نیشنل ٹیکسٹائل یونیورسٹی میں واک، سیمینار

کتاب اتنے استاد اور رہنمائی کرنے والے نفاذ ساتھی کی حیثیت رکھتی ہے، ڈاکٹر تنویر

فیصل آباد (نامہ نگار خصوصی) نیشنل ٹیکسٹائل یونیورسٹی فیصل آباد میں "کتاب کا قومی دن" بھرپور طریقے سے منایا گیا اور اس سلسلہ میں نیشنل ٹیکسٹائل یونیورسٹی فیصل آباد کے شعبہ لائبریری اور پبلک فیصل آباد کے باہمی اشتراک و تعاون سے لائبریری سے آڈیو ریم تک واک کا اہتمام کیا گیا۔ واک کے اختتام پر یونیورسٹی کے آڈیو ریم میں سیمینار بھی ہوا۔ ریڈیکٹر پروفیسر ڈاکٹر تنویر حسین نے کہا کہ انسانی زندگی میں کتاب ایک ایسے استاد اور رہنمائی کرنے والے نفاذ ساتھی کی حیثیت رکھتی ہے۔ قومی میلہ کتاب پڑھنے کو مستعمل عادت بنانے اور کتاب کلچر کے فروغ میں فیصلہ کن کردار ادا کریگا اور جدید ٹیکنالوجی اور انٹرنیٹ کی دینا میں بھی کتاب کے مقام کو قائم رکھے گا۔



## **VI. AUDITOR'S REPORTS**



CONFIDENTIAL

PAKISTAN SCIENCE FOUNDATION  
(Finance & Accounts wing)  
Islamabad

No. PSF/Audit/4(42)/2012-13

Dated:- 17.10.2016

**SUBJECT: ANNUAL AUDITED FINANCIAL STATEMENT FOR THE YEAR 2015-16  
IN RESPECT OF PSF, PMNH AND PASTIC NATIONAL CENTER,  
ISLAMABD.**

Dear Sir,

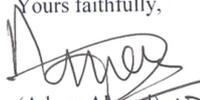
Enclosed please find attached herewith Copies of Annual Audited Financial Statements for the year 2015-16 in respect of PSF (alongwith Management letter), PMNH & PASTIC duly signed by the Chartered Accountants (M/S Ilyas Saeed & Co;), for the PSF Annual Report.

It is Further stated that inclusion in Audit General of Pakistan vide letter No.245/21-R&SD/PSF/CA/2005 dated.02.08.2016 Communicated by the MoST Vide letter No. 21(1)2002-Org-II/PSF dated 08.08.2016 (copies attached) has accorded concurrence for the appointment of M/S Ilyas Seed & Co; Chartered Accountants as auditors to audit the accounts of PSF, and subsidiaries for the Year 2015-16 as per terms & condition approved by the BOG of PSF.

Therefore, the case regarding obtaining of Ex-Post Facto approval of BOG for the appointment of M/S Ilyas Seed & Co; to audit the accounts of PSF, and its subsidiaries for the Year 2015-16 may placed on the Following terms & condition.

- |      |        |              |
|------|--------|--------------|
| i)   | PSF    | Rs. 50,000/- |
| ii)  | PASTIC | Rs. 25,000/- |
| iii) | PMNH   | Rs. 25,000/- |
| iv)  | NSLP   | Rs. 15,000/- |

Yours faithfully,

  
(Adnan Ahmed)  
Deputy Director (F&A)  
(051-9201963)

**Enclosed:- as above.**

Copy to:

1. Secretary, PSF

Deputy Secretary Office  
By No. 130 dt. 18/10/16

Dr. M. Saeed  
18/10/16

*please process as stated above.*

*ADDC 18/10/16*

*17/10/16*

262

Islamabad the 08<sup>th</sup> August, 2016

The Chairman,  
Pakistan Science Foundation,  
Islamabad.

Subject:- CONCURRENCE OF AUDITOR GENERAL OF PAKISTAN FOR APPOINTMENT OF CHARTERED ACCOUNTANTS FOR THE AUDIT OF ACCOUNTS OF PSF, PMNH, PASTIC & NSLP FOR TH YEAR 2015-16.

Kindly refer to PSF letter No.PSF/Audit/4(21)2012-13, dated 26.05.2016 on the subject noted above and to convey the concurrence of Auditor General of Pakistan vide letter No.245/21-R&SD/PSF/CA/2005, dated 02.08.2016 (copy enclosed) for appointment of M/S Ilyas Saeed & Co. Chartered Accountant as external auditor to audit the accounts of PSF and its Subsidiaries for the year 2015-16.

2. PSF is requested to take further necessary action accordingly.

DDir. (A&A)

(Rubina Akhtar)  
Section Officer (Org-II)  
Ph:9205302

08/8/16

09/VIII/16

B&S

766  
9.8.16

626  
9/8/16  
FINANCIAL ACCOUNTS W/...



OFFICE OF THE  
AUDITOR - GENERAL OF PAKISTAN  
CONSTITUTION AVENUE  
ISLAMABAD

No. 24 /21-R&SD/PSF/CA/2005

Dated: 02.08.2016

To

The Section Officer (Elect),  
M/o Science & Technology,  
Islamabad.

Subject:- CONCURRENCE OF AUDITOR GENERAL OF PAKISTAN FOR THE APPOINTMENT OF  
CHARTERED ACCOUNTANTS FOR THE AUDIT OF THE ACCOUNTS OF  
PSF, PMNH, PASTIC & NSLP FOR THE YEAR 2015-16

Reference your office letter No. 21(1)/2002-Elect/PSF dated 09.06.2016 on the  
subject mentioned above.

2. The Competent Authority has been pleased to accord concurrence for appointment  
of M/s Ilyas Saeed & Co. *Chartered Accountants* as auditors to audit the accounts of PSF and its  
subsidiaries for the financial year 2015-16, as per terms & conditions approved by Board of  
Directors of PSF.

  
(Mehmood Ahmed)  
Audit Officer (Policy)  
Ph.051-9218252

Ho. 184  
05/08/2016

PAKISTAN SCIENCE FOUNDATION

AUDITED FINANCIAL STATEMENTS  
FOR THE YEAR ENDED JUNE 30, 2016

ILYAS SAEED & CO.  
CHARTERED ACCOUNTANTS

mgj

OFFICE # 26, 2<sup>ND</sup> FLOOR, ROSH PLAZA, I-8 MARKAZ, ISLAMABAD  
PH: (+92) 051 - 4938026 & 051 - 4938027, FAX: (+92) 051 - 4938028

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Rose Plaza, I-8 Maritaz,  
Islamabad - Pakistan.  
Tel: 92-51-4938026-27  
Fax: 92-51-4938028  
E-mail: info@ilyassaeed.com  
www.ilyassaeed.com

**Ilyas Saeed & Co.**  
Chartered Accountants

## INDEPENDENT AUDITORS' REPORT TO THE BOARD OF TRUSTEES

### *Report on the Financial Statements*

We have audited the accompanying financial statements of Pakistan Science Foundation which comprise the statement of financial position as at June 30, 2016 and the related income and expenditure statement, statement of cash flows and statement of changes in general fund together with the summary of significant accounting policies and other explanatory notes forming part thereof for the year then ended.

### *Management's Responsibility for the Financial Statements*

Management is responsible for the preparation and fair presentation of these financial statements in accordance with the approved International Financial Reporting Standards as applicable in Pakistan and the requirements of the Pakistan Science Foundation Act, 1973 and for such internal control as management determines necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

### *Auditor's Responsibility*

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with International Standards on Auditing as applicable in Pakistan. Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditors' judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal controls. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

### *Opinion*

In our opinion, the financial statements present fairly, in all material respects, the financial position of Pakistan Science Foundation as of June 30, 2016 and its financial performance, its cash flows and changes in general fund for the year then ended in accordance with the approved International Financial Reporting Standards as applicable in Pakistan and the requirements of the Pakistan Science Foundation Act, 1973.

ISLAMABAD: 07/20/2016

*Ilyas Saeed & Co.*  
CHARTERED ACCOUNTANTS  
Engagement Partner: Imran Ilyas, FCA

**mgil**

Offices: Karachi, Lahore, Gujranwala.  
A firm of MGI, an alliance of independent accounting, audit, tax and consulting firms worldwide.

PAKISTAN SCIENCE FOUNDATION  
STATEMENT OF FINANCIAL POSITION  
AS AT JUNE 30, 2016

| FUNDS AND LIABILITIES                  | NOTE | 2016<br>Rupees     | 2015<br>Rupees     |
|--|------|--------------------|--------------------|
| <b>FUNDS</b>                           |      |                    |                    |
| General fund                           | 3    | 19,770,598         | 17,777,362         |
| Development fund                       | 4    | 15,704,975         | 5,998,283          |
| Miscellaneous funds                    | 5    | 2,168,799          | 2,131,524          |
|  |      | 37,644,372         | 25,907,169         |
| <b>NON-CURRENT LIABILITIES</b>         |      |                    |                    |
| Research support grant - contra        | 6    | 117,543,913        | 134,603,171        |
| Long term security deposits            | 7    | -                  | -                  |
|  |      | 117,543,913        | 134,603,171        |
| <b>TOTAL FUNDS AND LIABILITIES</b>     |      | <u>155,188,285</u> | <u>160,510,340</u> |
| <b>ASSETS</b>                          |      |                    |                    |
| <b>NON-CURRENT ASSETS</b>              |      |                    |                    |
| Property, plant and equipment          | 8    | 17,817,362         | 15,728,331         |
| Long term security deposits            | 9    | 1,917,195          | 1,917,195          |
| Research projects in progress - contra | 6    | 117,543,913        | 134,603,171        |
|  |      | 137,278,470        | 152,248,697        |
| <b>FUNDS INVESTMENTS</b>               |      |                    |                    |
| Development fund                       | 4    | 15,704,975         | 5,998,283          |
| Miscellaneous fund                     | 5    | 2,168,799          | 2,131,524          |
|  |      | 17,873,774         | 8,129,807          |
| <b>CURRENT ASSETS</b>                  |      |                    |                    |
| Advances                               | 10   | 1,626              | 97,421             |
| Cash and bank balances                 | 11   | 34,415             | 34,415             |
|  |      | 36,041             | 131,836            |
| <b>TOTAL ASSETS</b>                    |      | <u>155,188,285</u> | <u>160,510,340</u> |

The annexed notes from 1 to 17 form an integral part of these financial statements.

  
TRUSTEE

  
CHAIRMAN

**PAKISTAN SCIENCE FOUNDATION**  
**INCOME AND EXPENDITURE STATEMENT**  
**FOR THE YEAR ENDED JUNE 30, 2016**

| PARTICULARS                      | NOTE | 2016<br><u>Rupees</u> | 2015<br>Rupees     |
|----------------------------------|------|-----------------------|--------------------|
| <b>INCOME</b>                    |      |                       |                    |
| Grant from federal government    | 12   | 177,061,425           | 165,979,681        |
| <b>EXPENDITURES</b>              |      |                       |                    |
| Statutory scientific functions   | 13   | 39,416,000            | 32,570,000         |
| Administrative expenses          | 14   | 135,652,189           | 134,655,828        |
|                                  |      | 175,068,189           | 167,225,828        |
| Prior year adjustment            | 15   | -                     | 27,300             |
| Surplus / (deficit) for the year |      | <u>1,993,236</u>      | <u>(1,218,847)</u> |

The annexed notes from 1 to 17 form an integral part of these financial statements.

  
 TRUSTEE

  
 CHAIRMAN

**PAKISTAN SCIENCE FOUNDATION**  
**STATEMENT OF CASH FLOWS**  
**FOR THE YEAR ENDED JUNE 30, 2016**

| PARTICULARS  | 2016<br><u>Rupees</u> | 2015<br><u>Rupees</u> |
|--|-----------------------|-----------------------|
| <b>CASH FLOW FROM OPERATING ACTIVITIES</b>         |                       |                       |
| Surplus / (deficit) for the year                   | 1,993,236             | (1,218,847)           |
| Adjustments for non cash charges:                  |                       |                       |
| Depreciation                                       | 1,059,086             | 1,145,354             |
| Surplus / (deficit) before working capital changes | 3,052,322             | (73,493)              |
| Working capital changes                            |                       |                       |
| (Increase) / decrease in current assets:           |                       |                       |
| Advances   | 95,795                | 100,793               |
| Net cash generated from operating activities       | 3,148,117             | 27,300                |
| <b>CASH FLOW FROM INVESTING ACTIVITIES</b>         |                       |                       |
| Security deposits payable                          | -                     | (27,300)              |
| Purchase of property, plant & equipment            | (3,148,117)           | -                     |
| Net cash used in investing activities              | (3,148,117)           | (27,300)              |
| <b>CASH FLOW FROM FINANCING ACTIVITIES</b>         |                       |                       |
| Long term security deposits                        | -                     | -                     |
| Net cash from financing activities                 | -                     | -                     |
| Net change in cash & cash equivalents              | -                     | -                     |
| Cash & cash equivalents at the beginning of year   | 34,415                | 34,415                |
| Cash & cash equivalents at the end of year         | <u>34,415</u>         | <u>34,415</u>         |

The annexed notes from 1 to 17 form an integral part of these financial statements.

  
 \_\_\_\_\_  
 TRUSTEE

  
 \_\_\_\_\_  
 CHAIRMAN

PAKISTAN SCIENCE FOUNDATION  
STATEMENT OF CHANGES IN GENERAL FUND  
FOR THE YEAR ENDED JUNE 30, 2016

| PARTICULARS                      | 2016<br><u>Rupees</u> | 2015<br>Rupees    |
|----------------------------------|-----------------------|-------------------|
| Opening balance                  | 17,777.362            | 18,996.209        |
| Surplus / (deficit) for the year | 1,993.236             | (1,218.847)       |
| Closing balance                  | <u>19,770.598</u>     | <u>17,777.362</u> |

The annexed notes from 1 to 17 form an integral part of these financial statements.

  
\_\_\_\_\_  
TRUSTEE

  
\_\_\_\_\_  
CHAIRMAN

**PAKISTAN SCIENCE FOUNDATION  
NOTES TO THE FINANCIAL STATEMENTS  
FOR THE YEAR ENDED JUNE 30, 2016**

**1. THE FOUNDATION AND ITS OPERATIONS**

Pakistan Science Foundation is a statutory organization established under Pakistan Science Foundation Act, 1973 on February 02, 1973. The main objects are to promote and finance scientific activities having a bearing on the socio-economic needs of the country.

**2. SIGNIFICANT ACCOUNTING POLICIES**

The principal accounting policies which have been adopted in the preparation of these financial statements are summarized as under:

**2.1 ACCOUNTING CONVENTION**

These financial statements have been prepared under the historical cost convention.

**2.2 BASIS OF PREPARATION**

*Statement of Compliance*

These financial statements have been prepared in accordance with the approved accounting standards as applicable in Pakistan. Approved Accounting Standards comprise of International Financial Reporting Standards (IFRSs) issued by the International Accounting Standards Board (IASB) as applicable in Pakistan and the requirements of the Pakistan Science Foundation Act, 1973. In case, the requirements differ, the provisions or directives of the Pakistan Science Foundation Act, 1973 shall prevail.

**2.3 PROPERTY, PLANT AND EQUIPMENT**

These are stated at cost less accumulated depreciation except leasehold land which is stated at cost. Cost of tangible assets consists of historical cost and other directly attributable costs of bringing the asset to working condition. Depreciation is charged on reducing balance method at the rates specified in the relevant notes. Depreciation on additions is charged from the month in which the asset is put to use, whereas depreciation on disposals is charged upto the month the asset remained in use.

**2.4 INTANGIBLE ASSETS**

These are stated at cost less accumulated amortization. Amortization is charged on reducing balance method from the year of commercial use at the annual rate of 10%. Gain or loss, if any, on disposal of intangibles are included in the current income.

**2.5 REVENUE RECOGNITION**

Grant is recognized on actual receipt basis from the GoP.



## 2.6 RESTRICTED FUNDS

Funds received directly as grants for development or received as contribution from the donor for specific functions are classified as restricted funds. Restricted funds representing direct grants are classified as grant funds. Expenses incurred out of grant funds are reflected in the notes to the financial statements.

## 2.7 EXPENDITURE

Expenses are recognized on actual payment basis except non cash expenses such as depreciation and amortization which is charged on accrual basis. Expenses incurred out of restricted funds or grant funds are adjusted against the outstanding balance without being routed through the income & expenditure account.

|  | 2016<br><u>Rupees</u> | 2015<br><u>Rupees</u> |
|--|-----------------------|-----------------------|
| <b>3. GENERAL FUND</b>                                     |                       |                       |
| Opening balance  | 17,777,362            | 18,996,209            |
| Surplus / (deficit) for the year                           | <u>1,993,236</u>      | <u>(1,218,847)</u>    |
|  | <u>19,770,598</u>     | <u>17,777,362</u>     |
| <b>4. DEVELOPMENT FUND</b>                                 |                       |                       |
| Opening balance  | 5,998,283             | 7,066,140             |
| Grants received during the year for:                       |                       |                       |
| Participation of scientists & technologists in conferences | 4.1 <u>70,098,274</u> | <u>5,000,000</u>      |
|  | 76,096,557            | 12,066,140            |
| Less: Expenditure incurred during the year                 | 4.2 <u>6,439,588</u>  | <u>6,067,857</u>      |
| Less: Science Talent Farming Scheme                        | 4.3 <u>53,951,994</u> | <u>-</u>              |
|  | 60,391,582            | 6,067,857             |
| Closing balance  | <u>15,704,975</u>     | <u>5,998,283</u>      |
| <b>REPRESENTED BY:</b>                                     |                       |                       |
| Intangibles  | 4.4 398,581           | 442,868               |
| Property, plant & equipment                                | 4.5 15,256,275        | 5,505,296             |
| Cash at bank   | <u>50,120</u>         | <u>50,120</u>         |
|  | <u>15,704,975</u>     | <u>5,998,283</u>      |
| <b>4.1 GRANT FROM FEDERAL GOVERNMENT</b>                   |                       |                       |
| Grant received   | 320,380,254           | 5,000,000             |
| Grant un-utilized  | <u>(250,281,980)</u>  | <u>-</u>              |
|  | <u>70,098,274</u>     | <u>5,000,000</u>      |



#### 4.2 PARTICIPATION IN CONFERENCES

|                            |     |                  |                  |
|----------------------------|-----|------------------|------------------|
| TA / DA and evaluation fee |     | 3,240,653        | 4,385,703        |
| Registration fee           |     | 586,325          | 35,000           |
| Postage and stationery     |     | 137,694          | 88,507           |
| Amortization               | 4.4 | 44,287           | 49,208           |
| Depreciation               | 4.5 | 1,015,047        | 1,018,649        |
| Miscellaneous              |     | 190,157          | 294,558          |
| Living expenses            |     | 439,666          | -                |
| Staff salaries             |     | 785,759          | 135,167          |
| Advertisement expenses     |     | -                | 61,065           |
|                            |     | <u>6,439,588</u> | <u>6,067,857</u> |

#### 4.3 SCIENCE TALENT FARMING SCHEME

|                                     |  |                   |          |
|-------------------------------------|--|-------------------|----------|
| Pay of contractual staff            |  | 86,600            | -        |
| Research & survey                   |  | 748,970           | -        |
| Electronic communication            |  | 23,151            | -        |
| POI charges                         |  | 91,343            | -        |
| TA to other than government servant |  | 10,870,582        | -        |
| Stationery                          |  | 67,844            | -        |
| Conference / seminars / workshops   |  | 985,000           | -        |
| Advertisement and publicity         |  | 567,144           | -        |
| Payment for other services rendered |  | 2,999,342         | -        |
| Others                              |  | 499,788           | -        |
| Cash awards                         |  | 37,012,230        | -        |
|                                     |  | <u>53,951,994</u> | <u>-</u> |

#### 4.4 INTANGIBLE ASSETS - Software

|                              |  |                |                |
|------------------------------|--|----------------|----------------|
| <b>COST</b>                  |  |                |                |
| Opening cost                 |  | 750,000        | 750,000        |
| Addition                     |  | -              | -              |
| Closing cost                 |  | 750,000        | 750,000        |
| <b>AMORTIZATION</b>          |  |                |                |
| Opening amortization         |  | 307,133        | 257,925        |
| Amortization during the year |  | 44,287         | 49,208         |
| Closing amortization         |  | 351,419        | 307,133        |
| Written down value           |  | <u>398,581</u> | <u>442,868</u> |
| Amortization rate            |  | <u>10%</u>     | <u>10%</u>     |



PAKISTAN SCIENCE FOUNDATION  
NOTES TO THE FINANCIAL STATEMENTS  
FOR THE YEAR ENDED JUNE 30, 2016

4.5 PROPERTY, PLANT & EQUIPMENT - Development Projects

| PARTICULARS            | C O S T                   |                               |                           |           | D E P R E C I A T I O N   |                  |                           |                           | W.D.V.<br>AS AT<br>JUNE 30,<br>2016 |
|------------------------|---------------------------|-------------------------------|---------------------------|-----------|---------------------------|------------------|---------------------------|---------------------------|-------------------------------------|
|                        | AS AT<br>JULY 01,<br>2015 | ADDITIONS<br>/<br>(DELETIONS) | AS AT<br>JUNE 30,<br>2016 | RATE<br>% | AS AT<br>JULY 01,<br>2015 | FOR THE<br>YEAR  | AS AT<br>JUNE 30,<br>2016 | AS AT<br>JUNE 30,<br>2015 |                                     |
|                        | 2016                      |                               |                           |           |                           |                  |                           |                           |                                     |
| Motor vehicles         | 6,494,293                 | 5,800,000                     | 12,294,293                | 20        | 6,085,832                 | 178,359          | 6,264,191                 | 6,030,102                 |                                     |
| Office equipments      | 24,950,380                | 4,040,426                     | 28,990,806                | 15        | 20,183,109                | 765,596          | 20,948,705                | 8,042,101                 |                                     |
| Computer equipment     | 2,571,218                 | 557,600                       | 3,128,818                 | 33        | 2,444,757                 | 57,066           | 2,501,823                 | 626,995                   |                                     |
| Furniture and fixtures | 381,907                   | 368,000                       | 749,907                   | 6         | 178,804                   | 14,026           | 192,830                   | 557,077                   |                                     |
| <b>TOTAL 2016</b>      | <b>34,397,798</b>         | <b>10,766,026</b>             | <b>45,163,824</b>         |           | <b>28,892,502</b>         | <b>1,015,047</b> | <b>29,907,549</b>         | <b>15,256,275</b>         |                                     |
| PARTICULARS            | C O S T                   |                               |                           |           | D E P R E C I A T I O N   |                  |                           |                           | W.D.V.<br>AS AT<br>JUNE 30,<br>2015 |
|                        | AS AT<br>JULY 01,<br>2014 | ADDITIONS<br>/<br>(DELETIONS) | AS AT<br>JUNE 30,<br>2015 | RATE<br>% | AS AT<br>JULY 01,<br>2014 | FOR THE<br>YEAR  | AS AT<br>JUNE 30,<br>2015 | AS AT<br>JUNE 30,<br>2015 |                                     |
|                        | 2015                      |                               |                           |           |                           |                  |                           |                           |                                     |
| Motor vehicles         | 6,494,293                 | -                             | 6,494,293                 | 20        | 5,983,717                 | 102,115          | 6,085,832                 | 408,461                   |                                     |
| Office equipments      | 24,950,380                | -                             | 24,950,380                | 15        | 19,341,826                | 841,283          | 20,183,109                | 4,767,271                 |                                     |
| Computer equipment     | 2,571,218                 | -                             | 2,571,218                 | 33        | 2,382,470                 | 62,287           | 2,444,757                 | 126,161                   |                                     |
| Furniture and fixtures | 381,907                   | -                             | 381,907                   | 6         | 165,840                   | 12,964           | 178,804                   | 203,103                   |                                     |
| <b>TOTAL 2015</b>      | <b>34,397,798</b>         | <b>-</b>                      | <b>34,997,798</b>         |           | <b>27,873,853</b>         | <b>1,018,649</b> | <b>28,892,502</b>         | <b>5,305,296</b>          |                                     |

5. MISCELLANEOUS FUNDS

|                                     |                  |                  |
|-------------------------------------|------------------|------------------|
| Endowment                           | 1,861,193        | 1,704,407        |
| PSF Mutual Collaboration Activities | 224,755          | 290,140          |
| UNESCO                              | 82,851           | 136,977          |
|                                     | <u>2,168,799</u> | <u>2,131,524</u> |

REPRESENTED BY:

|                      |                  |                  |
|----------------------|------------------|------------------|
| Cash at bank         | 2,197,599        | 2,208,824        |
| Tender money payable | (28,800)         | (77,300)         |
|                      | <u>2,168,799</u> | <u>2,131,524</u> |

6. RESEARCH PROJECTS IN PROGRESS

|  |     |                    |                    |
|--|-----|--------------------|--------------------|
| Opening balance                          |     | 134,603,171        | 136,455,748        |
| Add: Disbursements during the year       | 6.1 | 25,649,574         | 20,816,244         |
|  |     | 160,252,745        | 157,271,992        |
| Less: Projects completed during the year | 6.2 | 40,962,999         | 21,711,256         |
| Expenses for projects                    | 6.3 | 1,745,833          | 957,565            |
|  |     | <u>42,708,832</u>  | <u>22,668,821</u>  |
|  |     | <u>117,543,913</u> | <u>134,603,171</u> |

6.1 DISBURSEMENTS DURING THE YEAR

|   |       |                   |                   |
|---|-------|-------------------|-------------------|
| Institutional support                                   | 6.1.1 | 628,456           | -                 |
| Biotech sciences  |       | 286,879           | 254,772           |
| Evaluation fee  |       | 459,500           | 643,000           |
| Physical sciences                                       |       | -                 | 1,871,297         |
| Chemical sciences                                       |       | 3,246,498         | 2,365,801         |
| Biological sciences                                     |       | 3,465,658         | 3,068,774         |
| Earth sciences  |       | 215,827           | 361,263           |
| Environmental sciences                                  |       | 1,594,299         | 1,153,618         |
| Engineering sciences                                    |       | 5,489,780         | 2,940,358         |
| Agricultural sciences                                   |       | 1,796,706         | 1,976,676         |
| Medical sciences  |       | 6,530,529         | 2,692,910         |
| Math and computer science                               |       | 422,109           | 842,710           |
| Board / committee meetings                              |       | 1,286,333         | 314,565           |
| Utilization of results of research and pilot plant stud |       | 227,000           | 2,330,500         |
|   |       | <u>25,649,574</u> | <u>20,816,244</u> |

6.1.1 Disbursement for institutional support include Rs.628,456/- (2015: Rs.Nil) for which cheques were issued but not presented by the recipients upto year end. Resultantly, the said cheques have been lapsed and the amounts stand transferred to GoP.



2016  
Rupees

2015  
Rupees

6.2 PROJECTS COMPLETED DURING THE YEAR

|                                     |                   |                   |
|-------------------------------------|-------------------|-------------------|
| Agricultural sciences               | 7,690,053         | 1,838,662         |
| Biological sciences                 | 5,956,972         | 4,190,703         |
| Biotechnology & genetic engineering | 2,958,022         | 3,823,893         |
| Chemical sciences                   | 8,917,618         | 4,789,819         |
| Engineering sciences                | 1,581,194         | -                 |
| Environmental sciences              | -                 | 596,408           |
| Medical sciences                    | 13,859,140        | 2,578,241         |
| Physics                             | -                 | 2,498,545         |
| R & D industry programme            | -                 | 1,394,985         |
|                                     | <u>40,962,999</u> | <u>21,711,256</u> |

6.3 EXPENSES FOR PROJECTS

|                            |       |                  |                |
|----------------------------|-------|------------------|----------------|
| Board / committee meetings |       | 1,286,333        | 314,565        |
| Evaluation fee             | 6.3.1 | 459,500          | 643,000        |
|                            |       | <u>1,745,833</u> | <u>957,565</u> |

6.3.1 Evaluation fee include Rs.25,000/- (2015: Rs.17,000/-) for which cheques were issued but not presented by the recipients upto year end. Resultantly, the said cheques have been lapsed and the amount stands transferred to GoP.

7. SECURITY DEPOSITS

|                             |          |          |
|-----------------------------|----------|----------|
| Zargoan Traders             | -        | 750      |
| Mak Traders                 | -        | 22,000   |
| EGS Limited                 | -        | 1,550    |
| PSF Canteen                 | -        | 3,000    |
|                             | -        | 27,300   |
| Less: Prior Year Adjustment | -        | (27,300) |
|                             | <u>-</u> | <u>-</u> |

PARSIAN SCIENCE FOUNDATION  
NOTES TO THE FINANCIAL STATEMENTS  
FOR THE YEAR ENDED JUNE 30, 2016

8. PROPERTY, PLANT AND EQUIPMENT

| PARTICULARS             | C O S T                   |                               |                           | D E P R E C I A T I O N |                           |                  |                           | W.D.V.<br>AS AT<br>JUNE 30,<br>2016 |
|-------------------------|---------------------------|-------------------------------|---------------------------|-------------------------|---------------------------|------------------|---------------------------|-------------------------------------|
|                         | AS AT<br>JULY 01,<br>2015 | ADDITIONS<br>/<br>(DELETIONS) | AS AT<br>JUNE 30,<br>2016 | RATE<br>%               | AS AT<br>JULY 01,<br>2015 | FOR THE<br>YEAR  | AS AT<br>JUNE 30,<br>2016 |                                     |
| Land - Leasehold        | 3,713,418                 | -                             | 3,713,418                 | -                       | -                         | -                | 3,713,418                 |                                     |
| Building                | 19,484,540                | -                             | 19,484,540                | 5                       | 12,499,606                | 349,247          | 12,848,853                |                                     |
| Motor vehicles          | 9,770,952                 | 1,650,500                     | 11,421,452                | 20                      | 8,306,935                 | 320,312          | 8,627,247                 |                                     |
| Office equipment        | 5,508,012                 | 250,000                       | 5,758,012                 | 15                      | 4,840,630                 | 113,017          | 4,953,647                 |                                     |
| Science equipment       | 6,558,040                 | 347,617                       | 6,905,657                 | 15                      | 5,519,307                 | 169,155          | 5,679,462                 |                                     |
| Furniture and fixture   | 3,039,314                 | 900,000                       | 3,939,314                 | 6                       | 1,907,328                 | 79,902           | 1,987,230                 |                                     |
| Air conditioners        | 194,974                   | -                             | 194,974                   | 20                      | 194,570                   | 81               | 194,651                   |                                     |
| Library books and films | 1,794,815                 | -                             | 1,794,815                 | 5                       | 1,067,357                 | 36,373           | 1,103,730                 |                                     |
| <b>TOTAL 2016</b>       | <b>50,064,065</b>         | <b>3,148,117</b>              | <b>53,212,182</b>         |                         | <b>34,335,734</b>         | <b>1,059,086</b> | <b>35,394,820</b>         |                                     |

| PARTICULARS             | C O S T                   |                               |                           | D E P R E C I A T I O N |                           |                  |                           | W.D.V.<br>AS AT<br>JUNE 30,<br>2015 |
|-------------------------|---------------------------|-------------------------------|---------------------------|-------------------------|---------------------------|------------------|---------------------------|-------------------------------------|
|                         | AS AT<br>JULY 01,<br>2014 | ADDITIONS<br>/<br>(DELETIONS) | AS AT<br>JUNE 30,<br>2015 | RATE<br>%               | AS AT<br>JULY 01,<br>2014 | FOR THE<br>YEAR  | AS AT<br>JUNE 30,<br>2015 |                                     |
| Land - Leasehold        | 3,713,418                 | -                             | 3,713,418                 | -                       | -                         | -                | 3,713,418                 |                                     |
| Building                | 19,484,540                | -                             | 19,484,540                | 5                       | 12,131,978                | 367,628          | 12,499,606                |                                     |
| Motor vehicles          | 9,770,952                 | -                             | 9,770,952                 | 20                      | 7,940,931                 | 366,004          | 8,306,935                 |                                     |
| Office equipment        | 5,508,012                 | -                             | 5,508,012                 | 15                      | 4,722,857                 | 117,773          | 4,840,630                 |                                     |
| Science equipment       | 6,558,040                 | -                             | 6,558,040                 | 15                      | 5,336,901                 | 183,306          | 5,519,307                 |                                     |
| Furniture and fixture   | 3,039,314                 | -                             | 3,039,314                 | 6                       | 1,835,074                 | 72,254           | 1,907,328                 |                                     |
| Air conditioners        | 194,974                   | -                             | 194,974                   | 20                      | 194,469                   | 101              | 194,570                   |                                     |
| Library books and films | 1,794,815                 | -                             | 1,794,815                 | 5                       | 1,029,070                 | 38,287           | 1,067,357                 |                                     |
| <b>TOTAL 2015</b>       | <b>50,064,065</b>         | <b>-</b>                      | <b>50,064,065</b>         |                         | <b>33,190,380</b>         | <b>1,145,354</b> | <b>34,335,734</b>         |                                     |

|  | 2016<br><u>Rupees</u> | 2015<br><u>Rupees</u> |
|--|-----------------------|-----------------------|
| <b>9. LONG TERM SECURITY DEPOSITS</b>  |                       |                       |
| Electricity  | 1,472,195             | 1,472,195             |
| Gas  | 145,000               | 145,000               |
| CMH Rawalpindi   | 300,000               | 300,000               |
|  | <u>1,917,195</u>      | <u>1,917,195</u>      |
| <b>10. ADVANCES</b>  |                       |                       |
| Advance to staff   | 1,626                 | 97,421                |
|  | <u>1,626</u>          | <u>97,421</u>         |
| 10.1. This represents interest free loan given to employee for purchase of vehicle / motorcycle. |                       |                       |
| <b>11. CASH AND BANK BALANCES</b>  |                       |                       |
| Cash in hand   | 34,415                | 34,415                |
|  | <u>34,415</u>         | <u>34,415</u>         |
| <b>12. GRANT FROM FEDERAL GOVERNMENT</b>   |                       |                       |
| Grant received   | 181,000,000           | 166,013,000           |
| Grant un-utilized  | (3,938,575)           | (33,319)              |
|  | <u>177,061,425</u>    | <u>165,979,681</u>    |
| <b>13. STATUTORY SCIENTIFIC FUNCTIONS</b>  |                       |                       |
| Research support grant   | 6.1 25,649,574        | 20,816,244            |
| Scientific societies & professional bodies   | 13.1 700,000          | 500,000               |
| Scientific conferences, meetings & seminars  | 2,520,000             | 600,000               |
| Operation of science caravan   | 4,609,943             | 3,976,401             |
| Science popularization activities  | 13.1 3,913,032        | 3,531,972             |
| International liaison  | 338,752               | 71,412                |
| Science fair   | 44,851                | 117,634               |
| Awards, prizes and fellowship  | -                     | 248,200               |
| Innovations & inventions   | 986,326               | 314,400               |
| Subscription to international organization   | 160,600               | 83,795                |
| Science centre herbaria planetarium  | 492,922               | 2,309,942             |
|  | <u>39,416,000</u>     | <u>32,570,000</u>     |

13.1 Scientific societies and professional bodies include Rs. NIL for the year (2015: Rs.100,000/-) and Science promotion activities include Rs. NIL for the year (2015: Rs.100,000/-) for which cheques were issued but not presented by the recipients upto the year end. The said cheques have been lapsed and stand transferred to GoP.

2016  
Rupees

2015  
Rupees

14. ADMINISTRATIVE EXPENSES

|                             |      |                    |                    |
|-----------------------------|------|--------------------|--------------------|
| Salaries and other benefits | 14.1 | 105,667,056        | 107,480,474        |
| Traveling                   | 14.1 | 631,200            | 600,000            |
| House rent facility         |      | 16,247,000         | 17,517,000         |
| Rent, rates & taxes         | 14.1 | 109,936            | 167,000            |
| Electricity, gas & water    |      | 1,330,000          | 1,155,000          |
| Communication               |      | 2,543,000          | 1,575,000          |
| Printing and stationery     |      | 364,091            | 400,000            |
| Vehicle running             |      | 1,870,000          | 2,145,000          |
| Newspapers and magazines    |      | 88,797             | 125,000            |
| Liveries and uniforms       |      | 135,000            | 75,000             |
| Entertainment               |      | 375,432            | 330,000            |
| Repair and maintenance      |      | 3,579,740          | 1,176,000          |
| Audit fee                   |      | 50,000             | 50,000             |
| Legal charges               |      | 463,000            | 50,000             |
| Staff welfare fund          |      | 140,420            | 150,000            |
| Advertisement and publicity |      | 500,000            | 125,000            |
| Miscellaneous               |      | 498,431            | 390,000            |
| Depreciation                | 8    | 1,059,086          | 1,145,354          |
|                             |      | <u>135,652,189</u> | <u>134,655,828</u> |

14.1 Salaries & other benefits include Rs.14,417/- paid to RTO, Islamabad (2015: Rs. NIL). Travelling include Rs.11,700/- (2015: Rs. NIL) and Rent, rates & taxes include Rs.7,522/- paid to CDA (2015: Rs. NIL) for which cheques were issued but not presented by the recipients upto the year end. The said cheques have been lapsed and stand transfered to GoP.

15. PRIOR YEAR ADJUSTMENT

|  |  |   |        |
|--|--|---|--------|
| Prior year adjustment - Security deposit payable |  | - | 27,300 |
|  |  | - | 27,300 |

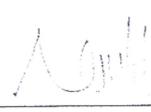
16. DATE OF AUTHORIZATION FOR ISSUE

The financial statements were authorized for issue by the Management on 07/10/2016.

17. FIGURES

In these financial statements figures have been rounded off to the nearest rupee.

  
\_\_\_\_\_  
TRUSTEE

  
\_\_\_\_\_  
CHAIRMAN

**PAKISTAN MUSEUM OF NATURAL HISTORY**

**AUDITED FINANCIAL STATEMENTS  
FOR THE YEAR ENDED JUNE 30, 2016**

**ILYAS SAEED & CO.**  
CHARTERED ACCOUNTANTS

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OFFICE # 26, 2<sup>ND</sup> FLOOR, ROSE PLAZA, I-8 MARKAZ, ISLAMABAD  
PH: (+92) 051 - 4938026 & 051 - 4938027, FAX: (+92) 051 - 4938028

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Rose Plaza, I-8 Markaz,  
Islamabad - Pakistan.  
Tel: 92-51-4938026-27  
Fax: 92-51-4938028  
E-mail: info@ilyassaeed.com  
www.ilyassaeed.com

# Ilyas Saeed & Co.

Chartered Accountants

## INDEPENDENT AUDITORS' REPORT TO THE MANAGEMENT

### *Report on the Financial Statements*

We have audited the accompanying financial statements of Pakistan Museum of Natural History which comprise the statement of financial position as at June 30, 2016 and the related income and expenditure statement, statement of cash flows and statement of changes in general fund together with the summary of significant accounting policies and other explanatory notes forming part thereof for the year then ended.

### *Management's Responsibility for the Financial Statements*

Management is responsible for the preparation and fair presentation of these financial statements in accordance with the approved International Financial Reporting Standards as applicable in Pakistan and the requirements of the Pakistan Science Foundation Act, 1973 and for such internal control as the management determines necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

### *Auditors' Responsibility*

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with International Standards on Auditing as applicable in Pakistan. Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditors' judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditors consider internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal controls. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

### *Opinion*

In our opinion, the financial statements present fairly, in all material respects, the financial position of Pakistan Museum of Natural History as of June 30, 2016 and its' financial performance, its cash flows and changes in general fund for the year then ended in accordance with the approved International Financial Reporting Standards as applicable in Pakistan and the requirements of the Pakistan Science Foundation Act, 1973.

*Ilyas Saeed & Co.*

CHARTERED ACCOUNTANTS  
Engagement Partner: Imran Ilyas, FCA

ISLAMABAD: 10/10/2016.

*IKO*



Other Offices: Karachi, Lahore, Gujranwala.  
A member firm of MGI, an alliance of independent accounting, audit, tax and consulting firms worldwide.

**PAKISTAN MUSEUM OF NATURAL HISTORY**  
**STATEMENT OF FINANCIAL POSITION**  
**AS AT JUNE 30, 2016**

| ASSETS  | NOTE | 2016<br><u>Rupees</u> | 2015<br><u>Rupees</u> |
|---|------|-----------------------|-----------------------|
| <b>NON-CURRENT ASSETS</b>                       |      |                       |                       |
| Property, plant and equipment - Development     | 3    | 80,217,031            | 86,722,275            |
| Property, plant and equipment - Non-Development | 4    | 10,701,862            | 7,970,078             |
|   |      | <b>90,918,893</b>     | <b>94,692,354</b>     |
| CWIP - Development                              | 5    | 8,768,531             | 8,768,531             |
| Long term deposits - PIMS                       | 6    | 250,000               | 250,000               |
| <b>CURRENT ASSETS</b>                           |      |                       |                       |
| Receivables                                     |      | 82,750                | 85,000                |
| Cash & bank balances                            | 7    | 1,157,434             | 704,850               |
|   |      | <b>101,177,608</b>    | <b>104,500,735</b>    |
| <b>FUNDS AND LIABILITIES</b>                    |      |                       |                       |
| <b>ACCUMULATED FUNDS</b>                        | 8    | <b>101,177,608</b>    | <b>104,500,735</b>    |
|   |      | <b>101,177,608</b>    | <b>104,500,735</b>    |

The annexed notes from 1 to 16 form an integral part of these financial statements. *JSC*

  
**ASSISTANT DIRECTOR**  
 Assistant Director (Accounts)  
 Pakistan Museum of Natural History  
 Islamabad

  
**DIRECTOR GENERAL**  
 Director General  
 Pakistan Museum of Natural History  
 Islamabad

**PAKISTAN MUSEUM OF NATURAL HISTORY**  
**INCOME AND EXPENDITURE STATEMENT**  
**FOR THE YEAR ENDED JUNE 30, 2016**

| PARTICULARS                                    | NOTE | 2016<br><u>Rupees</u>     | 2015<br><u>Rupees</u>   |
|--|------|---------------------------|-------------------------|
| <b>INCOME</b>                                  |      |                           |                         |
| Grant from GoP - Non-Development               | 9    | 115,001,000               | 107,500,000             |
| Grant from GoP - Development                   | 10   | -                         | 8,768,531               |
| Miscellaneous Receipts                         | 11   | 1,129,318                 | 2,231,178               |
|  |      | <b>116,130,318</b>        | <b>118,499,709</b>      |
| <b>EXPENDITURE</b>                             |      |                           |                         |
| Development                                    | 12   | 6,505,245                 | 7,662,663               |
| Non-Development                                | 13   | 112,346,085               | 107,664,289             |
| Miscellaneous Payments                         | 14   | 1,003,867                 | 1,542,312               |
|  |      | <b>119,855,197</b>        | <b>116,869,263</b>      |
| <b>SURPLUS / (DEFICIT) TRANSFERRED TO FUND</b> |      | <b><u>(3,724,879)</u></b> | <b><u>1,630,446</u></b> |

The annexed notes from 1 to 16 form an integral part of these financial statements.

  
**ASSISTANT DIRECTOR**  
 Assistant Director (Accounts)  
 Pakistan Museum of Natural History  
 Islamabad

  
**DIRECTOR GENERAL**  
 Director General  
 Pakistan Museum of Natural History  
 Garden Avenue Islamabad.

**PAKISTAN MUSEUM OF NATURAL HISTORY**  
**STATEMENT OF CASH FLOWS**  
**FOR THE YEAR ENDED JUNE 30, 2016**

|  | <u>2016</u>      | <u>2015</u>    |
|--|------------------|----------------|
|  | <u>Rupees</u>    | <u>Rupees</u>  |
| <b>CASH FLOWS FROM OPERATING ACTIVITIES</b>          |                  |                |
| (Deficit) / Surplus for the year                     | (3,724,879)      | 1,630,446      |
| Adjustments for non-cash changes and other items:    |                  |                |
| Depreciation   | 8,257,430        | 9,542,061      |
| Cash generated before working capital changes:       | 4,532,552        | 11,172,507     |
| Working capital changes                              |                  |                |
| (Increase) / decrease in receivables                 | 2,250            | (85,000)       |
| Net cash flow from operating activities              | 4,534,802        | 11,087,507     |
| <b>CASH FLOWS FROM INVESTING ACTIVITIES</b>          |                  |                |
| Capital expenditure on Property, plant and equipment | (4,483,970)      | (10,483,641)   |
| Net cash flow from investing activities              | (4,483,970)      | (10,483,641)   |
| <b>CASH FLOWS FROM FINANCING ACTIVITIES</b>          |                  |                |
| Cash inflow from Entry Ticket Account                | 401,752          |                |
| Net cash flow from financing activities              | 401,752          | -              |
| <b>NET INCREASE IN CASH AND CASH EQUIVALENT</b>      | <b>452,584</b>   | <b>603,866</b> |
| <b>CASH &amp; CASH EQUIVALENTS AT START OF YEAR</b>  | <b>704,850</b>   | <b>100,984</b> |
| <b>CASH AND CASH EQUIVALENTS AT END OF YEAR</b>      | <b>1,157,434</b> | <b>704,850</b> |

*(Signature)*

The annexed notes from 1 to 16 form an integral part of these financial statements.

  
**ASSISTANT DIRECTOR**  
 Assistant Director (Accounts)  
 Pakistan Museum of Natural History  
 Islamabad

  
**DIRECTOR GENERAL**  
 Director General  
 Pakistan Museum of Natural History  
 Garden Avenue Islamabad.

**PAKISTAN MUSEUM OF NATURAL HISTORY  
STATEMENT OF CHANGES IN GENERAL FUND  
FOR THE YEAR ENDED JUNE 30, 2016**

| <b>PARTICULARS</b>                           | <b>GENERAL<br/>FUND<br/><u>Rupees</u></b> | <b>TOTAL<br/><u>Rupees</u></b> |
|--|---|--------------------------------|
| Balance as at July 01, 2014                  | 102,870,289                               | 102,870,289                    |
| Surplus for the year                         | 1,630,446                                 | 1,630,446                      |
| Balance as at June 30, 2015                  | <u>104,500,735</u>                        | <u>104,500,735</u>             |
| Adjustment - Balance of Entry Ticket Account | 401,752                                   | 401,752                        |
| (Deficit) for the year                       | <b>(3,724,879)</b>                        | <b>(3,724,879)</b>             |
| Closing Balance as at June 30, 2016          | <u><u>101,177,608</u></u>                 | <u><u>101,177,608</u></u>      |

*JSC*

The annexed notes from 1 to 16 form an integral part of these financial statements.

  
**ASSISTANT DIRECTOR**  
 Assistant Director (Accounts)  
 Pakistan Museum of Natural History  
 Islamabad

  
**DIRECTOR GENERAL**  
 Director General  
 Pakistan Museum of Natural History  
 Garden Avenue Islamabad.

**PAKISTAN MUSEUM OF NATURAL HISTORY**  
**NOTES TO THE FINANCIAL STATEMENTS**  
**FOR THE YEAR ENDED JUNE 30, 2016**

**1. BACKGROUND AND OBJECTIVE**

Pakistan Museum of Natural History (PMNH) is under administrative control of Pakistan Science Foundation (PSF) established under Pakistan Science Foundation Act, 1973 with the objective of promoting and financing scientific activities having a bearing on socio-economic needs of country. Main objective of PMNH is to establish a museum of natural history.

**2. SIGNIFICANT ACCOUNTING POLICIES**

The principal accounting policies which have been adopted in the preparation of these financial statements are summarized as under:

**2.1 ACCOUNTING CONVENTION**

These financial statements have been prepared under the historical cost convention.

**2.2 BASIS OF PREPARATION**

**Statement of Compliance**

These financial statements have been prepared in accordance with the approved accounting standards as applicable in Pakistan. Approved Accounting Standards comprise of International Financial Reporting Standards (IFRSs) issued by the International Accounting Standards Board (IASB) as applicable in Pakistan and the requirements of the Pakistan Science Foundation Act, 1973. In case, the requirements differ, the provisions or directives of the Pakistan Science

**2.3 PROPERTY, PLANT, EQUIPMENT AND WIP**

These are stated at cost less accumulated depreciation except leasehold land which is stated at cost. Cost of tangible assets consists of historical cost and other directly attributable costs of bringing the asset to working condition. Depreciation is charged on reducing balance method at the rates specified in the relevant notes. Depreciation on additions is charged from the month in which the asset is put to use whereas depreciation on disposals is charged upto the month the asset

**2.4 REVENUE RECOGNITION**

Grant is recognized on actual receipt basis from the GoP. Other income is also recognized on actual receipt basis, as and when received.

**2.5 RESTRICTED FUNDS**

Funds received directly as grants or received as contribution from the donor for specific functions are classified as restricted funds. Restricted funds representing direct grants are classified as grant funds. Expenses incurred out of grant funds are reflected in the income & expenditure account.

**2.6 EXPENDITURE**

Expenses are recognized on actual payment basis except non cash expenses such as depreciation and amortization which is charged on accrual basis.

**2.7 DEPOSITS & RECEIVABLES**

Advances, deposits and receivables are recognized on actual receivable / payment basis. These are generally given for future expected expenses and / or as security.



PAKISTAN MUSEUM OF NATURAL HISTORY  
NOTES TO THE FINANCIAL STATEMENTS  
FOR THE YEAR ENDED JUNE 30, 2016

3 PROPERTY, PLANT AND EQUIPMENT - DEVELOPMENT

| PARTICULARS             | 2016                   |                        |           | DEPRECIATION           |                  |                        | W.D.V.<br>AS AT JUNE 30,<br>2016 |
|-------------------------|------------------------|------------------------|-----------|------------------------|------------------|------------------------|----------------------------------|
|                         | AS AT JULY 01,<br>2015 | AS AT JUNE 30,<br>2016 | RATE<br>% | AS AT JULY 01,<br>2015 | FOR THE<br>YEAR  | AS AT JUNE 30,<br>2016 |                                  |
| Land                    | 2,576,000              | 2,576,000              | -         | -                      | -                | -                      | 2,576,000                        |
| Building                | 87,150,893             | 87,150,893             | 5         | 19,715,193             | 3,371,785        | 23,086,978             | 64,063,915                       |
| Motor vehicles          | 5,691,447              | 5,691,447              | 20        | 3,826,474              | 372,995          | 4,199,468              | 1,491,979                        |
| Display centre          | 10,370,351             | 10,370,351             | 10        | 4,246,762              | 612,359          | 4,859,121              | 5,511,230                        |
| Generator               | 8,990                  | 8,990                  | 10        | 3,681                  | 531              | 4,212                  | 4,778                            |
| Audio visual equipment  | 13,235,840             | 13,235,840             | 30        | 11,011,292             | 667,364          | 11,678,657             | 1,557,183                        |
| Laboratory equipment    | 11,589,153             | 11,589,153             | 30        | 9,641,364              | 584,337          | 10,225,701             | 1,363,452                        |
| Computer equipments     | 9,477,774              | 9,477,774              | 30        | 7,965,725              | 453,615          | 8,419,340              | 1,058,434                        |
| Books                   | 4,242,784              | 4,242,784              | 20        | 2,852,509              | 278,055          | 3,130,564              | 1,112,220                        |
| Furniture and fixture   | 1,862,967              | 1,862,967              | 10        | 762,904                | 110,006          | 872,910                | 990,057                          |
| Air conditioners        | 917,850                | 917,850                | 10        | 375,869                | 54,198           | 430,067                | 487,783                          |
| <b>TOTAL 30-06-2016</b> | <b>147,124,049</b>     | <b>147,124,049</b>     |           | <b>60,401,774</b>      | <b>6,505,245</b> | <b>66,907,018</b>      | <b>80,217,031</b>                |

| PARTICULARS             | 2015                   |                        |           | DEPRECIATION           |                  |                        | W.D.V.<br>AS AT JUNE 30,<br>2015 |
|-------------------------|------------------------|------------------------|-----------|------------------------|------------------|------------------------|----------------------------------|
|                         | AS AT JULY 01,<br>2014 | AS AT JUNE 30,<br>2015 | RATE<br>% | AS AT JULY 01,<br>2014 | FOR THE<br>YEAR  | AS AT JUNE 30,<br>2015 |                                  |
| Land                    | 2,576,000              | 2,576,000              | -         | -                      | -                | -                      | 2,576,000                        |
| Building                | 87,150,893             | 87,150,893             | 5         | 16,165,946             | 3,549,247        | 19,715,193             | 67,435,700                       |
| Motor vehicles          | 5,691,447              | 5,691,447              | 20        | 3,360,230              | 466,243          | 3,826,474              | 1,864,973                        |
| Display centre          | 10,370,351             | 10,370,351             | 10        | 3,566,364              | 680,399          | 4,246,762              | 6,123,589                        |
| Generator               | 8,990                  | 8,990                  | 10        | 3,092                  | 590              | 3,681                  | 5,309                            |
| Audio visual equipment  | 13,235,840             | 13,235,840             | 30        | 10,057,915             | 953,378          | 11,011,292             | 2,224,548                        |
| Laboratory equipment    | 11,589,153             | 11,589,153             | 30        | 8,806,597              | 834,767          | 9,641,364              | 1,947,789                        |
| Computer equipments     | 9,477,774              | 9,477,774              | 30        | 7,317,704              | 648,021          | 7,965,725              | 1,512,049                        |
| Books                   | 4,242,784              | 4,242,784              | 20        | 2,504,940              | 347,569          | 2,852,509              | 1,390,275                        |
| Furniture and fixture   | 1,862,967              | 1,862,967              | 10        | 640,674                | 122,229          | 762,904                | 1,100,063                        |
| Air conditioners        | 917,850                | 917,850                | 10        | 315,649                | 60,220           | 375,869                | 541,981                          |
| <b>TOTAL 30-06-2015</b> | <b>147,124,049</b>     | <b>147,124,049</b>     |           | <b>52,739,111</b>      | <b>7,662,663</b> | <b>60,401,774</b>      | <b>86,722,275</b>                |

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4 PROPERTY, PLANT AND EQUIPMENT - NON-DEVELOPMENT

| PARTICULARS                   | COST                |                  |                     | DEPRECIATION |                     |                  | W.D.V.            |
|-------------------------------|---------------------|------------------|---------------------|--------------|---------------------|------------------|-------------------|
|                               | AS AT JULY 01, 2015 | ADDITIONS        | AS AT JUNE 30, 2016 | RATE %       | AS AT JULY 01, 2015 | FOR THE YEAR     |                   |
| Land                          | 1,050,000           | -                | 1,050,000           | -            | -                   | -                | 1,050,000         |
| Machinery                     | 1,152,472           | 241,047          | 1,393,519           | 20           | 762,294             | 82,053           | 844,347           |
| Motor vehicles                | 3,648,926           | -                | 3,648,926           | 20           | 2,449,619           | 239,861          | 2,689,480         |
| Furniture and fixture         | 1,677,131           | -                | 1,677,131           | 20           | 1,071,276           | 127,171          | 1,198,447         |
| Interactive floor system      | 1,425,000           | 220,000          | 1,425,000           | 30           | 249,375             | 352,688          | 602,063           |
| Office laboratory equipments  | 4,496,385           | -                | 4,514,719           | 33.33        | 3,881,989           | 207,945          | 4,089,933         |
| Computer equipments           | 4,038,077           | 576,919          | 4,614,996           | 33.33        | 2,762,445           | 454,568          | 3,217,013         |
| Kiosk system                  | -                   | 3,375,020        | 3,375,020           | 30           | -                   | 93,741           | 93,741            |
| Biometric System              | 60,400              | -                | 60,400              | 30           | 13,590              | 14,043           | 27,633            |
| Books                         | 543,412             | -                | 543,412             | 10           | 222,071             | 32,134           | 254,205           |
| Camera                        | 67,300              | 52,650           | 119,950             | 33.33        | 49,018              | 20,717           | 69,735            |
| Baluchitherium Life Side Mode | 1,740,000           | -                | 1,740,000           | 10           | 482,111             | 125,789          | 607,899           |
| Whales and elephant skeleton  | 25,000              | -                | 25,000              | 10           | 10,238              | 1,476            | 11,714            |
| <b>TOTAL 30-06-2016</b>       | <b>19,924,103</b>   | <b>4,483,970</b> | <b>24,408,073</b>   |              | <b>11,954,025</b>   | <b>1,752,186</b> | <b>13,706,211</b> |
|                               |                     |                  |                     |              |                     |                  | <b>10,701,862</b> |

2015

| PARTICULARS                   | COST                |                  |                     | DEPRECIATION |                     |                  | W.D.V.            |
|-------------------------------|---------------------|------------------|---------------------|--------------|---------------------|------------------|-------------------|
|                               | AS AT JULY 01, 2014 | ADDITIONS        | AS AT JUNE 30, 2015 | RATE %       | AS AT JULY 01, 2014 | FOR THE YEAR     |                   |
| Land                          | 1,050,000           | -                | 1,050,000           | -            | -                   | -                | 1,050,000         |
| Machinery                     | 1,152,472           | -                | 1,152,472           | 20           | 664,749             | 97,545           | 762,294           |
| Motor vehicles                | 3,648,926           | -                | 3,648,926           | 20           | 2,149,792           | 299,827          | 2,449,619         |
| Furniture and fixture         | 1,627,649           | 49,482           | 1,677,131           | 20           | 929,648             | 141,628          | 1,071,276         |
| Interactive floor system      | 1,425,000           | 1,425,000        | 1,425,000           | 30           | 249,375             | 249,375          | 249,375           |
| Office laboratory equipments  | 4,487,385           | 9,000            | 4,496,385           | 33.33        | 3,577,086           | 304,903          | 3,881,989         |
| Computer equipments           | 3,866,849           | 171,228          | 4,038,077           | 33.33        | 2,176,164           | 586,281          | 2,762,445         |
| Biometric System              | -                   | 60,400           | 60,400              | 30           | -                   | 13,590           | 13,590            |
| Books                         | 543,412             | -                | 543,412             | 10           | 186,366             | 35,705           | 222,071           |
| Camera                        | 67,300              | -                | 67,300              | 33.33        | 39,878              | 9,140            | 49,018            |
| Baluchitherium Life Side Mode | 1,740,000           | -                | 1,740,000           | 10           | 342,345             | 139,766          | 482,111           |
| Whales and elephant skeleton  | 25,000              | -                | 25,000              | 10           | 8,598               | 1,640            | 10,238            |
| <b>TOTAL 30-06-2015</b>       | <b>18,208,993</b>   | <b>1,715,110</b> | <b>19,924,103</b>   |              | <b>10,074,626</b>   | <b>1,879,399</b> | <b>11,954,025</b> |
|                               |                     |                  |                     |              |                     |                  | <b>7,970,078</b>  |

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PAKISTAN MUSEUM OF NATURAL HISTORY  
 NOTES TO THE FINANCIAL STATEMENTS  
 FOR THE YEAR ENDED JUNE 30, 2016

|   |            | 2016<br><u>Rupees</u>     | 2015<br><u>Rupees</u>     |
|---|------------|---------------------------|---------------------------|
| <b>5. CAPITAL WORK IN PROGRESS</b>  | <b>5.1</b> | <u><u>8,768,531</u></u>   | <u><u>8,768,531</u></u>   |
| <p>5.1 The project 'Strengthening of Security &amp; Measures at Pakistan Museum of Natural History, Islamabad' is classified as Capital Work-in-Progress. The work done is 60% complete with respect to cost and the same shall be transferred to fixed assets when complete. During the year further expenditure was suspended as no grant was allowed by the Government of Pakistan. However, further grant is allowed during the financial year 2016-17 and the work on the project shall resume</p> |            |                           |                           |
| <b>6. SECURITY DEPOSITS</b>   |            |                           |                           |
| Security Deposits at PIMS   |            | <u><u>250,000</u></u>     | <u><u>250,000</u></u>     |
| <b>7. CASH &amp; BANK BALANCE</b>   |            |                           |                           |
| Cash at bank - Miscellaneous Accounts   | 7.1        | 1,157,434                 | 704,850                   |
| Cash at bank - Development Account  |            | <u><u>-</u></u>           | <u><u>-</u></u>           |
|   |            | <u><u>1,157,434</u></u>   | <u><u>704,850</u></u>     |
| <p>7.1 This amount represents cash kept in current accounts termed as CD-70 Account and Entry Ticket Account for miscellaneous receipt &amp; payments.</p>  |            |                           |                           |
| <b>8. ACCUMULATED FUNDS</b>   |            |                           |                           |
| Opening balance   |            | 104,500,735               | 102,870,289               |
| Opening balance - Entry Ticket Account  | 8.1        | 401,752                   | -                         |
| (Deficit) / Surplus for the year  |            | <u><u>(3,724,879)</u></u> | <u><u>1,630,446</u></u>   |
|   |            | <u><u>101,177,608</u></u> | <u><u>104,500,735</u></u> |
| <p>8.1 This account represents a current account which previously was not incorporated in the audited financial statements of PMNH. Management has decided to incorporate this bank account in current years financial statements on prospective basis.</p>   |            |                           |                           |
| <b>9. GRANT FROM GOP - NON-DEVELOPMENT</b>  |            |                           |                           |
| Grant From Government of Pakistan   |            | <u><u>115,001,000</u></u> | <u><u>107,500,000</u></u> |
| <b>10. GRANT FROM GOP - DEVELOPMENT</b>   |            |                           |                           |
| Grant From Government of Pakistan   |            | <u><u>-</u></u>           | <u><u>8,768,531</u></u>   |
| <b>11. MISCELLANEOUS ACCOUNT</b>  |            |                           |                           |
| Miscellaneous Receipts  | 11.1       | <u><u>1,129,318</u></u>   | <u><u>2,231,178</u></u>   |
| <p>11.1 These receipts include receipts from the sale of museum entry tickets.</p>  |            |                           |                           |

PAKISTAN MUSEUM OF NATURAL HISTORY  
 NOTES TO THE FINANCIAL STATEMENTS  
 FOR THE YEAR ENDED JUNE 30, 2016

|   | 2016<br><u>Rupees</u> | 2015<br><u>Rupees</u> |
|---|-----------------------|-----------------------|
| <b>12. EXPENDITURE - DEVELOPMENT FUND</b> |                       |                       |
| Depreciation                              | <u>6,505,245</u>      | <u>7,662,663</u>      |
| <b>13. EXPENDITURE - NON-DEVELOPMENT</b>  |                       |                       |
| Pay, overtime, honorarium and allowances  | 64,386,859            | 64,112,000            |
| Rent of residential accommodation         | 13,407,000            | 13,150,000            |
| CPF & GLI contribution                    | 679,000               | 570,000               |
| Gratuity                                  | -                     | 59,000                |
| Pension contribution                      | 19,911,000            | 17,052,000            |
| Ground rent                               | 6,000                 | 6,000                 |
| Travelling expenses                       | 210,000               | 410,000               |
| Repair and maintenance                    | 2,340,000             | 1,340,000             |
| Communication                             | 810,000               | 710,000               |
| Printing and stationery                   | 400,000               | 200,000               |
| Electricity, gas and water                | 1,300,000             | 1,400,000             |
| Entertainment                             | 100,000               | 75,000                |
| Vehicle running (POL)                     | 1,800,000             | 1,800,000             |
| Uniform expenses                          | 80,000                | 50,000                |
| Audit Fee                                 | 25,000                | 25,000                |
| Advertisement                             | 400,000               | 50,000                |
| Newspapers and magazines                  | 80,000                | 75,000                |
| Other function / research activity        | 3,865,899             | 4,509,390             |
| Miscellaneous expenses                    | 400,000               | 191,500               |
| Surrendered to GOP                        | 13.1 393,141          | -                     |
| Depreciation                              | 4 <u>1,752,186</u>    | <u>1,879,399</u>      |
|   | <u>112,346,085</u>    | <u>107,664,289</u>    |

13.1 This represents the amount of un-utilized funds which, as per rules and regulations of Government of Pakistan, is surrendered to the same.

**14. EXPENDITURE - MISCELLANEOUS ACCOUNT**

|                                 |                  |                  |
|---------------------------------|------------------|------------------|
| Miscellaneous expenses          | 2,602            | 15,184           |
| PMNH council                    | 108,318          | 75,470           |
| 6th SCAM                        | -                | 1,334,210        |
| Telephone                       | 20,422           | 22,750           |
| Pay & allowances                | 735              | 946              |
| Gem & Gemology                  | 115,998          | 60,931           |
| Medical                         | -                | 32,821           |
| Display activities              | 162,202          | -                |
| Additional duty charges         | 47,160           | -                |
| Printing of tickets             | 34,935           | -                |
| Remuneration charges            | 149,000          | -                |
| Renovation of audio visual hall | 206,680          | -                |
| Fuel                            | 15,000           | -                |
| Electricity                     | 115,925          | -                |
| Maintenance                     | 24,890           | -                |
|                                 | <u>1,003,867</u> | <u>1,542,312</u> |

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PAKISTAN MUSEUM OF NATURAL HISTORY  
NOTES TO THE FINANCIAL STATEMENTS  
FOR THE YEAR ENDED JUNE 30, 2016

14.1 Most of the above expenses represent the expenses incurred out of CD-70 Account and Entry Ticket Account which are administrative in nature but are in excess of the approved budgeted

15. DATE OF AUTHORIZATION FOR ISSUE

These financial statements were authorized for issue by the Management on *10/10/2016*.

16. FIGURES

In these financial statements figures have been rounded off to the nearest rupee.

  
ASSISTANT DIRECTOR

Assistant Director (Accounts)  
Pakistan Museum of Natural History  
Islamabad

  
DIRECTOR GENERAL

Pakistan Museum of Natural History  
Garden Avenue Islamabad.

PAKISTAN SCIENTIFIC AND  
TECHNOLOGICAL INFORMATION CENTRE

AUDITED FINANCIAL STATEMENTS  
FOR THE YEAR ENDED JUNE 30, 2016

**ILYAS SAEED & CO.**  
CHARTERED ACCOUNTANTS

**mg**i .

OFFICE # 26, 2<sup>ND</sup> FLOOR, ROSE PLAZA, I-8 MARKAZ, ISLAMABAD  
TEL: (031) 351 403033 FAX: (031) 351 403033

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Rose Plaza, I-8 Markaz,  
Islamabad - Pakistan.  
Tel: 92-51-4938026-27  
Fax: 92-51-4938028  
E-mail: info@ilyassaeed.com  
www.ilyassaeed.com

# Ilyas Saeed & Co.

Chartered Accountants

## INDEPENDENT AUDITORS' REPORT TO THE MANAGEMENT

### *Report on the Financial Statements*

We have audited the accompanying financial statements of Pakistan Scientific And Technological Information Centre which comprise the statement of financial position as at June 30, 2016 and the related income and expenditure statement, statement of cash flows and statement of changes in accumulated fund together with the summary of significant accounting policies and other explanatory notes forming part thereof for the year then ended.

### *Management's Responsibility for the Financial Statements*

Management is responsible for the preparation and fair presentation of these financial statements in accordance with the approved International Financial Reporting Standards as applicable in Pakistan and the requirements of the Pakistan Science Foundation Act, 1973 and for such internal control as the management determines necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

### *Auditors' Responsibility*

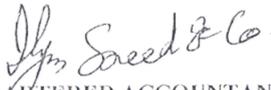
Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with International Standards on Auditing as applicable in Pakistan. Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditors' judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditors consider internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal controls. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

### *Opinion*

In our opinion, the financial statements present fairly, in all material respects, the financial position of Pakistan Scientific And Technological Information Centre as of June 30, 2016 and its financial performance, its cash flows and changes in accumulated fund for the year then ended in accordance with the approved International Financial Reporting Standards as applicable in Pakistan and the requirements of the Pakistan Science Foundation Act, 1973.

  
Ilyas Saeed & Co.  
CHARTERED ACCOUNTANTS  
Engagement Partner: Imran Ilyas, FCA  
ISLAMABAD: 10/10/2016



Other Offices: Karachi, Lahore, Gujranwala.  
A member firm of MGI, an alliance of independent accounting, audit, tax and consulting firms worldwide.



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E-mail: info@ilyassaeed.com  
www.ilyassaeed.com

## Ilyas Saeed & Co.

Chartered Accountants

### INDEPENDENT AUDITORS' REPORT TO THE MANAGEMENT

#### *Report on the Financial Statements*

We have audited the accompanying financial statements of Pakistan Scientific And Technological Information Centre which comprise the statement of financial position as at June 30, 2016 and the related income and expenditure statement, statement of cash flows and statement of changes in accumulated fund together with the summary of significant accounting policies and other explanatory notes forming part thereof for the year then ended.

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Management is responsible for the preparation and fair presentation of these financial statements in accordance with the approved International Financial Reporting Standards as applicable in Pakistan and the requirements of the Pakistan Science Foundation Act, 1973 and for such internal control as the management determines necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

#### *Auditors' Responsibility*

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with International Standards on Auditing as applicable in Pakistan. Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance whether the financial statements are free from material misstatement.

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*Ilyas Saeed & Co.*

CHARTERED ACCOUNTANTS  
Engagement Partner: Imran Ilyas, FCA  
ISLAMABAD: 10/10/2016.



Other Offices: Karachi, Lahore, Gujranwala.  
A member firm of MGI, an alliance of independent accounting, audit, tax and consulting firms worldwide.

**PAKISTAN SCIENTIFIC AND TECHNOLOGICAL INFORMATION CENTRE**  
**STATEMENT OF FINANCIAL POSITION**  
**AS AT JUNE 30, 2016**

|                               | NOTE | 2016<br>(Rupees) | 2015<br>(Rupees) |
|-------------------------------|------|------------------|------------------|
| <b>ASSETS</b>                 |      |                  |                  |
| <b>NON-CURRENT ASSETS</b>     |      |                  |                  |
| Property, plant and equipment | 3    | 39,275,095       | 42,468,307       |
| <b>CURRENT ASSETS</b>         |      |                  |                  |
| Advance rent - Documentation  |      | -                | 41,615           |
| Cash & bank balances          | 4    | 11,835,911       | 11,568,541       |
|                               |      | 11,835,911       | 11,610,156       |
|                               |      | 51,111,005       | 54,078,463       |
| <b>FUNDS AND LIABILITIES</b>  |      |                  |                  |
| <b>ACCUMULATED FUNDS</b>      |      |                  |                  |
|                               | 5    | 50,282,267       | 53,249,725       |
| <b>CURRENT LIABILITIES</b>    |      |                  |                  |
| Payables                      | 6    | 828,738          | 828,738          |
|                               |      | 51,111,005       | 54,078,463       |



The annexed notes from 1 to 13 form an integral part of these financial statements.

  
 ASSISTANT DIRECTOR  
 (ACCOUNTS)

  
 ADDITIONAL DIRECTOR  
 (A & F)

**Dr. Raja Razi-ul-Hussnain**  
 Additional Director (A&F)/DDO  
 PASTIC National Centre  
 Quaid-e-Azam University Campus  
 Islamabad

  
 DIRECTOR GENERAL

**Dr. Muhammad Akram Shaikh**  
 Director General, PASTIC  
 Quaid-e-Azam University Campus,  
 Islamabad

**PAKISTAN SCIENTIFIC AND TECHNOLOGICAL INFORMATION CENTRE  
INCOME AND EXPENDITURE ACCOUNT  
FOR THE YEAR ENDED JUNE 30, 2016**

| PARTICULARS                             | NOTE | 2016<br>(Rupees)          | 2015<br>(Rupees)      |
|---|------|---------------------------|-----------------------|
| <b>INCOME</b>                           |      |                           |                       |
| Non-development account                 | 7    | 126,121,069               | 110,000,000           |
| Reprographic and Documentation          | 8    | 4,829,064                 | 8,455,046             |
| Pastic Services Commercialization       |      | 675,080                   | 216,898               |
|   |      | <u>131,625,213</u>        | <u>118,671,944</u>    |
| <b>EXPENDITURE</b>                      |      |                           |                       |
| Non- development account                | 9.1  | 123,882,076               | 108,758,037           |
| Reprographic and Documentation          | 10   | 4,632,799                 | 4,008,112             |
| Pastic Services Commercialization       | 11   | 645,591                   | 151,213               |
| Depreciation                            | 3    | 5,432,205                 | 5,584,716             |
|   |      | <u>134,592,671</u>        | <u>118,502,078</u>    |
| <b>(DEFICIT) / SURPLUS FOR THE YEAR</b> |      | <u><u>(2,967,458)</u></u> | <u><u>169,866</u></u> |



The annexed notes from 1 to 13 form an integral part of these financial statements.

ASSISTANT DIRECTOR  
(ACCOUNTS)  
Assistant Director (Accounts)  
PASTIC National Centre, Quaid-i-Azam  
University Campus, Islamabad

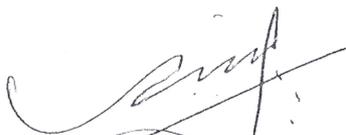
ADDITIONAL DIRECTOR  
(A & F)  
**Dr. Raja Razi-ul-Hussain**  
Additional Director (A&F)/DDO  
PASTIC National Centre  
Quaid-e-Azam University Campus  
Islamabad

DIRECTOR GENERAL  
**Dr. Muhammad Akram Shaikh**  
Director General, PASTIC  
Quaid-i-Azam University Campus,  
Islamabad

**PAKISTAN SCIENTIFIC AND TECHNOLOGICAL INFORMATION CENTRE  
STATEMENT OF CASH FLOWS  
FOR THE YEAR ENDED JUNE 30, 2016**

|  | 2016<br>(Rupees) | 2015<br>(Rupees) |
|--|------------------|------------------|
| <b>CASH FLOW FROM OPERATING ACTIVITIES</b>   |                  |                  |
| (Deficit) / Surplus for the year             | (2,967,458)      | 169,866          |
| Adjustments for non cash charges:            |                  |                  |
| Depreciation                                 | 5,432,205        | 5,584,716        |
| Surplus before working capital changes       | 2,464,748        | 5,754,582        |
| Working capital changes:                     |                  |                  |
| Advances                                     | 41,615           | (41,615)         |
| Payables                                     | -                | (2,166,220)      |
|  | 41,615           | (2,207,835)      |
| Net cash generated from operating activities | 2,506,363        | 3,546,747        |
| <b>CASH FLOW FROM INVESTING ACTIVITIES</b>   |                  |                  |
| Property, plant and equipment                | (2,238,993)      | (1,303,961)      |
| Net cash used in investing activities        | (2,238,993)      | (1,303,961)      |
| NET CHANGE IN CASH AND CASH EQUIVALENTS      | 267,369          | 2,242,786        |
| CASH & CASH EQUIVALENTS AT THE BEGINNING     | 11,568,541       | 9,325,755        |
| CASH & CASH EQUIVALENTS AT THE END           | 11,835,911       | 11,568,541       |

The annexed notes from 1 to 13 form an integral part of these financial statements.

  
\_\_\_\_\_  
ASSISTANT DIRECTOR  
(ACCOUNTS)  
**CHAFFAR AHMAD**  
Assistant Director (Accounts)  
PASTIC National Centre, Quaid-i-Azam  
University Campus, Islamabad

  
\_\_\_\_\_  
ADDITIONAL DIRECTOR  
(A & F)  
**Dr. Nazim Atazi-ul-Hussnain**  
Additional Director (A&F)/DBO  
PASTIC National Centre  
Quaid-e-Azam University Campus  
Islamabad

  
\_\_\_\_\_  
DIRECTOR GENERAL  
**Dr. Muhammad Akram Shaikh**  
Director General, PASTIC  
Quaid-i-Azam University Campus,  
Islamabad



**PAKISTAN SCIENTIFIC AND TECHNOLOGICAL INFORMATION CENTRE  
STATEMENT OF CHANGES IN ACCUMULATED FUND  
FOR THE YEAR ENDED JUNE 30, 2016**

| PARTICULARS                      | NOTE | 2016<br>(Rupees) | 2015<br>(Rupees) |
|----------------------------------|------|------------------|------------------|
| Opening balance                  |      | 53,249,725       | 53,079,859       |
| (Deficit) / Surplus for the year |      | (2,967,458)      | 169,866          |
| Closing balance                  |      | 50,282,267       | 53,249,725       |



The annexed notes from 1 to 13 form an integral part of these financial statements.

ASSISTANT DIRECTOR  
(ACCOUNTS)

**SHAFFAR AHMAD**  
Assistant Director (Accounts)  
PSTIC National Centre, Quaid-i-Azam  
University Campus, Islamabad

ADDITIONAL DIRECTOR  
(A & F)

**Dr. Raja Razi-ul-Hussain**  
Additional Director (A&F)/DDO  
PSTIC National Centre  
Quaid-i-Azam University Campus  
Islamabad

DIRECTOR GENERAL

**Dr. Muhammad Akram Shailkh**  
Director General, PSTIC  
Quaid-i-Azam University Campus,  
Islamabad

**PAKISTAN SCIENTIFIC AND TECHNOLOGICAL INFORMATION CENTRE**  
**NOTES TO THE FINANCIAL STATEMENTS**  
**FOR THE YEAR ENDED JUNE 30, 2016**

**1. BACKGROUND AND OBJECTIVES**

Pakistan Scientific and Technological Information Centre (PASTIC) is the premier organization established under the Pakistan Science Foundation Act, 1973 for dissemination of Scientific and Technological Information to the Scientists, Researchers, Engineers, Entrepreneurs, Industry and Citizens of Pakistan. It is situated at Quaid-e-Azam University, Islamabad.

**2. SIGNIFICANT ACCOUNTING POLICIES**

The principal accounting policies which have been adopted in the preparation of these financial statements are summarized as under:

**2.1 ACCOUNTING CONVENTION**

These financial statements have been prepared under the historical cost convention.

**2.2 BASIS OF PREPARATION**

**Statement of Compliance**

These financial statements have been prepared in accordance with the approved accounting standards as applicable in Pakistan. Approved Accounting Standards comprise of Accounting & Financial Reporting Standards (AFRSs) issued by the International Accounting Standards Board (IASB) as applicable in Pakistan and the requirements of the Pakistan Science Foundation Act, 1973. In case, the requirements differ, the provisions or directives of the Pakistan Science Foundation Act, 1973, shall prevail.

**2.3 PROPERTY, PLANT AND EQUIPMENT**

These are stated at cost less accumulated depreciation except leasehold land which is stated at cost. Cost of tangible assets consists of historical cost and other directly attributable costs of bringing the asset to working condition.

Depreciation is charged on reducing balance method at the rates specified in the relevant notes. Depreciation on additions is charged from the month in which the asset is put to use, whereas depreciation on disposals is charged upto the month the asset remained in use.

Normal repairs are charged to income & expenditure account.

**2.4 REVENUE RECOGNITION**

Profits and grants are recognized on actual receipt basis. Other income is also recognized on actual receipt basis.

**2.5 RESTRICTED FUNDS**

Funds received directly as grants for development or received as endowment from the collaborating partners are classified as restricted / endowment funds. Restricted funds representing direct grants are classified as grant funds.

**2.6 CASH AND CASH EQUIVALENTS**

For the purpose of cash flow statement, cash and cash equivalents comprise cash in hand, cash with banks on current, saving and deposit accounts and other short term highly liquid investments that are readily convertible to known amounts of cash and which are subject to insignificant risk of change in value.



PAKISTAN SCIENTIFIC AND TECHNOLOGICAL INFORMATION CENTRE  
NOTES TO THE FINANCIAL STATEMENTS  
FOR THE YEAR ENDED JUNE 30, 2016

3. PROPERTY, PLANT AND EQUIPMENT

| PARTICULARS             | C O S T                   |                           |                           | R<br>A<br>T<br>E | D E P R E C I A T I O N   |                  |                           | W.D.V.<br>AS AT<br>JUNE 30,<br>2016 |
|-------------------------|---------------------------|---------------------------|---------------------------|------------------|---------------------------|------------------|---------------------------|-------------------------------------|
|                         | 2016                      |                           | AS AT<br>JUNE 30,<br>2016 |                  | 2015                      |                  | AS AT<br>JUNE 30,<br>2015 |                                     |
|                         | AS AT<br>JULY 01,<br>2015 | ADDITIONS /<br>(DELETION) |                           |                  | AS AT<br>JULY 01,<br>2015 | FOR THE<br>YEAR  |                           |                                     |
| Building                | 7,585,261                 | -                         | 7,585,261                 | 10%              | 7,324,807                 | 26,045           | 7,350,852                 | 234,409                             |
| Machinery               | 47,812,512                | -                         | 47,812,512                | 10%              | 12,552,301                | 3,526,021        | 16,078,322                | 31,734,190                          |
| Motor Vehicles          | 7,136,470                 | -                         | 7,136,470                 | 20%              | 5,488,836                 | 329,527          | 5,818,363                 | 1,318,107                           |
| Computers               | 9,004,965                 | 1,315,809                 | 10,320,774                | 30%              | 7,318,359                 | 1,084,666        | 8,403,026                 | 1,917,748                           |
| Furniture and Fixtures  | 958,283                   | 810,404                   | 1,768,687                 | 10%              | 633,622                   | 120,099          | 753,721                   | 1,014,967                           |
| Office Equipments       | 722,812                   | -                         | 722,812                   | 10%              | 406,351                   | 31,646           | 437,997                   | 284,815                             |
| Electric Equipments     | 3,430,285                 | 15,780                    | 3,446,065                 | 10%              | 1,668,091                 | 178,642          | 1,846,733                 | 1,599,332                           |
| UPS                     | 83,500                    | 97,000                    | 180,500                   | 10%              | 15,801                    | 21,320           | 37,120                    | 143,380                             |
| Books                   | 3,046,784                 | -                         | 3,046,784                 | 10%              | 1,904,397                 | 114,239          | 2,018,636                 | 1,028,148                           |
| <b>TOTAL 2016 (Rs.)</b> | <b>79,780,872</b>         | <b>2,238,993</b>          | <b>82,019,865</b>         |                  | <b>37,312,565</b>         | <b>5,432,205</b> | <b>42,744,771</b>         | <b>39,275,095</b>                   |

| PARTICULARS             | C O S T                   |                           |                           | R<br>A<br>T<br>E | D E P R E C I A T I O N   |                  |                           | W.D.V.<br>AS AT<br>JUNE 30,<br>2015 |
|-------------------------|---------------------------|---------------------------|---------------------------|------------------|---------------------------|------------------|---------------------------|-------------------------------------|
|                         | 2015                      |                           | AS AT<br>JUNE 30,<br>2015 |                  | 2014                      |                  | AS AT<br>JUNE 30,<br>2014 |                                     |
|                         | AS AT<br>JULY 01,<br>2014 | ADDITIONS /<br>(DELETION) |                           |                  | AS AT<br>JULY 01,<br>2014 | FOR THE<br>YEAR  |                           |                                     |
| Building                | 7,585,261                 | -                         | 7,585,261                 | 10%              | 7,295,867                 | 28,939           | 7,324,807                 | 260,454                             |
| Machinery               | 47,792,512                | 20,000                    | 47,812,512                | 10%              | 8,633,389                 | 3,918,912        | 12,552,301                | 35,260,211                          |
| Motor Vehicles          | 7,136,470                 | -                         | 7,136,470                 | 20%              | 5,076,928                 | 411,908          | 5,488,836                 | 1,647,634                           |
| Computers               | 8,254,752                 | 750,213                   | 9,004,965                 | 30%              | 6,514,141                 | 804,218          | 7,318,359                 | 1,686,606                           |
| Furniture and Fixtures  | 958,283                   | -                         | 958,283                   | 10%              | 597,549                   | 36,073           | 633,622                   | 324,661                             |
| Office Equipments       | 573,812                   | 149,000                   | 722,812                   | 10%              | 367,050                   | 39,301           | 406,351                   | 316,461                             |
| Electric Equipments     | 3,104,537                 | 325,748                   | 3,430,285                 | 10%              | 1,458,820                 | 209,270          | 1,668,091                 | 1,762,194                           |
| UPS                     | 24,500                    | 59,000                    | 83,500                    | 10%              | 6,640                     | 9,161            | 15,801                    | 67,699                              |
| Books                   | 3,046,784                 | -                         | 3,046,784                 | 10%              | 1,777,465                 | 126,932          | 1,904,397                 | 1,142,387                           |
| <b>TOTAL 2015 (Rs.)</b> | <b>78,476,911</b>         | <b>1,303,961</b>          | <b>79,780,872</b>         |                  | <b>31,727,849</b>         | <b>5,584,716</b> | <b>37,312,565</b>         | <b>42,468,307</b>                   |



PAKISTAN SCIENTIFIC AND TECHNOLOGICAL INFORMATION CENTRE  
 NOTES TO THE FINANCIAL STATEMENTS  
 FOR THE YEAR ENDED JUNE 30, 2016

|   | 2016<br>(Rupees)         | 2015<br>(Rupees)         |
|---|--------------------------|--------------------------|
| <b>4. CASH AND BANK BALANCES</b>  |                          |                          |
| Cash in hand  | -                        | 2,240                    |
| Documentation account   |                          |                          |
| Cash at bank:   |                          |                          |
| Reprographic account  | 9,156,906                | 9,041,540                |
| Documentation account   | 1,795,768                | 1,745,758                |
| Services Commercialization account  | 789,266                  | 759,777                  |
| Miscellaneous account   | 93,970                   | 19,226                   |
|   | <u>11,835,911</u>        | <u>11,566,301</u>        |
|   | <u><u>11,835,911</u></u> | <u><u>11,568,541</u></u> |
| 4.1 Balance in saving accounts carry mark up at the rate of 5% - 6% per annum.          |                          |                          |
| <b>5. ACCUMULATED FUNDS</b>   |                          |                          |
| Opening balance   | 53,249,725               | 53,079,859               |
| (Deficit) / surplus for the year  | (2,967,458)              | 169,866                  |
|   | <u>50,282,267</u>        | <u>53,249,725</u>        |
| <b>6. PAYABLES</b>  |                          |                          |
| Payable to M/S Recto  | 819,656                  | 819,656                  |
| Employees Profit (4%)   | 9,082                    | 9,082                    |
|   | <u>828,738</u>           | <u>828,738</u>           |
| <b>7. NON DEVELOPMENT ACCOUNT</b>   |                          |                          |
| Grant received  | 7.1. 129,001,000         | 110,000,000              |
| Less: Surrendered during the year   | 2,879,931                | -                        |
|   | <u>126,121,069</u>       | <u>110,000,000</u>       |
| 7.1. This represents amount received from GoP for non-development / recurring expenses. |                          |                          |
| <b>8. REPROGRAPHIC AND DOCUMENTATION</b>  |                          |                          |
| Reprography   | 3,211,312                | 7,190,221                |
| Documentation   | 199,675                  | 27,475                   |
| Miscellaneous   | 1,059,518                | 956,163                  |
| Profit on bank account  | 358,558                  | 281,187                  |
|   | <u>4,829,064</u>         | <u>8,455,046</u>         |

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PAKISTAN SCIENTIFIC AND TECHNOLOGICAL INFORMATION CENTRE  
NOTES TO THE FINANCIAL STATEMENTS  
FOR THE YEAR ENDED JUNE 30, 2016

9 EXPENDITURE NON-DEVELOPMENT ACCOUNT - CENTRE WISE

| PARTICULARS                                    | Islamabad    |           | Karachi     |           | Lahore      |           | Peshawar    |             | Quetta      |             | Faisalabad  |           | Muzaffargarh |           | 2016         |           | 2015        |            |           |
|--|--------------|-----------|-------------|-----------|-------------|-----------|-------------|-------------|-------------|-------------|-------------|-----------|--------------|-----------|--------------|-----------|-------------|------------|-----------|
|  | Rs           | Pak       | Rs          | Pak       | Rs          | Pak       | Rs          | Pak         | Rs          | Pak         | Rs          | Pak       | Rs           | Pak       | Rs           | Pak       | Rs          | Pak        |           |
| RECEIPTS                                       |              |           |             |           |             |           |             |             |             |             |             |           |              |           |              |           |             |            |           |
| Government grants                              | 126,121,069  | -         | 9,985,938   | -         | 4,063,162   | -         | 3,322,539   | -           | 2,246,656   | -           | 1,944,718   | -         | 1,337,392    | -         | 126,121,069  | -         | 99,608,000  | -          | -         |
| Transferred to sub-centres                     | (22,900,405) | -         | (9,985,938) | -         | (4,063,162) | -         | (3,322,539) | -           | (2,246,656) | -           | (1,944,718) | -         | (1,337,392)  | -         | (22,900,405) | -         | (9,985,938) | -          | -         |
|  | 103,220,664  | -         | 9,985,938   | -         | 4,063,162   | -         | 3,322,539   | -           | 2,246,656   | -           | 1,944,718   | -         | 1,337,392    | -         | 103,220,664  | -         | 99,608,000  | -          | -         |
| PAYMENTS                                       |              |           |             |           |             |           |             |             |             |             |             |           |              |           |              |           |             |            |           |
| Salaries and allowances                        | 56,400,267   | 7,711,270 | 3,067,628   | 2,448,315 | 1,669,080   | 1,602,472 | 1,246,333   | 741,453,365 | 66,632,959  | 16,240,162  | 11,189,829  | 2,777,956 | 197,833      | 53,313    | 1,299,097    | 1,062,594 | 1,505,000   | 335,864    | 1,386,809 |
| House rent (residential)                       | 13,376,242   | 1,279,278 | 656,856     | 524,796   | 402,990     | 8,000     | 2,660       | 894,080     | 277,956     | 850,592     | 12,788      | 45,798    | 8,821        | 3,989     | 1,512,000    | 1,459,838 | 200,000     | 3,496,825  | 9,651,000 |
| Printing and stationery                        | 850,592      | 12,788    | 22,500      | 11,700    | 8,500       | 4,668     | 9,450       | 200,879     | 1,734,629   | 1,734,629   | 1,512,000   | 1,062,594 | 1,505,000    | 335,864   | 1,505,000    | 335,864   | 1,386,809   | 9,651,000  |           |
| Newspapers/books/journals                      | 45,798       | 8,821     | 3,012       | 5,016     | 4,704       | 9,450     | 68,812      | 18,837      | 1,734,629   | 1,734,629   | 1,512,000   | 1,062,594 | 1,505,000    | 335,864   | 1,505,000    | 335,864   | 1,386,809   | 9,651,000  |           |
| Entertainment                                  | 187,440      | 3,989     | -           | -         | -           | -         | -           | -           | -           | -           | -           | -         | -            | -         | -            | -         | -           | -          | -         |
| Communication/ Internet                        | 1,396,031    | 63,948    | 64,952      | 78,212    | 43,837      | 68,812    | 18,837      | 1,734,629   | 1,734,629   | 1,734,629   | 1,512,000   | 1,062,594 | 1,505,000    | 335,864   | 1,505,000    | 335,864   | 1,386,809   | 9,651,000  |           |
| Electricity, water and gas                     | 1,345,465    | 94,164    | 36,895      | 35,478    | 18,500      | -         | -           | -           | -           | -           | -           | -         | -            | -         | -            | -         | -           | -          | -         |
| Vehicle running/POL charges                    | 1,322,920    | 33,189    | 52,000      | 33,229    | 18,500      | -         | -           | -           | -           | -           | -           | -         | -            | -         | -            | -         | -           | -          | -         |
| Travelling Allowance (TA/DA)                   | 200,000      | -         | -           | -         | -           | -         | -           | -           | -           | -           | -           | -         | -            | -         | -            | -         | -           | -          | -         |
| Medical Facility                               | 3,274,101    | 113,271   | -           | 15,930    | 26,090      | 67,433    | -           | -           | -           | -           | -           | -         | -            | -         | -            | -         | -           | -          | -         |
| Pension contribution                           | 15,800,000   | -         | -           | -         | -           | -         | -           | -           | -           | -           | -           | -         | -            | -         | -            | -         | -           | -          | -         |
| Financial assistance to deceased               | -            | -         | -           | -         | -           | -         | -           | -           | -           | -           | -           | -         | -            | -         | -            | -         | -           | -          | -         |
| Advertisement                                  | 279,376      | -         | -           | -         | -           | -         | -           | -           | -           | -           | -           | -         | -            | -         | -            | -         | -           | -          | -         |
| Repair and maintenance:                        |              |           |             |           |             |           |             |             |             |             |             |           |              |           |              |           |             |            |           |
| -Office equipment                              | 204,935      | 45,365    | 9,100       | 9,100     | 22,000      | 9,500     | -           | 300,000     | 172,172     | 420,385     | 12,525      | 17,290    | 5,100        | 17,750    | 500,000      | 500,000   | 349,884     | 100,000    | 548,073   |
| -Transport                                     | 420,385      | 12,525    | 32,600      | 17,200    | 17,290      | -         | -           | -           | -           | -           | -           | -         | -            | -         | -            | -         | -           | -          | -         |
| -Furniture and fixtures                        | 62,150       | 6,000     | 9,000       | 9,000     | 5,100       | 17,750    | -           | 1,880,100   | 1,880,100   | 1,880,100   | 1,880,100   | 1,880,100 | 1,880,100    | 1,880,100 | 1,880,100    | 1,880,100 | 1,880,100   | 1,880,100  |           |
| -Building                                      | 1,685,012    | 156,988   | 22,600      | 22,600    | 22,600      | 5,350     | 4,785       | 1,037,923   | 1,037,923   | 1,037,923   | 1,037,923   | 1,037,923 | 1,037,923    | 1,037,923 | 1,037,923    | 1,037,923 | 1,037,923   | 1,037,923  |           |
| Computer expenses                              | 98,001       | 14,640    | 2,000       | 2,000     | 5,275       | -         | -           | 1,068,938   | 1,068,938   | 1,068,938   | 1,068,938   | 1,068,938 | 1,068,938    | 1,068,938 | 1,068,938    | 1,068,938 | 1,068,938   | 1,068,938  |           |
| Staff welfare fund/uniforms/leave              | 1,028,905    | -         | 2,000       | 1,745     | -           | 110,246   | 51,303      | 102,000     | 102,000     | 102,000     | 102,000     | 102,000   | 102,000      | 102,000   | 102,000      | 102,000   | 102,000     | 102,000    |           |
| Conference, seminars and workshops             | 626,908      | 127,068   | 43,273      | 110,140   | -           | -         | -           | 2,221,662   | 2,221,662   | 2,221,662   | 2,221,662   | 2,221,662 | 2,221,662    | 2,221,662 | 2,221,662    | 2,221,662 | 2,221,662   | 2,221,662  |           |
| Rent- office building                          | 2,221,662    | 102,000   | -           | -         | -           | -         | -           | 9,240       | 9,240       | 9,240       | 9,240       | 9,240     | 9,240        | 9,240     | 9,240        | 9,240     | 9,240       | 9,240      |           |
| Data bases, journals and annual subscription   | -            | -         | -           | -         | -           | -         | -           | -           | -           | -           | -           | -         | -            | -         | -            | -         | -           | -          | -         |
| National Bureau TISD (Tech Info Service Depart | -            | -         | -           | -         | -           | 9,240     | -           | -           | -           | -           | -           | -         | -            | -         | -            | -         | -           | -          | -         |
| Foreign expert assistance                      | -            | -         | -           | -         | -           | -         | -           | -           | -           | -           | -           | -         | -            | -         | -            | -         | -           | -          | -         |
| Miscellaneous / unforeseen expenses            | 264,755      | 111,334   | 18,586      | 31,678    | 12,690      | 16,297    | 13,474      | 468,944     | 468,944     | 468,944     | 468,944     | 468,944   | 468,944      | 468,944   | 468,944      | 468,944   | 468,944     | 468,944    |           |
|  | 101,070,971  | 9,896,658 | 4,063,162   | 3,322,539 | 2,246,656   | 1,944,718 | 1,337,392   | 123,882,076 | 98,646,083  | 101,070,971 | 9,896,658   | 4,063,162 | 3,322,539    | 2,246,656 | 1,944,718    | 1,337,392 | 123,882,076 | 98,646,083 |           |
| CAPITAL PAYMENTS                               |              |           |             |           |             |           |             |             |             |             |             |           |              |           |              |           |             |            |           |
| Purchase of fixed assets                       | 2,149,695    | 89,300    | 4,063,162   | 3,322,539 | 2,246,656   | 1,944,718 | 1,337,392   | 2,238,993   | 961,917     | 2,149,695   | 89,300      | 4,063,162 | 3,322,539    | 2,246,656 | 1,944,718    | 1,337,392 | 2,238,993   | 961,917    |           |
|  | 103,220,664  | 9,985,938 | 4,063,162   | 3,322,539 | 2,246,656   | 1,944,718 | 1,337,392   | 2,238,993   | 961,917     | 103,220,664 | 9,985,938   | 4,063,162 | 3,322,539    | 2,246,656 | 1,944,718    | 1,337,392 | 2,238,993   | 961,917    |           |

PAKISTAN SCIENTIFIC AND TECHNOLOGICAL INFORMATION CENTRE  
 NOTES TO THE FINANCIAL STATEMENTS  
 FOR THE YEAR ENDED JUNE 30, 2016

|  | 2016<br>(Rupees)   | 2015<br>(Rupees)   |
|--|--------------------|--------------------|
| <b>9.1. EXPENDITURE NON-DEVELOPMENT ACCOUNT</b>              |                    |                    |
| Salaries and allowances                                      | 74,145,365         | 68,609,662         |
| House rent (Residential)                                     | 16,240,162         | 15,198,597         |
| Printing, stationery and consumable stores                   | 894,080            | 700,775            |
| Newspaper /Book/Journals                                     | 74,679             | 76,139             |
| Entertainment  | 200,879            | 119,352            |
| Postage, telegrams, Internet and telephone                   | 1,734,629          | 1,310,546          |
| Electricity, water and gas                                   | 1,512,000          | 1,120,928          |
| Vehicle running/POI charges                                  | 1,459,838          | 1,100,000          |
| Travelling Allowance (TA/DA)                                 | 200,000            | 149,909            |
| Medical Facility   | 3,496,825          | 2,407,855          |
| Advertisement  | 279,376            | 3,000              |
| Repair and maintenance-office equipment                      | 300,000            | 135,360            |
| Repair and maintenance-transport                             | 500,000            | 518,278            |
| Repair and maintenance-furniture & fixtures                  | 100,000            | 36,600             |
| Repair and maintenance-building                              | 1,880,100          | 739,636            |
| Computer expenses (Hardware, software, IT Equipment & Comput | 155,436            | 301,114            |
| Staff welfare funds & Uniforms                               | 1,037,923          | 365,037            |
| Conferences, seminar & workshops                             | 1,068,938          | 717,068            |
| Rent Office building   | 102,000            | 102,000            |
| Data bases, journals and annual subscriptions                | 2,221,662          | 2,000,000          |
| National bureau (TISD)                                       | 9,240              | 187,957            |
| Pension contribution   | 15,800,000         | 12,236,951         |
| Foreign expert assistance                                    | -                  | 355,143            |
| Miscellaneous / audit & unforeseen                           | 468,944            | 266,130            |
|  | <u>123,882,076</u> | <u>108,758,037</u> |
| <b>10. EXPENDITURE REPROGRAPHIC &amp; DOCUMENTATION</b>      |                    |                    |
| Reprography expense  | 3,452,582          | 2,889,346          |
| Documentation expenses                                       | 152,229            | 365                |
| Documentation expenses - prior year                          | 41,615             | -                  |
| Miscellaneous  | 984,775            | 1,117,735          |
| Bank charges   | 1,598              | 666                |
|  | <u>4,632,799</u>   | <u>4,008,112</u>   |
| <b>11. EXPENDITURE PASTIC SERVICES COMMERCIALIZATION</b>     |                    |                    |
| Withholding Tax  | 1,947              | 6,433              |
| Misc. Other Expenses   | 643,644            | 144,780            |
|  | <u>645,591</u>     | <u>151,213</u>     |



PAKISTAN SCIENTIFIC AND TECHNOLOGICAL INFORMATION CENTRE  
NOTES TO THE FINANCIAL STATEMENTS  
FOR THE YEAR ENDED JUNE 30, 2016

12. DATE OF AUTHORIZATION FOR ISSUE

These financial statements have been authorized for issue by the Board of Trustees on 10/10/2016.

13. FIGURES

In these financial statements figures have been rounded off to the nearest rupee.



ASSISTANT DIRECTOR  
(ACCOUNTS)  
**SHAFIQ AHMAD**  
Assistant Director (Accounts)  
PASTIC National Centre, Quaid-e-Azam  
University Campus, Islamabad

ADDITIONAL DIRECTOR  
(A & F)

**Dr. Rayanazi-ul-Hussnain**  
Additional Director (A&F)/DOO  
PASTIC National Centre  
Quaid-e-Azam University Campus  
Islamabad

DIRECTOR GENERAL

**Dr. Muhammad Akram Shailkh**  
Director General, PASTIC  
Quaid-e-Azam University Campus,  
Islamabad



# **ANNEXURES**



**Pakistan Science Foundation Act 1973**

**National Assembly of Pakistan**

Islamabad, the 2<sup>nd</sup> February, 1973

The following Acts of the National Assembly received the assent of the President on the 31<sup>st</sup> January, 1973, and are hereby published for general information:-

**ACT NO. III OF 1973**

An Act to provide for the establishment of the Pakistan Science Foundation

WHEREAS it is expedient to provide for the establishment of the Pakistan Science Foundation and for matters ancillary thereto;

It is hereby enacted as follows:-

1. Short title, extent and commencement.-(1) This Act may be called the Pakistan Science Foundation Act, 1973.

(2) It extends to the whole of Pakistan.

(3) It shall come into force at once.

2. **Definitions** – In this Act, unless there is anything repugnant in the subject or context,-

- a). “Board” means the Board of Trustees of the Foundation;
- (b). “Chairman” means the Chairman of the Foundation; and
- (c) “Foundation” means the Pakistan Science Foundation established under this Act.

3. **Establishment of the Foundation.**-- (1) As soon as may be after the commencement of this Act, the Federal Government may, by notification in the official Gazette, establish a Pakistan Science Foundation to promote and finance scientific activities having a bearing on the socio-economic needs of the country.

(2) The Foundation shall be a body corporate by the name of the Pakistan Science Foundation, having perpetual succession and a common seal, with power, subject to the provisions of this Act, to acquire, hold and dispose of property, both movable and immovable, and shall by the said name sue and be sued.

(3) The head office of the Foundation shall be at Islamabad.

4. **Functions of the Foundation.**-(1) The Foundation shall function as a financing agency for –

- (i) the establishment of comprehensive scientific and technological information and dissemination centres;
- (ii) the promotion of basic and fundamental research in the universities and other institutions on scientific problems relevant to the socio-economic development of the country;
- (iii) the utilization of the results of scientific and technological research including pilot plant studies to prove the technical and economic feasibility of processes found to be promising on a laboratory scale;
- (iv) the establishment of science centres, clubs, museums, herbaria and planetaria;
- (v) the promotion of scientific societies, associations and academies engaged in spreading the cause of scientific knowledge in general or in the pursuit of a specific scientific discipline or technology in particular;
- (vi) the organization of periodical science conferences, symposia and seminars;
- (vii) the exchange of visits of scientists and technologists with other countries;
- (viii) the grant of awards, prizes and fellowships to individuals engaged in developing processes, products and inventions of consequence to the economy of the country ; and
- (ix) special scientific surveys not undertaken by any other organization and collection of scientific statistics related to the scientific effort of the country.

(2) The Foundation shall also—

- (i) review the progress of scientific research sponsored by it and evaluate the results of such research;
- (ii) maintain a National Register of highly qualified and talented scientists of Pakistan, including engineers and doctors, in or outside the country and to assist them, in collaboration with the concerned agencies in finding appropriate employment; and
- (iii) establish liaison with similar bodies in other countries.

(3) In the performance of its functions, the Foundation shall be guided on questions of policy by the instructions, if any, given to it by the Federal Government which shall be the sole judge as to whether a question is a question of policy.

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5. Board of Trustees.- (1) The general direction, conduct and management of the affairs of the Foundation, including administration of its funds, shall vest in a Board of Trustees consisting of the following members, namely:-

Whole-time members

- (i) the Chairman;
- (ii) one eminent scientist;
- (iii) the Director of Finance;

to be appointed by the President;

Part-time members

- (iv) the Chairman of the National Science Council;
- (v) four scientists to be nominated by the National Science Council; and
- (vi) eleven eminent scientists to be nominated by the President.

(2) The remuneration and other terms and conditions of service of Chairman and the two other whole-time members of the Board shall be such as may be determined by the President.

6. Chairman of the Foundation.- (1) The Chairman of the Board shall be the Chairman of the Foundation and shall be appointed from amongst eminent scientists of the country having experience of research and scientific administration

(2) The Chairman shall, subject to sub-section (3), hold office for a term not exceeding three years and shall be eligible for re-appointment.

(3) The President may at any time terminate the appointment of the Chairman without notice and without assigning any reason.

7. Members of the Board.- (1) The members of the Board, other than the ex-officio member shall, subject to sub-section (3), hold office for a term not exceeding three years and shall be eligible for re-appointment or re-nomination, as the case may be.

(2) A member, other than an ex-officio member, may at any time resign his office by writing under his hand addressed to the President but shall continue to perform his functions until his resignation has been accepted.

(3) The President may at any time terminate the appointment or, as the case may be, nomination of any member of the Board without notice and without assigning any reason

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(As amended vide Ordinance No XIII of 1979, published in the Gazette of Pakistan, Extra, Feb, 24, 1979) Part I,

**8. Meetings of the Board.**---(1) The meetings of the Board shall be held at least twice a year and shall be presided over by the Chairman or, in his absence by its whole-time scientist member.

(2) All decisions at a meeting of the Board shall be taken by a majority of the votes of the members present and voting.

**9. Quorum at the meeting of the Board.**—To constitute a quorum at a meeting of the Board not less than nine members shall be present.

10. Executive Committee.- There shall be an Executive Committee consisting of the Chairman and the two other whole-time members of the Board.

11. Delegation of powers.—The Board may, from time to time, delegates to the Chairman or the Executive Committee such of its powers and functions as it may consider necessary.

12. Adhoc Committees.—The Foundation may set up ad hoc committees consisting of university professors and other leading scientists and experts to scrutinize applications for financial assistance for carrying out scientific research submitted to the Foundation by the universities or other institutions or by individual scientific workers or groups of scientific workers and to review ;and evaluate the results of research sponsored by the Foundation.

**13. Funds.**—The funds of the Foundation shall consist of—

(a) grants made by the Federal Government and the Provincial Government donations and endowments ; and income from other sources.

**14. Budget.**—The Foundation shall cause to be prepared and approve a statement of its receipt and expenditure for each financial year.

15. Accounts and audit.—(1) The funds of the Foundation shall be kept in a personal ledger account of the Foundation with the State Bank of Pakistan or with any Branch of the National Bank of Pakistan acting as an agent of the State Bank.

(2). The accounts of the Foundation shall be maintained in such form and manner as the Auditor-General of Pakistan may determine in consultation with the Federal Government.

(3) The accounts of the Foundation shall be audited by one or more auditors who are chartered accountants within the meaning of the Chartered Accountants Ordinance, 1961 (X of 1961), and are appointed by the Foundation in consultation with the Auditor-General of Pakistan.

**16. Appointment of officers and servants.—**(1) The Foundation may appoint such officers and servants, and engage such consultants or experts, as it may consider necessary for the efficient performance of its functions, on such terms and conditions as it may deem fit.

(2) In fixing the terms and conditions of service of its officers and servants, the Foundation shall as nearly as may be conform to the scales of pay, allowances and conditions of service applicable to the corresponding class of employees of the Federal Government.

**17. Annual report.—**(1) The annual report of the Foundation, which shall, among other things, clearly bring out the benefits accruing to the nation as a result of the activities sponsored by the Foundation, shall be prepared by the Chairman and submitted, through the Board, to the Federal Government alongwith the audited accounts of the Foundation.

(2) The annual report alongwith the audited accounts of the Foundation shall be laid before the National Assembly.

**18. Regulations.—**The Foundation may make Regulations for the efficient conduct of its affairs.

**19. Repeal.—**The Pakistan Science Foundation Ordinance, 1972 (LII of 1972), is hereby repealed.

**ANNEXURE-II****List of Projects Approved By Executive Committee in 2015-16**

| <b>S. #</b> | <b>Project No. &amp; Title</b>   | <b>P.I. Name, Designation &amp; Address</b>  | <b>Total Cost (Rs.)</b> |
|-------------|--|--|-------------------------|
| 1.          | PSF/Res/KPK-AU/Bio (484)<br>Modification of Egg Cholesterol Content through Medicinal Plants   | Dr. Naila Chand<br>Assistant Professor<br>Department of Poultry Science<br>Faculty of Animal Husbandry and Veterinary Science<br>KPK Agricultural University<br>Peshawar | 1,507,764/-             |
| 2.          | PSF/Res/S-KU/Bio (456)<br>Genetic Diversity of Some Ocy podoid Crabs with Special Reference to Gnera Uca and Macrophthalmus Along the Coast of Pakistan  | Dr. Noor Us Saher<br>Assistant Professor<br>Centre of Excellence in Marine Biology<br>University of Karachi<br>Karachi   | 2,241,756/-             |
| 3.          | PSF/Res/S-ICCBS/Chem (516)<br>Identification of Small Molecular Agonists against G-Protein Coupled Receptors (GPCRs): Opportunities for Cancer Prevention and Treatment  | Prof. Dr. M. Iqbal Choudhary<br>Director<br>International Centre for Chemical and Biological Sciences<br>Karachi   | 1,894,956/-             |
| 4.          | PSF/Res/P-CIIT/Chem (570)<br>Development of Mechanically Reinforced Silica Based Bioactive Glass (SiO <sub>2</sub> CaO-P <sub>2</sub> O <sub>5</sub> ) Polymer Composites for Potential Application in Osteochondral Defect Site | Dr. Asma Tufail<br>Associate Professor<br>Interdisciplinary Research Centre in Biomedical Materials (IRCBM)<br>COMSATS Institute of Information Technology<br>Lahore     | 3,798,480/-             |
| 5.          | PSF/Res/KPK-MU/Chem (461)<br>The Efficient and Facile Synthesis of Asymmetric Aldol Adducts Catalyzed by Bifunctional Diamine Organo-catalysts   | Dr. Muhammad Naveed Umer<br>Department of Chemistry<br>University of Malakand<br>Chakdara, Dir (L)   | 1,848,240/-             |

|     |  |  |             |
|-----|--|--|-------------|
| 6.  | PSF/Res/S-SU/Chem (465)<br>Metal ions Imprinted Polymers (MIPs) Novel Material for Pre-concentration and Separation of Total Arsenic in Aqueous System | Dr. Amna Baloch<br>Assistant Professor<br>NCE in Analytical Chemistry<br>University of Sindh<br>Jamshoro   | 2,472,684/- |
| 7.  | PSF/Res/S-PCSIR/Chem (478)<br>Synthesis of Heterocyclic Organic Compounds for Drug Development   | Dr. Shahnaz Perveen<br>Senior Scientific Officer<br>Pharmaceutical Research Centre<br>PCSIR, Laboratories Complex<br>Karachi                             | 1,933,818/- |
| 8.  | PSF/Res/C-NUST/Envr (112)<br>Chlorine Decay Modeling in a Prototype Distribution Network   | Dr. Imran Hashmi<br>Assistant Professor<br>Institute of Environmental Science & Engineering<br>National University of Science & Technology, Islamabad    | 1,052,278/- |
| 9.  | PSF/Res/S-ICCBS/Med (431)<br>A Data Base Development of the Unique Metabolic Pathways of the Infectious Pathogens                                      | Dr. Reaz uddin<br>Assistant Professor<br>Dr. Panjwani Center for Molecular Medicine & Drug Research<br>University of Karachi, Karachi                    | 2,659,344/- |
| 10. | PSF/Res/C-PIMS/Med (450)<br>Identification of Molecular Determinants of Hereditary Deafness  | Prof. Dr. Javed Akram<br>Vice Chancellor<br>Shaheed Zulfiqar Ali Bhutto Medical University<br>Pakistan Institute of Medical Sciences (PIMS)<br>Islamabad | 4,257,480/- |
| 11. | PSF/Res/KPK-KUST/Med (283)<br>Identification of Risk Factors for Hepatitis C Virus Infection and HCV Genotyping in Hemophiliac Patients of KPK         | Dr. Shahid Niaz Khan<br>Chairman<br>Department of Zoology<br>Kohat University of Science and Technology<br>Kohat   | 1,049,070/- |
| 12. | PSF/Res/C-NUST/Med (374)<br>Development and Commercialization of Intelligent Functional Stent for the Treatment of Lung Cancer                         | Dr. Murtaza Najabat Ali<br>Assistant Professor<br>School of Mechanical and Manufacturing Engineering (SMME) NUST<br>Islamabad.                           | 2,251,956/- |

|     |   |  |             |
|-----|---|--|-------------|
| 13. | PSF/Res/C-CIIT/Med (297)<br>Next Generation Granular<br>Biomedical Ceramics for Rapid<br>Bone Defect Repair | Dr. Aqif Anwar Chaudhry<br>Assistant Professor<br>Interdisciplinary Research Center<br>in Biomedical Materials<br>COMSATS Institute of<br>Information Technology<br>Lahore | 1,783,123/- |
| 14. | PSF/Res/C-NILOP/ Phys (183)<br>Development of Fluorosensor for<br>In vivo Tissue Characterization           | Dr. Muhammad Saleem<br>Principal Scientist<br>National Institute of Laser and<br>Optronics (NILOP)<br>Islamabad  | 912,957/-   |
| 15. | PSF/Res/P-LUMS/ Phys (159)<br>Development of Low Field, Low<br>Cost, Reconfigurable NMR and<br>MRI          | Dr. Muhammad Sabieh Anwar<br>Associate Professor<br>Department of Physics<br>Lahore University of<br>Management Sciences (LUMS)<br>Lahore                                  | 2,540,820/- |

**ANNEXURE-III**

**Detail of Monitoring and Evaluation of On-Going Projects in 2015-2016**

**A. Non Development Budget**

**a. Semi Annual Technical Reports**

| <b>S. No.</b> | <b>Project No.</b>       | <b>Project Title</b>   | <b>Reports</b>  |
|---------------|--------------------------|--|-----------------|
| 1.            | PSF/Res/ P-UA/ Bio (478) | Exploitation of Wild Edible Plant Diversity of the Punjab        | 1 <sup>st</sup> |
| 2.            | PSF/Res/KPK-AU/Bio (484) | Modification of Egg Cholesterol Content through Medicinal Plants | 1 <sup>st</sup> |

**b. First Annual Technical Reports**

| <b>S.#</b> | <b>Project No.</b>             | <b>Project Title</b>  |
|------------|--------------------------------|---|
| 1.         | PSF/Res/S-AKU/Med (336)        | Vitamin D Binding Protein to (VDPP) Gene Polymorphism and <i>Diabetes mellitus</i> in a Pakistan Population |
| 2.         | PSF/Res/C-PINSTECH/ Phys (172) | Development of Graphene Based High Sensitive and Low Cost Glucose Biosensor                                 |

**d. Final Technical Reports**

| <b>S.#</b> | <b>Project No.</b>           | <b>Project Title</b>   |
|------------|------------------------------|--|
| 1.         | PSF/Res/P-PMAS.AAU/Agr (374) | Isolation and Identification of Plant Growth Promoting N <sub>2</sub> -Fixing Soil Bacteria using Molecular Techniques for Improving Legume-Cereal Cropping System |
| 2.         | PSF/Res/P-UET/Agr (376)      | Assessment of Agricultural Drought Prone Areas of Pothwar and Agro-Ecological Zoning (AEZ) Using Remote Sensing Techniques   |
| 3.         | PSF/Res/P-AU/Agr (381)       | Entomopathogenic Fungi and Diatomaceous Earths for the Control of <i>Tribolium castaneum</i> (Herbst.) (Coleoptera: Tenebrionidae) on Stored Wheat                 |
| 4.         | PSF/Res/P-AU/Agr (394)       | Evaluation of Dried Citrus Pulp as a Concentrate Source and its Effect on Growth Performance and Milk Yield in Ruminant Animals.                                   |

|     |  |   |
|-----|--|---|
| 5.  | PSF/Res/P-PMAS.AAU/Agr (395)           | Utilization of Plant Growth Promoting Rhizobacteria for the Induction of Systemic Resistance in Potato Seed Against Bacterial Rot Disease |
| 6.  | PSF/Res/P-PMAS.AAU/Agr (396)           | Studies on Characterization and Management of Leaf Crinkle Virus Infecting Blackgram  |
| 7.  | PSF/Res/P-AU/Agr (405)                 | Parasitoid Wasps as a Source of Novel Insecticidal Molecules  |
| 8.  | PSF/Res/P-AU/Bio (431)                 | Molecular Epidemiological Study on Paratuberculosis along with Pathology of Mesenteric Lymph Nodes and Intestine in Buffalo and Cattle    |
| 9.  | PSF/Res/P-PMAS.AAU /Bio (446)          | Biodiversity and Ecology of Bats and Rodents in the Thorn Forests and Croplands of the Potohar Plateau                                    |
| 10. | PSF/Res/C-CIIT/ Bio (447)              | Proteome Alterations Associated with <i>Banana Bunchy Top Virus</i> Infection in Banana   |
| 11. | PSF/Res/ Biotech /C-PINSTECH/ Ind (51) | Microbiological Leaching of Uranium, Copper and Vanadium from Low-Grade Graphite Schist Ores  |
| 12. | PSF/ Res/Biotech/S-KU/Med (80)         | Production of Monoclonal Antibodies for Rapid Diagnosis of Hepatitis-C  |
| 13. | PSF/Res/S-LUMHS/Biotech (101)          | Study of Genetic and Molecular Basis of Primary Congenital Glaucoma in Patients of Sindh  |
| 14. | PSF/R&D/KPK-IBGE/ Biotech (209)        | In Vitro Development of Salt Tolerance in Rice  |
| 15. | PSF/Res/C-QU/Chem (419)                | Computer Aided Identification and Synthesis of $\alpha$ -Glucosidase Inhibitors   |
| 16. | PSF/Res/P-NUST/Comp (38)               | Indigenous Development of Multi-Biometric Authentication System.  |
| 17. | PSF/Res/S-MUET/Engg (121)              | Design & Implementation of Intelligent Energy Efficient Industrial Process Control System Using Conveyor Belts via Robotic Arm.           |
| 18. | PSF/Res/P-HITECU/Engg (113)            | Compressed Air Powered Bike.  |
| 19. | PSF/Res/P-GCU/Envr (89)                | Comparative Study of Genotoxic Effects of Heavy Metals on Indian Major Carps by Bioassays in the River Indus.                             |
| 20. | PSF/Res/P-PU/Envr (97)                 | Potential Use of Yeast in Decontamination of Heavy Metals (Cu, Pb, Cr, As, Cd) from Polluted Water Waste                                  |
| 21. | PSF/Res/S-AKU/Med (293)                | Association Between Neuregulin-1 Mutations and Schizophrenia in a Pakistani Population : A Case-  |

|     |                          |   |
|-----|--------------------------|---|
|     |                          | Control Study   |
| 22. | PSF/Res/C-IBGE/Med (318) | House Dust Mite Species and Allergen Levels in Pakistani Population :Molecular Characterization and a Phylogenetic Analysis |
| 23. | PSF/Res/P-AU/ Phys (151) | Synthesis of Soft and Hard Ferrites and Their Characterization Using Laser Induced Breakdown Spectroscopy                   |

e. **Technical Reports Adopted by Technical Committee**

| Sr. No. | Project No.                  | Project title  | Reports                |
|---------|------------------------------|--|------------------------|
| 1.      | PSF/Res/P-PMAS.AAU/Agr (374) | Isolation and Identification of Plant Growth Promoting N <sub>2</sub> -Fixing Soil Bacteria using Molecular Techniques for Improving Legume-Cereal Cropping System | Final Report           |
| 2.      | PSF/Res/P-UET/Agr (376)      | Assessment of Agricultural Drought Prone Areas of Pothwar and Agro-Ecological Zoning (AEZ) Using Remote Sensing Techniques   | Final Report           |
| 3.      | PSF/Res/B-BACP/Agr (379)     | Population Dynamics and Life Table of Dubas Bug ( <i>Ommatissus Lybicus</i> ) on Date Palm in District Panjgur, Balochistan.                                       | Second Annual Report   |
| 4.      | PSF/Res/P-AU/Agr (381)       | Entomopathogenic Fungi and Diatomaceous Earths for the Control of <i>Tribolium castaneum</i> (Herbst.) (Coleoptera: Tenebrionidae) on Stored Wheat                 | Second Annual Report   |
| 5.      | PSF/Res/P-AU/Agr (381)       | Entomopathogenic Fungi and Diatomaceous Earths for the Control of <i>Tribolium castaneum</i> (Herbst.) (Coleoptera: Tenebrionidae) on Stored Wheat                 | Final Technical Report |
| 6.      | PSF/Res/S-SAU/Agr (383)      | Management of Pests of Chilies in Sindh.   | Second Annual Report   |
| 7.      | PSF/Res/P-AU/Agr (394)       | Evaluation of Dried Citrus Pulp as a Concentrate Source and its Effect on Growth Performance and Milk Yield in Ruminant Animals.                                   | First Annual Report    |

|     |                               |   |                      |
|-----|-------------------------------|---|----------------------|
| 8.  | PSF/Res/P-AU/Agr (394)        | Evaluation of Dried Citrus Pulp as a Concentrate Source and its Effect on Growth Performance and Milk Yield in Ruminant Animals.          | Second Annual Report |
| 9.  | PSF/Res/P-PMAS.AAU/Agr (395)  | Utilization of Plant Growth Promoting Rhizobacteria for the Induction of Systemic Resistance in Potato Seed Against Bacterial Rot Disease | Final Report         |
| 10. | PSF/Res/P-PMAS.AAU/Agr (395)  | Utilization of Plant Growth Promoting Rhizobacteria for the Induction of Systemic Resistance in Potato Seed Against Bacterial Rot Disease | Second Annual Report |
| 11. | PSF/Res/P-PMAS.AAU/Agr (396)  | Studies on Characterization and Management of Leaf Crinkle Virus Infecting Blackgram  | Second Annual Report |
| 12. | PSF/Res/P-PMAS.AAU/Agr (396)  | Studies on Characterization and Management of Leaf Crinkle Virus Infecting Blackgram  | Final Report         |
| 13. | PSF/Res/P-AU/Agr (405)        | Parasitoid Wasps as a Source of Novel Insecticidal Molecules  | Final Report         |
| 14. | PSF/Res/S-SALU/Bio (382)      | Comparative Characterization and Recombinant Study of Indigenous Keratinase Enzymes   | First Annual Report  |
| 15. | PSF/Res/S-SALU/Bio (382)      | Comparative Characterization and Recombinant Study of Indigenous Keratinase Enzymes   | Second Annual Report |
| 16. | PSF/Res/S-SALU/Bio (382)      | Comparative Characterization and Recombinant Study of Indigenous Keratinase Enzymes   | Final Report         |
| 17. | PSF/Res/P-GCU/Bio (436)       | Enhanced Production of L-Lysine by Bacteria in Stirred Fermenter for Chick Feed Industry  | Final Report         |
| 18. | PSF/Res/P-GCU/Bio (437)       | Cloning and Characterization of Alpha Amylase from <i>Thermotoga petrophilla</i> for Textile Industry                                     | Final Report         |
| 19. | PSF/Res/P-PMAS.AAU /Bio (446) | Biodiversity and Ecology of Bats and Rodents in the Thorn Forests and   | Second Annual Report |
| 20. | PSF/Res/P-PMAS.AAU /Bio (446) | Biodiversity and Ecology of Bats and Rodents in the Thorn Forests and Potohar Plateau   | Final Report         |
| 21. | PSF/Res/C-QU/Bio (455)        | Collection and Characterization of Crucifer Biodiversity in Pakistan  | Final Report         |
| 22. | PSF/Res/C-CIIT/ Bio (447)     | Proteome Alterations Associated with <i>Banana Bunchy Top Virus</i>   | First Annual Report  |

|     |                                 |  |                                 |
|-----|---------------------------------|--|---------------------------------|
|     |                                 | Infection in Banana  |                                 |
| 23. | PSF/Res/C-CIIT/ Bio (447)       | Proteome Alterations Associated with <i>Banana Bunchy Top Virus</i> Infection in Banana  | Final Report                    |
| 24. | PSF/Res/P-AU/Bio (431)          | Molecular Epidemiological Study on Paratuberculosis along with Pathology of Mesenteric Lymph Nodes and Intestine in Buffalo and Cattle                                       | Second Annual Report            |
| 25. | PSF/Res/P-AU/Bio (431)          | Molecular Epidemiological Study on Paratuberculosis along with Pathology of Mesenteric Lymph Nodes and Intestine in Buffalo and Cattle                                       | Final Report                    |
| 26. | PSF/Res/P-AAR/Biotech (93)      | Determination of Biological Activities and Micropropagation of <i>Polygonum amplexicaulis</i> : a Popular Medicinal Plant in North Pakistan                                  | Final Report                    |
| 27. | PSF/Res/C-QU/Biotech 99)        | Cloning and Characterization of Plastic Degrading Microbial  | Final Report                    |
| 28. | PSF/Res/S-LUMHS/ Biotech (101)  | Study of Genetic and Molecular Basis of Primary Congenital Glaucoma in Patients of Sindh   | Final Report                    |
| 29. | PSF/Res/P-UHS/Biotech (107)     | Molecular Genetic Studies in Pakistani Families with Autosomal Recessive Primary Microcephaly (MCPH)   | First Annual Report             |
| 30. | PSF/Res/KPK-IBGE/ Biotech (209) | In Vitro Development of Salt Tolerance in Rice   | First, Second and Final Reports |
| 31. | PSF/Res/S-HEJ/Chem (403)        | Design, Synthesis and Characterization of $\beta$ -octiphenyloctacix[4] Arane a Super molecular Multifunctional Pore having Practical Applications in Medicine and Mechanics | Final Report                    |
| 32. | PSF/Res/C-QU/Chem (408)         | Molecularly Designed Precursors for the Chemical Vapour Deposition of Ceramic Materials  | Final Report                    |
| 33. | PSF/Res/P-CIIT/Chem (416)       | Synthesis and Characterization of Novel Composites Based on Carbon Nanotubes and Carbonated Hydroxyapatite   | Final Report                    |
| 34. | PSF/Res/S-HEJ/Chem (417)        | Studies on Hepatoprotective Effects of Bioactive Secondary Metabolites of Plants by using Antioxidant and Relevant   | Final Report                    |

|     |                           | Bioassays   |              |
|-----|---------------------------|---|--------------|
| 35. | PSF/Res/C-QU/Chem (419)   | Computer Aided Identification and Synthesis of $\alpha$ -Glucosidase Inhibitors   | Final Report |
| 36. | PSF/Res/S-HEJ/Chem (425)  | Synthesis of Novel Piperidine like Compounds for Anticancer Activity  | Final Report |
| 37. | PSF/Res/F-UM/Chem (434)   | Efficiency of Iron Supported on Porous Material (Prepared from Peanut Shell) for Liquid Phase Aerobic Oxidation of Alcohols                       | Final Report |
| 38. | PSF/Res/S-SU/Chem (439)   | Gas Chromatographic Analysis of Amino Acids in Skin Samples of Psoriatic and Arsenicosis Patients   | Final Report |
| 39. | PSF/R&D/F-NIFA/Engg (216) | Design and Fabrication of a Laboratory-Size Single Screw Extruder for Conversion of Agro-Based Materials into Value added Food and Feed Products. | Final Report |
| 40. | PSF/Res/S-MUET/Engg (121) | Design & Implementation of Intelligent Energy Efficient Industrial Process Control System Using Conveyor Belts via Robotic Arm.                   | Final Report |
| 41. | PSF/Res/C-IBGE/Med (318)  | House Dust Mite Species and Allergen Levels in Pakistani Population: Molecular Characterization and a Phylogenetic Analysis                       | Final Report |
| 42. | PSF/Res/S-AKU/Med (249)   | Role of TFB2 (Transcription Factor-B2) in Sulfolobus Sulfataricus Gene Expression   | Final Report |
| 43. | PSF/Res/C-QU/Med (272)    | Analysis of Association Between TNF-alpha Gene Polymorphism and Coronary Heart Disease in a Pakistani Population                                  | Final Report |

**List of Scientific Publications Produced through PSF Support Completed****Projects in 2015-16**

| Sr. No | Project No.            | Publication   |
|--------|------------------------|---|
| 1.     | PSF/Res/P-AU/Bio (375) | <ul style="list-style-type: none"> <li>• Altaf, J., I. Ahmed and S. Nader (2010). <i>Channa marulius</i> as controlling predator in the culture of Tilapia and its growth performance. Proceeding of 30<sup>th</sup> Pakistan Congress of Zoology (International), March 2-4, 2010 held at University of Agriculture, Faisalabad 196p.</li> <li>• Qadeer, I. I. Ahmed, F. Rashid and M. S. Mubarak, (2010). Evaluation of growth and production of saul (<i>channa marulius</i>) under the influence of artificial feed and Tilapia mixed culture. Proceeding of 30<sup>th</sup> Pakistan Congress of Zoology (International), March 2-4, 2010 held at University of Agriculture, Faisalabad 183p.</li> <li>• Rashid, F., I. Ahmed, I. Qadeer and M. S Mubarak (2010). Growth and survival rate of <i>Channa marulius</i> under the influence of artificial feed in fertilized ponds. Proceeding of 30<sup>th</sup> Pakistan Congress of Zoology (International), March 2-4, 2010 held at University of Agriculture, Faisalabad 182p.</li> </ul>  |
| 2.     | PSF/Res/C-QU/Bio (455) | <ul style="list-style-type: none"> <li>• Iqbal, J, Z. K. Shinwari, M. A. Rabbani and S. A. Khan. (2014). Genetic Variability assessment of Maize (<i>Zea mays</i> L.) Germplasm Based on Total Seed Storage Proteins Banding Pattern Using SDS-PAGE. European Academic Research Vol. II, Issue 2.</li> <li>• Shinwari, S., F. Akbar, M. A. Rabbani, A. S. Mumtaz and Z. K. Shinwari. 2013. Evaluation of genetic diversity in different genotypes of <i>Eruca Sativa</i> from Pakistan by SDS-PAGE analysis. Pak. J. Bot., 45(4): 1235-1240.</li> <li>• Shinwari, S., A.S. Mumtaz, M. A. Rabbani, F. Akbar and Z. K. Shinwari, 2013. Genetic divergence in <i>Taramira</i> (<i>Eruca Sativa</i> L.) germplasm based on quantitative and qualitative characters. Pak. J. Bot., 45(SI): 375-381.</li> <li>• Turi, N. A., Farhatullah, M. A. Rabbani and Z. K. Shinwari. (2012). Genetic Diversity in the Locally Collected Brassica Species of Pakistan based on Micro satellite Markers. PAK. J. Bot., 44(3): 1029-1035.</li> <li>• Zada, M., Z. K. Shinwari, N. Zakir and M. A. Rabbani. 2013. Study of total seed storage proteins in Ethiopian mustard (<i>Brassica carinata</i> A. Braun) germplasm using multivariate techniques. Pak. J. Bot., 45(2): 443-448.</li> <li>• Zada, M., N. Zakir, M. A. rabbani and Z. K. Shinwari. 2013. Assessment of genetic variation in Ethiopian mustard (<i>Brassica Carinata</i> A. Braun) germplasm using multivariate technique. Pak. J. Bot., 45(SI): 583-593.</li> </ul> |

|    |                               |   |
|----|-------------------------------|---|
| 3. | PSF/Res/C-QU/Biotech (99)     | <ul style="list-style-type: none"> <li>• ALI, I., Ahmed, S., Robson, G., Javed, I., ALI, N., Atiq, N. &amp; Hameed, A. (2014). Isolation and molecular characterization of polyvinyl chloride (PVC) plastic degrading fungal isolates. <i>J. Basic Microbiology</i>, 54, 18-27</li> <li>• Ali, I. , Ahmed S , Javed I., N. Ali, Atiq N, Hameed A Robson G (2013) . Biodegradation of Starch Blended Polyvinyl Chloride Film by <i>Phanerochaete chrysosporium</i> PV1. International Journal of Environmental Science and Technology DOI: 10.1007/s13762-013-0220-5</li> </ul>  |
| 4. | PSF/Res/S-LUMHS Biotech (101) | <ul style="list-style-type: none"> <li>• The novel heterozygous Thr3 77 Arg MYO C mutation causes severe Juvenile Open Angle Glaucoma in a large Pakistani family Ali Muhammad Waryah,, , Ashok Kumar Narsani, Shakeel Ah mad Sheikh, Hina Shaikh, Muhammad Y aqoob Shahani Gene 528 ( 2013) 356–359</li> <li>• Mutational spectrum of the CYP1B1 gene in Pakistani patietns with primary congenital glaucoma: Novel variants and genotype-phenotype correlations Shakeel Ahmed Sheikh, Ali Muhammad Waryah,, , Ashok Kumar Narsani, Hina Shaikh, Hina Shaikh, Imtiaz Ahmed, Khairuddin Shah, Muhammad Qasim, Azam Iqbal Memon, Pitambar Kewalramani, Naila Shaikh Molecular Vision 20 ( 2014) 991–1001</li> </ul>  |
| 5. | PSF/Res/S-HEJ/Chem (403)      | <ul style="list-style-type: none"> <li>• Khan, SB.; Anis, I.; Singh, K.; Shah, M. R., 2-(2-Methyl-5-nitro-1H-imidazol-1-yl)- ethyl 2-nitrobenzoate. <i>Acta Crystallographica Section E-Structure Reports Online</i> 2010, 66, O548.</li> <li>• Mohammad, A; Shah, M. R.; Anis, I.; McKee, V.; Frese, W.E.J 5,7-Dihydroxy-3,6-dimethoxy-2-(4-methoxyphenyl)-4Hchromen-4-one monohydrate <i>Acta Crystallographica Section E-Structure Reports Online</i> 2010, 66, 2716–2717.</li> <li>• Nadeem, S.; Anis, I.; Vanderveer, D.; Shah, M. R. 6,7-Dihydro-3H-1,4-diazepino[1,2,3,4-<i>lmn</i>][1,10]phenanthroline-3,9(5H)-dione, <i>Acta Crystallographica Section E-Structure Reports Online</i> 2010, 66, 1853.</li> <li>• Ali, Q.; Anis, I.; Vanderveer, D.; Shah, M. R. Diethyl 2, 2`-(biphenyl-2, 2`-diyldioxy) diacetate, <i>Acta Crystallographica Section E-Structure Reports Online</i> 2010, 66, O1984</li> <li>• Bahadur, S.; Anis, I.; Shah, M. R.; Singh, K., 2-(2-Methyl-5-nitro-1H-imidazol-1-yl)-ethyl 3-bromobenzoate. <i>Acta Crystallographica Section E-Structure Reports Online</i> 2009, 65, O1176-U3423. 60</li> </ul> |
| 6. | PSF/Res/C-QU/Chem (408)       | <ul style="list-style-type: none"> <li>• Asif Ali Tahir, Muhammad Mazhar, Mazhar Hamid, Matthis Zeller, Allen D. Hunter, “Heterobimetallic copper–barium complexes for deposition of composite oxide thin</li> </ul>  |

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|----|---------------------------|--|
|    |                           | <p>films” <i>New Journal of Chemistry</i> 2009, 33, 1535-1541.</p> <ul style="list-style-type: none"> <li>• Muhammad Shahid, Muhammad Mazhar, Mazhar Hamid, Paul O’Brien, Mohammad A. Malik, Madeleine Helliwell and James Raftery, “Aerosol assisted chemical vapour deposition of Cu-ZnO Composite from single source precursors”, <i>Dalton Trans.</i>, 5487-5494, 2009.</li> <li>• Muhammad Shahid, Imtiaz-ud-Din, Muhammad Mazhar, Kieran C. Molly, “A phosphine complex of copper (I) bromide as single-source precursor for the aerosol-assisted chemical vapour deposition of phosphide”, <i>Inorg. Chem. Acta.</i> 2009. 362-3069-3072.</li> <li>• Muzammil Hussain, Muhammad Mazhar, Muhammad Khawar Rouf, Masahiro Ebihara, Tajammul Hussain, “Sonochemical Synthesis, Thermal studies and X-ray structure of precursor [Zr(acac)<sub>3</sub>(H<sub>2</sub>O)<sub>2</sub>]Cl for deposition of thin films of ZrO<sub>2</sub> by ultrasonic Aerosol assisted chemical vapour deposition”, <i>Bull. Korean Chem. Soc.</i> 2008, 29(11).</li> <li>• M. Hussain, M. Mazhar, T. Hussain, N. A. Khan “High efficiency ZnO Nano sensors, Fabrication and characterization”, <i>J. Iran. Chem. Soc.</i> 2010, 7, 59-69.</li> <li>• Asif Ali Tahir, Muhammad Ali Ahsan, Muhammad Mazhar, K.G. Upul Wijayantha, Matthis Zeller, Allen D. Hunter, “Photoelectrochemical and Photoresponsive properties of Bi<sub>2</sub>S<sub>3</sub> Nanotube and Nanoparticle thin films”, <i>Chem. Mater.</i> 2010, 22(17), 5084-5092.</li> </ul> |
| 7. | PSF/Res/P-CIIT/Chem (416) | <ul style="list-style-type: none"> <li>• R. Nazir, A.S. Khan, A. Ahmed, A.U. Rehman, A.A. Chaudhry, I.U. Rehman, F.S.L. Wong. Synthesis and <i>In-vitro</i> Cytotoxicity Analysis of Microwave Irradiated Nano-Apatites. <i>Ceramics International</i>, 2013; 39: 4339-4347.</li> <li>• R. Nazir, N.I. Khan, A.S. Khan, A. Ahmad, A. Asif, A.A. Chaudhry, I.U. Rehman, R. Hussain. Rapid Synthesis of Thermally Stable Hydroxyapatite, <i>Ceramics International</i>, 2012; 38(1): 457-462.</li> </ul>   |
| 8. | PSF/Res/S-HEJ/Chem (417)  | <ul style="list-style-type: none"> <li>• M. Iqbal Choudhary, Juveria Siddiqui, Ahmad Abbas Khan, Saud Naheed, Achyut Adhikari and Jalaluddin A. Jalal Awalia. Antioxidants from plant food: Potential candidate for nutraceutical development (US Patent application No. 13/759/820.2013).</li> </ul>  |
| 9. | PSF/Res/C-QU/Chem (419)   | <ul style="list-style-type: none"> <li>• F.Jabeen, P.V.Oliferenko, A.A.Oliferenko, G.G.Pilan, , F. Latif Ansari, C. Dennis Hall, A.R.Katritzky, Dual inhibition of the <math>\alpha</math>-glucosidase and butyrylcholinesterase studied by Molecular Field Topology Analysis, <i>Eur. J.Med.Chem</i>, 2014, 80, 228-242.</li> <li>• Farukh Jabeen, Syeda Aaliya Shehzadi, Muhammad Qaiser Fatmi, Sobia Shaheen, Lubna Iqbal, Nighat Afza, Siva S. Panda *, Farzana Latif Ansari , Synthesis, in vitro and computational studies of 1,4-disubstituted 1,2,3-triazoles as potential <math>\alpha</math>-glucosidase inhibitors, <i>Bioorg.Med.Chem.Lett</i>, 2015, doi.org/10.1016/j.bmcl.2015.12.033.</li> </ul>   |

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|     |                          | <ul style="list-style-type: none"> <li>• Umer Rashid, F. Latif Ansari, Challenges in designing therapeutics for treating Alzheimer's disease-from serendipity to rationality, <i>Frontiers in Drug Design and Discovery</i> " Vol.6, 2014, 40-14, Bentham Sc. Publishers.</li> <li>• Farukh Jabeen, Muhammad Qaiser Fatmi, Farzana Latif Ansari., In-silico studies of benzothiazepines as novel <math>\alpha</math>-glucosidase inhibitors, <i>Med. Chem. Res</i>, 2015</li> </ul>   |
| 10. | PSF/Res/S-HEJ/Chem (425) | <ul style="list-style-type: none"> <li>• Z.S.Saify, Shazia Haidr, Huma Rasheed, Synthesis of 4-[4-chloro-3- (trifluoromethyl)-phenyl]-4-piperidinol and their spectral studies.</li> <li>• Z.S.Saify, Shazia Haidr, Huma Rasheed Cytotoxic evaluation of 4-[4-chloro-3- (trifluoromethyl)-phenyl]-4-piperidinol using PC-3 and 3T3 cell line.</li> </ul>  |
| 11. | PSF/Res/F-MU/Chem (434)  | <ul style="list-style-type: none"> <li>• Sadiq, M.; Razia.; Sajid, H.; Zamin, G. "Efficiency of Iron Supported on Porous Material (Prepared from Peanut Shell) for Liquid Phase Aerobic Oxidation of Alcohols." <i>Modern Research in Catalysis</i> 3.02 (2014): 35.</li> <li>• Sadiq, M.; Sajid, H. "An Efficient Activated Carbon for the Wastewater Treatment, Prepared from Peanut Shell." <i>Modern Research in Catalysis</i> 2 (2013): 148.</li> <li>• Sadiq, M.; Razia.; Umar, M. N.; Zamin, G. "One-Pot Synthesis of Aldol Adduct Catalyzed by Immobilized Picolyamine on Zirconia" <i>Modern Res. Catal.</i>(2014): 1-5.</li> <li>• Sadiq, M.; Zamin, G.; Razia.; Ilyas, M.; Gul. Zamin. "Synthesis and Characterization of Iron Oxide Nanoparticles Supported on Ziconia and Its Application in the Gas-Phase Oxidation of Cyclohexanol to Cyclohexanone" <i>Modern Res. Catalysis</i> 3 (2014): 12-17</li> </ul> |
| 12. | PSF/Res/S-SU/Chem (439)  | <ul style="list-style-type: none"> <li>• Muhammad Yar Khuhawar, Subhan Ali Majidano GC analysis of amino acids using trifluoroacetylacetone and ethyl chloroformate as derivatizing reagents in skin samples of psoriatic and arsenocosis patients. <i>Chromatographia</i>. 73 (2011) 701-708.</li> <li>• Suhill Ahmed Soomro, Muhammad Yar Khuhawar, Shahid Hussain Soomro Gas Chromatographic determination of amino acids in human skin samples using trifluoroacetylacetone and isobutyl chloroformate as derivatizing reagents. <i>Analytical Biochem.</i> Under Review).</li> <li>• Muhammad Tariq Mahar, Muhammad Yar Khuhawar, Mushtaq Ahmed Baloch, Taj Muhammad Jhangir and Subhan All Majidano Determination of amino acids in industrial effluents and contaminated soil. <i>Journal of Chemical Society of Pakistan</i>. Vol 37 No: 02 April 2015 issue (Accepted).</li> </ul>                                 |
| 13. | PSF/Res/ S-KU/Med (261)  | <ul style="list-style-type: none"> <li>• Ligand-based 3D-QSAR Studies of Physostigmine Analogues as Acetylcholinesterase Inhibitors, <i>Chem Biol Drug Des</i>;</li> <li>• Potent Butyrylcholinesterase Inhibitors from Microbial transformation of Dihydrotestosterone and its molecular</li> </ul>  |

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|     |                          | <p>docking studies Chem Central Journal</p> <ul style="list-style-type: none"> <li>• In silico Studies applied on Molecular transformed potent Butyrylcholinesterase inhibitors World Journal of Pharmacy and Pharmaceutical Sciences</li> <li>• Comparative Molecular Modeling Study of Butyryl cholinesterase</li> <li>• Small Scale Structure based Virtual screening based on flexible docking: discovery of novel cholinesterase inhibitors (In process)</li> </ul>  |
| 14. | PSF/Res/ S-KU/Med (282)  | <ul style="list-style-type: none"> <li>• Simjee SU, Khurshid S, Shah SUA, Jawed H, Jamall S. Enhanced effects of co-administered gabapentin and indomethacin on inflammatory pain processing and associated BDNF expression in the adjuvant-induced arthritic rat</li> </ul>  |
| 15. | PSF/Res/ S-AKU/Med (336) | <ul style="list-style-type: none"> <li>• “Relationship of socio-demographic factors with serum levels of vitamin D in a Pakistani population of diabetic patients” was accepted for oral presentation in the 17<sup>th</sup> National Health Sciences Research Symposium on Non-communicable Diseases held in Karachi from Feb. 26-17, 2014. The Abstract of that paper has been published in the Symposium CD.</li> <li>• Iqbal K, Islam N, Mehboobali N, Asghar A, Iqbal SP, Iqbal MP: Relationship of socio-demographic factors with serum levels of vitamin D in a Pakistani population of diabetic patients and healthy controls. 17<sup>th</sup> National Health Sciences Research Symposium on “Non-communicable diseases”, Aga Khan University, Karachi, Feb. 26-27, 2014: A/248</li> </ul> |
| 16. | PSF/Res/C-IBGE/Med (318) | <ul style="list-style-type: none"> <li>• Group 10 allergens (tropomyosins) from house-dust mites may cause covariation of sensitization to allergens from other invertebrates. Allergy Rhinol 3:e74 –e90.</li> <li>• High House Dust Mite counts and Der p1 allergen levels in house dust during the monsoon season: a risk factor for atopic allergies in the population of Rawalpindi and Islamabad (Pakistan) submitted in 'International Archives of Allergy and Immunology</li> </ul>  |
| 17. | PSF/Res/ S-AKU/Med (230) | <ul style="list-style-type: none"> <li>• Cyclooxygenase-2 Polymorphism and Breast Cancer Associated Risk in Pakistani Patients. Moatter, Aban M, Iqbal W, Pervez S.</li> </ul>  |
| 18. | PSF/Res/P-UAAR/Med (259) | <ul style="list-style-type: none"> <li>• Rizwana Abdul Ghani; Masoom Fatima; Raja Muhammad Saqlain; Muhammad Fiaz; Abid Mahmood; Pakeeza Arzoo Shaiq, Ph.D; Syed Muhammad Saqlan Naqvi, Ph.D; Ghazala KaukabRaja, Ph.D. Study of risk phenotypes predisposing to fatty liver disease in a Pakistani Cohort. Journal of Chinese Medical Association. Manuscript Number: JCMA-D-15-00088.</li> <li>• Rizwana Abdul Ghani, Raja M. Saqlain, Abid Mahmood, Ghazala Kaukab Raja. Association of Risk Phenotypes on the Susceptibility of Nonalcoholic Fatty Liver Disease. 15th</li> </ul>   |

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|     |                              | Annual Conference Pakistan Society of Hepatology. 20th - 22nd February 2015. Pearl Continental, Karachi, Pakistan   |
| 19. | PSF/Res/C-CIIT/<br>Med (280) | <ul style="list-style-type: none"> <li>• Micheal S, Yousaf S, Khan MI, Akhtar F, Islam F, Khan WA, den Hollander AI, Qamar R, Ahmed A. Polymorphisms in matrix metalloproteinases <i>MMP1</i> and <i>MMP9</i> are associated with primary open-angle and angle closure glaucoma in a Pakistani population. <i>Mol.vis</i> 2013;19:441-447.</li> <li>• Micheal S, Khan MI, Akhtar F, Ali M, Ahmed A, den Hollander AI, Qamar R Role of Lysyl oxidase like 1 gene polymorphism in Pakistani patients with pseudoexfoliative glaucoma. <i>Mol.vis</i> 2012;18:1040-1044.</li> <li>• Yousaf S, Khan MI, Micheal S, Akhtar F, Ali SHB, Riaz M, Ali M, Lall P, Waheed NK, den Hollander AL, Ahmed A, Qamar R. XRCC1 and XPD DNA repair gene polymorphisms: A potential risk factor for glaucoma in the Pakistani population. <i>Mol.vis</i> 2011;17:1153-1163.</li> <li>• Khan MI, Micheal S, Akhtar F, Ahmed W, Ijaz B, Ahmed A, Raheel QW. The association of glutathione S-transferase <i>GSTT1</i> and <i>GSTM1</i> gene polymorphisms with pseudoexfoliative glaucoma in a Pakistani population. <i>Mol.vis</i>2010;16:2146-2152.</li> </ul> |

**ANNEXURE-V**

**List of NSLP Projects Recommended by Technical Committees in 2015-2016**

| <b>Sr. No.</b> | <b>Project No. and Title</b>  | <b>Name, Designation &amp; Address of PI</b>  |
|----------------|---|---|
| 1.             | Follow up of Established Mushroom farms and Popularization of Oyster and Milky Mushrooms as Cottage Industry for Economic Uplift of Landless Communities of KPK & Punjab.<br><br>PSF/NSLP/KP-NIFA (656) | Mr. Dawood Khan<br>Senior Scientist<br>Nuclear Institute for Food & Agriculture (NIFA),<br>Tarnab, Peshawar                         |
| 2.             | DNA Based Identification of Halal and Non Halal Meat and its Product<br><br>PSF/NSLP/C-NARC (595)   | Dr. Muhmmad Naeem Riaz<br>Scientific Officer<br>NIGAB, NARC<br>Islamabad  |
| 3.             | Development of simple photo-bioreactor for quality algal biomass and oil Production<br><br>PSF/NSLP/KP-AU (647)   | Dr. Saleem Ullah<br>Associate professor<br>Department of Agricultural Chemistry,<br>University of Agriculture Peshawar,<br>Pakistan |

**Detail of Monitoring and Evaluation of NSLP On-Going Projects in 2015-2016****a. Semi Annual Technical Reports**

| <b>Sr. No.</b> | <b>Project No.</b>       | <b>Project Title</b>   | <b>Reports</b>  |
|----------------|--------------------------|--|-----------------|
| 1.             | PSF/NSLP/P-UAAR(543)     | Developing Various Dimensions of Indigenous Hydroponics System   | 1 <sup>st</sup> |
| 2.             | PSF/NSLP/KP-GU(424)      | Entomocidal Studies of Plant Materials against Maize Weevil ( <i>Sitophilus oryza</i> ) and Side Effect on Parasitoid <i>Anisoptromanlous Calandareae</i> (Howard) | 1 <sup>st</sup> |
| 3.             | PSF/NSLP/GB-KIU (478)    | Assessment of Maize Legume Multiple Intercropping System for Sustainable Production in Gilgit Baltistan  | 1 <sup>st</sup> |
| 4.             | PSF/NSLP/B-BUITEMS (488) | Assessment of Yeast Species Efficacy for the Biological Control of Post Harvest Fungal Diseases of Fresh Fruits of Balochistan                                     | 1 <sup>st</sup> |
| 5.             | PSF/NSLP/P-NIBGE (319)   | Developing a Sustainable Formulation for Biological Control of Rice Bacterial Blight and Yield Increase Using Native Growth Promoting Bioantagonists               | 1 <sup>st</sup> |
| 6.             | PSF/NSLP/P-AU (357)      | Diagnosis of Acaricide Resistance in Ticks of Cattle and Management of Acaricide Resistant Ticks by Using Medicinal Plant Extracts                                 | 1 <sup>st</sup> |
| 7.             | PSF/NSLP/KP-AU (270)     | Genetic Transformation of <i>Brassica Carinata</i> for Low Viscosity Biodiesel Production  | 1 <sup>st</sup> |
| 8.             | PSF/NSLP/P-US(382)       | Detection and Innovative Management of Postharvest Disease Incursions in Citrus  | 1 <sup>st</sup> |
| 9.             | PSF/NSLP/P-AU(296)       | Development of Conditioned (Omega-3 rich) Meat and Eggs through Modifications in Feed Ingredients  | 1 <sup>st</sup> |
| 10.            | PSF/NSLP/P-PU (510)      | Employing Chitinolytic Bacteria for Biological Control of Termites   | 1 <sup>st</sup> |
| 11.            | PSF/NSLP/KP-AU(219)      | Prevalence & Molecular Characterization of Contagious <i>Caprine</i>   | 1 <sup>st</sup> |

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|     |                          | <i>pleuropneumonia</i> in small Ruminants in Khyber Pakhtunkhwa   |                 |
| 12. | PSF/NSLP/P-UAAR (268)    | Development of Breed Identification Marker for Pakistani Dairy Cattle Breeds  | 2 <sup>nd</sup> |
| 13. | PSF/NSLP/S-KU (240)      | Studies on Modification and Food Applications of Modified White Sorghum ( <i>Sorghum bicolor</i> ) Starch                   | 2 <sup>nd</sup> |
| 14. | PSF/NSLP/P-AU (235)      | Comparative Susceptibility of Some Indigenous Breeds of Goats to Gastrointestinal Parasitism                                | 2 <sup>nd</sup> |
| 15. | PSF/NSLP/P-UAAR(311)     | Mosquito Fauna of Pothwar Region: A Resource-Based Approach   | 2 <sup>nd</sup> |
| 16. | PSF/NSLP/P-NIBGE (315)   | Diversity of Symbiotic and Free Living Plant Growth Promoting Rhizobacteria in the Root Nodules and Rhizosphere of Chickpea | 2 <sup>nd</sup> |
| 17. | PSF/NSLP/KP-AU (293)     | Utilization of Maggots as an Alternative Animal Origin Protein on the Production Performance of Meat and Egg-Type Bird      | 2 <sup>nd</sup> |
| 18. | PSF/ NSLP/S-KU (240)     | Studies on Modification and Food Applications of Modified White Sorghum ( <i>Sorghum bicolor</i> ) Starch                   | 2 <sup>nd</sup> |
| 19. | PSF/ NSLP/P-UAAR (313)   | Ants – Aphid’s Mutulistic Association, its Impact on Biological Parameters of Aphids and Predation of <i>Coccinelids</i>    | 2 <sup>nd</sup> |
| 20. | PSF/ NSLP/P- NIBGE (315) | Diversity of Symbiotic and Free Living Plant Growth Promoting Rhizobacteria in the Root Nodules and Rhizosphere of Chickpea | 2 <sup>nd</sup> |
| 21. | PSF/ NSLP/S-HEJ (290)    | Synthesis of Combinatorial Libraries of Cyclic Peptides in Search of Novel Medicinal Agents                                 | 2 <sup>nd</sup> |
| 22. | PSF/ NSLP/P-UAAR (209)   | Integrated Management of Brinjal Shoot & Fruit Borer, <i>Leucinades Orbonalis</i> ( <i>Lepidoptera: Pyralidae</i> )         | 2 <sup>nd</sup> |
| 23. | PSF/ NSLP/P-FCCU (244)   | Development of Homozygous Lines of Transgenic Wheat and Screening for Phosphorus Use Efficiency                             | 2 <sup>nd</sup> |
| 24. | PSF/ NSLP/P-AU (285)     | Assessment of Genotoxic Effects of Metals in Fish using Comet and Micronucleus Assays                                       | 2 <sup>nd</sup> |
| 25. | PSF/ NSLP/P-UAAR (314)   | Nematodes Infecting Temperate Fruits in Pakistan and their Management   | 2 <sup>nd</sup> |

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| 26. | PSF/ NSLP/P-UAAR (501)   | Surveillance & Characterization of Pathogens Infecting Loquat in Pakistan   | 2 <sup>nd</sup> |
| 27. | PSF/ NSLP/AJK-UoP (301)  | Agronomic Efficacy of Rock Phosphate Applied to Alkaline Calcareous Soils of Azad Jammu and Kashmir: Impact of Phosphate Solubilizing Bacteria and Agronomic Amendments | 2 <sup>nd</sup> |
| 28. | PSF/ NSLP/C-QU (77)      | In Vivo Evaluation of Anti Sense Poly Phenol Oxidase Gene Construct Under the Control of a Wound Inducible Promoter   | 2 <sup>nd</sup> |
| 29. | PSF/ NSLP/GB-PCSIR (437) | Processing of Fruits and Vegetables and its Utilization in the Development of Value Added Products  | 2 <sup>nd</sup> |
| 30. | PSF/ NSLP/P-GU (424)     | Entomocidal Studies of Plant Materials against Maize Weevil ( <i>Sitophilus oryza</i> ) and Side Effect on Parasitoid <i>Anisoptromanlous Calandareae</i> (Howard)      | 2 <sup>nd</sup> |
| 31. | PSF/ NSLP/P-UAAR (543)   | Developing Various Dimensions of Indigenous Hydroponics System  | 2 <sup>nd</sup> |
| 32. | PSF/NSLP/P-NIAB (277)    | Development of Cost Effective and Potential Biocontrol Agents for Area Wide Management of Sucking Pests in Bt Cotton  | 2 <sup>nd</sup> |
| 33. | PSF/NSLP/KP-NIFA (203)   | Development & Validation of Technologies for Pesticide Residue Management in Fruit and Vegetable Produce  | 3 <sup>rd</sup> |
| 34. | PSF/NSLP/P-NIAB (155)    | Isolation, Characterization & Bioremediation Potential of the EPS-Producing Bio-film Bacteria from Brackish & Polluted Irrigation Waters                                | 3 <sup>rd</sup> |
| 35. | PSF/NSLP/S-SAU (242)     | Integrated Pest Management in Organic Cotton and its Impact on Yield and Lint Quality Characteristics   | 3 <sup>rd</sup> |

**b. First Annual Technical Reports**

| Sr. No. | Project No.             | Project Title   |
|---------|-------------------------|---|
| 36.     | PSF/NSLP/KP-AU (281)    | Genetic Engineering of Sugarcane with the Rice Tonoplast H <sup>+</sup> PPase Gene to Improve Sucrose Content and Salt Tolerance  |
| 37.     | PSF/ NSLP/P-UAAR (314)  | Nematodes Infecting Temperate Fruits in Pakistan and their Management   |
| 38.     | PSF/ NSLP/AJK-UoP (301) | Agronomic Efficacy of Rock Phosphate Applied to Alkaline Calcareous Soils of Azad Jammu and Kashmir: Impact of Phosphate Solubilizing Bacteria and Agronomic Amendments |

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| 39. | PSF/NSLP/P-NIAB (277)    | Development of Cost Effective and Potential Biocontrol Agents for Area Wide Management of Sucking Pests in Bt Cotton   |
| 40. | PSF/NSLP/P-UAAR (264)    | Improving Yield, Quality and Storage Life of Bell Pepper by Use of Food Grade Chemicals  |
| 41. | PSF/NSLP/P-UAAR(501)     | Surveillance & Characterization of Pathogens Infecting Loquat in Pakistan  |
| 42. | PSF/NSLP/P-FCCU(244)     | Development of Homozygous Lines of Transgenic Wheat and Screening for Phosphorus Use Efficiency  |
| 43. | PSF/NSLP/P-AU (285)      | Assessment of Genotoxic Effects of Metals in Fish using Comet and Micronucleus Assays  |
| 44. | PSF/NSLP/P-UAAR(314)     | Nematodes Infecting Temperate Fruits in Pakistan and their Management  |
| 45. | PSF/NSLP/KP-GU(424)      | Entomocidal Studies of Plant Materials against Maize Weevil ( <i>Sitophilus oryza</i> ) and Side Effect on Parasitoid <i>Anisoptromanlous Calandareae</i> (Howard) |
| 46. | PSF/NSLP/GB-KIU (478)    | Assessment of Maize Legume Multiple Intercropping System for Sustainable Production in Gilgit Baltistan  |
| 47. | PSF/NSLP/P-UAAR(543)     | Developing Various Dimensions of Indigenous Hydroponics System   |
| 48. | PSF/NSLP/KP-AU (270)     | Genetic Transformation of <i>Brassica Carinata</i> for Low Viscosity Biodiesel Production  |
| 49. | PSF/NSLP/P-NIBGE (319)   | Developing a Sustainable Formulation for Biological Control of Rice Bacterial Blight and Yield Increase Using Native Growth Promoting Bioantagonists               |
| 50. | PSF/NSLP/B-BUITEMS (488) | Assessment of Yeast Species Efficacy for the Biological Control of Post Harvest Fungal Diseases of Fresh Fruits of Balochistan                                     |
| 51. | PSF/NSLP/P-PU (510)      | Employing Chitinolytic Bacteria for Biological Control of Termites   |
| 52. | PSF/NSLP/P-US(382)       | Detection and Innovative Management of Postharvest Disease Incursions in Citrus  |
| 53. | PSF/NSLP/KP-AU(421)      | Isolation and Structural Elucidation of the Antimicrobial Compounds Effective against the Wilt Pathogens from <i>Penicillium</i> sp. EU0013                        |
| 54. | PSF/NSLP/P-AU(296)       | Development of Conditioned (Omega-3 rich) Meat and Eggs through Modifications in Feed Ingredients  |
| 55. | PSF/NSLP/P-GCU (291)     | Survey and Detection of <i>Wolbachia</i> in Natural Insect Population of Pakistan  |

**c. Second Annual Technical Reports**

| <b>Sr. No.</b> | <b>Project No.</b>     | <b>Project Title</b>  |
|----------------|------------------------|---|
| 56.            | PSF/NSLP/KP-AU(219)    | Prevalence & Molecular Characterization of Contagious <i>Caprine pleuropneumonia</i> in small Ruminants in Khyber Pakhtunkhwa                             |
| 57.            | PSF/NSLP/P- AU(168)    | Engineering Maize with Heat Shock Proteins.   |
| 58.            | PSF/NSLP/KP-NIFA (253) | Nutrient Management of Deciduous Orchards (Plum) Through Foliar Feeding   |
| 59.            | PSF/NSLP/KP-AU (271)   | Development of Abiotic Stress Tolerant Rice   |
| 60.            | PSF/NSLP/S-SAU (231)   | Screening of Cotton Germplasm for Viral Resistance Using DNA Molecular Markers  |
| 61.            | PSF/NSLP/P-AU (185)    | Evaluation of Some Cereal Derived Polysaccharides and Natural Biological Response Modifiers and their Therapeutic Efficacy Against Coccidiosis in Chicken |
| 62.            | PSF/NSLP/KP-AU (293)   | Utilization of Maggots as an Alternative Animal Origin Protein on the Production Performance of Meat and Egg-Type Bird                                    |
| 63.            | PSF/NSLP/P-UAAR (313)  | Ants – Aphid’s Mutulistic Association, its Impact on Biological Parameters of Aphids and Predation of <i>Coccinelids</i>                                  |
| 64.            | PSF/NSLP/S-HEJ (290)   | Synthesis of Combinatorial Libraries of Cyclic Peptides in Search of Novel Medicinal Agents   |
| 65.            | PSF/NSLP/P-UAAR (268)  | Development of Breed Identification Marker for Pakistani Dairy Cattle Breeds  |
| 66.            | PSF/NSLP/P-NIBGE (315) | Diversity of Symbiotic and Free Living Plant Growth Promoting Rhizobacteria in the Root Nodules and Rhizosphere of Chickpea                               |

**d. Final Technical Reports**

| <b>Sr. No.</b> | <b>Project No.</b>      | <b>Project Title</b>   |
|----------------|-------------------------|--|
| 67.            | PSF/NSLP/KP-NIFA (202)  | Development of locally adapted canola (brassica napus l.) F1 hybrid using induced mutations and double haploidy techniques                   |
| 68.            | PSF/ NSLP/KP-NIFA (178) | Development of Innovative Nutraceuticals Products from Indigenous Herbal Ingredients for Improving Socio-Economic Status of the Communities” |

|     |                        |   |
|-----|------------------------|---|
| 69. | PSF/NSLP/KP-KUST (298) | Biological Control of <i>Haemonchus contortus</i> by Fungal Antagonists in Small Ruminants                |
| 70. | PSF/NSLP/S-KU (240)    | Studies on Modification and Food Applications of Modified White Sorghum ( <i>Sorghum bicolor</i> ) Starch |
| 71. | PSF/NSLP/P-AU (235)    | Comparative Susceptibility of Some Indigenous Breeds of Goats to Gastrointestinal Parasitism              |

**ANNEXURE-VII****List of On-Going Projects Monitored on-Site in 2015-16**

| <b>Sr. No</b> | <b>Project Title &amp; No.</b>   | <b>Name &amp; Designation of PI</b>   |
|---------------|--|---|
| 1.            | Estimation of Aflatoxins in Milk and its Control Measures.<br><br>PSF/Res/P-UVAS/Bio (416)   | Dr. Saima<br>Assistant Professor<br>Department of Food & Nutrition<br>University of Veterinary and Animal Sciences<br>Lahore.   |
| 2.            | The Development and Evaluation of Thermostable Vaccine against Peste des Petits Ruminants<br>PSF/Res/ P-UVAS/Bio (544)                   | Prof. Dr. Tahir Yaqub Director<br>Quality Operations Lab / Institute of Biochemistry and Biotechnology,<br>University of Veterinary and Animal Sciences, Lahore   |
| 3.            | Development of Homozygous Lines of Transgenic Wheat and Screening for Phosphorus Use Efficiency<br><u>PSF/NSLP/P-FCCU (244)</u>          | Dr. Asma Maqbool, Assistant Professor,<br>Department of Biological Sciences,<br>Forman Christian College University,<br>Lahore, 0306-4579951,<br><a href="mailto:asmamaqbool@fccollege.edu.pk">asmamaqbool@fccollege.edu.pk</a> ,<br><a href="mailto:asma_maqbool42@yahoo.com">asma_maqbool42@yahoo.com</a> |
| 4.            | Molecular Genetic Studies in Pakistani Families with Autosomal Recessive Primary Microcephaly (MCPH)<br><br>PSF/Res/P-UHS/ Biotech (107) | Dr. Saqib Mahmood<br>Assistant Professor<br>Department of Human Genetics and Molecular Biology<br>University of Health Sciences<br>Lahore   |
| 5.            | Employing Chitinolytic Bacteria for Biological Control of Termites<br>PSF/NSLP/P-PU (510)  | Prof. Dr. Javed Iqbal Qazi<br>Department of Zoology, University of the Punjab, Lahore.  |
| 6.            | AC Magnetic Measurement<br><br>PSF/R&D/P-GCU /Phys (246)   | Dr. Salamat Ali<br>Associate Professor<br>Department of Physics<br>Government College University<br>Lahore  |
| 7.            | PSF/ILP/P-PCSIR/Chem (053)<br>Development of Technology for the Synthesis of Pharmaceutical Raw Materials                                | Dr. Muhammad Naeem Khan<br>Senior Scientific Officer<br>Applied Chemistry Research Center<br>Pakistan Council of Scientific & Industrial Research, Lahore.  |
| 8.            | PSF/ILP/P-PCSIR/Envr (054)<br>Eco-Friendly Alternative Energy Source from Municipal Solid Waste  | Dr. Muhammad Khalid Iqbal<br>Senior Scientific Officer<br>CEPS, Pakistan Council of Scientific & Industrial Research, Lahore.<br><a href="mailto:Khalid_khichi2000@yahoo.com">Khalid_khichi2000@yahoo.com</a>   |
| 9.            | PSF/ILP/P-PCSIR/Envr (055)<br>Development of Eco-Friendly Products as Larvicidal/Insecticidal against Dengue Vector                      | Dr. Rauf Ahmed Khan<br>Principal Scientific Officer<br>Centre for Environmental Protection Studies (CEPS)<br>PCSIR Labs. , Lahore   |

|     |   |   |
|-----|---|---|
| 10. | Investigation of the Mechanisms Responsible for Adherence in Bifidobacterial Species: its Relevance to the Development of effective Bifidobacterial Probiotic Products<br><u>PSF/NSLP/P-NIBGE (273)</u>                   | Dr. Arsalan Zaidi<br>Senior Scientist, Health Biotechnology Division, NIBGE, Jhang Road, Faisalabad.<br>041-2651475-79, 0305-5888875                |
| 11. | Diversity of Symbiotic and Free Living Plant Growth Promoting Rhizobacteria in the Root Nodules and Rhizosphere of Chickpea<br><u>PSF/NSLP/P-NIBGE (315)</u>  | Mr. Muhammad Sajjad Mirza,<br>Principal Scientist,<br>NIBGE, Jhang Road, Faisalabad.<br>041-2651475 ext-268, 0300-7627092                           |
| 12. | Cloning Expression and Characterization Of INGAP Encoded Gene: A Prospective Means of Amelioration of Diabetes<br><u>PSF/Res /P-NIBGE/Med (58)</u>  | Prof. Dr. Javed Anver Qureshi<br>NIBGE Faisalabad   |
| 13. | Developing a Sustainable Formulation for Biological Control of Rice Bacterial Blight and Yield Increase Using Native Growth Promoting Bioantagonists<br><u>PSF/NSLP/P-NIBGE (319)</u>                                     | Dr. Sumera Yasmin<br>Senior Scientist<br>National Institute of Biotechnology & Genetic Engineering, Faisalabad.                                     |
| 14. | Studies on Genetic Mutations of Low Density Liprotein Receptor Gene (LDLR); Implication in Diagnosis, Prognosis, Treatment and Management of Familial Hypercholesterolemia in Pakistan<br><u>PSF/Res/P-NIBGE/Med (76)</u> | Dr. Shahid Mahmood Baig<br>Head, Health Biotechnology Division<br>National Institute of Biotechnology & Genetic Engineering , (NIBGE)<br>Faisalabad |
| 15. | Improvement of Low Phytate Basmati Rice<br><u>PSF/NSLP/P-NIAB (149)</u>   | Dr. Zia-ul-Qamar<br>Senior Scientist<br>NIAB, Faisalabad,<br>03137053834,03247735595  |
| 16. | Isolation, Characterization & Bioremediation Potential of the EPS-Producing Bio-film Bacteria from Brackish & Polluted Irrigation Waters<br><u>NSLP/P-NIAB (155)</u>  | Dr. Muhammad Ashraf<br>Principal Scientist<br>NIAB, Faisalabad  |
| 17. | Development of Cost Effective and Potential Biocontrol Agents for Area Wide Management of Sucking Pests in Bt Cotton<br><u>PSF/NSLP/P-NIAB (277)</u>  | Dr. Nazia Suleman<br>Principal Scientist<br>NIAB,, Faisalabad.<br>0307-5456987  |
| 18. | Evaluation of Dried Citrus Pulp as a Concentrate Source and its Effect on Growth Performance and Milk Yield in Ruminant Animals.<br><u>PSF/Res/P-AU/Agr (394)</u>   | Dr. Muhammad Sharif<br>Dept. Animal Nutrition<br>University of Agriculture<br>Faisalabad  |
| 19. | Development of Information Management System for Commercial Broiler and Layer Farm Data.<br><u>PSF/NSLP/P-AU(167)</u>   | Mr. Shahid-ur-Rehman<br>Lecturer<br>Department of Poultry Science<br>University of Agriculture<br>Faisalabad  |
| 20. | Exploitation of Wild Edible Plant Diversity of the Punjab<br><u>PSF/Res/P-UA/ Bio (478)</u>   | Prof. Dr. Mumtaz Hussain<br>Department of Botany<br>University of Agriculture<br>Faisalabad   |

|     |   |   |
|-----|---|---|
| 21. | Engineering Maize with Heat Shock Proteins.<br><u>PSF/NSLP/P- AU(168)</u>   | Dr. Iqrar Ahmad Rana<br>Assistant Professor, CABB<br>University of Agriculture<br>Faisalabad<br>0333 6627846  |
| 22. | Evaluation of Some Cereal Derived Polysaccharides and Natural Biological Response Modifiers and their Therapeutic Efficacy Against Coccidiosis in Chicken<br><u>PSF/NSLP/P-AU (185)</u> | Dr. Kasib Khan,<br>Department of Parasitology<br>University of Agriculture<br>Faisalabad<br>041-9201094, 0300-6622170                                     |
| 23. | Assessment of Genotoxic Effects of Metals in Fish using Comet and Micronucleus Assays<br><u>PSF/NSLP/P-AU (285)</u>   | Prof. Dr. M. Javed<br>Chairman, Department of Zoology & Fisheries<br>University of Agriculture<br>Faisalabad. 0322-6003004                                |
| 24. | Development of Conditioned (Omega-3 rich) Meat and Eggs through Modifications in Feed Ingredients<br><u>PSF/NSLP/P-AU (296)</u>   | Dr. Muhammad Issa Khan<br>Assistant Professor<br>National Institute of Food Science & Technology, University of Agriculture<br>Faisalabad<br>0333-6627448 |
| 25. | Diagnosis of Acaricide Resistance in Ticks of Cattle and Management of Acaricide Resistant Ticks by Using Medicinal Plant Extracts<br><u>PSF/NSLP/P-AU (357)</u>                        | Dr. Zia ud Din Sindhu<br>Assistant Professor<br>Department of Parasitology<br>University of Agriculture<br>Faisalabad<br>0333-6689899                     |
| 26. | Delivery of Protein and Micronutrients to School going Children through Shelf Stable Ready to Eat Crispy Nutribars<br><u>PSF/NSLP/P-AU (531)</u>  | Dr. Mian Kamran Sharif<br>Assistant Professor<br>Institute of Food Science & Technology<br>University of Agriculture<br>Faisalabad<br>0333-8608341        |
| 27. | Development of Technology Rich Seeds for Improving the Performance of Crops<br><u>PSF/NSLP/P-AU (489)</u>   | Dr. Arfan Afzal<br>Assistant Professor<br>Department of Crop Physiology<br>University of Agriculture<br>Faisalabad<br>0300-9658671                        |
| 28. | Survey and Detection of <i>Wolbachia</i> in Natural Insect Population of Pakistan<br><u>PSF/NSLP/P-GCU (291)</u>  | Dr. Bilal Rasool<br>Assistant Professor<br>Department of Wild life<br>GC University<br>Faisalabad<br>0321-7689470   |
| 29. | Detection and Innovative Management of Postharvest Disease Incursions in Citrus<br><u>PSF/NSLP/P-US (382)</u>   | Dr. Zafar Iqbal<br>Principal<br>University College of Agriculture,<br>Sargodha. 0322-6637060  |

**ANNEXURE-VIII**

**List of Scientific Publications through NSLP Supported Projects in 2015-16**

| <b>Sr. No</b> | <b>Project No.</b>    | <b>Publication</b>  |
|---------------|-----------------------|---|
| 1.            | PSF/NSLP/P-NIBGE (19) | M Rahman, T Shaheen, S Irem and Y Zafar. Biosafety risk assessment of genetically modified crops containing Cry genes. Environmental Chemistry for a Sustainable World, Springer Publisher (Accepted).It will also be published in abridged form in Environmental Chemistry Letter (Springer Publisher, IF= 2.0). |
| 2.            | PSF/NSLP/KP-NIFA(76)  | Farid, A., M. Zaman, M. Saeed, M. Khan, and T. B. shah. 2015. Evaluation of boric acid as a slow-acting toxicant against subterranean termites (Heterotermes and Odontotermes) Journal of Entomology and Zoology Studies. 3: 213-216.   |
| 3.            | PSF/NSLP/C-CIIT(79)   | Hassan MN, Afghan S and Hafeez FY. Production of broad spectrum antibiotic 2,4-diacetyl phloroglucinol by a new antagonist Ochrobacterum intermedium strain NH-5 and its potential to bioprotect sugarcane against red rot (Colletotrichum falcatum Went).  |
| 4.            | PSF/NSLP/S-PARC(187)  | Sultana, N., Khan, A., Khanzada, K.A., Khatoon, N. and Shaukat, S.S., 2015. Histology of infected almond roots (Prunus amygdalus Batsch) seedlings with root-knot nematode (Meloidogyne javanica (Treub, Chitwood) and a fungus Plasmodiophora brassicae Woronin. Int. J. Biol. Biotech., 12(1): 63–68.           |
| 5.            | PSF/NSLP/S-PARC(187)  | Khan, A., Shaukat, S.S., Khanzada, K.A. and Khan, M.S., 2015. Effect of amendments for the control of nematodes on peach seedlings. Pak. J. Nematology, 33(1): 93–98  |
| 6.            | PSF/NSLP/KP-AU(161)   | Akhtar, K.P., M.Y.Saleem, Q. Iqbal, M.Asghar, A. Hmeed and N. Sarwar. 2016. Evaluation of tomato genotypes for late blight resistance using low tunnel assay. Accepted in Journal of Plant Pathology, Italy   |
| 7.            | PSF/NSLP/KP-AU(161)   | Saleem, M.Y., K. P. Akhtar, Q. Iqbal, M. Asghar, A.Hameed and M. Shoaib. 2016. Development of tomato hybrids with multiple disease tolerance. Pakistan Journal of Botany. 48(2): 771-778.   |

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|-----|----------------------|---|
| 8.  | PSF/NSLP/KP-AU(161)  | Saleem, M.Y., K. P. Akhtar, Q. Iqbal, M. Asghar and M. Shoaib. 2015. Transfer of cucumber mosaic virus resistance into hybrids of tomato. Pakistan Journal of Agricultural Sciences. 52(3): 671-675.  |
| 9.  | PSF/NSLP/KP-AU(161)  | Saleem, M.Y., K. P. Akhtar, Q. Iqbal, M. Asghar and M. Shoaib. 2015. Development of high yielding and blight resistant hybrids of tomato. Pakistan Journal of Agricultural Sciences. 52(2): 293-299.  |
| 10. | PSF/NSLP/KP-AU(161)  | Saleem, M.Y., M. Asghar and Q. Iqbal. 2015. Analysis of genetic proximity in tomato ( <i>Solanum lycopersicum</i> ) genotypes. Journal of Environmental and Agricultural Sciences.3:8-13.   |
| 11. | PSF/NSLP/KP-CIIT(51) | Wajid Ila M., J. Hussain, R.Ahmad, A.Hassan, M.M. Shah. 2015. Molecular evaluation of wheat genotypes for vernalization response based on the Intron 1 deletion in vernalization gene , <i>Minerva Biotechnologica</i> [accepted].[in press] [IF= 0.263] <a href="http://www.minervamedica.it/en/journals/minerva-biotechnologica/notice-toauthors.php">http://www.minervamedica.it/en/journals/minerva-biotechnologica/notice-toauthors.php</a>                                      |
| 12. | PSF/NSLP/KP-CIIT(51) | G. Khurshid, A. Hassan, A Shahzad, N Bibi, K. Khan, M. M. Shah*. 2015. Molecular Characterization of Winter Wheat Cultivars in Relation to Leaf Rust Disease. <i>SABRAO Journal of Breeding and Genetics</i> [submitted] [IF= 0.227 for 2011]<br>3. Khan, AM, Jamal Hussain, MM Shah. 2015. Marker Assisted Evaluation of VRN1 and NAM-B1 Genes Responsible for flowering and Enhancing Iron and Zinc Contents in Bread Wheat. <i>Turkish J Agric Forest</i> [Submitted] (IF= 0.914.) |
| 13. | PSF/NSLP/KP-CIIT(51) | Aamir, M, AM Khan, I Shahazadi, G Khurshid, A Hassan, MM Shah. 2015. Molecular Marker Based Screening and evaluation of Winter Wheat germ plasma against Gpc-1, Glu1 and Lr genes in advanced Wheat Lines using STS Molecular Markers. <i>Pak J Bot</i> [Submitted] [IF= 1.207]   |
| 14. | PSF/NSLP/P-AU(245)   | Khaliq T, A Iftikhar, I Javed, ZU Rahman, H Anwar, JA Khan, A Mahmood and H Muzaffar, 2015. Effect of vitamins, probiotics and low protein diet on lipid profile, hormonal status and serum proteins level of molted White Leghorn male layer breeders. <i>Pakistan Journal of Life and</i>   |

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|-----|----------------------|---|
|     |                      | Social Sciences, 336-PJLSS-15. (Submitted) (IF: 1.029)  |
| 15. | PSF/NSLP/P-AU(245)   | Khaliq T, A Mahmood, SU Rahman, ZU Rahman, JA Khan, H Muzaffar, Aiftikhar and R Mahmood. Dynamics of serum macro and micro minerals and immunomodulation potential of dietary low crude protein, probiotics and vitamins (C and E) supplementations in molted white leghorn breeder males. Pakistan Journal of Agricultural Sciences. (Submitted) (IF: 1.054) |
| 16. | PSF/NSLP/P-AU(245)   | Khaliq T, H Muzaffar, SU Rahman, F Mahmood, ZU Rahman, Aiftikhar, IJaved and A Mahmood. Effect of vitamin E, vitamin C, probiotics and low crude protein diet on semen quality traits and immunohistochemistry of pituitary gland in white leghorn breeder males after molting. Pakistan Veterinary Journal. (Submitted) (IF: 1.395)                          |
| 17. | PSF/NSLP/P-AU(245)   | A Iftikhar, T Khaliq, JA Khan, ZU Rahman, SU Rahman, H Anwar, H Muzaffar and A Mahmood, 2015. Efficacy of vitamins, probiotics and protein supplementation on serum health biomarkers of molted male layer breeders. Pakistan Veterinary Journal, PVJ-15-026. (Accepted) (IF: 1.395)  |
| 18. | PSF/NSLP/P-UAAR(147) | Khalid, A. and S. Mahmood. 2015. The biodegradation of azo dyes by Actinobacteria. P. 297-314. In: S.N. Singh (Ed.). Microbial degradation of synthetic dyes in wastewaters. Springer, Switzerland.   |
| 19. | PSF/NSLP/P-UAAR(147) | Mahmood, S., A. Khalid, M. Arshad, T. Mahmood and D.E. Crowley. 2015. Detoxification of azo dyes by oxidoreductase enzymes. Critical Reviews in Biotechnology doi:10.3109/07388551.2015.1004518.  |
| 20. | PSF/NSLP/P-UAAR(147) | Imran, M., D.E. Crowley, A. Khalid, S. Hussain, M.W. Mumtaz and M. Arshad. 2015. Microbial biotechnology for decolorization of textile wastewaters. Reviews in Environmental Science and Bio/Technology 14:73-92.   |
| 21. | PSF/NSLP/P-UAAR(147) | Batool, S., A. Khalid, A.J.K. Chowdhury, M. Sarfraz, K.S. Balkhair and M.A. Ashraf. 2015. Impacts of azo dye on ammonium oxidation process and ammonia oxidizing soil bacteria. RSC Advances DOI: 10.1039/C5RA03768A).  |

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|-----|-----------------------|---|
| 22. | PSF/NSLP/P-UAAR(147)  | Saba, B., M. Jabeen, A. Khalid, T. Mahmood and I. Aziz. 2015. Effectiveness of rice agricultural waste, microbes and wetland plants in the removal of reactive black-5 azo dye in microcosm constructed wetlands. International Journal of Phytoremediation (Accepted).           |
| 23. | PSF/NSLP/P-UAAR(147)  | Mahmood, S., A. Khalid. M. Arshad and R. Ahmad. 2015. Effect of trace metals and electron shuttle on simultaneous reduction of Reactive Black 5 azo dye and hexavalent chromium in liquid medium by <i>Pseudomonas</i> sp. Chemosphere DOI: 10.1016/j.chemosphere.2014.10.084. 88 |
| 24. | PSF/NSLP/P-UAAR(147)  | Khalid, A., J. Arshad, S. Mahmood, I. Aziz and M. Arshad. 2015. Effect of chromium forms on the biodegradation of Reactive Black-5 azo dye by <i>Psychrobacter</i> and <i>Klebsiella</i> species. International Journal of Agriculture and Biology (In press).                    |
| 25. | PSF/NSLP/P-NIAB (155) | Imran M, Negm F, Hussain S, Ashraf M, Ashraf M, Ahmad Z, Arshad M and Crowley DE (2016) Characterization and Purification of Membrane-Bound Azoreductase from Azo Dye Degrading <i>Shewanella</i> sp. Strain IFN4. Clean-Soil, Air Water (clen201501007R1)                        |

**ANNEXURE-IX****Detail of Caravan Exhibitions during 2015-16**

| <b>Sr. No.</b>                             | <b>Place of Exhibition</b>            | <b>Dates</b>           | <b>No. of Students</b> | <b>No. of Schools</b> |
|--|---------------------------------------|------------------------|------------------------|-----------------------|
| <b>Science Caravan, Sukkur Unit, Sindh</b> |                                       |                        |                        |                       |
| 1.   | GBHSS, Tehsil Pano Aqil, Distt.Sukkur | 31.8.15                | 3300                   | 20                    |
| 2.   | GBHSS, Tehsil Phulji, Dadu            | 14.10.15 to 28.10.2015 | 3440                   | 22                    |
| 3.   | GBHS, Tehsil&Distt. Shahdadkot        | 10.11.15 to 26.11.15   | 4360                   | 26                    |
| 4.   | GBHSS, Tehsil Bakrani, Larkana        | 06.12.15 to 17.12.15   | 2970                   | 17                    |
| 5.   | GBHS, Tehsil Kandiaro, Feroze.        | 22.2.16 to 27.2.2016   | 2270                   | 10                    |
| 6.   | Govt.(B) HSS- Rustam&Jahan Khan       | 09.5.16 to 14.5.16     | 1680                   | 8                     |
| 7.   | GHSS, Moro Distt. Naushahro Feroze    | 16.5.2016 to 20.5.2016 | 780                    | 2                     |
| <b>Total</b>                               |                                       |                        | <b>18800</b>           | <b>105</b>            |
| <b>Science Caravan KP Unit</b>             |                                       |                        |                        |                       |
| 8.   | GCMS Uper Dir                         | 24.8.2015 to 16.9.15   | 4137                   | 28                    |
| 9.   | GHSS Mazdoorabad, Mardan              | 12.10.15 to 21.10.15   | 5758                   | 32                    |
| 10.  | GHS No. 1 Bannu City                  | 9.11.15 to 25.11.15    | 4215                   | 23                    |
| 11.  | GMHS Lakki Marwat, Naurang            | 04.01.16 to 24.01.2016 | 6043                   | 24                    |
| 12.  | GHS Azakhel Bala, Nowshera            | 22.02.16 to 27.02.2016 | 1188                   | 9                     |
| 13.  | GHS_ -Pakha & new peshawar public     | 02.5.16 to 7.5.2016    | 2622                   | 5                     |
| 14.  | GHS-Battagram, Distt. Charssada       | 23.5.16 to 31.5.2016   | 1399                   | 12                    |
| 15.  | GHS-Ambadher Distt. Charssada         | 18.4.16 to 23.4.2016   | 965                    | 8                     |
| <b>Total</b>                               |                                       |                        | <b>26327</b>           | <b>141</b>            |
| <b>Science Caravan, Unit Tandojam</b>      |                                       |                        |                        |                       |
| 16.  | Cadet College Petaro, Jamshoro        | 6.11.15 to 8.11.15     | 400                    | 1                     |
| 17.  | GHS Tehsi&Distt. Badin                | 11.11.15 to 21.11.2015 | 4076                   | 13                    |
| 18.  | GBHS Tehsil&Distt.Thatta              | 13,12,15 to 19.12.2015 | 1510                   | 10                    |
| 19.  | GHSS-Shujaabad, Distt.Mirpur Khas     | 16.5.16 to 21.5.16     | 1088                   | 7                     |
| <b>Total</b>                               |                                       |                        | <b>7074</b>            | <b>31</b>             |

| <b>Science Caravan, Unit Jaffarabad</b>          |   |                         |                |            |
|--|---|-------------------------|----------------|------------|
| 20.  | Al Hijra Residential School & College Ziarat        | 02.08.15 to 19.08.15    | 5032           | 24         |
| 21.  | GHS, Jhal Magsi Tehsil Gandakha                     | 04.10.15 to 17.10.2015  | 3767           | 22         |
| 22.  | WSDPD at Usta Muhammad                              | 10.11.2015              | 262            | 16         |
| <b>Total</b>                                     |   |                         | <b>9061</b>    | <b>62</b>  |
| <b>Science Caravan, Federal Unit</b>             |   |                         |                |            |
| 23.  | EFA, School System, Nilore                          | 2.2.16 to 4.2.16        | 782            | 3          |
| 24.  | Shaheed GHS- Dhangri Bala                           | 18-23 April,2016        | 3150           | 16         |
| 25.  | GGHSS Kaller Sydean                                 | 14.9.15 to 18.9.15      | 1450           | 7          |
| 26.  | Planetarium show at IST, Islamabad                  | 07.10.15 to 9.10.15     | 4000           | 20         |
| 27.  | GGHSS Skardu, Gilgit, Baltistan                     | 10.10.15 to 23.10.2015  | 3150           | 21         |
| 28.  | GGHSS Sohawa  | 23.11.15 to 28.11.2015  | 2500           | 9          |
| 29.  | Amir Public School Neelam                           | 4.4.16 to 8.4.16        | 2650           | 8          |
| 30.  | GBHSS, Dadyal AJK                                   | 25.1.16 to 30.1.16      | 2293           | 16         |
| 31.  | GGHSS, Bagga, Mirpur                                | 2.5.2016 to 7.5.2016    | 1400           | 11         |
| <b>Total</b>                                     |   |                         | <b>21375</b>   | <b>111</b> |
| <b>Science Caravan, Punjab Unit, Faisalabad</b>  |   |                         |                |            |
| 32.  | Private Schools of Faisalabad                       | 05.10.15 to 30.10.2015  | 6231           | 18         |
| 33.  | NMST at Lahore                                      | 01.11.2015 to 5.11.2015 | 2,000          | 00         |
| 34.  | GIFT, University, Gujranwala<br>17-20 January 2016  |                         | 1700           | 00         |
| 35.  | Govt. Furqan Shaheed High School, Distt. Sheikhpura | 18.5.16 to 28.5.2016    | 3000           | 7          |
| <b>Total</b>                                     |   |                         | <b>12,931</b>  | <b>25</b>  |
| <b>Science Caravan, Unit Quetta, Balochistan</b> |   |                         |                |            |
| 36.  | GHS, Tehsil & distt. Pishin                         | 04.4.16 to 18.4.2016    | 2450           | 12         |
| 37.  | GHS Tehsil Khanozai, distt. Pishin                  | 23.4.16 to 01.05.16     | 2085           | 10         |
| <b>Total</b>                                     |   |                         | <b>4535</b>    | <b>22</b>  |
| <b>Science Caravan Unit, Multan</b>              |   |                         |                |            |
| 38.  | GHs, Jampur Distt. Rajanpur                         | 17.5.2016 to 28.05.2016 | 2170           | 9          |
| <b>Grand Total</b>                               |   |                         | <b>102,273</b> | <b>506</b> |

**ANNEXURE-X****Detail of 25<sup>th</sup> Intra Board Science Essay Competition 2015-16****Theme: “Is renewable energy an economically viable option for Pakistan?”**

| <b>Sr. No</b> | <b>Name of Students</b> | <b>School Name</b>                                      | <b>Board</b> | <b>Medium</b> | <b>Position</b> | <b>Prize Money</b> |
|---------------|-------------------------|---|--------------|---------------|-----------------|--------------------|
| 1             | Saira Narejo            | Waqar Public Higher Secondary School, Khairpur          | Sukkur       | English       | 1 <sup>st</sup> | 5,000              |
| 2             | Safina Zia              | Rotary Public School, Sukkur                            | Sukkur       | English       | 2 <sup>nd</sup> | 3,000              |
| 3             | MuskanMangi             | City Public HS Rohri                                    | Sukkur       | English       | 3 <sup>rd</sup> | 2,000              |
| 4             | Moiz Ahmed              | Hira Public Higher Secondary School, Sukkur             | Sukkur       | Urdu          | 1 <sup>st</sup> | 5,000              |
| 5             | Noor-un-Nisa            | Waqar Public Higher Secondary School, Khairpur          | Sukkur       | Urdu          | 2 <sup>nd</sup> | 3,000              |
| 6             | Shahmir Ali             | Islamia Public High School Lumen, Khairpur              | Sukkur       | Urdu          | 3 <sup>rd</sup> | 2,000              |
| 7             | Farooq Ali              | Mazhar Muslim Model High School, Khairpur               | Sukkur       | Sindhi        | 1 <sup>st</sup> | 5,000              |
| 8             | Noshaba Jalbani         | Waqar Public Higher Secondary School, Khairpur          | Sukkur       | Sindhi        | 2 <sup>nd</sup> | 3,000              |
| 9             | Seema Falak             | Sindh Children Academy, Khairpur                        | Sukkur       | Sindhi        | 3 <sup>rd</sup> | 2,000              |
| 10            | Qurat-ul-Ain            | Govt. High School, Panhwar                              | Larkana      | Sindhi        | 1 <sup>st</sup> | 5,000              |
| 11            | Marvi                   | Govt. Girls Higher Secondary School Munwarabad, Larkana | Larkana      | Sindhi        | 2 <sup>nd</sup> | 3,000              |
| 12            | Hazoor Bux              | Govt. Pilot Higher Secondary School, Larkana            | Larkana      | Sindhi        | 3 <sup>rd</sup> | 2,000              |
| 13            | Atif Malik              | Cadet College, Larkana                                  | Larkana      | English       | 1 <sup>st</sup> | 5,000              |
| 14            | Komal Rasool            | Public School, Larkana                                  | Larkana      | English       | 2 <sup>nd</sup> | 3,000              |
| 15            | Mahjabeen Abro          | Quaid-e-Awam Public School, Larkana                     | Larkana      | English       | 3 <sup>rd</sup> | 2,000              |
| 16            | AlamMarri               | Cadet College, Larkana                                  | Larkana      | Urdu          | 1 <sup>st</sup> | 5,000              |
| 17            | Naveed Raja             | Govt. Saint Joseph High School, Larkana                 | Larkana      | Urdu          | 2 <sup>nd</sup> | 3,000              |
| 18            | Kahaful Sardar          | Public School, Larkana                                  | Larkana      | Urdu          | 3 <sup>rd</sup> | 2,000              |
| 19            | Maqadas Mushtaq         | Govt. Girls High School F/1, Mirpur (AJK)               | Mirpur AJK   | English       | 1 <sup>st</sup> | 5,000              |
| 20            | Farah Batool            | Govt. Degree College,                                   | Mirpur       | English       | 2 <sup>nd</sup> | 3,000              |

|    |                        |  |            |         |                 |       |
|----|------------------------|--|------------|---------|-----------------|-------|
|    |                        | Panjeri Mirpur AJK   | AJK        |         |                 |       |
| 21 | Ali Haider             | Govt. Pilot Secondary School Tehsil Dadyal District Mirpur | Mirpur AJK | English | 3 <sup>rd</sup> | 2,000 |
| 22 | Aiman Attaullah        | GGCMS, Bannu   | Bannu      | English | 1 <sup>st</sup> | 5,000 |
| 23 | Muhammad Uzair         | Akram Khan Durrani College, Bannu                          | Bannu      | Urdu    | 2 <sup>nd</sup> | 3,000 |
| 24 | Muiz Khan              | Akram Khan Durrani College, Bannu                          | Bannu      | English | 3 <sup>rd</sup> | 2,000 |
| 25 | Waseem Abbas           | GHS No.1 Dheri Alladand, District Malakand                 | Malakand   | English | 1 <sup>st</sup> | 5,000 |
| 26 | WisalMukhtiar          | Al-Huda Model School Ouch, District Dir Lower              | Malakand   | English | 2 <sup>nd</sup> | 3,000 |
| 27 | Altaf Ahmad            | Allama Iqbal Model School Dir, District Dir Upper          | Malakand   | English | 3 <sup>rd</sup> | 2,000 |
| 28 | Sana Jafar             | Govt. Model Girls High School, Okara City                  | Sahiwal    | Urdu    | 1 <sup>st</sup> | 5,000 |
| 29 | Aqib Shahzad           | Govt. Higher Secondary School Renala Khurd, Distt. Okara   | Sahiwal    | Urdu    | 2 <sup>nd</sup> | 3,000 |
| 30 | Muhammad Hammad        | Govt. Satlug Boys High School, Okara                       | Sahiwal    | Urdu    | 3 <sup>rd</sup> | 2,000 |
| 31 | Minahil Fatima         | Divisional Public and Inter College Sahiwal                | Sahiwal    | English | 1 <sup>st</sup> | 5,000 |
| 32 | Ayesha Saddique        | Govt. Model Girls High School Okara                        | Sahiwal    | English | 2 <sup>nd</sup> | 3,000 |
| 33 | Muhammad Sajid Mehmood | Govt. Higher Secondary School Renala Khurd Distt. Okara    | Sahiwal    | English | 3 <sup>rd</sup> | 2,000 |
| 34 | Jawad Hafeez           | GHS Minchanabad, Bahawalnagar                              | Bahawalpur | Urdu    | 1 <sup>st</sup> | 5,000 |
| 35 | M Owais Saleem         | GHS Sondha Bahawalnagar                                    | Bahawalpur | Urdu    | 2 <sup>nd</sup> | 3,000 |
| 36 | Rana Haider Ali        | Danish Boys School Chishtian, Bahawalnagar                 | Bahawalpur | English | 1 <sup>st</sup> | 5,000 |
| 37 | Khadija Bibi           | GGHSS Chah Fath Khan Bahawalpur                            | Bahawalpur | English | 2 <sup>nd</sup> | 3,000 |
| 38 | Maha Ali Shahid        | GGHSS Satellite Town Bahawalpur                            | Bahawalpur | English | 3 <sup>rd</sup> | 2,000 |
| 39 | Izza Danish            | Islamic Alta Vista   | Sargodha   | English | 1 <sup>st</sup> | 5,000 |

|    |                             |   |            |         |                 |       |
|----|-----------------------------|---|------------|---------|-----------------|-------|
|    |                             | Girls High School,<br>Sargodha  |            |         |                 |       |
| 40 | Hafiz Noman<br>Azam         | Sanai School System<br>104, Satellite Town<br>Sargodha                    | Sargodha   | English | 2 <sup>nd</sup> | 3,000 |
| 41 | Diam<br>Armaghan            | Islamic Alta Vista<br>Boys High School,<br>Sargodha                       | Sargodha   | English | 3 <sup>rd</sup> | 2,000 |
| 42 | Bazif Saleem                | Dar-e-Arqam Boys H/S<br>Jauharabad  | Sargodha   | Urdu    | 1 <sup>st</sup> | 5,000 |
| 43 | Muhammad<br>Faheem          | PAF College, Sargodha   | Sargodha   | Urdu    | 2 <sup>nd</sup> | 3,000 |
| 44 | Sapna Shehzadi              | Govt. National Model<br>Higher Secondary<br>School, PAF Base,<br>Sargodha | Sargodha   | Urdu    | 2 <sup>nd</sup> | 3,000 |
| 45 | Nighat Shafqat              | Govt. Girls High<br>School, 101,NB,<br>Sargodha                           | Sargodha   | Urdu    | 3 <sup>rd</sup> | 2,000 |
| 46 | Ayesha Razzaq               | The Educator,<br>Wazirabad  | Gujranwala | Urdu    | 1 <sup>st</sup> | 5,000 |
| 47 | Nimra Liaqat                | Govt. Girls E/M High<br>School, Khaian, Gujrat                            | Gujranwala | Urdu    | 2 <sup>nd</sup> | 3,000 |
| 48 | Abdul Hanan                 | The Oxford School,<br>Gujranwala  | Gujranwala | Urdu    | 2 <sup>nd</sup> | 3,000 |
| 49 | AbihaTahir                  | The Oxford School,<br>Gujranwala  | Gujranwala | Urdu    | 3 <sup>rd</sup> | 2,000 |
| 50 | Memona<br>Taqadus           | Unique Model High<br>School, Gujranwala                                   | Gujranwala | Urdu    | 3 <sup>rd</sup> | 2,000 |
| 51 | Iqra Ghauri                 | The Educator,<br>Wazirabad  | Gujranwala | English | 1 <sup>st</sup> | 5,000 |
| 52 | Saad Abdul<br>Rehman        | City Public School<br>Peoples Colony<br>Gujranwala                        | Gujranwala | English | 2 <sup>nd</sup> | 3,000 |
| 53 | Nibila Eman                 | Gov. Model Girls H/S<br>Satellite Town,<br>Gujranwala                     | Gujranwala | English | 2 <sup>nd</sup> | 3,000 |
| 54 | Fatima                      | Gov. Model Girls H/S<br>Satellite Town,<br>Gujranwala                     | Gujranwala | English | 3 <sup>rd</sup> | 2,000 |
| 55 | Irsa Mehwish                | Unique Model High<br>School, Ali Pur<br>Chattha, Gujranwala               | Gujranwala | English | 3 <sup>rd</sup> | 2,000 |
| 56 | Muhammad<br>Meesam Ali      | Govt. Model Boys<br>High School No.1,<br>Rajanpur                         | DG Khan    | English | 1 <sup>st</sup> | 5,000 |
| 57 | Syed Tafseer-e-<br>Muhammad | Govt. City High School<br>DG Khan   | DG Khan    | English | 2 <sup>nd</sup> | 3,000 |
| 58 | Muneeb                      | Govt. City High School  | DG Khan    | English | 3 <sup>rd</sup> | 2,000 |

|    |                     |  |         |         |                 |       |
|----|---------------------|--|---------|---------|-----------------|-------|
|    | Shahzad             | DG Khan  |         |         |                 |       |
| 59 | Muhammad Jamal Khan | Govt. Boys High School Gaddi, DG Khan  | DG Khan | Urdu    | 1 <sup>st</sup> | 5,000 |
| 60 | Abdul Majeed        | Govt. High School KotAdu, Muzaffargarh                                       | DG Khan | Urdu    | 2 <sup>nd</sup> | 3,000 |
| 61 | Mehwish Ejaz        | Govt. Girls Model High School Layyah   | DG Khan | Urdu    | 3 <sup>rd</sup> | 2,000 |
| 62 | Huzaiifa Nawaz      | Cadet College, Kohat   | Kohat   | English | 1 <sup>st</sup> | 5,000 |
| 63 | Haris Rehman        | Cadet College Kohat  | Kohat   | English | 2 <sup>nd</sup> | 3,000 |
| 64 | Ammar Ahmad         | Fauji Foundation Higher Secondary School Lachi, Kohat                        | Kohat   | English | 3 <sup>rd</sup> | 2,000 |
| 65 | Noor-Ul-Ain         | Bahria Model School I, Majeed S.R.E. Stadium Road, Karachi                   | Karachi | English | 1 <sup>st</sup> | 5,000 |
| 66 | Uzair Naseem        | Customs Public School 29-C, Block-6, P.E.C.H.S., Karachi                     | Karachi | English | 2 <sup>nd</sup> | 3,000 |
| 67 | Fasiha Azhar        | Gulistan Shah Abdul Latif Girls Higher Secondary School, S.M.C.H.S., Karachi | Karachi | English | 3 <sup>rd</sup> | 2,000 |
| 68 | Meerab Fatima       | Bahria Model School 1, Majeed S.R.E. Stadium Road, Karachi                   | Karachi | Urdu    | 1 <sup>st</sup> | 5,000 |
| 69 | Jaweria Kaleem      | Iqra Huffaz Girls Secondary School, F-108, Block-B, North Nazimabad, Karachi | Karachi | Urdu    | 2 <sup>nd</sup> | 3,000 |
| 70 | Aisha Ali           | The Metropolis Academy C-7, Block-C, North Nazimabad, Karachi                | Karachi | Urdu    | 3 <sup>rd</sup> | 2,000 |
| 71 | Kamla Asim          | Bahria Model School  | Karachi | Sindhi  | 1 <sup>st</sup> | 5,000 |

|               |                                |   |            |         |                 |                  |
|---------------|--------------------------------|---|------------|---------|-----------------|------------------|
|               |                                | II, Majeed S.R.E.<br>National Stadium<br>Road, Karachi                                    |            |         |                 |                  |
| 72            | Hafiza Fatima<br>Masroor       | Iqra Huffaz Girls<br>Secondary School, F-<br>108, Block-B, North<br>Nazimabad, Karachi    | Karachi    | Sindhi  | 2 <sup>nd</sup> | 3,000            |
| 73            | Khadija Urooj                  | Bahria Model School<br>1, Majeed S.R.E.<br>Stadium Road, Karachi                          | Karachi    | Sindhi  | 3 <sup>rd</sup> | 2,000            |
| 74            | Fizza Khalid                   | Govt. M.C. Girls High<br>School Peoples Colony<br>No.1, Faisalabad                        | Faisalabad | English | 1 <sup>st</sup> | 5,000            |
| 75            | Usama Kamal                    | Divisional Public<br>School and College,<br>Faisalabad                                    | Faisalabad | English | 2 <sup>nd</sup> | 3,000            |
| 76            | Muhammad<br>Usama bin<br>Tariq | Divisional Public<br>School and College,<br>Ghulam Muhammad<br>Abad Campus,<br>Faisalabad | Faisalabad | English | 3 <sup>rd</sup> | 2,000            |
| <b>Total:</b> |                                |   |            |         |                 | <b>251,000/-</b> |

**ANNEXURE-XI****Detail of 25<sup>h</sup> Intra Board Science Poster Competition 2015-16****Theme: “Importance of light for life”**

| <b>Sr. No</b> | <b>Name of Students</b>       | <b>Name of School</b>                             | <b>Board</b>    | <b>Position</b> | <b>Prize Money</b> |
|---------------|-------------------------------|---|-----------------|-----------------|--------------------|
| 1             | Seerat Ali                    | IBA Public School Sukkur,<br>Khairpur             | Sukkur          | 1 <sup>st</sup> | 5,000              |
| 2             | Shoukat Maitlo                | Waqar Public Higher Secondary<br>School, Khairpur | Sukkur          | 2 <sup>nd</sup> | 3,000              |
| 3             | Shazia Hassan                 | Govt. Girls High School New<br>Pind, Sukkur       | Sukkur          | 3 <sup>rd</sup> | 2,000              |
| 4             | Sawera Nawaz                  | Ahmed Ali Soomro Grammar<br>High School, Larkana  | Larkana         | 1 <sup>st</sup> | 5,000              |
| 5             | Atiya                         | Govt. Girls English Model High<br>School, Larkana | Larkana         | 2 <sup>nd</sup> | 3,000              |
| 6             | Asma Bhatti                   | Ahmed Ali Soomro Grammar<br>High School, Larkana  | Larkana         | 3 <sup>rd</sup> | 2,000              |
| 7             | Ahsan Ali                     | Govt.Pilot Higher Secondary<br>School, Larkana    | Larkana         | 3 <sup>rd</sup> | 2,000              |
| 8             | Sawera Naz                    | Govt. Girls High School F/1,<br>Mirpur (AJK)      | Mirpur<br>(AJK) | 1 <sup>st</sup> | 5,000              |
| 9             | Rabia Baber                   | Govt. Girls High School Kalyal,<br>Mirpur (AJK)   | Mirpur<br>(AJK) | 2 <sup>nd</sup> | 3,000              |
| 10            | Natasha<br>Shahbaz<br>Pirzada | Govt. Girls High School Sahang,<br>Mirpur (AJK)   | Mirpur<br>(AJK) | 3 <sup>rd</sup> | 2,000              |
| 11            | Maryam Abid<br>& Saweera Gul  | GGCMS, Bannu                                      | Bannu           | 1 <sup>st</sup> | 5,000              |
| 12            | Nihad Ali                     | Akram Khan Durrani College,<br>Bannu              | Bannu           | 2 <sup>nd</sup> | 3,000              |
| 13            | Kainat                        | Govt. Girls Higher Secondary<br>School, Bannu     | Bannu           | 3 <sup>rd</sup> | 2,000              |
| 14            | Fareed Gul                    | GHS No.2, Dargai, District<br>Malakand            | Malakand        | 1 <sup>st</sup> | 5,000              |
| 15            | Asim Khan                     | Al-Huda Model School Ouch,<br>District Dir Lower  | Malakand        | 2 <sup>nd</sup> | 3,000              |
| 16            | Shahid Khan                   | Al-Huda Model School Ouch,<br>District Dir Lower  | Malakand        | 3 <sup>rd</sup> | 2,000              |
| 17            | Bisma Khan                    | Govt. Model Girls High School ,<br>Okara City     | Sahiwal         | 1 <sup>st</sup> | 5,000              |
| 18            | Arslan Hussain                | Govt. Satlug Boys High School,<br>Okara           | Sahiwal         | 2 <sup>nd</sup> | 3,000              |
| 19            | Muhammad<br>Farrukh Ahmad     | Govt. Sutlug Boys High School,<br>Okara           | Sahiwal         | 3 <sup>rd</sup> | 2,000              |
| 20            | Muhammad<br>Tariq             | GHS Khan Bala Rahim Yar<br>Khan                   | Bahawalpur      | 1 <sup>st</sup> | 5,000              |

|                |                       |   |            |                 |                |
|----------------|-----------------------|---|------------|-----------------|----------------|
| 21             | Zia-Ul-Rehman         | GHS Tameere-e-Millat Rahim Yar Khan   | Bahawalpur | 2 <sup>nd</sup> | 3,000          |
| 22             | Kainat Mazhar         | GGHSS Satellite Town Bahawalpur   | Bahawalpur | 3 <sup>rd</sup> | 2,000          |
| 23             | Hijab-e-Hoor          | Sanai School System 104, Satellite Town Sargodha  | Sargodha   | 1 <sup>st</sup> | 5,000          |
| 24             | Aqeedat Malik         | District Public School & Inter College Jauhrabad (Khushab)  | Sargodha   | 2 <sup>nd</sup> | 3,000          |
| 25             | Nazia                 | Govt. Girls High School 42-NB Gullwala, Sargodha  | Sargodha   | 3 <sup>rd</sup> | 2,000          |
| 26             | Laraib Rauf           | Govt. Girls High School No.1, Kharian, Gujrat   | Gujranwala | 1 <sup>st</sup> | 5,000          |
| 27             | Qamar Aman            | Govt. Girls Model H/S, Satellite Town, Gujranwala   | Gujranwala | 2 <sup>nd</sup> | 3,000          |
| 28             | Sana Saleem           | Govt. Girls H/S, Sarai Alamgir  | Gujranwala | 3 <sup>rd</sup> | 2,000          |
| 29             | AlinaSamreen          | Govt. Girls Higher Secondary School city, DG khan   | DG Khan    | 1 <sup>st</sup> | 5,000          |
| 30             | Sabhat-ul- Ain        | Govt. Girls Model School, Layyah  | DG Khan    | 2 <sup>nd</sup> | 3,000          |
| 31             | Tehreem Fatima        | Govt. Girls High School, Model Town, DG Khan  | DG Khan    | 3 <sup>rd</sup> | 2,000          |
| 32             | Naeema Khattak        | Fauji Foundation Higher Secondary School, Kohat   | Kohat      | 1 <sup>st</sup> | 5,000          |
| 33             | Aqib Hussain          | Cadet College, Kohat  | Kohat      | 2 <sup>nd</sup> | 3,000          |
| 34             | Kiran Manan           | Fauji Foundation Higher Secondary School, Kohat   | Kohat      | 3 <sup>rd</sup> | 2,000          |
| 35             | Iqra Shoaib           | Fauji Foundation Higher Secondary School, Kohat   | Kohat      | 3 <sup>rd</sup> | 2,000          |
| 36             | Tooba Firdous         | Metropolis School for Gils, Karachi   | Karachi    | 1 <sup>st</sup> | 5,000          |
| 37             | Syed Emad Ullah Qadri | Bahria Foundation College (Secondary) D-57, Block-H, AllamaRasheedTurabi Road, North Nazimabad, Karachi | Karachi    | 2 <sup>nd</sup> | 3,000          |
| 38             | Kiran Kabir           | Little Folks School F-22, Block-F, North Nazimabad, Karachi   | Karachi    | 3 <sup>rd</sup> | 2,000          |
| 39             | Syeda Amna Gilani     | Sandal College Millat Road Faisalabad   | Faisalabad | 1 <sup>st</sup> | 5000           |
| 40             | Muneeb Ahmad Siddiqui | Govt. Comprehensive Higher Secondary School Samanabad, Faisalabad                                       | Faisalabad | 2 <sup>nd</sup> | 3,000          |
| 41             | Marhaba Majeed        | Govt. Girls Higher Secondary School 527/G.B Samundri, Faisalabad  | Faisalabad | 3 <sup>rd</sup> | 2,000          |
| <b>Total :</b> |                       |   |            |                 | <b>134,000</b> |

**ANNEXURE-XII****List of Scientists Aailed Travel Grants under Development Budget in 2015-16**

| <b>Sr. No.</b> | <b>Name of the Applicant</b>  | <b>Title of the Conference / Workshop / Seminar / Meeting / Sympoium / Training Course</b>  | <b>Amount Released (Rs.)</b> |
|----------------|---|---|------------------------------|
| 1.             | Dr. Muhammad Arshad<br>Assistant Professor<br>Department of Mathematics<br>International Islamic<br>University<br>H-10, Islamabad<br>Pakistan<br><br>TG-II(1491)/15 | “The 11 <sup>th</sup> Conference on Fixed Theory and its Applications” from July 20 -24, 2015 at Istanbul Turkey.<br><br>“Best Proximity Points of Local Contractions Endowed with Binary Relation”   | Rs.150,000/-                 |
| 2.             | Dr. Muhammad Sharif<br><br>Assistant Professor,<br>Department of Soil Science,<br>Baluchistan Agriculture<br>College, Quetta.<br><br>TG-II(1524)/15                 | 20 <sup>th</sup> International Soil Tillage Research Organization (ISTRO) Conference”<br>From 14 – 18 September, 2015 at Nanjing, China<br><br>“Conservation Agriculture: Research Status, Opportunities and Challenges in Dry land Area of Pakistan” | Rs.150,000/-                 |
| 3.             | Dr. Imtiaz Khan<br><br>Assistant Professor<br>Department of Weed Science,<br>The University of Agriculture,<br>Peshawar.<br><br>TG-II(1530)/15                      | “6 <sup>th</sup> International Scientific Agriculture Symposium (Agrosym 2015)” from 15 – 18 October, 2015 at Sarajevo, Bosnia.<br><br>“Weed can work as Bio-Herbicides in Wheat Crop, A new approach of Eco-Friendly Weed”                           | Rs.149,055/-                 |
| 4.             | Mr. Jawaid Iqbal<br><br>PhD (Scholar)<br>Department of IT,<br>Hazara University<br>Mansehra.<br><br>TG-II(1531)/15  | “3 <sup>rd</sup> International Conference on Computational and Social Science (ICSS-15) ” from 25 – 27 August, 2015 at Johor Bahru, Malaysia.<br><br>“An Efficient Key Agreement for Wireless Body Area Networks Based on Hyper Elliptic Curves”      | Rs.130,000/-                 |
| 5.             | Prof. M. Subhan Qureshi   | “7 <sup>th</sup> International Symposium of Integrative Zoology” ” from 25 – 28   | Rs.94,000/-                  |

|     |  |   |              |
|-----|--|---|--------------|
|     | Dean/Professor ,<br>Faculty of Animal Husbandry<br>and Veterinary Sciences,<br>The University of Agriculture,<br>Peshawar.<br><br>TG-II(1545)/15                           | August, 2015 Shaanxi, China.<br><br>“Semen quality of local and exotic<br>roosters ( <i>Gallus Gallus Domesticus</i> )<br>during extremes of summers<br>supplemented with ascorbic acid and<br>electrolytes (CE-COL®)”  |              |
| 6.  | Dr. Baseer Ullah<br>General Manager,<br>National Development<br>Complex (NESCOM),<br>Islamabad.<br><br>TG-II(1556)/15  | “8 <sup>th</sup> Ankara International Aerospace<br>Conference (AIAC-2015)” from 10 –<br>12 September, 2015, Ankara, Turkey.<br><br>“ A boundary element and level set<br>based topology optimization using<br>sensitivity analysis”   | Rs.138,838/- |
| 7.  | Dr. Nazim Ashraf<br>Assistant Professor,<br>Department of Computer<br>Science,<br>Forman Christian College,<br>Lahore.<br><br>TG-II(1565)/15                               | “International Conference on Imaging<br>Processing (ICIP)” from 27–30<br>September 2015, at Quebec, Canada.<br><br>“Motion retrieval using consistency of<br>epipolar geometry”   | Rs.96,764/-  |
| 8.  | Dr. Nasir Mehmood Khan<br>Assistant Professor,<br>Department of Chemistry,<br>Shaheed Benazir Bhutto<br>University,<br>Dir Upper, KPK.<br><br>TG-II(1578)/15               | “International Training Workshop on<br>High Efficient Plant Factory<br>Technology” from 12-31 <sup>th</sup><br>October 2015, at Chinese Academy of<br>Agricultural Sciences, Beijing, China<br><br>Training   | Rs.91,604/-  |
| 9.  | Dr. M. Ishfaq Khan<br>Assistant Professor,<br>Department of Weed Sciences<br>The University of Agriculture,<br>Peshawar.<br><br>TG-II(1595)/15                             | “3 <sup>rd</sup> International Conference<br>Sustainable Agriculture, Food and<br>Energy” from 17-20 <sup>th</sup> November 2015,<br>at Ho Chi Minh, Vietnam.<br><br>“Testing of Johnsongrass ( <i>Sorghum<br/>halepense</i> ) for its Allelopathic<br>Potential Against Crops Seeds” | Rs.157,240/- |
| 10. | Dr. Illahi Bakhsh Marghazani<br>Associate Professor,<br>Faculty of Veterinary &<br>Animal Sciences,<br>Lasbela University of<br>Agriculture, Water and Marine<br>Sciences, | “5 <sup>th</sup> International Conference on<br>Sustainable Animal Agriculture for<br>Developing Countries” from 27-30 <sup>th</sup><br>October 2015, at Pattaya, Thailand<br><br>“In situ evaluation of heat treated<br>vegetable protein sources”                                   | Rs.122,160/- |

|     |  |  |              |
|-----|--|--|--------------|
|     | Uthal, Balochistan.<br>TG-II(1624)/15  |  |              |
| 11. | Dr. M. Naeem Khan<br>Senior Scientific Officer,<br>Applied Chemistry Research<br>Center PCSIR Laboratories<br>Complex<br>Lahore.<br>TG-II(1625)/15                 | “1 <sup>st</sup> International Conference on Applied Chemistry” from 18-19 <sup>th</sup> November 2015 at Jeddah, Saudi Arabia<br><br>“Tetracyclic Heteroaromatic Systems-Synthesis of ethoxycarbonyl-phenyl-pyrido [3’, 2’:5,6] thiopyranoquinolines”           | Rs.94,299/-  |
| 12. | Dr. Habib Ahmad<br>Vice Chancellor,<br>Hazara University<br>Mansehra.<br><br>TG-II(1639)/15  | “2 <sup>nd</sup> International Plant Breeding Congress & EUCARPIA-Oil and Protein Crops Section Conference” from 01-05 <sup>th</sup> November 2015, at Antalya, Turkey<br><br>“Evaluation of Production Technologies for Seed Yield of Iron Weed”                | Rs.150,000/- |
| 13. | Dr. Abid Hussain<br>Lecturer,<br>Faculty of Veterinary and<br>Animal Science,<br>University of Poonch,<br>Rawalakot, Azad Jammu and<br>Kashmir.<br>TG-II (1661)/15 | “International Conference on Bioscience and Biotechnology -2016” from 12-14 <sup>th</sup> January 2016, at Colombo, Sri Lanka.<br><br>“Molecular characterization of coagulase Genes of <i>Staphylococcus Aureus</i> isolated from Mastitic River Buffaloes”     | Rs.150,000/- |
| 14. | Dr. M. Haris Aziz<br>Assistant Professor,<br>Industrial Engineering<br>Department, University of<br>Engineering and Technology<br>Taxila<br>TG-II (1670)/15        | “6 <sup>th</sup> International Conference on Industrial Engineering and Operations Management” from 8 – 10 <sup>th</sup> March 2016, at Kuala Lumpur, Malaysia.<br><br>“Application of concurrent engineering for collaborative learning and new product design” | Rs.150,000/- |
| 15. | Dr. Farid Asif Shaheen<br>Assistant Professor,<br>Department of Entomology,<br>PMAS Arid Agriculture<br>University<br>Rawalpindi.                                  | “2 <sup>nd</sup> Kuala Lumpur International Agriculture, Forestry and Plantation Conference 2016” from 20 – 21 <sup>st</sup> February, 2016 at Kuala Lumpur, Malaysia.<br><br>“Comparative aptness of plant  | Rs.150,000/- |

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|     | TG-II (1677)/16  | products with chemical-based standard grain protectant against <i>Callosobruchus chinensis</i> L. attacking chickpea grains in storage”  |              |
| 16. | Dr. Imtiaz Khan<br>Assistant Professor,,<br>Department of Weed Science,<br>University of Agriculture,<br>Peshawar.<br><br>TG-II (1688/16                           | “International Conference on Advances in Natural and Applied Science” 21 – 23 <sup>rd</sup> April, 2016 at Antalya, Turkey.<br><br>“Weed management in maize ( <i>Zee mays</i> L.) through different control strategies”   | Rs.150,000/- |
| 17. | Mr. Asif Iqbal Butt<br><br>Deputy Chief Manager,<br>Project Management<br>Organization,<br>Rawalpindi.<br><br>TG-II (1689)/16                                      | “19 <sup>th</sup> World Conference on Non-destructive Testing” 13 <sup>th</sup> – 17 <sup>th</sup> June, 2016 at Munich, Germany.<br><br>“Optimization of Spot Welding Processes in Low Carbon Hot Rolled Sheets”  | Rs.66,276/-  |
| 18. | Dr. Muhammad Afzal<br><br>Professor/Dean ,<br>Faculty of Agriculture,,<br>Department of Entomology,<br>University of Sargodha,<br>Sargodha.<br><br>TG-II (1695)/16 | “13 <sup>th</sup> Asian Apicultural Association Conference” 24 – 26 <sup>th</sup> April, 2016 at Jeddah, Saudi Arabia.<br><br>“Relative efficacy of natural occurring chemicals for control of varroa mites, Varroa destructor (Anderson and Trueman) on Honey bees ( <i>Apis mellifera</i> L.)” | Rs.150,000/- |
| 19. | Dr. Rozina Khattak<br><br>Assistant Professor,<br>Department of Chemistry,<br>Shaheed Benazir Bhutto<br>Women University, Peshawar.<br><br>TG-II (1702)/16         | “7 <sup>th</sup> Jordanian International Conference of Chemistry” from 19 – 21 <sup>st</sup> April, 2016 at Irbid, Jordan<br><br>“Thermodynamic Aspect: Kinetics of the oxidation of 1-(ferrocenyl)-ethanone/ethanol”  | Rs.109,000/- |
| 20. | Dr. Shamim Akhter<br><br>Associate Professor,<br>Department of Zoology,<br>PMAS Arid Agriculture<br>University,<br>Rawalpindi.<br><br>TG-II (1703)/16              | “15 <sup>th</sup> Chulalongkorn University Veterinary Conference” from 20 – 22 <sup>nd</sup> April, 2016 at Bangkok, Thailand<br><br>“Cryopreservation of Nili-Ravi ( <i>Bubalus bubalis</i> ) Buffalo Bull Sperm: The Role of Antifreeze Glycoprotein’s (AFGPs)”                                | Rs.127,000/- |

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| 21. | Dr. Naveed Zafar Ali<br><br>Senior Scientific Officer,<br>National Center for Physics<br>(NCP), Quaid-I-Azam<br>University,<br>Islamabad.<br><br>TG-II (1709)16 | “The Annual scientific meeting of the American crystallographic Association” from 22 – 26 <sup>th</sup> July, 2016 organized by Brigham Young University at Utah, USA<br><br>“Magneto-structural relationship in the tetrahedral spin-chain oxide CsCoO <sub>2</sub> ”                                  | Rs.150,000/- |
| 22. | Mr. Asif Javed<br><br>Assistant Professor,<br>Department of Earth and<br>Environmental Sciences,<br>Bahria University, Islamabad.<br><br>TG-II (1726)16         | “6 <sup>th</sup> International Congress (Arsenic in the Environment)” from 19 – 23 <sup>rd</sup> June, 2016 at Stockholm, Sweden.<br><br>“Continuous use of arsenic contaminated irrigation water: a future threat to sustainable agriculture in Pakistan”  | Rs.141,594/- |
| 23. | Dr. Rafat Saeed<br><br>Assistant Professor,<br>Federal Urdu University of<br>Arts, Science and Technology,<br>Islamabad.<br><br>TG-II (1734)16                  | “Training on Wheat miRNAs” from 14 – 30 <sup>th</sup> May, 2016 at Beijing, China.<br><br>“Training”  | Rs.66,710/-  |
| 24. | Dr. Nuzhat Afsar<br><br>Assistant Professor,<br>Institute of Marine Science,<br>University of Karachi,<br>Karachi.<br><br>TG-II (1745)16                        | “Training Course on Marine Radiochemistry” from 8 – 10 <sup>th</sup> June, 2016 organized by Xiamen University at Xiamen, China<br><br>“Training”   | Rs.60,000/-  |
| 25. | Ms. Izzah Shahid<br><br>PhD Scholar,<br>Biological Science Department,<br>Forman Christian college,<br>Lahore.<br><br>TG-II (1747)16                            | “International Conference on Beneficial Microbes” from 31 May – 2 <sup>nd</sup> June, 2016 at Phuket, Thailand<br><br>“Identification and comparison of secondary metabolites produced by <i>Pseudomonas chlororaphis</i> and <i>P. aurantiaca</i> strains isolated from cactus, cotton and para grass” | Rs.116,981/- |

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| 26. | Mr. M. Mubashar Hussain<br><br>PhD Scholar,<br>University College of<br>Agriculture, University of<br>Sargodha,<br>Sargodha.<br><br>TG-II (1749)16              | “19 <sup>th</sup> International Sunflower<br>Conference” from 29 May – 3 <sup>rd</sup> June,<br>2016 at Edirne, Turkey<br><br>“Exploring drought tolerance related<br>traits in <i>Helianthus argophyllus</i> ,<br><i>Helianthus annuu</i> and their hybrids”   | Rs.171,550/-     |
| 27. | Dr. Abida Farooqi<br><br>Assistant professor,<br>Deptt. of Environmental<br>Sciences,<br>Quaid-i-Azam University,<br>Islamabad.<br><br>TG-II (1751)16           | “6 <sup>th</sup> International Congress on Arsenic<br>in the Environment” from 19 – 23 <sup>rd</sup><br>June, 2016 at Stockholm, Sweden<br><br>“Arsenic exposure in drinking water a<br>growing health threat: well testing in<br>outskirts of Lahore to identify wells<br>low in arsenic to mitigate the as crisis<br>in Pakistan” | Rs.150,000<br>/- |
| 28. | Dr. Nadeem Anwer Qureshi<br><br>Deputy GM (Tech)<br>Frontier Works Organization,<br>Islamabad.<br><br>TG-II (1752)16  | “Training on Advanced Material<br>Characterization using Material<br>Testing System (MTS)” from 20 –<br>27 <sup>th</sup> June, 2016 at Lafayette, USA<br><br>“Training”   | Rs.147,600/-     |
| 29. | Dr. Hammad M. Cheema<br><br>Assistant Professor,<br>SEECS –NUST<br>Islamabad<br><br>TG-II (1761)16  | “2016 IEEE APS – Symposium on<br>Antennas and Propagation” from 26 <sup>th</sup><br>June– 1 <sup>st</sup> July, 2016 at Puerto Rico,<br>USA<br><br>“Frequency band utilization<br>enhancement for chip-less RFID tag<br>through place value encoding”   | Rs.143,300/-     |
| 30. | Dr. Muhammad Ismail<br><br>Assistant Professor,<br>Department of Statistics,<br>COMSATS Institute of<br>information Technology,<br>Lahore<br><br>TG-II (1770)16 | “International Conference for<br>Engineering & Technology” from<br>May 23 – 27 <sup>th</sup> , 2016 at<br>Massachusetts, USA<br><br>“Generalized regression-cum-ratio<br>estimators for estimation of population<br>mean using multi-auxiliary variables<br>under non-response”   | Rs.160,000<br>/- |

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| 31.          | Dr. M. Inayatullah Khan Babar<br><br>Professor,<br>Department of Electrical<br>engineering, UET Peshawar.<br><br>TG-II (1788)16               | “82 <sup>nd</sup> International Conference on Recent Innovations in Engineering and Technology (ICRIET)” from 22 – 23 <sup>rd</sup> , June 2016 at Boston, USA.<br><br>“Framework for implementation of National Electrical Safety Grounding Standards for communication infrastructure” | Rs.180,000<br>/-             |
| 32.          | Prof. Dr. Nasim Ahmad<br>Dean,<br>Department of Theriogeology<br>University of Veterinary &<br>Animal Sciences, Lahore<br><br>TG-II (1796)/16 | “18 <sup>th</sup> International Conference on Animal Reproduction” from June 26 – 30 <sup>th</sup> , 2016 at Paris, France.<br><br>“New strategies to enhance buffalo production”  | Rs.175,000 /-                |
| <b>Total</b> |   |  | <b>Rs. 4.239<br/>Million</b> |

**ANNEXURE-XIII****Activities of Science Talent Farming Scheme During 2015-16****(Rs in Million)**

| <b>Sr. #</b> | <b>Items</b>   | <b>PSDP Allocation</b> | <b>Expenditure (2015-16)</b> |
|--------------|--|------------------------|------------------------------|
| 1.           | <b>* Establishment of National Science School</b>  |                        |                              |
|              | i. Purchase of Land  | 169.021                | -                            |
|              | ii. Construction of Boundary Wall including Gates and Guard Room                                 | -                      | -                            |
|              | iii. Design Consultancy Fee  | 100.00                 | -                            |
| 2.           | <b>Advertisements about STFS and selection of students</b>                                       | 1.25                   | 0.567                        |
| 3.           | <b>Selection / Monetary Benefits for the students</b>  |                        |                              |
|              | i. Test / Assessment activities  | 3.00                   | -                            |
|              | ii. Monetary Benefits for selected students  | 40.8                   | 37.012                       |
|              | iii. Procurement of 750 Laptop for Students, Mentors @55,000                                     | 24.75                  | -                            |
|              | iv. Internet connectivity for 750 Students/ Mentors @18,000                                      | 8.10                   | -                            |
| 4.           | <b>Additional Interventions</b>  |                        |                              |
|              | i. Visit to S&T Organizations/ labs boarding/ lodging (@3000 per year/ student) by Mobile labs   | 0.90                   | 0.90                         |
|              | ii. International Visits to high tech labs for 25 students yearly @0.40M                         | 10.00                  | 6.512                        |
|              | iii. Summer colleges boarding/ lodging @6000 each student  | 1.80                   | 1.800                        |
|              | iv. Presentations, Planetarium/ Film Shows, interaction with scientists etc. through mobile Labs | 9.00                   | 4.638                        |
|              | v. Acquiring /Licensing Learning Apps from local/ international Software Developers              | 5.00                   | -                            |
| 5.           | <b>Special activities of the project</b>   |                        |                              |
|              | i. Research Projects for Students  | 9.00                   | 0.749                        |
|              | ii. Inquiry Based Science Education Sessions for Students and Teachers                           | 4.500                  | 0.985                        |
|              | iii. Website of the Project, Software Development for students' Data/record                      | 2.00                   | -                            |
| 6.           | <b>Salaries / Allowances/ Honorarium</b>   |                        |                              |
|              | i. Salaries of Project staff   | 5.94                   | 0.086                        |
|              | ii. Honorarium to 36 Mentors @100,000 per year   | 3.600                  | -                            |
|              | iii. Honorarium to 72 Science Teachers @48,000 per year  | 3.456                  | -                            |
| 7.           | Strengthening of Mobile Labs, Addition of working models   | 36.00                  | 3.181                        |
| 8.           | Transport  | 5.800                  | 5.80                         |
| 9.           | Office Furniture/Equipment and other facilities For the Project Management Unit                  | 4.583                  | 1.874                        |
| 10.          | Contingencies including POL and other Misc expenses  | 1.50                   | 0.614                        |
|              | <b>Total</b>   | <b>450.00</b>          | <b>64.718</b>                |