

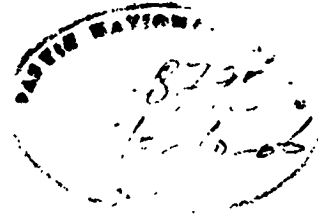
Annual Report

**19 96**

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**Pakistan Science Foundation**



# **PAKISTAN SCIENCE FOUNDATION**

**ANNUAL REPORT  
1996-97**

**PAKISTAN SCIENCE FOUNDATION  
CONSTITUTION AVENUE  
ISLAMABAD**

## LETTER OF TRANSMITTAL

Dear Mr. Secretary,

I have the honour to enclose herewith the Annual Report of the Pakistan Science Foundation for the Fiscal year 1996-97, alongwith its audited accounts as adopted by PSF Board of Trustees for submission to the National Assembly as required by the Pakistan Science Foundation's Act No. III of 1973.

With regards

Yours Sincerely

**Dr. Khalid Mahmood Khan**  
Chairman  
Pakistan Science Foundation  
Islamabad

Secretary  
Ministry of Science and Technology  
Government of Pakistan  
Islamabad

# PAKISTAN SCIENCE FOUNDATION

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**Dr. Khalid Mahmood Khan**

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Dr. Munir Ahmed Bhatti Member Science

Mr. Faris Rehman Khan Director/Member Finance

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12. Prof. Dr. M. Arslan, Ex-Vice Chancellor, Quaid-e-Azam University, Islamabad.

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14. Dr. N.M. Butt, Ex-Director PINSTECH, Nilore, Islamabad.
15. Prof. Dr. Atta-ur-Rehman, Director, H.E.J. Research Institute of Chemistry, University of Karachi, Karachi.
16. Dr. G.M. Khattak, Ex-Vice Chancellor, NWFP Agricultural University, Peshawar.
17. Engr. A. Karim Khan, Ex-Vice Chancellor, NWFP University of Engineering and Technology, Peshawar.
18. Dr. Ghulam Sarwar Garani, Principal, Bolan Medical College, Quetta.
19. Mr. Aezaz Hussain, Managing Director, Systems (Pvt.) Limited and Member Pakistan Federation of Chamber of Commerce, Lahore.

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## LIST OF ABBREVIATIONS

### Provinces

AJK	Azad Jammu and Kashmir
B	Balochistan
C	Centre
F	Frontier
P	Punjab
S	Sindh

### Sponsoring Institutions

AKU	The Aga Khan University
AU	Agricultural University
AEARC	Atomic Energy Agricultural Research Center
BU	Balochistan University
BZU	Bahauddin Zakaria University
CEME	College of Electrical and Mechanical Engineering, Rawalpindi
CSIR	Council of Scientific and Industrial Research
DRIP	Drainage and Reclamation Institute of Pakistan
EU	Engineering University
GC	Government College, Lahore
GU	Gomal University
KU	Karachi University
IIBC	International Institute of Biological Control
NCEAC	National Centre of Excellence in Analytical Chemistry
NIBGE	National Institute for Biotechnology and Genetic Engineering
NIAB	Nuclear Institute for Agriculture and Biology
NSFC	National Science Foundation of China
PDC	Poultry Development Centre
PINSTECH	Pakistan Institute of Nuclear Science and Technology
PU	Peshawar University/Punjab University
QU	Quaid-e-Azam University
SU	Sindh University
PCCC	Pakistan Central Cotton Committee
UCR	University College of Rawalakot



## Disciplines

<b>Agr</b>	<b>Agricultural Sciences</b>
<b>Bio</b>	<b>Biological Sciences</b>
<b>Eng</b>	<b>Engineering Sciences</b>
<b>Med</b>	<b>Medical Sciences</b>
<b>Phys</b>	<b>Physical Sciences</b>
<b>Chem</b>	<b>Chemical Sciences</b>
<b>Math</b>	<b>Mathematical Sciences</b>
<b>Earth</b>	<b>Earth Sciences</b>
<b>Envr</b>	<b>Environmental Sciences</b>

## EXECUTIVE SUMMARY

### PAKISTAN SCIENCE FOUNDATION (PSF)

Pakistan Science Foundation is the apex body for promotion and funding of scientific and technological activities in the country. The activities undertaken by the Foundation for the performance of its statutory functions are divided into three broad categories:

- i) To promote basic and fundamental research in universities and research institutes on scientific problems related to socio-economic needs/development of the country.
- ii) To increase public awareness about science through science promotion activities by establishing museum, clubs, herbaria and planetaria etc.
- iii) To establish centers for comprehensive scientific and technological information systems.

The activities of the Foundation revolve around these objectives, some of which are undertaken through 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 the PSF Science Wing, and are reflected in the following.

### **RESEARCH SUPPORT:**

Research support is the principal program of the Foundation for the promotion of basic and fundamental research relevant to the socio-economic needs of the country. During 1996-97, a total of 171 projects in the fields of Agriculture, Biology, Chemistry, Earth, Engineering, Environment, Medical and Physics remained under consideration for funding. Among these, 56 projects were newly received while 115 had been carried over from the previous year. Among these, 30 projects costing Rs. 13.072 million were sanctioned in various fields. In addition, an amount of Rs. 0.250 million was released to two academic organizations as institutional support grant for purchase of laboratory equipment and accessories, and books.

Monitoring and evaluation of the on-going research projects sponsored by PSF is an important function of the Research Support Programme. During the year, 82 technical reports of ongoing studies including semi-annual and annual reports were received and assessed by the staff and experts. During the period under report, 18 studies/projects in various fields were completed. The final reports of these projects were reviewed by the PSF experts. The studies completed during the year were:

1. Fate of Nitrogen-15 Fertilizer in Soil Plant System as Influenced by Nitrification Inhibitor.
2. Application of Molecular Approach Towards Biological Nitrogen Fixation (BNF) in Azad Kashmir.
3. Fish as a Bio-indicator of Freshwater Contamination by Metals.
4. Utilization of Intraspecific and Alien Genetic Variation for Inducing and Enhancing Salt Tolerance of Bread Wheat.
5. Modelling Integrated Control For Maize Smuts in the NWFP.
6. Taxonomic Studies on Grasshoppers and Locusts (*Acridoidea: Orthoptera*) of Pakistan.
7. Genetic Variation in the Morphological Characteristics, Chemical Composition and Rumen Digestibility of Wheat Straw Cultivars Grown in N.W.F.P.
8. Use of Rhizobium Biofertilizer for Increasing the Production of Food Legumes.
9. Biological and Chemical Transformation of Phosphorus and its availability to plants in NWFP soils.
10. Transformation Studies of Rice *Oryza sativa*.

11. Ecophysiology of Indus Delta Mangroves.
12. Microbial Transformation (Biotransformation) of Natural Anti-tumor Agents.
13. Process Development for the Manufacture of 6-Amino-Penicillanic Acid (6-APA) from Penicillin.
14. Isolation and Characterization of Flavonoids Having Potential Agricultural Applications.
15. Isolation of Cytotoxic Compounds from Marine Animals.
16. Isolation, Purification and Characterization of Anti-bacterial/Anti-fungal Properties of Peptides of Plants.
17. Optical Characterization of Defects in Semi-conductors.
18. Solar Tents for Snow Bound Areas.

The major achievements of above projects are highlighted below.

- The loss of nitrogen fertilizers due to leaching in silty-clay-loam soils of NWFP can be reduced by using nitrification inhibitor.
- An indigenous species of Rhizobium, i.e., *R. trifolii* (UCR-3) was found to be the best to enhance crop production in Azad Kashmir.
- Three freshwater fish species, viz. *Catla catla*, *Labeo rohita* and *Cirrhina mrigala* were found to be on the verge of extinction in the Ravi river system.
- A new salt tolerant wheat variety, '**Kiran-95**' was developed and released as a better suited variety for cultivation in calcareous soils of Sindh.
- For an effective control of maize smuts and better maize production in NWFP, an Integrated Disease Management Model (IDMM) was developed, wherein, maize cultivar "Pahari" seed treated with Dithene M-45 is planted and NPK fertilizer @ 100:50:0 kg/ha with the plant population of 75000 plants per hectare is used.
- Some 118 species/subspecies of Grasshoppers and Locusts were identified and catalogued across Pakistan for developing better management strategies.
- It was found that humic acid can be utilized as a fertilizer and soil conditioner to boost up agricultural production.
- Mangrove species *Avicennia marina* was found to be salinity-tolerant and proved that it can be grown for rehabilitation of the degraded areas in arid environment.
- Natural anti-cancer compounds were microbially transformed to be more active against human cancer cells.
- An indigenous bacterium, *E. coli* (PCSIR-231) was identified for producing enzymes locally which are imported at the moment.
- Flavonoids and peptides/ glycosids isolated from various plants were found to have anti-bacterial and anti-fungal properties and may be developed as pollution-free bio-pesticides
- The concept of using solar energy to heat the space has been tested and a Solar Tent to accommodate 2-3 persons has been fabricated and is being used in extremely cold areas of northern Pakistan.

One of the main achievements and usefulness of any research is the publication of results in scientific journals, and through projects. 30 research papers were published in different scientific journals. In addition, two Ph.D., three M. Phil and a number of M. Sc. degrees were awarded to the Research Associates employed in the PSF-supported projects.

Scientific research was further supported by giving annual grants-in-aid to various societies for publication of technical journals. During the year a total amount of Rs. 0.650 million was released for the purpose. Furthermore, holding of 28 conferences was supported through partial financial assistance costing Rs. 0.563 million, and three scientists were given travel grants to participate in international conferences abroad.

## **SCIENCE POPULARIZATION:**

Popularization of Science is one of the statutory functions of Pakistan Science Foundation. Popularization and promotion of science has also been emphasized in the National Science and Technology Policy. The Foundation is engaged in science popularization activities at national level with the aim of increasing awareness about the role played by science in the development of the nations. In order to achieve this objective, the Foundation has taken up a number of programs including science exhibitions, fairs, science film shows, popular science lectures and science quiz competitions etc. as summarized below.

Science Caravans (Mobile Science Exhibitions) of Pakistan are the main mode of science popularization at school level, particularly in the rural areas of the country. Through these exhibitions, people are exposed to some of the most fascinating scientific and technological developments of the modern world. All narration is in national language and are accompanied with simple illustration. Presently, five science caravan units, viz., Federal, Sindh, Balochistan, Punjab and NWFP are in operation. During the year, the Caravan Units organized 16 mobile exhibitions and planetarium shows, where 205 school brought their students to see the exhibitions and shows.

Science exhibition contest was also organized for school/college students through their Boards of Intermediate and Secondary Education (BISE) and the prizes were awarded to the winners. In this regard, a science Day-1996 too was held jointly with the National Museum of Science & Technology, Lahore.

In addition, Summer School by BISE Gujranwala was financially supported, and All Pakistan Intra Board Science Quiz, Science Essay Competitions, and Inter Board Science Poster Contests were held during the year. Science books, magazines and posters were also donated to more than 8000 Science Clubs in the country.

Another major activity for popularization of science is to organize popular lectures on important scientific topics by eminent scientists in the county. During the year, six lectures and two seminars were arranged at various places on the topics related to Environment, Natural Resources, Biotechnology, Biology and Physics.

## **S&T STRATEGIES: PRIME MINISTER'S PAKISTAN-2010 PROGRAM:**

A special meeting of eminent scientists and engineers was convened at Pakistan Science Foundation on 23<sup>rd</sup> May 1997 to discuss the issues and options for the Development of Science & Technology Strategies for the Prime Minister's 2010 Program. It was attended by 38 eminent scientists and policy makers and was chaired by Engr. Ahsan Iqbal, Chief Coordinator, Prime Minister's Pakistan-2010 Program.

## **PSF PUBLICATIONS:**

The Foundation from time to time or as and when needed, collects various S&T related statistics not compiled by any other organization for the benefit of policy makers and scientists at large. During the year following directories/booklets were published.

1. A to Z Directory of Ph.D. Professionals of Science, Engineering & Technology, 1996, compiled by Dr. Munir Ahmed Bhatti, Member (Science).
2. Directory of PSF Funded Projects (1973-1996), compiled by Dr. Munir Ahmed Bhatti, Member (Science).

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

Pakistan Museum of Natural History (PMNH) is an important scientific organization carrying out environmental and biodiversity research in the country as well as promoting informal education and public awareness about our natural wealth. It is a subsidiary organization of Pakistan Science Foundation and was established in 1979 to serve 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.

PMNH continued with its research and public education programs during the year under review. A total of 18 field trips were undertaken to various parts of the country in order to collect natural history specimens. An overseas exploration trip was also undertaken in northern Italy. About 8,000 specimens of plants, animals, minerals and fossils were collected and processed in the laboratories for their identification, analyses and curation. Twenty research papers were published in national and international journals.

In addition to research endeavours, the Museum organizes various activities for education and promotion of natural history concepts. Such activities include holding of seminars and symposia etc. and assistance to other institutions for establishment of museums and galleries. In this regard, a 2-day symposium on "Economic Geology of Pakistan" was held in March 1997 in Islamabad, and assistance was provided to Pakistan Navy for the establishment of Maritime Museum in Karachi. Moreover, many M.Sc. M.Phil and Ph.D. students from different organizations/universities were helped and provided facilities with respect to identification and other research activities. Research collaboration with international organizations also continued, including those with IUCN, WWF, BBC Natural History Unit, UK, Florida Museum of Natural History, USA and Oxford University, UK.

The Public Services Division (PSD) of PMNH upgraded the display facility of the Museum. An hour long video film of PMNH and its activities was prepared at the museum's own Audio-Visual Centre, donated recently by the Japanese Government. The public education through displays also continued and more than 50,000 persons visited the Museum Display Centre and Display Corner during the report period.

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

PASTIC is one of the organs of PSF established to undertake the establishment of comprehensive scientific and technological information and dissemination centres. Its main objective is to collect, organize, classify and disseminate information in all disciplines of Science and Technology to the scientific community of Pakistan.

With its National Centre at Islamabad and four sub-centres at Karachi, Lahore, Quetta and Peshawar, PASTIC develops inter-library cooperation for sharing resources, establishes and maintains links with international/regional information networks/agencies. It trains information specialists in modern information handling and management techniques.

During report period, 2,656 requests for supply of articles were received, against which 2,305 were honored. Similarly, 1512 tables of contents from journals of different subjects were provided to

scientists and copies of 115 articles were supplied to users. In addition, against 404 orders, 22,622 references were collected and supplied to researchers. PASTIC publishes "Pakistan Science Abstracts" on regular basis. During the report period, four issues were finalized and composed. Similarly on the basis of information on technology, collected from 27 countries, three issues of the monthly bulletin, "Technology Information" were published and supplied to more than 150 industrial/technological establishments and traders etc. Under Reprographic services of PASTIC, about 6,11,117 impressions, 1673 pages and 104,822 copies were produced against 103 jobs received from 11 S&T organizations. PASTIC library added to its collection some 125 books, 157 documents and 943 periodical issues during the report period

International liaison is the prominent activity of PASTIC as it is the National Focal Point for International/Regional Information Networks, like SAARC Documentation Center, WHO/CEHANET and UNEP/INFOTERRA. The PASTIC also acts as coordinating/collaborating body for UNDP/TIPS, UNESCO/ASTINFO etc. During the report period, information/data from these organizations was collected and disseminated to various institutions and professionals. In addition, certain packages including CDS/ISIS and IDAMS were provided to various organizations. PASTIC also trains information specialists in modern information handling and management techniques. In this connection, certain trainings and lectures were arranged at National and International level during the report period. A SAARC workshop on "Intellectual Property Rights" was organized in Islamabad in December 1996.

PASTIC's allied technological information promotion system (TIPS) remains always busy to publish upto date information on technology and trade opportunities. It covers 14 different sectors for carrying over the required information from the developing countries. During the report period, 5,500 technology/trade offers and requests received from 25 countries were disseminated to users. Subsequently, 260 Pakistani entrepreneurs/business organizations were provided information as required. It also arranged computer exhibition in Lahore and has published a book "Baroon-e-Mulk Tijarat" on Trade and Technology in urdu language.

## INTRODUCTION

Pakistan Science Foundation was established on June 30, 1973 under the Pakistan Science Foundation Act No. III as an autonomous body to promote and finance scientific and technological activities having a bearing on the socio-economic needs of the country. 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 economy of the country, and
- ix) special scientific surveys not undertaken by any other organizations 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, and
- iii) establish liaison with similar bodies in other countries.

The activities performed under the above mentioned statutory functions are given in the chapters that follow.

## CHAPTER - 1

### **ACTIVITIES & PROGRAMMES**

The Activities and Programs undertaken by the Foundation for the performance of its statutory functions can be broadly divided into the following four categories.

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

The first activity is carried out through Pakistan Scientific and Technological Information Centre (PASTIC), a subsidiary organization of PSF. The other functions i.e., research support, science popularization etc. are performed by the Science Wing of the Foundation. Functions of the Science Wing of PSF are further subdivided as under:

**(I) Research Support Sections** performing the following activities.

1. Research Support
  - a) Grants for Research Projects
  - b) Institutional Support
2. Research Evaluation
3. Promotion of Scientific Societies/Learned Bodies
4. Travel Grants
5. International Liaison
6. Awards and Fellowships
7. Survey and Statistics
8. Scientists Pool
9. Planning and Development Program

**(II) Science Popularization Section**, which carries out the following activities;

1. Science Popularization Activities including Science Caravans, Science Clubs, Science Fairs and holding Popular Science Lectures.
2. Funding for Conferences, Symposia, Seminars, Workshops



In addition to PASTIC, the other subsidiary organization of PSF is the Pakistan Museum of Natural History (PMNH), 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.

The progress of the work carried out by the Science Wing of the Foundation, PMNH and PASTIC during the year 1996-97 is summarized in the following pages.

# **PAKISTAN SCIENCE FOUNDATION (PSF)**

## **I. RESEARCH SUPPORT SECTIONS**

### **1. RESEARCH SUPPORT**

During the year under report the Foundation carried out a number of programs for the promotion of basic and fundamental research in universities and other institutions on scientific problems relevant to the socio-economic development of the country. These programs include:

- (a) Grants to research projects submitted by individuals or groups of scientists in the universities and research institutions throughout the country.
- (b) Institutional support to scientific institutions for provision of equipment, literature, staff training facilities, etc. to build institutional capability for conducting research.
- (c) Support for participation in regional and international research programs.

#### **a) Grants for Research Projects**

Research Support is the principal program of Foundation for the promotion of basic and fundamental research having relevance to the socio-economic needs of the country. During the period under report, 56 projects requesting for funds totaling more than Rs. 50.000 million were received by the Foundation, whereas 115 projects proposal, at various stages of their processing, were brought forward from the previous year. Thus, in all 171 projects in the fields of Agriculture, Biology, Chemistry, Earth Sciences, Engineering, Environment, Medical and Physics remained under active consideration of the Foundation. The proposals were examined by the experts in the relevant fields in the light of their scientific merit and relevance to the national needs according to the criteria laid down by the Foundation.

The criteria for research are: competence of the scientific personnel to carry out the research, institutional capability i.e., availability of requisite equipment and library facilities, scientific merit of the proposed research, and likelihood of completion of the project within the stipulated time. Each proposal, after getting a favourable review report by an expert in that particular field, is placed before the Technical Committees for technical evaluation and Executive Committee of the Foundation for final approval.

During the year, only 30 project proposals succeeded in getting the approval of the Foundation at an estimated cost of Rs. 13.072 million. Details of the newly approved projects are given in Annexure-II.

#### **b) Institutional Support**

Pakistan Science Foundation assists the universities and research institutions in the provision of equipment, chemicals, literature etc. to research workers who, for one reason or another, are unable to obtain these from their own institutions and it is established that such support would lead to quick progress of research of national significance. The emphasis is on fostering and equipping multi-disciplinary research units directed towards the solution of problems in areas of high research priority. During the report period, an amount of Rs. 0.25 million was sanctioned to the following institutions.

<u>Institution</u>	<u>Purpose</u>	<u>Amount</u>
Institute of Chemistry, University of the Punjab, Lahore.	Purchase of Hydrogen Gas Generator.	Rs. 0.10 million
National Center of Excellence in Physical Chemistry, University of Peshawar, Peshawar	Purchase of Spare Parts for FI- IR Spectra Physics Laser DLS Photometer	Rs. 0.15 million

## 2. RESEARCH MONITERING AND EVALUATION

The Foundation evaluates the technical progress as well as fiscal position of on-going projects continuously till the completion of the projects. During the year, a total of 82 reports (semi-annual, 1st & 2nd annual and final) were received and evaluated as per the procedure laid down for reviewing the progress of scientific research and evaluating the results of such research.

### a) On-Going Projects

During the year, 64 semi-annual and first & second-annual reports received after the initiation of each project or after the submission of the annual reports were scrutinized by the Research Support Sections to assess the interim progress of these projects, and to release their next due instalments. The details of reports are given in Annexure-III.

### b) Completed Projects

The final technical reports of 18 research projects were received during the year 1996-97. The reports were evaluated by the subject experts and were subsequently submitted along with reviewers' comments to the relevant PSF Technical Committees for consideration and adoption. Titles of the completed projects followed by their summaries are given below.

#### i) List of Completed Projects

<u>S. No</u>	<u>Project No.</u>	<u>Project Title:</u>
1.	F-AU/Agr(121)	Fate of Nitrogen-15 Fertilizer in Soil Plant System as Influenced by Nitrification Inhibitor.
2.	AJK-UCR/Agr(126)	Application of Molecular Approach Towards Biological Nitrogen Fixation (BNF) in Azad Kashmir.
3.	P-AU/Agr(128)	Fish as a Bio-indicator of Freshwater Contamination by Metals.
4.	S-AEARC/ Agr (131)	Utilization of Intraspecific and Alien Genetic Variation for Inducing and Enhancing Salt Tolerance of Bread Wheat.
5.	F-AU/Agr (133)	Modeling Integrated Control For Maize Smuts in the NWFP
6.	P-AU/Agr (134)	Taxonomic Studies on Grasshoppers and Locusts (Acridoidea: Orthoptera) of Pakistan.

- |     |                   |   |
|-----|-------------------|---|
| 7.  | F-AU/Agr (135)    | Genetic Variation in the Morphological Characteristics, Chemical Composition and Rumen Digestibility of Wheat Straw Cultivars Grown in N.W.F.P. |
| 8   | P-NIBGE/Agr(136)  | Use of Rhizobium Biofertilizer for Increasing the Production of Food Legumes.   |
| 9.  | F-AU/Agr(149)     | Biological and Chemical Transformation of Phosphorus and its Availability to Plants in NWFP Soils   |
| 10  | P-PU/Bio(187)     | Transformation Studies of Rice <i>Oryza Sativa</i> .  |
| 11  | S-KU/Bio(201)     | Ecophysiology of Indus Delta Mangroves.   |
| 12  | S-KU/Chem (218)   | Microbial Transformation (Biotransformation) of Natural Anti-tumor Agents.  |
| 13. | P-CSIR/Chem (219) | Process Development for the Manufacture of 6-Amino-Penicillanic Acid (6-APA) from Penicillin.   |
| 14  | C-QU/Chem (235)   | Isolation and Characterization of Flavonoids Having Potential Agricultural Applications.  |
| 15  | S-KU/Chem (236)   | Isolation of Cytotoxic Compounds from Marine Animals  |
| 16. | S-SU/Chem (272)   | Isolation, Purification and Characterization of Anti-bacterial/Anti-fungal Properties of Peptides of Plants.                                    |
| 17  | C-QU/Phys (71)    | Optical Characterization of Defects in Semi-conductors.   |
| 18. | P-CEME/Engg (61)  | Solar Tents for Snow Bound Areas  |

## ii) Brief Summaries of Completed Projects

**Project No:** F-AU/Agr(121)  
**Project Title:** Fate of Nitrogen-15 Fertilizer in Soil Plant System as Influenced by Nitrification Inhibitor

Duration: 3 years

Date of Initiation: 1-4-1993

Date of Completion: 31-3-1996

Location of Scheme: NWFP Agricultural University, Peshawar

Principal Investigator: Dr. Zahir Shah

Total Expenditure: Rs. 3,96,614/43

- Main Objectives:**
- To evaluate the effect of nitrification inhibitor nitraphrin (2-chloro-6), (trichloromethyl pyridine) on yield components of maize and wheat
  - To determine the distribution of fertilizer-N in various depths of irrigated fields planted with maize and/or wheat.
  - To monitor the fate of a single application of  $^{15}\text{N}$ -enriched urea in the presence or absence of nitrapyrin over a multi-year period in both soil and plant.

### **Summary of work done:**

A series of field experiments were carried out at the farmer's field in Mardan SCARP area (NWFP) to investigate the influence of nitrification inhibitor (N-serve) on wheat and maize and on the fate of applied nitrogen (N) in the soil plant system using  $^{15}\text{N}$  enriched technique. The effect of split application of N fertilizer was also evaluated and compared with the inhibitor effect on yield and N content of wheat and maize at same experimental site. The effects of inhibitor and the split application of N fertilizer on yields and N contents of wheat and maize were compared. The effectiveness of N-serve on nitrification inhibition was also evaluated in the field at several occasions i.e., 2, 5, 8, 16, 38, and 66 days after application. It was found that the N-serve was effective in controlling nitrification as the concentration of  $\text{NO}_3\text{-N}$  in soil was smaller in the inhibitor than in the no-inhibitor treatment at all occasions.

The yield and N content of wheat increased significantly with N levels and the addition of inhibitor. On the average, the N fertilizer increased the grain yield by 2 tons, dry matter (DM) by 4 tons, and crop N by  $55 \text{ kg ha}^{-1}$ . Similarly, the inhibitor increased the grain yield by 0.3 tons, DM, by 1.4 tons, crop N by  $22 \text{ kg. Ha}^{-1}$  and crop recovery of applied N by 27%. The effect of inhibitor, however, varied with the level of N addition. The inhibitor was generally more effective at the low level of N addition. The research showed that the effectiveness of N fertilizer for wheat grown on the silty clay loam soils in NWFP can be markedly improved by using nitrification inhibitor.

The soil analysis for  $\text{NH}_4\text{-N}$  and  $\text{NO}_3\text{-N}$  at 0-30 and 30-60 cm depth after wheat harvest showed that nitrification inhibitor controlled the leaching losses of  $\text{NO}_3$ . The inhibitor eliminated the nitrification process which resulted into increased concentration of  $\text{NH}_4\text{-N}$  in the surface layer (0-300 cm). Where the nitrification process was not eliminated (meaning inhibitor was not used), the concentration of  $\text{NO}_3\text{-N}$  increased with depth (30-60 cm) which was a clear sign of downward movement of  $\text{NO}_3\text{-N}$  from the surface in the absence of inhibitor treatment.

The  $^{15}\text{N}$ -enriched experiment further revealed that all the yields and yield components (except 1000-grain weight) of wheat were substantially greater in the inhibitor than in the no-inhibitor treatment. Similarly, the N uptake and % recovery of applied N by wheat crop were substantially enhanced by the use of nitrification inhibitor. Out of  $1.5 \text{ kg } ^{15}\text{N -N}$  applied to wheat in the beginning of the experiment,  $1.0116 \text{ kg}$  was recovered by wheat crop in the inhibitor treatment with only  $0.6605 \text{ kg ha}^{-1}$  in the no-inhibitor treatment. It was found that the % recovery of applied  $^{15}\text{N-N}$  in the inhibitor treatment was 67.44% as compared with 44.03% in the no-inhibitor treatment.

By comparing the residual effect of nitrification inhibitor with the split application of N fertilizer on maize, it was found that the split application yielded significantly greater than the inhibitor treatment. This indicated that the effect of nitrapyrin disappeared completely after two and a half year of its

application. This was further confirmed by the soil analysis for  $\text{NH}_4\text{-n}$  and  $\text{NO}_3\text{-N}$  at 0-30 and 30-60 cm where the differences in  $\text{NH}_4\text{-N}$  and  $\text{NO}_3\text{-N}$  concentration were not significant between the inhibitor and no-inhibitor treatment.

**Project No:** AJK-UCR/Agr(126)  
**Project Title:** Application of Molecular Approach towards Biological Nitrogen Fixation (BNF) in Azad Kashmir

Duration: 3 years

Date of Initiation: 15-7-1993

Date of Completion: 14-7-1996

Location of Scheme: University College of Agriculture  
Rawalakot (AJ & K)

Principal Investigator: Syed Dilnawaz A. Gerdazi

Total Expenditure: Rs. 4,23,849/-

Main Objectives: To isolate and evaluate the Rhizobium strains of white clover from different environmental conditions of Azad Jammu and Kashmir.

To study the genetics of Rhizobium regarding plasmid number, the electrophoretic types, protein profiles, intrinsic antibiotic tests and its interaction with host plant (white clover)

To select the best performing strains of Rhizobium under low temperature, low pH and drought, and preparation of Rhizobium inoculum for the development of pasture species of legumes and grasses in order to diversify the un-economic farming system towards dairy and sheep farming industries.

### Summary of work done:

Increasing the agricultural production from marginal soils of Azad Jammu and Kashmir, represents the real challenge for closing the wide gap between production and consumption of food. Most of the area of the State is hilly, the soils are shallow and devoid of vegetative cover. Due to indiscriminate deforestation and overgrazing, the soil erosion is destroying the soil and important natural resource apart from other constituents of the environment like soil micro-fauna and flora. Thus, the soils are subjected to low fertility, drought, low temperature and low pH. The land holdings are small and the use of fertilizers is limited because of economical, atmospheric and environmental reservations. Biological Nitrogen Fixation (BNF) using the biological agents like Rhizobium and pasture legumes in conjunction with pasture species of perennial grasses as a cover crop, holds the key to maximize the agricultural production, to ameliorate the soil conditions, and to reduce the water erosion. The present project was initiated to collect, characterize, test and to manipulate the locally established strains of Rhizobium for various ecological conditions of the area.

The *Rhizobium* isolates collected from various ecological conditions were characterized using conventional and molecular techniques. The conventional techniques including antibiotic resistance, *in-vitro* and *in-vivo* nodulation tests proved that there exists large diversity among the isolates. The isolates showed great potential for BNF under natural conditions, however, their potential could only be exploited if their genetic and biochemical markers are identified. The molecular techniques such as, plasmid profiles and the cellular protein profiles, were investigated to identify some marker genes and their protein products for practical BNF and for the manipulation of DNA-based markers for better activity of the bacteria in plant nodules. Comparisons based on plasmid and protein profiles indicated very interesting information. The isolates differed in nodulation test, and also showed variability in their plasmid and protein profiles. The relationship between plasmid and protein profile was interesting because it depicted the presence of variable genes on plasmids, which produce their influence in the form of protein products. These proteins may have their role against the environmental stresses in which the bacteria are adopted. The status of the genes, once confirmed, would be of great importance because plasmids are easy to handle, manipulate and transfer from one strain to another which may have otherwise desirability in BNF Program. The best performing isolate of *Rhizobium* for local conditions when tested in controlled environment was "UCR 3" of *R. trifolii*. However, in the field tests, it ranked 4<sup>th</sup>.

**Project No: P-AU/Agr (128)**  
**Project Title: Fish as a Bio-indicator of Freshwater contamination by Metals.**

Duration:	3 years
Date of Initiation:	2-5-1993
Date of Completion:	1-5-1996
Location of Scheme:	University of Agriculture, Faisalabad
Principal Investigator:	Dr. Muhammad Javed
Total Expenditure:	Rs. 4,88,321/02
Main Objectives:	To identify the types, specific sources and release of metal bearing effluent and their release at specific riverine system and in other watery environment and their subsequent targets in terms of poisoning symptoms on fish and ultimately on human body.  To identify the residual effects of organic pollutants on the chemical composition of the fish which is released into the market.

To test the river water at different places of the course of the river Ravi for heavy metal toxicants at different distances from the source of their release.

To suggest measures pertaining to remedy for all such losses and improving the breeding capability of indigenous fish species i.e. *Catla catla*, *Labeo rohita* and *Cirrhina mrigala*.

To study the tolerance levels of the three fish species against such toxicants in the laboratory.

### **Summary of work done:**

The effect of aquatic toxicity on the fate and dynamics of planktonic biomass including uptake and accumulation of heavy metals by the fish, plankton and sediments have been studied with a view to assess its ill-effects on the river Ravi aquatic ecosystem. The assessment of eco-toxicity is difficult and complicated process, and therefore parameters by which it was measured are quantitative and relatively basic. However, long-term studies would be necessary for the continuous monitoring of such toxicity levels in water for sustainable conservation of aquatic resource, i.e. river Ravi for freshwater fisheries, irrigation, sports and drinking water.

The assessment of water quality has been made by physicochemical and biological analyses. The role of both plankton and fish as indicators of fresh water contamination by metals has been studied through the computation of regression models. The two year data on heavy metals toxicity levels at all sampling sites were compared with the standards prescribed by the EPA (USA) for safe freshwater fisheries. However, during last three months of the project, metals toxicity in water and their uptake and accumulation by the plankton and sediments were studied and possible relationships among these components of river ecosystem have been established.

The current heavy metals toxicity of water at various points, viz. Farrukhabad nulla, Bakar Mandi nulla, Munshi Hospital nulla, Hudiara nulla, Taj company nulla and Degh fall are extremely high and there has been an increasing tendency towards accumulation of metal in fish, plankton and sediments in riverine ecosystem. Differential water rituality patterns, cultural practices and waste-disposal procedures adopted by the public and sanitation authorities have resulted in considerable degradation of the water quality in Ravi river through out the stretch investigated. At the same time, this river still exhibits a potential for self-purification. However, if we consider rivers as the renal systems of the land spaces, then this kidney system is close to the renal failure at river Ravi. Hence, it is imperative that appropriate steps be taken by both the governmental and public agencies to restore river Ravi from effluent tributary to a natural riverine condition.

During this research endeavor, it has been observed that significant variations in the concentrations of heavy metals in water were due to changes in the volumes of untreated industrial effluents and domestic sewage added continuously into the river through various effluent discharge tributaries. There was considerable deterioration in the quality of river water at discharge points of Farrukhabad nulla, Bakar Mandi nulla, Munshi Hospital nulla, Hudiara nulla, Taj company nulla and Degh fall. The quality of river water improved gradually after Bakar Mandi nulla onwards, except at Khurdpur (the point where Hudiara nulla enters river Ravi), where this river receives large quantities of wastes deteriorating its water quality. The gradual improvement in the quality of river water at Baloki Headworks was due to merging of less polluted tributary, i.e. Q.B Link Canal, into the river. The concentrations of all heavy metals except cadmium and mercury in water samples at all the sampling



stations were found significantly higher than the safe limits for freshwater fisheries and drinking purposes as prescribed by EPA and PHSDWS (USA). All the three freshwater fish species, viz. *Catla catla*, *Labeo rohita* and *Cirrhina mrigala* are on the verge of extinction in the Ravi river system, whereas, *Catla catla* at Shahdera toll tax bridge has already vanished.

Among Phytoplankton, *Bumilleria*, *Cladophora*, *Chlorella*, *Fragilaria*, *Synedra*, *Scendesmus*, *Tabellaria* and *Zygnema* indicated direct relationships with the intensity of pollution at highly polluted sites. Among Zooplankton, *Brachionus* and *Polyarthra* were almost absent at highly polluted sampling stations. However, the genera; *Aphanizomenon*, *Bacillaria*, *Closterium*, *Cyclopedia*, *Cocconeis*, *Cosmarium*, *Chrococus*, *Denticulla*, *Euglena*, *Spirulina*, *Spirogyra*, and *Volvox* showed considerable tolerance against heavy metals toxicity. *Keratella* and *Filinia* appeared to be the tolerant genera against heavy metals toxicity while *Cyclops* and *Philodena* were found as the sensitive forms. The proximate body composition of three fish species namely *Catla catla*, *Labeo rohita* and *Cirrhina mrigala* showed increased total ash, while both muscle proteins and fats decreased with the increase in aquatic metals. Among the three fish species, *Catla catla* showed significantly higher ability to accumulate metals in its body than *Labeo rohita* and *Cirrhina mrigala*. Metal ions in sediments and plankton have also shown direct relationships with the intensity of water pollution. Thus, the present investigation indicated that both plankton and sediments could act as indicators of freshwater contamination by metals in river ecosystem.

**Project No:** S-AEARC/ Agr (131)  
**Project Title:** Utilization of Intraspecific and Alien Genetic Variation for Inducing and Enhancing Salt Tolerance of Bread Wheat

**Duration:** 3 years

**Date of Initiation:** 28-3-1993

**Date of Completion:** 27-3-1996

**Location of Scheme:** Atomic Energy Agricultural Research Centre,  
Tando Jam

**Principal Investigator:** Dr. Khushnood A. Siddiqui

**Total Expenditure:** Rs. 2,52,985/81

**Main Objectives:** To work out profitable exploitation of genetic environmental interactions for promoting salt tolerance in bread wheat.

To apply the new synergetic approach for utilization of intraspecific and alien genetic variation pertaining to salt tolerance

To develop a package of technology for profitable cultivation of salt tolerant varieties.

## Summary of work done:

Screening of Wheat (*Triticum aestivum*) and alien genetic material belonging to the tribe Triticeae has helped in identifying cultivars/lines suited for saline lands. These are being maintained for use in future breeding programs.

Promising cvs/lines of wheat (*Triticum aestivum*) from the above study were used in a treatment trial involving soil amendments with N, P-Fertilizers, Farm Yard Manure and/or Gypsum. The salinity reduced the germination and growth of all the cultivars but Sarsabz and M-283 showed slight superiority over the other cvs/lines under test. The later has recently been released as a new variety 'Kiran-95' for the Sindh province. Irrespective of cultivars, gypsum application gave higher yields followed by enhanced N+P and Farm Yard Manure. The soil amendments did not help in ameliorating the soil which rather deteriorated further during the course of experiment.

Some studies were also initiated on the use of irradiation to induce chromosomal translocations and on hybridization of salt tolerant cultivars with commercial cultivars but these are at a preliminary stage and will be continued under the regular program of wheat breeding at the Centre.

**Project No:** F-AU/Agr (133)  
**Project Title:** Modeling Integrated Control For Maize Smuts in the NWFP

Duration: 3 years

Date of Initiation: 01-05-1993

Date of Completion: 30-04-1996

Location of Scheme: Department of Plant Pathology, NWFP Agricultural University, Peshawar.

Principal Investigator: Dr. Shabeer Ahmed

Total Expenditure: Rs. 3,07,343/43

Main Objectives: To identify suitable sources of resistance, better seed dressing fungicides, balanced fertilizers and optimum level of plant populations.

To establish relationship between disease control factors and maize yield.

To develop a model for integrated control of maize smuts.

## Summary of work done:

Maize is apt to the attack of smut diseases at the high altitudes in the North West Frontier Province (NWFP) of Pakistan, which reduces its productivity by approximately 25% every year. With no proper control of this disease, it is assumed that these losses may increase year after year on account of a number of reasons. Farmers, generally plant susceptible varieties that not only reduce the crop yields but also help in increasing the disease inoculum. Dense planting for dual purpose of food and feed provides

conducive environment for the disease development. Sub-optimal levels of fertilizers make the plants weak and liable to the attack of smuts and the minimal use of fungicides in maize for control of seed/soil borne smuts may increase the disease infection. Thus, more effective methods need to be evolved to warrant effective control of maize smuts. These include the use of resistant varieties, balanced soil fertility, optimum plant density and seed treatment with fungicides. The main objectives of this research were to identify such best controls and to study their synergistic effect into an Integrated Disease Management Model (IDMM) in the NWFP.

During the first two years of the project, several replicated experiments were laid out in Hazara and Malakand Divisions to ascertain the validity of various maize genotypes, fertilizers, seed dressing fungicides and plant density levels in reducing common smut attack and yield loss in maize. In each experiment, data were recorded on the disease incidence, grain yield, stalk yield and percentage of barren plants.

Out of 16 different genotypes, cv. Pahari showed the best performance, where the common smut attack was the lowest and grain yield was the highest. Pahari is a short duration variety and its high disease resistance and yielding capability shall make it best fit into the cropping pattern of the area, where, farmers generally demand early maturing varieties. Among different NPK combinations, 100:50:0 kg/ha was the best, this fertilizer can be applied with less investment of labour, time and money. Common smut attack was the least and grain yield the highest at the plant population of 0.075 million/ha. Maintaining this recommended plant population, may not only reduce the smut attack but can also serve the dual purpose of grain and fodder production. The results of maize seed treatment with fungicide 'Dithane M-45' were the most satisfactory. This practice shall be encouraged among farmers to minimize the seed/soil borne inoculum of the disease.

During the 2<sup>nd</sup> phase of the research, the best controls were integrated into a Disease Management Model (IDMM) and compared with other treatments. The results of the multi-location experiment showed the superiority of the proposed model comprising of improved variety plus improved practices over other treatments. The synergistic effect of different control measures into the IDMM was more significant than their single effect in decreasing common smut incidence, percentage of barren plants and increasing grain and stalk yield. The successful testing of the model under different agroecological zones in the NWFP indicated that the proposed model, if adopted properly, shall help in reducing smut losses and increasing/stabilizing maize productivity in this province.

**Project No:** P-AU/Agr (134)  
**Project Title:** Taxonomic Studies on Grasshoppers and Locusts (*Acridoidea: Orthoptera*) of Pakistan

Duration:	Two years
Date of Initiation:	01-06-1993
Date of Completion:	31-05-1995
Location of Scheme:	Department of Entomology, University of Agriculture, Faisalabad.
Principal Investigator:	Dr. Muhammad Yousuf
Total Expenditure:	Rs. 102,262/55

- Main Objectives:**
- To carry out a general survey to know the distribution of Grasshoppers and Locusts in different climatic conditions of Pakistan.
  - To identify the economic and non-economic species.
  - To prepare taxonomic keys for their easy identification by the field workers.

**Summary of work done:**

The present survey of acridoid grasshoppers and locusts conducted during the years 1993-95 for about 125 localities of four provinces of Pakistan has yielded 118 species and subspecies under 59 genera, 13 subfamilies and 4 families. Out of these 9 species; *Gomphomastax reductus*, *Poekilomorpha fasciata*, *Dericorys nushkiensis*, *Phyllocercus peshawarensis*, *Eyprepocnemis islamabadensis*, *Sohanra cylindrica*, *S. spathulate*, *Oedipoda neelumenis* and *Mesopsis immaculata* and 2 genera; *Popekilomorpha* and *Sohanra* are new to science and described in detail. Three new female allotypes of *Gonista chinensis*, *Mesopsis exilis* and *Ochrilidia longiceps* were also collected from Bhakkar (Thal) , Khushab (Thal) and Lal Sohanra (Cholistan) in the Punjab.

In addition , 17 species, viz., *G. antennata*, *Iranotmethis cyanipennis*, *Atractomorpha sinesis sinensis*, *Pyrgomorpha conica deserti*, *Tristria marginicosta*, *Calliptamus abbreviatus*, *C. tenuicercis*, *C. barbarus nanus*, *Xenocatantops henryi*, *Gonista chinensis*, *Gastrimargus africanus sulphureus*, *Hilethera turanica*, *O. fedtshenko pamirica*, *Arcyptera microptera*, *Stauroderus scalaris*, *Chorthippus turanicus* and *Kraussella* sp., 5 genera, *Gomphomastax*, *Iranotmethis*, *Xenocatantops*, *Phyllocercus* and *Kraussella*, one subfamily, Gomphomastacinae, and one family, Eumastacidae, have been recorded for the first time from Pakistan.

The distribution of all previously recorded species has been greatly extended to the new localities. The measurements of various body parts and the ecological observations for all the species have been given. The taxonomic keys for various taxa have also been prepared for their future identification.

**Project No:** F-AU/AGR (135)  
**Project Title:** Genetic Variation in the Morphological Characteristics, Chemical Composition and Rumen Digestibility of Wheat Straw of Cultivars Grown in N.W.F.P.

**Duration:** Two years  
**Date of Initiation:** 01-05-1993  
**Date of Completion:** 30-04-1995  
**Location of Scheme:** NWFP, Agricultural University, Peshawar.  
**Principal Investigator:** Prof. Syed Basit Ali Shah

Total Expenditure: Rs. 2,34,005/12

Main Objectives: To determine and compare the nutritive value of wheat straw of different cultivars and find suitable genotypes which together with high grain yield provide good quality straw for livestock feeding.

To find correlation among the morphological characters of wheat crop with the straw quality which could be used by wheat breeders and nutritionists in assessment of wheat straw quality.

To determine the suitability of ammoniation for further improving the feeding value of wheat straw of divergent varieties.

### Summary of work done:

Experiments were conducted to evaluate straw from 15 wheat genotypes for rumen degradability and to investigate response to ammoniation in straw varying in quality. All the straw varieties were previously grown in 3 replicates (3x0.9 meter plot/replicate) under the same agronomic conditions. In one experiment, ruminal degradability of straw from 15 genotypes was determined with the standard in Sacco technique in two rumen fistulated buffalo steers at 4, 8, 12, 24, 48, and 72 hours. The results were used to calculate potentially degradable fraction, rate of degradation and effective degradability of the straw varieties at different rumen outflow rates. Dry matter intake in animal was then predicated from the degradability parameter.

In another experiment, straw from 9 wheat genotypes, each varying in quality (dry matter digestibility), were selected for ammoniation. These were grouped as good, medium and poor, each group consisting of three genotypes. The straw, in batches of one kg, was treated with urea solution which provided final concentrations of urea 4% and moisture 40%. The treated straw was stored in sealed polythene bag at room temperature for a period of 7 weeks. Both untreated and ammoniated straw samples were processed for chemical analysis and *in-vitro* dry matter digestibility.

Results of the first experiment demonstrated that degradability characteristics of straw were strongly influenced by wheat genotypes. All the straw genotypes showed an average lag time of 1.67 hours before initiation of degradation in the rumen. Relatively small refraction of the straw varying from 10.29 to 16.02% and affected by genotypes ( $P < 0.001$ ) were found instantly soluble in the rumen. The potentially degradable part of the straw also varied due to genotypes ( $P < 0.001$ ). Results of degradation rate (percent/hour) were confounded by large variation ( $P < 0.01$ ) due to animals and replicates and were therefore not different ( $P = 0.11$ ) among the different genotypes. Based on these results, effective degradability at different rumen outflow rates was estimated, which showed significant variation ( $P < 0.001$ ) due to genotypes. Comparison among the 15 wheat genotypes revealed that the effective degradability at 4% and 6% rumen outflow rates, was maximum for the straw from C-518 and Sarhad-83 and lowest in case of Dirk and Pak-81. Straw from the remaining genotypes were ranked as intermediate. Predicted straw intake by a steer or cow weighing 250 kg varied from 4.57 to 5.76 kg/day due to genotypes. The results suggested that straw consumption could be increased to an extent of 26% through selection of wheat genotypes for better quality straw.

Dry matter digestibility of straw samples determined with the *in-vitro* and *in-Sacco* techniques were highly correlated, suggesting the validity of both techniques for assessment of straw quality.

However, the use of *in-Sacco* technique was considered more appropriate because of its high relevancy to practical situation.

Results of the second experiment revealed that ammoniation irrespective of genotypes, increased ( $P < 0.001$ ) the average crude protein contents from 4.12% in untreated straw to 9.83 % in treated straw. Such an increase due to ammoniation which brought the protein value of wheat straw close to that of local non-legume fodders, was considered favourable in efficient utilization of the straw.

Increase in the *in-vitro* dry matter digestibility (IVDMD) of straw due to ammoniation was influenced by the genotypes ( $P < 0.001$ ) and quality of untreated straw ( $P < 0.001$ ). A negative linear correlation ( $r = -0.79$ ,  $p < 0.001$ ) between the quality of untreated straw and increase in IVDMD after ammoniation was maximum in poor quality straw. Economic comparison of response to ammoniation in wheat straw revealed that the technology should be applied strategically only for upgrading the feeding value of poor quality straw. It was found that the digestibility of poor quality straw, even after ammoniation, remained below that of untreated good quality straw. This emphasizes the selection of genotypes for good quality straw as an economically and managerially viable approach for sustainable improvement in utilization of cereal straw in ruminant feeding. Better quality of straw can be obtained without sacrificing for the grain yield. Results of the previous studies conducted in this laboratory revealed that it is possible to select genotypes which combine both high grain yield and superior quality straw.

**Project No: P-NIBG/AGR (136)**  
**Project Title: Use of Rhizobium Biofertilizer for Increasing the Production of Food Legumes.**

Duration:	Three years
Date of Initiation:	17-03-1993
Date of Completion:	16-03-1996
Location of Scheme:	National Institute for Biotechnology and Genetic Engineering. (NIBGE), Jhang Road, Faisalabad
Principal Investigator:	Dr. Fauzia Yusuf Hafeez
Total Expenditure:	Rs. 3,75,513/-
Main Objectives:	To determine the indigenous population of mungbean and chickpea rhizobia in soils of four agroclimatic zones of Pakistan.  To study the competition between indigenous and inoculated strains to monitor the nodule occupancy.  To develop the quality control method for rhizobium inoculum

## Summary of work done:

Under the project, response of nitrogen biofertilizer was studied on different cultivars of chickpea, lentil, mungbean and black gram at different agroclimatic areas of Pakistan.

During the first year, biofertilizer response and application of different nitrogen fertilizer doses were studied in a chickpea cultivar C-44 at Faisalabad, Peshawar and Tando Jam. A significant increase in nodule number was present in inoculated treatments, but data on shoot dry weight, grain yield, biomass production and plant total nitrogen indicates towards the establishment of effective symbiosis by inoculated strains at Faisalabad and Tando Jam only. Whereas at Peshawar, no response of inoculation may have been due to ineffective symbiosis or higher soil nitrogen levels prevailing in the area.

During second and third year of the project, mode of seed inoculation and its response in two different cultivars of chickpea were studied at four sites viz. Kundian, Faisalabad, Peshawar and Tando Jam. Seed pelleting by carrier based inoculum had more modules on the tap root than by broth seed pelleting. Overall nodulation was comparatively higher in MB-75 than C-44, except at Kundian. A positive response of biofertilizer for shoot dry weight, grain yield, biomass production and plant total nitrogen was observed at Faisalabad, Kundian and Tando Jam. A significant increase in nodule number in inoculated treatments was observed at Peshawar, but no response at Peshawar for all other parameters may have been due to ineffective symbiosis.

The effect of single super phosphate (SSP) application before, after and at the time of seed sowing was also studied at Faisalabad. SSP application before and after seed sowing gave better nodulation and grain yield rather than its application at the time of seed sowing. Rhizobia applied in the form of broth came in direct contact with SSP and were killed due to its acidic effect before their entry into the host root cells.

Effect of Rhizobium biofertilizer on thirteen mungbean and nine black gram genotypes were evaluated for their nitrogen fixing potential at Bhakkar, Khanewal and Faisalabad. The response in inoculated treatment at Faisalabad was relatively poor as compared to Bhakkar and Khanewal. A compatible indigenous rhizobial population and total soil nitrogen may have been the limiting factor.

In addition, biofertilizer response on lentil, studied only at Faisalabad, showed significant increase in nodule number in inoculated treatments but a non significant difference in fresh and dry weight of nodules. Also, the inoculum tested for lentil, prepared in sterilized and unsterilized carrier, showed that unsterilized carrier can also be used effectively.

Attempts have also been made for the isolation of rhizobial strains from the chickpea nodules using different isolation media/carbon sources. Fluorescent antibodies (FA's) against cowpea (cv. Brady), rhizobial strains Ma 8 and M 55, and chickpea strain Ca 34 were also developed to study nodule occupancy of the stains in competition experiments.

It is concluded through these studies that selection of efficient nitrogen fixing strain (s) should be made, keeping in mind the soil N level, indigenous rhizobial population and the genotype of the host.

**Project No: F-AU/AGR (149)**  
**Project Title: Biological and Chemical Transformation of Phosphorus and its Availability to Plants in NWFP (Pakistan) Soils.**

<b>Duration:</b>	<b>3 years</b>
<b>Date of Initiation:</b>	<b>01-02-1994</b>
<b>Date of Completion:</b>	<b>31-01-1997</b>
<b>Location of Scheme:</b>	<b>NWFP, Agricultural University, Peshawar</b>
<b>Principal Investigator:</b>	<b>Dr. Mohammad Sarirullah Sarir</b>
<b>Total Expenditure:</b>	<b>Rs. 2,39,927/60</b>
<b>Main Objectives:</b>	<p><b>To test the selected extractant for studying the P status and mineralization of important soil series of NWFP.</b></p> <p><b>Adsorption and disruption studies on selected areas of NWFP.</b></p> <p><b>To evaluate PO<sub>4</sub> availability in relation to mineralization and carbon mineralization rates measurement as an index of soil respiration.</b></p> <p><b>Measurement of phosphates activities and its assessments by relating it with other soil parameters related to P behavior.</b></p> <p><b>Influence of incubation on changes in extractable PO<sub>4</sub> resulting from the addition of both PO<sub>4</sub> and FYM.</b></p>

### **Summary of work done:**

This work pertains to the study of some aspects of Phosphorus-Cycling (PC) in NWFP soils. In the first phase, preliminary study related to physicochemical properties, PC-mineralization and P-adsorption of agriculturally important soil series were carried out in laboratory. In order to monitor P-Changes in greater depth, laboratory incubation study was conducted in the second phase to study the effect of FYM on both native and added P.

CO<sub>2</sub> evolution and P-turnover rates showed that moderate to high level of C but very little P was turned over. C-mineralization rates which range from 65.0 to 110.0 mg/kg/soil week<sup>-1</sup> indicate the presence of biologically available C. 40% of the series studied showed P turnover, while the rest exhibited PO<sub>4</sub> immobilization. C mineralization correlated with lime, clay, organic matter and total salts content. The rate of change of extractable P range from -0.2 to 0.3 mg/kg soil week<sup>-1</sup>. Due to either loss of P or very low P mineralization rates, the effect of soil pH on P was not pronounced. The generally low value of initial P and its significant correlation with P-turnover suggest that P-mineralization may be slower in these soils.

High value of adsorption maxima (149 to 250 mg kg<sup>-1</sup> soil) calculated from langmuir plots highlight the great ability of these soils for removing phosphate from solution. Significant correlation of CaCO<sub>3</sub> and clay content with P-adsorption indicated that these two factors are greatly instrumental in the adsorption phenomena. Significant but positive correlation of pH with P adsorption explain that P-fixation is a serious problem in alkaline calcareous system.



A laboratory incubation study was conducted to investigate the effect of 5 levels of FYM on the basis of humic acid content (0.1, 0.2, 0.4, 0.8 and 1.0 mgkg<sup>-1</sup> soil of humic acid). The result showed that addition of FYM increased the availability of P, but did not increase the amount of mineralized-P from the applied-P with time.

Studies have shown that Pakistan's low rank weathered coal have sizable amounts of humic acid. This humic acid can be utilized as a fertilizer and soil conditioner to boost up agricultural production. Information in this respect is, however, limited. Increasing the availability of native and added-P by humic acid may be better understood, if the effect of their application on native and added inorganic-P is known. Incubation of calcareous soil (%CaCO<sub>3</sub> = 23.0) with 34 mgkg<sup>-1</sup> soil of added-P, reinforced with 5 levels (0.1-1.0 mgkg<sup>-1</sup> soil) of humic acid, resulted in increase in mineralized-P. It was noted that mineralized-P increase with the increase in humic acid from 0.4 to 10 mgkg<sup>-1</sup> soil. Humic acid @ 0.1 mgkg<sup>-1</sup> (= 200 gha<sup>-1</sup>) alone mineralized P equivalent to that of 1.0 mgkg soil. Similarly, immobilized-P was lower in humic acid applied @ 0.1 and 1.0 mgkg<sup>-1</sup> soil alone. Percent-P recovery and available-P was also greater in these two treatments applied alone or reinforced with P. Humic acid @ 200 gha<sup>-1</sup> seemed to be more conducive for P availability and suppress P fixation through various mechanisms, both chemical and biological. Marked effect of added-P suggests that humic acid greater than 200 gha<sup>-1</sup> may not be necessary to reinforce with P fertilizer for increasing its efficiency. Humic acid applied in excess of 200 g ha<sup>-1</sup> caused P starvation. Added inorganic-P and that release from organic forms may be followed by sorption, precipitation and microbial assimilation.

To conclude, the effect of humic acid applied alone @ 200 gha<sup>-1</sup> was more effective in making the soil environment conducive for plant nutrients availability and may be considered beneficial for the subsequent crop. The organic matter status of the soil could be built up gradually by use of even small quantity of humic acid. It can also be advocated that the cumulative effect would be far more than both, direct and residual on soil physical, chemical and biological properties.

**Project No:** P-PU/Bio(187)  
**Project Title:** Transformation Studies of Rice *Oryza Sativa*

Duration:	Three years
Date of Initiation:	01.07.1992
Date of Completion:	30.06.1995
Location of Scheme:	University of the Punjab, Lahore.
Principal Investigator:	Dr. Tayyab Husnain .
Total Expenditure:	Rs. 2,04,815/10
Main Objectives:	Regeneration of local varieties of rice from various tissues into whole plants.  Transformation of rice tissues either by electroporating DNA into cells or targeting the regenerating tissue with DNA coated tungsten particles.  Establishment of regenerated plants into the soil.

## Summary of work done:

Under the 1st objective of the proposal, 12 varieties of rice *Oryza sativa* were screened for the evaluation of regeneration ability. The varieties included: RP15, RP18, IR70, BR11, Taipei 309, Basmati Pak, Super Basmati, Jhona, IRRI6, KS282, Bas 370, and Bas 385. All these varieties were subjected to callus induction, leaf bases, mesocotyl, scutellum and root explants were cultured on various media formulation. Variety Bas 370 and Super Basmati gave the best response in all the explants used for callus induction, while IRRI-6 produced the lowest response in callus formation in all the tissue explants studied. Out of 12 varieties, Bas370 and IRRI6 produced plants through callus formation, while Bas 370, Bas Pak, Super Basmati, IRRI6, BR11 and RP 15 produced plants without callus formation.

Under the 2nd objective, experiments were carried out to establish regeneration conditions of protoplasts of *Oryza sativa* Bas 370 and IRRI6. Calli were used to isolate protoplasts enzymatically with a mixture containing cellulase 10g/l, pectolyase 1.0 g/l and MES 5 mM in CPW13M salts. The protoplasts were purified by centrifugation at a speed of 80xg for 15 minutes. Isolated protoplasts were cultured either in KPR medium containing sea-plaque agarose or cultured in liquid medium in the feeder layer plates. Cultures were kept in the dark at 25°C and were fed with fresh medium at 12-15 days interval using reduced osmoticum. The dividing protoplasts were observed after three days.

Conditions for transformation of rice protoplasts and explants were optimized by transient expression of foreign genes in these tissues. In the local varieties of rice, protoplasts isolated from leaf base of aseptically grown seedlings were used. Chemically induced DNA uptake procedure was used to transfer GUS gene in the isolated protoplasts. A GUS substrate MUG (4-methyl-umbelliferyl D-glucuronide) was used and GUS activity was determined by examining the microtiter plates under UV. Fluorescence was observed in the extract of protoplasts after 48 hours. When leaf bases of rice seedlings were electroplated with DNA to transfer GUS gene and the explants were dipped in a solution containing X-Gluc (5-bromo-4-chloro-3-indolyl glucuronide) after 3 days. Blue colour was observed in transformed as well as non-transformed leaf base of rice seedlings. Conditions were also established for transient as well as stable expression of genes into leaf bases and mature embryos of rice using home-made particle acceleration gun. Beta-glucuronidase gun was introduced into leaf bases for transient expression. Leaf base isolated from 5 day old etiolated seedlings of rice were kept on petri plates containing MS medium solidified with 1% agar and bombarded. About 70% of leaf bases showed transient expression. A selectable marker gene, *hph* which confer hygromycin resistance in transgenic tissues was used for stable transformation. Mature embryos excised aseptically and kept on MS medium and bombarded with DNA-coated tungsten particles. After 5 days, these embryos were transferred to selection medium counteracting hygromycin at concentration of 50 µg/ml. The green fast growing plants were selected for Southern blotting to confirm the presence of introduced marker gene. Southern blot gave positive indication of presence of marker gene in rice genome.

Under the optimized conditions of stable transformation of marker gene, the co-transformation of Bt gene, *Cry IA (C)* has been achieved. Mature embryos were bombarded with tungsten coated particles. DNA from plasmid pROB5 and *ubi-Cry IA (C)* was mixed in 1:3 ratio and were used to coat tungsten particles. Leaf bases (2 mm) were excised from the resultant plants and cultured on medium containing hygromycin (30µg/ml). Transformed plants were identified by their ability to grow on selection medium while the non-transformed plants became necrotic and subsequently died. Putative transformants were multiplied *in vitro* and then transferred in 50:50 mixture of peat moss and clay.

Under the third objective, the regenerated plants of IRRI6 were transferred to soil through an intermediate stage of semi-controlled conditions in the greenhouse. These plants bore viable seeds. The

transgenic plants were grown at 28°C and 25°C day & night temperatures with 14 hours photoperiod of 2,500 lux. The photoperiod was gradually decreased to 10 hours day and 14 hours night to get fertile spikelets. Viable seeds were obtained and germinated into R1 plants.

**Project No:** S-KU/Bio (201)  
**Project Title:** Ecophysiology of Indus Delta Mangroves

**Duration:** Three years

**Date of Initiation:** 01-12-1992

**Date of Completion:** 30-11-1994

**Location of Scheme:** Department of Botany , University of Karachi, Karachi.

**Principal Investigator:** Dr. M. Ajmal Khan

**Total Expenditure:** Rs. 3,79,786/-

**Main Objectives:** To study the mechanism of osmoregulation of various mangroves species present under diverse ecological conditions.

To rehabilitate the mangroves ecosystem by planting suitable species in ecological situation.

### Summary of work done:

Mangroves are characteristically present in the delta of rivers, estuaries and sea coasts. Mangrove tidal swamp forest occurs on the coast of both Balochistan and Sindh. Whilst their occurrence in the former is largely restricted to Porali river delta to the north west of Karachi. The Indus delta mangroves represent the sixth largest mangrove block worldwide and in 1983 occupied some 410,000 ha, virtually the entire Sindh coast. The present mangrove forest is almost entirely composed of *Avicennia marina* (known locally as timer), with few small populations of *Ceriops tagal*. 75% percent of the total Indus delta mangrove forest is under severe grazing pressure and widely degraded. Excessive browsing by camels, lopping by inhabitants of coastal villages for cattle fodder and substantial decrease in Indus discharge due to diversion of river water to irrigation system have contributed to severe degradation. Growth and form of the mangroves of the Indus delta is generally extremely poor. There are numerous gaps in the forest, trees are commonly stunted and bushy and stems are often crooked and hollow.

The significance of mangrove lies in its economic importance. The product of mangroves include the mud itself, used as fertilizer (in India), potash, food, fodder, fiber, medicine, pulp for paper, matches, thatching material and charcoal. More important than material products are the direct benefits from mangroves, such as; protection against erosion, cyclones, tidal bores, and production of particulate and dissolved organic matter that enrich down stream fisheries in coastal waters.

Considering the importance of mangroves, it is imperative that serious attempts be made to protect and rehabilitate the threatened Indus delta mangrove ecosystem. Present investigation is the initial information gathering exercise to understand mechanism of osmoregulation (how they survive in salinity) of Indus delta mangroves.

The studies indicate that;

1. The growth of mangroves was very slow especially in high salinity.
2. *Avicennia marina* is more salt tolerant of the 3 mangrove species studied.
3. Optimum growth in 50% seawater indicates that mangroves thrive best where fresh water mixes with seawater.
4. Plant produces proline as an osmoregulator to tolerate high level of salinity along with other compatible solutes.
5. *A. marina* always maintains a more negative water and osmotic potential, whereas, in *C. tagal.* and *Rhizophora mucronata* water and osmotic potential become progressively more negative with the increase in salinity stress.

These results indicate that *A. marina* not only tolerate high salinity but also show a steady growth. It seems that in arid environment, *A. marina* is a better choice for rehabilitation. *R. mucronata* may also be introduced in the threatened mangrove ecosystem as it also shows good results but the seedlings of this species have to be brought all the way from Miani Hor (Sonmiani) near Porali river to the Indus Delta.

**Project No:** S-KU/Chem(218)  
**Project Title:** Microbial Transformations (Biotransformations) of Natural Anti-Tumor Agents.

Duration:	Three years
Date of Initiation:	1-6-1993
Date of Completion:	30-5-1996
Location of Scheme:	H.E.J. Research Institute. Karachi
Principal Investigator:	Dr. Atta-ur-Rahman
Total Expenditure:	Rs. 2,34,912/-
Main Objectives:	To carry out microbial transformation of different classes of natural products which are expected to show antitumor activities such as dimeric indol alkaloids, with anoloddes sesquiterpene, lactone etc.

#### Summary of work done:

The project was designed to microbiologically transform the natural anti-tumor compounds into more potent ones which has been successfully done and a compound 1  $\beta$ .3  $\beta$ -dihydroxysclareolide has been obtained which is much more cytotoxic as compared to its parent compound, sclareolide.

Microbial Transformation of the following classes of compounds were carried out which resulted in new compounds, some of which showed anti-tumor activity against human cancer cell lines.

1. Sesquiterpene Lactones with *Currularia lunata* and *Aspergillus niger*.
2. Withanolides and Steroids with *Aspergillus niger*.
3. Indole Alkaloids with *Aspergillus niger*.

#### 4. 10-Diacetylbaecatin and Taxol with available fungal strains.

**Project No:** P-CSIR/Chem (219)  
**Project Title:** Process Development for the Manufacture of 6-Amino Pencillanic Acid (6-APA) from Penicillin G.

Duration: Two years  
Date of Initiation: 1-2-1992  
Date of Completion: 31-2-1995  
Location of Scheme: PCSIR, Laboratories, Lahore  
Principal Investigator: Dr. M. A. Qadeer  
Total Expenditure: Rs. 1,51,029/50  
Main Objectives: To develop an economical process for the enzymic hydrolysis of Penicillin G to 6-amino Pencillanic acid (6-APA) using locally isolated culture of *E. Coli*.

#### Summary of work done:

Beta-lactam antibiotics make up a large group of physiologically active compounds including natural and semi-synthetic penicillins, cephalosporins, and cephamycins. Many of them are characterized by unique anti-microbial properties, bacteriocidal action and low toxicity, and are widely used for practical effectiveness. The synthesis and modification of Beta-lactam antibiotics are important targets of enzyme engineering.

During the present study, production of intracellular and extracellular enzyme Penicillin amidase by the cultures of *E. coli* & *Bacillus megaterium* respectively was studied by submerged fermentation in shake flasks and stirred fermenters. About 25 cultures of *E. coli* (Non-fecal type) capable of producing intracellular penicillin amidase were isolated from different habitats using lactose broth and EMB (Eosine Methylene Blue) agar media. These isolates were screened for the production of enzyme in shake flasks. The culture isolate producing maximum enzymic activity (1.10 units/ml) was selected, identified and assigned as *E. coli* PCSIR-231. The parameters such as selection of culture medium, size of vegetative inoculum, initial pH of the basal medium, time of the addition of phenyl acetic acid, aeration and time course of fermentation in shake flasks were determined. The basal medium M<sub>4</sub> consisting of Mono Sodium Glutamate, Tryptone, Yeast Ext. & Phenyl acetic acid gave maximum enzyme formation.

The synthesis of extracellular enzyme penicillin amidase by local *Bacillus* species and *B. megaterium* ATCC 13639 was also carried out. The *Bacillus* species were isolated from different soil (or food samples) after giving heat shock at 85°C in water suspension. The isolates were picked up on nutrient agar plates. Of all the cultures examined, *B. megaterium* ATCC 13639 produced maximum enzyme formation (2.36 units/ml) in medium M<sub>1</sub>, consisting of casein hydrolysate, glucose & phenyl acetic acid. The addition of phenyl acetic acid (PAA), 6 hours after inoculation was stimulatory for enzyme formation. Small amount of the enzyme remained in the bacterial cell, but most of the enzyme was extracellular in the fermented mash. Replacement of casein hydrolysate with peptone or trypton did not improve enzyme formation.

Scale up production of the enzyme penicillin amidase by both bacteria in the stirred fermenters (1.8 & 10l capacity) was also investigated separately using optimum basal media. The amount of enzyme produced by both bacteria and their rates were higher than those obtained in shake flasks. The cells of *E. coli* after centrifugation were immobilized in sodium alginate and hydrolysis of Penicillin G to 6-APA was studied repeatedly in shake flask. Similarly, extra cellular enzyme produced by the bacterium *B. megaterium* ATCC 13639, after centrifugation for the removal of cells was absorbed on bentonite clay for penicillin G hydrolysis. Effect of the concentration of intact whole cell penicillin amidase (*E. coli*) on the hydrolysis of penicillin G to 6-aminopenicillanic acid (6-APA) was studied. About 60-70% conversion of substrate required 12-14 hours reaction without concentration of whole cell enzyme. The conversion approached its maximum within 2 hours when 5-fold concentrated enzyme was used in shake flask. The recovered whole cell enzyme was reused several times repeatedly; 9-10 reactions were run with slight loss of activity.

**Project No: C-QU/Chem (235)**  
**Project Title: Isolation and Characterization of Flavonoids Having Potential Application.**

Duration: Two years

Date of Initiation: 4-7-1993

Date of Completion: 3-7-1995

Location of Scheme: Quaid-i-Azam University, Islamabad

Principal Investigator: Dr. Aurangzeb Hasen

Total Expenditure: Rs. 1,97,103/85

Main Objectives: Screening of some fifty plant species for their flavonoid contents.

Application of advanced chromatographic technology in lieu of conventional methodology for the effective and rapid purification of flavonoid compounds.

Bulk isolation and characterization of flavonoids having potential agricultural applications.

To introduce flavonoids as non-toxic fungicides, pesticides and insecticides as an alternate to the existing toxic formulations.

To provide proper flavonoids to agricultural research institutes for the production of better quality seeds and enhanced per hectare yield of cash and fodder crops.

### Summary of work done:

Flavonoid compounds have been reported to be involved in a number of agricultural applications, for instance, they act as phytoalexins and provide plants with defense against microbial and fungal attacks, help in pollination, stimulate seed germination and plant growth etc.

The present project was aimed at isolation and characterization of flavonoids from indigenous plant species and their possible application in the agricultural sector. Work was carried out on isolation of flavonoid compounds from 20 plants species. After extraction, analysis was done to determine the amount and number of flavonoids in each plant species and their possible agricultural applications by experts in the Labs of Crop Diseases Research Institute (CDRI) of the National Agricultural Research Centre (NARC), Islamabad. Analysis indicated that global flavonoids extracts of certain plant species showed pronounced antibacterial activity against certain bacterial strains which was never observed before.

In view of this comprehensive screening, the plant species namely, *Rumex, chalepensis, R. nepalensis* and *Bhauhinia verigata* were selected for detailed study. Two flavonoid aglycones namely: quercetin and kaempferol; four flavonoid glycosides (two being new compounds) and a new anthraquinone (emodin) glycoside were isolated and characterized from *R. chalepensis* by means of conventional and advanced chromatographic techniques as well as spectroscopic methods.

Purified flavonoid glycosides isolated from leaves of *R. chalepensis*, when subjected to antibacterial testing, showed significant activity against *S. aureus, S. lutea, E. coli* and *B. subtilis* at a concentration of 300 µg>. Analysis of antibacterial activity of flavonoids glycosides isolated from flowers of *Bhauhinia verigata* is in progress. These results indicate that flavonoids compounds can be used as potential antibacterial agents against crop bacteria.

**Project No.** S-KU/Chem (236)  
**Project Title:** Isolation of Cytotoxic Compounds from Marine Animals.

Duration:	Three years
Date of Initiation:	1-6-1993
Date of Completion:	31-5-1996
Location of Scheme:	Department of Biochemistry , University of Karachi, Karachi.
Principal Investigator:	Dr. Rashida Qasim
Total Expenditure:	Rs. 4,47,375/-

**Main Objectives:** Survey of envenomation and poisoning incidences by venomous and poisonous marine animals in man.

Selection of toxic species and their identification.

Collection of animal specimens from different localities.

Preparation of a record of affected persons with the help of a questionnaire.

Identification of the areas and time of year when these animals become abundant and cause a health hazard for the local population.

### **Summary of work done:**

During last three decades, a large number of toxins have been purified and characterized from several marine organisms. Among different classes of marine toxins, the Jelly fish (coelenterate), Shellfish (mollusks) and Sea-snake (Hydro-phidae) toxins are considered dangerous to humans due to severe clinical complications in victims. The toxins purified from these animals are broadly grouped as Cytotoxins and Biotoxins.

This research project was aimed at identifying venomous and poisonous marine animals suspected to induce cytotoxicological reaction in living system and to isolate and characterize the cytotoxic compounds causing these reactions. To achieve both objectives, a regular survey of envenomation and poisoning on coastal areas of Karachi was done on regular basis followed by location and collection of species responsible for the clinical manifestations. Later on, venoms and poisons from these species and their toxic compounds were isolated and characterized using specific biochemical and biological assay techniques. The study reveals that; potent cytotoxicity is associated with marine organisms. It would be interesting to elucidate the structure of isolated compounds in future.

**Project No:** S-SU/Chem (272)  
**Project Title:** Isolation, Purification and Characterization of Antibacterial and Antifungal Properties of Peptides from Plants.

**Duration:** One year

**Date of Initiation:** 18-4-1995

**Date of Completion:** 17-4-1996

**Location of Scheme:** Institute of Chemistry, University of Sindh, Jamshoro

**Principal Investigator:** Dr. Muhammed Umar Dahot

**Total Expenditure:** Rs. 4,70,026/60

**Main Objectives:** To develop a new methodology for isolation and separation of biologically active peptides from indigenous sources to reduce the incidence of skin disease caused by dermatophytes.



### Summary of work done:

Aqueous extract from different parts such as leaves, flowers and seeds of various plants (*Moringa oleifera*, *Melia azadirachta*, *Salvadora oleides*, *Salvadora permica*, *Capparis decidua*, *Acacia arabica*, *Cafanus cayan*, *Equisetum debile*, *Calotropis procera*, *Indigofera oblongifolia*, *Prosopis cineraria*, *Pithecallobium Sps.*) were prepared and were precipitated with acetone and ethanol. The precipitates were solubilized in sterilized distilled water and then were separated by Column Chromatography on Sephadex G-25. The fractions were then pooled according to protein/peptide absorbance and an anti-bacterial/anti-fungal activity from each fraction was checked by seed plate diffusion method. Mostly, isolated fractions were found homogenous in nature. Among the plants tested for antibacterial/anti-fungal, some isolated peptides/smaller protein of seeds of *M. oleifera*, leaves, flowers and seeds of *M. azadirachta*, leaves of *S. olides*, leaves of *I. oblongifolia*, leaves of *C. procera*, white and red seeds of *Cajanus cajan* were found highly active against gram +ve & gram -ve bacteria and fungi. None of these isolated peptides/smaller proteins from various plants showed hemolysis activity against human erythrocytes.

**Project No:** C-QU/Phys. (71)

**Project Title:** Optical Characterization of Defects in Semi-Conductors.

**Duration:** Three years

**Date of Initiation:** 1-1-1992

**Date of Completion:** 29-2-1996

**Location of Scheme:** Department of Physics, Quaid-I-Azam University, Islamabad

**Principal Investigator:** Dr. M. Zafar Iqbal

**Total Expenditure:** Rs. 3,89,066/-

**Main Objectives:** To apply the technique of Photoluminescence spectroscopy for the characterization and understanding of the nature of selected shallow and deep level defects in semiconductors.

### Summary of work done:

Characterization of deep-level defects in semiconductor materials have gained a lot of importance in the modern semiconductor science and technology due to their influence in the electronic properties of these materials. Photoluminescence spectroscopy is a powerful technique for the characterization and detailed understanding of the nature of the shallow and deep-level defects in semiconductors.

Under this project, experiments using the photoluminescence (PL) technique were carried out and interesting data was obtained. The work carried out under the project consisted the following main parts:

- a) A detailed PL study was undertaken to characterize the silver defect system in silicon.
- b) Photoluminescence investigation of the effects of Al doping on GaAs grown by molecular beam epitaxy (MBE-GaAs) was carried out. Crystals with 0.1% and 3% Al doping have been studied. The study on these materials presents results on the optical characteristics of the lowest Al composition GaAs reported to date.
- c) Some investigations though preliminary have been carried out on the effect of alpha irradiation on the photoluminescence properties of both n-and p-type InP.

**Project No: P-CEME/Engg.(61)**

**Project Title: Solar Tent for Snow Bound Areas**

Duration: Two months

Date of Initiation: 8-7-1996

Date of Completion: 7-9-1996

Location of Scheme: College of Electrical and Mechanical Engineering,  
Rawalpindi

Principal Investigator: Lt. Col. Dr. Nasim A. Khan

Total Expenditure: Rs. 27,920/-

Main Objectives: Fabrication of a solar tent having light aluminum structure and tempered glass for use in snow bound mountainous areas.

### Summary of work done:

Snow bound areas have acute shortage of energy resources during extremely cold weather for warming their houses. The situation is further aggravated due to absence of road communication. The local population, therefore, resorts to cutting of trees for warming their houses which results in deforestation and associated problems. A concept of utilizing solar energy to reduce and possibly alleviate the problem of accommodation warming was proposed.

A Solar Tent to accommodate 2-3 persons has been fabricated out of light aluminum structure and 5 mm window pane glass. The Solar Tiles specially designed for this purpose have been used as the heat absorber material and also as floor of the solar tent. A thermopore sheet below the tent was used to reduce the heat loss through the floor. The tent was initially designed to have two portions i.e., Sleeping Area and Heat Absorbing Area. It was found that entire tent got very warm and it was not possible to sleep in it in the months of July, August and September, the air temperature inside averaged 72°C at noon in these months, while reducing slightly the above ambient temperatures at night. Additional sensible heat storage was carried out in 65 Kilograms of water placed in plastic bottles. This proved slightly better and resulted in temperatures slightly higher than ambient, at night and at dawn. Covering the entire tent with insulating cover gave better results. However, wind tended to drift the top insulating cover. Considering the heat gain, the tent is now being attached with fiber glass accommodation to act as a heat source. It is now proposed to use Phase Change Materials (PCMs) to enhance the utility of the Solar Tent in colder environments and to store the energy for longer periods.

The concept of using solar energy to heat the space has been tested and effort is now being made to improve the tent profile, strength of structure and reduce heat loss. The insulating cover also needs improvement and relocation inside the tent to avoid drifting due to strong winds.

### iii) Scientific Publications Produced through PSF-Supported Projects

An important parameter of scientific achievement and a way of utilization of research results is their publication in research journals of repute. During the year, total of 30 research papers were published out of the results of above projects completed during the report period. The list is given in Annexure-IV.

### iv) Higher Degrees Earned through PSF-Supported Projects

One of the major goals of the Foundation is strengthening and development of scientific manpower in the country. Thus in recent years, PSF has been encouraging scientific manpower development through its projects. Under the Program, Research Associates (RAs) are appointed in the projects instead of Research Officers. The Research Associates are required to register for Ph.D or M. Phil and may complete their degrees during the project period.

During the past year, two Ph.D., three M. Phil and a number of M. Sc. degrees were reported to have been awarded through the completed projects as detailed below.

S.No.	Name	Degree	Project No.
1.	Dr. Athar Ata	Ph.D	S-KU/Chem(218)
2.	Dr. Afgan Farooq	Ph.D	S-KU/Chem(218)
3.	Mr. Abdul Rauf Raza	M.Phil.	S-KU/Chem(218)
4.	Mr. Sajid Iqbal	M.Phil	C-QU/Chem(235)
5.	Miss Asifa Hanif	M.Phil.	C-QU/Chem(235)

### 3. WORKSHOPS ON RESEARCH PROJECT FORMULATION

While processing research projects for funding, it was realized that many young and enthusiastic researchers are not able to write a good research proposal for funding due to lack of training. Thus, the Foundation decided to organize workshops at various institutions on "Research Project Formulation, Review and Funding Mechanism" to enable the academic staff and researchers in the Educational Institutions to be aware of the procedure for submission of research proposals to the Foundation, their review and the mechanism of funding. During the report period, workshops were arranged in the following institutions.

- |   |                                |
|---|--------------------------------|
| 1. University of Agriculture, Faisalabad.   | 9 <sup>th</sup> October, 1996. |
| 2. Centre of Excellence in Physical Chemistry,<br>University of Peshawar, Peshawar. | 26 <sup>th</sup> March, 1997.  |
| 3. University of Arid Agriculture, Rawalpindi.                                      | 14 <sup>th</sup> April, 1997.  |
| 4. Shah Abdul Latif University, Khairpur.   | 29 <sup>th</sup> April, 1997.  |

#### 4. SUPPORT TO SCIENTIFIC SOCIETIES/LEARNED BODIES

The promotion of Scientific Societies/Associations, Learned Bodies 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, is an important activity of the Foundation. The Foundation makes annual grants to the established learned bodies and scientific societies, as partial financial assistance for the achievement of their approved objectives and publication of their respective scientific journals. Annual grants amounting to Rs. 0.650 million were released to the following Scientific Societies and Journals during the year 1996-97.

<b>Name of Society/Journal</b>	<b>Amount of Grant</b>
1. Pakistan Academy of Sciences	Rs.1,00,000/-
2. Scientific Society of Pakistan	Rs. 50,000/-
3. Pakistan Association of Scientists and Scientific Professionals	Rs. 30,000/-
4. Pakistan Association for the Advancement of Science	Rs.1,00,000/-
5. Zoological Society of Pakistan	Rs. 40,000/-
6. Pakistan Botanical Society	Rs. 35,000/-
7. Pakistan Society of Biochemistry & Molecular Biology	Rs. 25,000/-
8. Institute of Engineers, Pakistan	Rs. 20,000/-
9. Pakistan Society of Nematologists	Rs. 15,000/-
10. Society of Economic Geologists and Mineral Technologists (SEGMITE)	Rs. 20,000/-
11. Pakistan Society for Semiconductors	Rs. 15,000/-
12. Pakistan Medical Association	Rs. 15,000/-
13. Biological Society of Pakistan	Rs. 20,000/-
14. Chemical Society of Pakistan	Rs. 30,000/-
15. Pakistan Thalassaemia Welfare Society	Rs. 25,000/-

#### Publications/Journals

1. Pakistan Journal of Pharmaceutical Sciences	Rs. 10,000/-
2. Mehran University Res. J. of Engineering & Tech.	Rs. 10,000/-
3. Pakistan Journal of Forestry	Rs. 10,000/-
4. Pakistan Oral & Dental Journal	Rs. 10,000/-
5. Pakistan Veterinary Journal	Rs. 20,000/-
6. Pakistan Journal of Pharmacology	Rs. 20,000/-
7. Journal of Natural Science & Mathematics	Rs. 10,000/-
8. Pakistan Journal of Marine Sciences	<u>Rs. 20,000/-</u>
<b>Total:</b>	<b><u>Rs.6,50,000/-</u></b>

#### 5. FUNDING FOR CONFERENCES/SEMINARS/SYMPOSIA/WORKSHOPS ETC.

To enable scientists to share their knowledge and research experience with each other, the Foundation provides partial financial assistance to Universities and R&D Organizations for organizing Science Conferences, Seminars, Symposia, Workshops etc. This is a continuing activity of the Foundation and during the report year, grants amounting to Rs. 0.5627 million were released to various Universities/R&D Organizations/Institutions for organizing 28 National/International Conferences, Seminars, Symposia and/or Workshop etc. (Annexure-V).

In addition an amount of Rs. 30,000/- was sanctioned and adjusted against the previous unspent grants released to some Institutes/Centers.

## 6. TRAVEL GRANTS

A major weakness of Pakistani scientists is their isolation. Due to lack of contact with the scientists in advanced countries and the absence of intellectual interaction, many of our scientific workers become obsolescent and lose enthusiasm, freshness and spontaneity. There is an urgent need to end the isolation from the world science of Pakistani scientists. Our scientific workers should be able to meet their counterparts in the advanced societies and visit international and regional research centres and universities of repute. The Foundation, therefore, gives grants for the purpose every year.

During the year, travel grants were sanctioned to five scientists. Out of those, only three were able to obtain NOC from the Government. Grants totaling Rs. 56,415/- were given to them to attend international conferences/symposia and to meet their counterparts in institutions of higher learning abroad. Details of their participation are as under:

<u>Name &amp; Address of Scientist</u>	<u>Conference Attended</u>	<u>Amount Paid</u>
Dr. Ihsan Ilahi Department of Botany, University of Peshawar, Peshawar.	2 <sup>nd</sup> Asia-Pacific Conference on Plant Cell and Tissue Culture, Beijing, China, July 28 to August 1, 1996.	Rs.28,645/-
Prof. Dr. Altaf-ur-Rahman Rao Dean, Faculty of Sciences, University of Agriculture, Faisalabad.	Past, Present and Future of Middle East Deserts, Yarmuk, Jordan, 30 July to 3 <sup>rd</sup> August, 1996.	Rs.11,000/-
Dr. Khalid Javed Baig Pakistan Museum of Natural History, Islamabad.	International Conference on the Biology and Conservation of South Asian Amphibians and Reptiles held in Sri Lanka from 1- 5 August, 1996.	Rs.16,770/-

It may be mentioned that a large number of travel grants requests received by the Foundation could not be processed in the light of Govt. instructions on utilization of G.O.P. funds for travel abroad.

## 7. SCIENTISTS POOL

In order to assist in the proper utilization of highly qualified scientific manpower, the Foundation has established a "Scientists Pool". The scientists and engineers returning after advanced training in foreign countries are appointed on PSF Scientists Pool, provided, they are successful in obtaining a research and teaching assignment in any university or a research institute in the country. As Scientists Pool Officers, they are paid subsistence allowance @ Rs.5,000/-p.m. for a period of six months, extendable to one year. During the year, one scientist, namely Dr. Ashfaq Ahmed was appointed on the pool at the Department of Physics, Quaid-i-Azam University, Islamabad. An amount of Rs. 30,000/- was released to the University for the payment.

## 8. INTERNATIONAL LIAISON

Liaison with international agencies and scientific establishments in different countries serves as a means to solve numerous scientific problems by sharing knowledge, exchange of expertise, collaborative research etc. Such agencies were accordingly contacted. Besides, representatives of several foreign

organizations paid visit to the Pakistan Science Foundation in order to explore possibilities of collaboration in scientific programmes of mutual interest. Activities undertaken during 1996-97 under various programmes are given below.

**a) MoU with the Royal Society London**

Under the MoU, exchange of scientists and technologists with other countries is the most important activity of the Foundation. During the report period, the Foundation facilitated visits of one Pakistani scientist to U.K. and two British Scientists to Pakistan as mentioned below.

<u>Name of Scientists</u>	<u>Purpose of Visit</u>
Dr. Javed Akhtar Senior Scientific Officer, PINSTECH, Islamabad.	Conduct Research on X-ray Absorption studies of Superconducting Ceramic Oxides.
Prof. P.S. Meadows University of Glassgow, UK.	Collaborative Research on Biodiversity of Endangered Ecosystem Associated with Indus River.
Prof. N.B.W. Harris Senior Lecturer, Dept. of Earth Sciences, Open University, Milton, Keynes, UK.	To deliver seminars and lectures on Application of Geo-chemical Techniques to the Implementation of Organic Bells and Tectonic Models for the Evaluation of the Western Himalayas.

**b) MoU with National Science Foundation of China**

Five collaborative projects initiated by the scientists of the two countries are being implemented. The details of projects are given below.

<u>Project Title and Number</u>	<u>Name &amp; Address of P.I.</u>	<u>Name of Counterpart</u>
Phytochemical Studies on the Bioactive Principles of Withania Species, and Other Related Plants. PSF-NSFC/Res(3)Chem/93	Dr. Atta-ur-Rehman HEJ. Research Institute of Chemistry, University of Karachi, Karachi.	Prof. Bing Nan Zhou Shanghai Institute of Materia Medica, Shanghai, China.
Use of Zeolites for the Removal of Heavy Metals of Environmental Importance from Aqueous Solutions. PSF-NSFC/Res(4)Chem/93	Dr. M. Afzal Department of Chemistry, Quaid-e-Azam University, Islamabad.	Prof. Yu Huisheng Guangzhou Institute of Chemistry, Chinese Academy of Sciences, Guangzhou - 510650, Guangdong Province, China.

Use of Azolla and Plant Growth Promoting Rhizobacteria in Rice based Cropping System.  
PSF-NSFC/Res(5)Bio/93

Dr. Kausar A Malik  
NIBGE,  
Faisalabad.

Dr. You Chongbiao  
Atomic Energy  
Application Institute,  
Beijing, China and Mr. Liu  
C.C., Azolla Research  
Centre, FAAS, Fujian,  
China.

Particles Production and Nuclear Fragmentation in  $O_{16}$  &  $S_{32}$  Collisions at 14.6 to 200 A GeV Energies.  
PSF-NSFC/Res(6)Phys/93

Dr. A. Waheed Khan  
Physics Department,  
Gomal University,  
D.I. Khan.

Dr. Puying Zheng  
Institute of High Energy  
Physics, Box. 980, Beijing  
100039, China.

Development of Thermostable Cellulase System for the Bioconversions of Ligno-cellulosic Biomass.  
PSF-NSFC/Res(10)

Dr. Waheed Akhtar  
Institute of Chemistry,  
University of the Punjab,  
Lahore.

Prof. YU Huisheng  
Guangzhou Institute of  
Chemistry, Chinese  
Academy of Sciences,  
Guangzhou - 510650,  
Guangdong Province,  
China.

### c) Miscellaneous

- i) New Collaborations: A number of proposals were prepared and sent to the Ministry of Science and Technology for collaboration with the Governments of Italy, Syria and Kazakhstan. No response, however, was received from these countries.
- ii) Foreign Participation in S&T Fair-1997: An invitation was extended, through the Ministry of Science and Technology, to many countries for participation in the S&T Fair, 1997. Some Governments with special reference to the Government of Peoples Republic of China have showed their willingness to participate in the Fair.

## 9. PLANNING AND DEVELOPMENT

### a) Construction of Block-II of PMNH Building

The tender for the construction of Block-II of the PMNH Building was got prepared, advertised and the contract was awarded to the lowest bidder.

### b) Construction of PSF Building

The final bills for the construction of PSF Building and External Development work were finalized and the payments were made to the contractors. The defects appeared during the maintenance period are being removed by the contractors.



View of the Building of Pakistan Science Foundation, Islamabad



### **c) Development of Science Centres**

The Foundation has initiated a programme to develop Science Centres in various provinces, in cities other than the provincial Head Quarters. It is envisaged to establish these Centres as joint ventures through public-private partnership. The first centre under this programme is being established at Faisalabad where a piece of land has been donated by the University of Agriculture, Faisalabad. Services of a consulting firm were acquired to design the Centre. Boundary wall of the Centre was completed during the report period.

## II. SCIENCE POPULARIZATION SECTION

Popularization of Science is one of the statutory functions of Pakistan Science Foundation. The Foundation is engaged in such activities on national level with the aim of increasing awareness about the role played by Science in improving and cultivating scientific minds. In order to achieve this objective, the Foundation has taken up a number of programs to popularize Science in the community, particularly among the students. These activities/programs are detailed as under:

### 1. SCIENCE CARAVAN (MOBILE SCIENCE EXHIBITION)

Science Caravan is a Mobile Science Exhibition that has been designed to increase public awareness about science, and to motivate the younger generation of Pakistan toward the study of Science.

Through the Mobile Science Exhibition, the people living in rural and backward areas of the country are exposed to some of the most fascinating scientific and technological developments of modern world. All narrations are in national language, and are accompanied by simple illustrations. At present, five Science Caravan Units are operating in the provinces of Balochistan, Sindh, NWFP, Punjab and Federal Areas. These Caravan units continued their activities throughout the report period and organized Science Exhibitions in schools within their jurisdiction as detailed below.

#### a) Federal and Punjab Units

S. No.	Place of Exhibition	No. of Schools Attended	Period
1.	Tehsil Murree	23	18 Aug. to 4 Sept., 1996
2.	Govt. High School, Kawai, Mansehra	1	17-28 Sept., 1996
3.	City Public School, Rawalpindi	1	9 March, 1997
4.	Sargodha	16	1-15 April, 1997
5.	Gilgit Area	14	4-30 June, 1997

#### b) NWFP Unit

1.	District Dir	9	1-10 July, 1996
2.	Kawai (Mansehra)	12	17-28 Sept., 1996
3.	Topi (Swabi)	18	10-20 Dec., 1996
4.	Peshawar	2	17-26 Feb., 1997

5.	Nowshera	1	6-15 May, 1997
6.	Batgram	27	16-29 June, 1997

**c) Sindh Unit**

1.	District Dadu	12	22 Sept. to 9 Oct., 1996
2.	Public School, Sukkur	1	13-19 Jan. 1997
3.	Khairpur Mirs	35	5-31 May, 1997

**d) Balochistan Unit**

1.	Quetta	7	24-30 June, 1997
2.	Quetta	25	At various times during the year.

**2. SCIENCE EXHIBITIONS/FAIRS**

The Foundation provides financial assistance to Educational Institutions for organizing Science Exhibitions. The students display Models, Posters, Technical Displays and other Scientific Exhibits prepared by them. Such exhibitions help increase general awareness about science among the masses.

**a) All Pakistan School/College Science Exhibition Contest**

The Intra-Board School/College Science Exhibition Contest initiated during the previous years continued during the report period. An amount of Rs. 90,000/- was released to the Boards of Intermediate & Secondary Education (BISE), Bannu, Sargodha, Sukkur, Faisalabad, Hyderabad and Lahore. The Intra-Board School/College Science Exhibition Contest was organized by 12 BISEs viz., Quetta, Multan, Karachi, Gujranwala, Hyderabad, Mirpur (AJK), Sukkur, Islamabad, Sargodha, Faisalabad, Swat and Lahore, and results, thereof were submitted to the Foundation. Cash prizes amounting to Rs.71,000/- (Rs.1000/- 1st, Rs. 800/- 2<sup>nd</sup>, and Rs.500/- 3<sup>rd</sup>) have been sent to the prize winning students participating in the contest through their respective Boards.

**b) Science Day-1996.**

Science Day, 1996 was celebrated by the National Museum of Science & Technology, Lahore, which arranged Science Quiz and Science Models Competition for the school students. A large number of students along with their science teachers participated. An amount of Rs.25,700/- was released to the National Museum of Science & Technology for distribution of cash prizes to the winner students of different events.

**3. PLANETARIUM SHOWS**

Two mobile Deluxe Planetaria (Model: SL-1000) have been imported from M/S Learning Technologies Incorporated, USA. Planetarium shows are arranged for Secondary and Higher Secondary Schools to promote interest of students in celestial phenomena (i.e., Solar System, Seasonal Changes,

Movement of Planets, Arrangement of Constellations and Galaxies etc.) and to arouse their interest in space science.

During the year, 132 Planetarium/Science Film Shows were arranged by the Federal Caravan Unit for the students of 86 schools located in Sargodha, Mansehra, Rawalpindi, Islamabad and Gilgit areas. A large number of science students alongwith their teachers visited these shows.

#### **4. SCIENTIFIC/EDUCATIONAL FILMS**

The Foundation has established a library of Scientific/Educational Films (16 mm & Videos). An order for the purchase of such films was placed with M/S R.M. Technical Services Islamabad. The consignment has arrived and an amount of Rs. 0.301 million has been spent for the purpose.

#### **5. DUBBING OF SCIENTIFIC & EDUCATIONAL FILMS**

The Foundation assigned the work of dubbing of scientific and educational films to M/S AVA Advertisers, Islamabad. So far, 20 films have been dubbed in urdu. An amount of Rs. 0.164 million has been released to the firm for completing the dubbing of the films listed below.

1. Beach & Sea Animals
2. The Solar System
3. Introduction to Laser
4. Inside the Atom
5. Blood
6. Electron at Work
7. Learning about Heat
8. Making Desert Green
9. Bacteria
10. Learning about Light
11. Energy from the Sun
12. Water Cycle
13. The Beach: A River of Sand
14. Rockets: How They work
15. Insects in a Garden
16. Weather Satellites
17. Gravity
18. What is Ecology
19. Solids, Liquids ad Gases
20. Jungles: The Green Oceans

#### **6. SUMMER/WINTER SCHOOL IN SCIENCE FOR TALENTED HIGHER SECONDARY STUDENTS**

The summer/winter residential schools are set up by different organizations during the vacations for the benefit of highly talented science students of Higher Secondary level. The purpose of this activity is to acquaint the students about the role of basic and fundamental science in National Development. Scientists, Educationists and Research Workers are invited to deliver lectures with special relevance to latest development in their areas of interest.



Dr. Khalid Mahmood Khan Chairman, Pakistan Science Foundation, Presided over the Prize Distribution Ceremony of Annual Science competition 1996, Organized by National Museum of Science and Technology, Lahore on 31-10-1996



Dr. Khalid Mahmood Khan Inaugurating Science Exhibition Organized by City School, Islamabad

An amount of Rs. 30,000/- was provided to the Board of Intermediate and Secondary Education, Gujranwala for organizing the summer school, 1996 at Khanaspur (Ayubia) from 12-22 July, 1996, where eminent scientists/educationists addressed the talented participants.

## **7. ALL PAKISTAN INTRA BOARD SCIENCE QUIZ COMPETITION**

All Pakistan Intra Board Science Quiz Competition also continued during the report period. The Foundation released a sum of Rs.10,000/- each to the BISEs of Swat and Sukkur for organizing the competition. The Boards of Gujranwala, Swat, Faisalabad, Bannu, Quetta, Sargodha, Islamabad, Lahore and Multan, who had organized the Quiz Competition at Intra-Board level, had forwarded their results. An amount of Rs. 23,000/- was released to these Boards for distribution of prize money to the position holders as 1st Prize (Rs.1000/-), 2<sup>nd</sup> (Rs.800/-) and 3<sup>rd</sup> (Rs.600/-).

The winning team and the runners up of all the Boards shall then participate in the Inter Board Science Quiz Competition scheduled to be held in Islamabad during the National Science & Technology Fair-97 (October 4-14, 1997).

## **8. NINTH INTER BOARD SCIENCE POSTERS CONTEST**

The Foundation has initiated this activity in collaboration with the Boards of Intermediate and Secondary Education. So far, nine Science Poster Contests have been organized. Theme for the 9<sup>th</sup> Science Poster Contest was "Information Highway". Nine (9) Boards of Intermediate and Secondary Education, viz., Gujranwala, Multan, Karachi, Swat, Islamabad, Hyderabad, Faisalabad, Sargodha, Quetta and Bannu participated in this contest and sent their best three posters for inclusion in the Inter Board Posters Contest which shall be held in the Foundation. Cash prizes amounting to Rs. 14,000/- have been sent to the winning students through their respective Boards.

## **9. EIGHTH INTRA BOARD SCIENCE ESSAY COMPETITION**

The Foundation is organizing Intra-Board Science Essay Competition to promote Science writing among students in three languages i.e., English, Urdu and Sindhi. Theme for 8<sup>th</sup> Science Essay Competition was 'Impact of Computer Technology on our Life'. Students from 13 Boards of Intermediate and Secondary Education, viz.; Sargodha, Bannu, Swat, Hyderabad, Lahore, Rawalpindi, Faisalabad, Quetta, Multan, Islamabad, Gujranwala, Bahawalpur and Karachi participated. The Boards have sent their best three essays for inclusion in the Inter-Board Science Essay Competition. An amount of Rs. 36,000/- has been distributed as cash prizes to the winning students through their respective Boards. The prizes of competition shall be awarded in the closing ceremony of the National Science & Technology Fair-97 scheduled for October 4-14, 1997 at Islamabad.

## **10. SCIENCE POSTER PROJECT**

Publication of posters on various S&T themes is an on-going activity of the Foundation. For preparation of these posters, a committee of scientists meets a number of times to discuss various themes proposed by the members and finalize 10 posters each year. Distribution of the 9<sup>th</sup> Science Posters Set, 1995, comprising of 10 posters on different scientific themes has been sent to more than 8000 schools on our mailing list through out the country. An expenditure of Rs.0.770 million was incurred in the preparation, printing and dispatch of these posters.

Tenth Science Posters Set, 1996, comprising the following 10 scientific themes has been printed. Its distribution to more than 8000 High Schools on our mailing list throughout the country will begin soon.

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- دھار تارے  
 ہمایا اور شہاب ثواب  
 زور پرک انجن  
 شور  
 پکن کارڈن  
 ڈامن  
 کیموڈ کی راخت  
 تخلیق و ایجادات  
 کیف در تین مانع  
 کر شل ر قتم

### 11. INFORMATIVE URDU LEAFLETS

Printing of urdu leaflets on different science related themes is a significant activity of the Foundation. Some Urdu leaflets are regularly printed every year, for free distribution to science students. Seven (7) such Urdu leaflets have been prepared and printed on the following topics.

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  - 
  -
- عامل قبول  
 شہد کی کھن  
 پلن الرجی  
 شمسی توانائی  
 متحرک زمینی طبق  
 ماریائی کورگی  
 لینا

### 12. DISTRIBUTION OF POPULAR SCIENCE MAGAZINES TO HIGH SCHOOLS

A National Monthly 'Science Digest', and Science Magazines; 'Science Bachoon Key Liye' and 'Jadid Science' are being subscribed for distribution to 1000 High Schools in the country on regular basis.

### 13. DONATION OF SCIENCE BOOKS

The Foundation has donated five sets of seven books each on Agriculture (worth Rs. 7,460/-) to the library of Balochistan Agriculture College, Quetta.

Ten (10) sets of children's computer books (each set comprising of six books) have been purchased for Rs.1,850/- from M/S Computer World, Lahore for donation to some selected computer training centers/schools imparting computer education.

Twenty one (21) sets, each comprising 10 books of informative science books worth Rs.11,000/- have been purchased for donation to selected Higher Secondary School libraries.

#### **14. DONATION OF SCIENCE EQUIPMENT**

a) Realizing the fact that our schools are not equipped with scientific material, the project of donating science equipment to High Schools has been initiated. The Foundation has sent 180 Colorimeters along with glassware, chemicals and instruction manuals to the Boards of Intermediate and Secondary Education, Sargodha, Faisalabad, Multan, D.G. Khan, Bahawalpur, Lahore and Gujranwala, for distribution to schools already identified by them. The Foundation is trying to enhance the scope of this activity in its future program.

b) A computer set, 386 DX 40 MHZ, ZBM/44BM, 130 BM RAM, Colour Monitor SVGA, Mouse 4-Tech (CPU, Monitor & Key Board) has been donated to Sir Syed Public School, Tipu Road, Rawalpindi for its Computer Lab under Computer Education Program of the Foundation.

#### **15. POPULAR SCIENCE LECTURE SERIES OF EMINENT SCIENTISTS, ENGINEERS AND TECHNOLOGISTS**

The Foundation, being the prime agency which funds the R&D activities in the fields of Science Engineering & Technology, and promotes awareness about Science & Technology in the country, chalked out a program for organizing Popular Lecture Series by Eminent Pakistani Scientists on Science, Engineering and Technology in various academic institutions of the country. The following lectures were arranged during the report period.

<b>S. No.</b>	<b>Date</b>	<b>Name of Speaker</b>	<b>Topic of Lecture and Venue</b>
1.	October 9, 1996	Dr. Khalida Usmani Medical Scientist/ Environmentalist, Fatima Jinnah Medical College, Lahore.	Environmental Degradation & its Effects on the Society, University of Agriculture, Faisalabad.
2.	January 19, 1997	Dr. S. M. Farooqi, Chairman, Eastern Technique (Pvt) Ltd., Islamabad.	Origin of Salajit, PSF, Islamabad.
3.	March 19, 1997	Dr. Mohammad Afzal Director General, PASTIC National Centre, Islamabad.	R&D Management, PSF, Islamabad.
4.	March 28, 1997	Dr. Anwar Naseem (Adviser Science), COMSTECH and Dr. Qasim Mehdi Director, KRL, Islamabad.	Story of Dolly-From Genes to Clones, PSF, Islamabad
5.	April 14, 1997	Dr. Shahzad A. Mufti Director General, Pakistan Museum of Natural History, Islamabad.	Cloning in Mammals, University of Arid Agriculture, Rawalpindi.



- |    |                |   |   |
|----|----------------|---|---|
| 6. | April 28, 1997 | Dr. Pervaiz Hoodbhoy<br>Professor, Quaid-e-Azam<br>University, Islamabad. | From Quark to Black Holes:<br>Space of Modern Physics, Shah<br>Abdul Latif University,<br>Khairpur. |
|----|----------------|---|---|

In addition, researchers from Pakistan Museum of Natural History, Islamabad delivered seminars on their work as under.

- |    |                  |  |  |
|----|------------------|--|--|
| 1. | October 28, 1996 | Miss. Tahira Rana<br>Research Associate, PMNH,<br>Islamabad. | Composition of Vertebrate<br>Tissues and Evolution of<br>Endothermy, PSF, Islamabad.             |
| 2. | December 8, 1996 | Dr. Bushra Inam<br>Research Associate, PMNH,<br>Islamabad.   | Responses of Bushloe<br>Dactyloides to Watering<br>Frequency and Defoliation, PSF,<br>Islamabad. |

### **III. DEVELOPMENT OF SCIENCE & TECHNOLOGY STRATEGIES: PRIME MINISTER'S PAKISTAN-2010 PROGRAM**

A special meeting of eminent scientists and engineers was convened at Pakistan Science Foundation on 23<sup>rd</sup> May 1997 to discuss the issues and options for the Development of Science & Technology Strategies for the Prime Minister's 2010 Program. It was attended by 38 eminent scientists including Dr. A. Q. Khan (Annexure-VI) and was chaired by Engr. Ahsan Iqbal, Chief Coordinator, Prime Minister's Pakistan-2010 Program.

Dr. Khalid Mahmood Khan, Chairman, PSF gave the over view of Science & Technology Infrastructure in Pakistan and the speakers presented their views and suggestions for the Program. Lt. Gen. (Rtd.) Javaid Ashraf Secretary, Ministry of Science & Technology and Dr. A.Q. Khan, Project Director, A.Q. Khan Research Laboratories and President Pakistan Academy of Sciences also spoke on the occasion. The meeting set the agenda for the 2010 Program on Science and Technology and following recommendations emerged during the deliberations.

- ⇒ Science & Technology should be given full political support and patronage at the highest level and S&T be declared as the main vehicle for economic development of the country.
- ⇒ A Minister for Science & Technology be appointed to look after the affairs of this vital sector which so far has remained neglected.
- ⇒ Bureaucratic procedures be simplified if any progress is to be achieved.
- ⇒ Recommendations of various commissions and committees should be implemented.
- ⇒ R&D/S&T organizations be given full autonomy and appropriate funds to achieve their defined goals.
- ⇒ Standard procedures for appointments of Institutional Heads be developed/enacted to avoid appointments through other means.
- ⇒ Ban on the appointment of Scientists and Engineers in R&D organizations be lifted.
- ⇒ All R&D be linked to economic development.
- ⇒ Subject of Technology Management be introduced in universities and colleges.
- ⇒ Import duties on equipment for academic and R&D institutions be removed.



A view of Popular Lecture on Gene Cloning by Dr. Anwar Naseem and Dr. Qasim Mehdi at the PSF Auditorium



Engr. Ahsan Iqbal, Chief Coordinator, Prime Minister's Pakistan 2010 Program, Lt. Gen. (Rtd.) Javaid Ashraf, Secretary, MoST, Dr. A.Q. Khan and Dr. Khalid Mahmood Khan at the Meeting with Scientists and Engineers



Some of the Participants at the Meeting



Dr. Khalid Mahmood Khan Chairman, Pakistan Science Foundation Delivering a talk on "Promotion of Science and Technology in Pakistan-Impediments and Remedies" at the Pakistan National Centre Islamabad on 28<sup>th</sup> August, 1996

- ⇒ National Target be fixed for achieving self reliance in essential commodities.
- ⇒ MSTQ system for quality control be immediately established. Ministry of Science and Technology be given go ahead to set up National Accreditation Council, Quality Control Authority etc.
- ⇒ Human resource development program be initiated in the country. This will lead to strengthening of local infrastructure and producing manpower oriented towards societal needs.
- ⇒ Technologies which are relevant to immediate needs of the country such as: Energy, Communication, Information Technology New Materials, Biotechnology, Textile, Leather and Defense Technologies, be given due priorities to achieve national objectives.
- ⇒ Legislation should be made to use solar energy for space and water heating in all buildings to be constructed in future.

Some actions for economic development are proposed as under:

- ⇒ Set-up “Pakistan Technology Board” with full mandate to implement “Technology for Growth” program
- ⇒ Identify specific products including house hold appliances and scientific equipment for Technology based manufacturing for domestic or export purpose.
- ⇒ Reforms to Stop smuggling & promote local assembly and manufacturing.
- ⇒ Development of Information Technology including export of software.
- ⇒ Announce special incentives for local technology based manufacturing of for exports.
- ⇒ Facilitate joint ventures with multinationals for export manufacturing & overseas marketing.
- ⇒ Technology venture capital companies be given tax rebate in view of risk involved.
- ⇒ Transfer of Technology should be mandatory or projects over 10 million.
- ⇒ Set-up Pakistan Technology Management Institute to provide training, education and to develop methodological for technology implementation.
- ⇒ Setting up of already approved Tech Town for establishing high tech industry at Islamabad be expedited by CDA.

#### **IV. PSF PUBLICATIONS:**

The Foundation from time to time or as and when needed, collects various S&T related statistics not compiled by any other organization for the benefit of policy makers and scientists at large. During the year following directories/booklets were published.

1. A to Z Directory of Ph.D. Professionals of Science, Engineering & Technology, 1996, compiled by Dr. Munir Ahmed Bhatti, Member (Science).
2. Directory of PSF Funded Projects (1973-1996), compiled by Dr. Munir Ahmed Bhatti, Member (Science).

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

One of the main objectives of Pakistan Museum of Natural History (PMNH) is to collect, identify and preserve Natural History specimens of Pakistan. This objective of collection of plants, animals, fossils and rocks is being earnestly fulfilled by the scientists of PMNH. Many international collaborative programs of PMNH with different foreign organizations such as Florida Museum of Natural History, Oxford University, UK and ETH, Switzerland have resulted in the acquisition of a large number of floral, faunal and geological samples. Many collection trips are undertaken regularly for this purpose and during one such trip to Balochistan and FATA, more than 5000 specimens were collected, many of which were first records from those areas. Proper identification and other research is being carried out on this material.

For dissemination of knowledge, seminars, symposia and workshops etc. are organized by PMNH on a regular basis. In this context, a 2-days symposium on "Economic Geology of Pakistan" was organized during March, 1997 by PMNH. This symposium was attended by more than 100 delegates from Pakistan.

Another activity of PMNH is to provide assistance and guidance to different institutions of the country in the establishment of Natural History Musea and galleries. In this regard, Public Services Division of PMNH designed Maritime Museum in Karachi at the request of Pakistan Navy. The Marine Life Diorama was planned and executed successfully by PMNH.

A brief account of research and educational activities of the Museum during 1996-97 is given below.

### **1. BOTANICAL SCIENCES DIVISION (BSD)**

#### **a) Reference Collection**

The main objective of BSD is to collect, identify and preserve for reference the plant treasure of the country. During the year, six field trips were undertaken to Siran Valley, Sarihut, Simli and Tanaza Dams and Islamabad and its adjoining areas and as a result 300 higher and 225 lower plant specimens were collected.

#### **b) Laboratory Work**

Preservation of the newly collected material and curation and cataloguing of the previous reference collection remained in progress. Processing, mounting and labeling of 3700 higher and 1800 lower plant specimens was carried out and 900 higher and 150 lower plants were identified upto species level.

#### **c) Extension Work and Services Rendered to other Organizations**

For the students of various educational institutions of Pakistan, 1275 plant specimens were identified by the BSD and eight lectures were prepared for the students of various educational institutions. Popular articles were also prepared for print media.

#### **d) Publications**

- Shah, M., B. Schirone and C. Pelsoi (1996) On the affinity between *Quercus baloot* Griffith and *Quercus ilex* L. Natural History Bulletin 2(1): 1-8.
- Awan, M.R. and N.A. Raja (1996). Some plants from Palas Valley, District Kohistan, Hazara Division, NWFP. Natural History Bulletin 2(1): 31-38.
- Ahmad, S. (1996). Three tribes of Cynareae (Composite) in Islamabad. Natural History Bulletin 2(1): 39-42.
- Shah, M., Z.K. Shinwari and F. Bano (1996). Distribution of genus *Potentilla* (Rosaceae) in Pakistan and Kashmir. Natural History Bulletin 2(1): 47-55.
- Sultana, K. (1996). Edible Mushrooms of Pakistan. Proc. First Train Worksh. Ethnobot. Appl. Conserv. Islamabad. Sept. 16-24, pp 46-50.
- Qureshi, H.M.A. and S. Ahmad (1996). Supply and regeneration of medicinal plants of Pakistan. Proc. First Train Worksh. Ethnobot. Appl. Conserv. Islamabad. Sept. 16-24, pp 90-93.
- Shah, M. and Z.K. Shinwari (1996). Traditional uses of potential species in Pakistan. Proc. First Train Worksh. Ethnobot. Appl. Conserv. Islamabad. Sept. 16-24, pp 124-132.
- Shinwari, Z.K. and M. Shah (1996). Ethnobotany of Kharan District (Balochistan-Pakistan). Proc. First Train Worksh. Ethnobot. Appl. Conserv. Isla. Sept. 16-24, pp 158-167.

## **2. EARTH SCIENCES DIVISION (ESD)**

### **a) Reference Collection**

ESD as one of its objectives, collects and preserves for reference various rocks, minerals and fossils present in the country. During the year, four field trips were made to Padhri area (Potwar Plateau), Islamabad and adjoining areas and Azad Kashmir and a foreign trip including field work in Northern Italy was also undertaken. 25 bags of mudstones and/or sediments for the recovery of fossils and 105 rock/mineral specimens were collected.

### **b) Laboratory Work**

Washing of 800 kgs of sediments was carried out for the recovery of fossils. Collected 92 ostracods and identified 150 specimens of ostracods. Catalogued 2200 larger foraminifera specimens. 600 rock/mineral samples were subjected to chemical analyses and thin sections of 140 rock samples were made. Megascopic studies of 50, x-ray diffraction of 25 and petrographic studies of 20 samples were carried out.

### **c) Extension Work and Services Rendered to Organizations**

Research facilities and guidance is being provided to two M. Sc. students of AJK University and a Ph.D. student of Quaid-i-Azam University, Islamabad. A National Symposium on Economic Geology of Pakistan was organized in collaboration with ETH, Switzerland and Punjab University, Lahore. Also, 20 rock/mineral samples for individuals and students were identified.

### **d) Publications**

- Cheema, I.U., S.M. Raza and L.J. Flynn (1997). Note on Pliocene small mammals from the Mirpur District, Azad Kashmir, Pakistan. Geobios Lync, 30(1):115-119.
- Dawood, H., S. Hussain and M.N. Chaudhry (1996). Geology of Thana Barikot Quadrangle (Sheet No. 43/2). Nat. Hist. Bull. 2(1): 15-24.

Cheema, I.U., S.M. Raza and A.R. Rajpar (1996). Late Astracian small mammal fauna of the Miocene Siwaliks of Kallar Kahar - Dhok Thalian, District. Chakwal. Pak. J. Zool. 28(3): 231-243.

Ahmad, J.M., S.R.H. Baqri and Anwar-ul-Haq (1996). Science Vision. Vol. 2, No. 1: 54-57.

### **3. ZOOLOGICAL SCIENCES DIVISION (ZSD)**

#### **a) Reference Collection**

Like other technical divisions of PMNH, ZSD collects zoological specimens as part of its reference collection. During 1996-97, eight field trips were undertaken to Balochistan, NWFP, FATA, Skardu, Gilgit (up to the Khunjerab Pass) and Islamabad and its adjoining areas for reference collection. In all, 4700 fish, 1400 butterfly, 700 small mammal, 300 invertebrate, and 250 herpetile specimens were collected.

#### **b) Laboratory Work**

Preserved 5300 specimens collected from Balochistan. Mounted and labelled 860 butterflies and 7000 other insects. Stuffed 40 birds and 90 study skins of birds were prepared. Also, stuffed 10 amphibians and mammals. Prepared drawings of 110 millipedes/centipedes after their identification.

#### **c) Extension Work and Services Rendered to other Agencies**

Provided information and helped IUCN and WWF in the preparation of Action Plan on the Biodiversity of Pakistan. Organized and executed field trips with the personnel of Florida Museum of Natural History, USA, and Oxford University, UK as part of joint ventures. Information regarding wildlife and prospects of its filming on Deosai Plains was prepared and sent to BBC Natural History Unit, Bristol, UK.

#### **d) Publications**

Hasan, S.A. (1996). Distribution and abundance of two noctuid pests of cultivated forests in Islamabad. Nat. Hist. Bull. 2(1):9-14.

Hasan, S.A. (1996). A new genus and a new species of the Pyrrhocoridae (Heteroptera) from Pakistan. Nat. Hist. Bull. 2(1):43-48.

Khaton, S. (1996). Water quality and macro invertebrates of the lakes of Chakwal District. Nat. Hist. Bull. 2(1):25-30.

Khaton, S. (1996). Description of a new species of butterfly from Pakistan. Pak. J. Sci. Ind. Res. 8:142-43.

Hasan, S.A. (1996). Structure and function of the Pretarsus in some plant bugs (Heteroptera: Pentatomidae) Bangladesh J. Zool. 23(1):35-40.

Ali S.R., M. Ahmad and S. Khaton, (1996). Physio-chemical variations of the waste water of tannery of Gujrat (Punjab) and fauna found in it. Pak. J. Sci. 48(1-2):21-23.

Khaton, S. (1996). Certain dragonfly (Odonata) nymphs of Pakistan. Pak. J. Sci. 48(3-4):59-65.

Khaton S. (1997). Physiological nature of water and fauna of Simly Reservoir, Islamabad - A preliminary study. Proc. Pak. Congr. Zool. 15:60-61.



#### **4. PUBLIC SERVICES DIVISION (PSD)**

One of the main objectives of PMNH is to promote education and public awareness about our natural wealth involving Pakistan's heritage of natural resources, and PSD is mainly responsible for achieving this objective. In addition, the Division takes care of the display part of the Museum, and provides assistance/expertise to various S&T organizations in designing and arranging science exhibitions.

##### **a) Museum Display and Maintenance**

Artwork for the abstract volume, folder and writing pad for International Symposium on Economic Geology of Pakistan. Layout of final draft of the Newsletter No. 9 was designed prepared and submitted for print .

For the improvement of "earth quake" diorama, a scale model was prepared. Various plans for the PMNH building Block -II including floor plans for proposed offices, floor plans for existing offices and display in the F-7 building, floor plans of proposed display arrangements were prepared. Also drawings of front and side elevations, plus rough cost estimates were prepared. Audiovisual Center of PMNH was constructed and the equipment donated by the Japanese Government was installed. A four-fold brochure of PMNH was designed and the artwork of the selected design was prepared for printing. Designed and erected an exhibition to go with the inaugural ceremony of the Audio-visual center.

Maintenance of existing display was carried out including refurbishing of all showcases of ZSD and fossil galleries. Fourteen (14) plinths for the ESD's display of rock specimens were prepared. Urdu kitabat of 25 brochures matter and 20 labels was done. An hour-long video film of PMNH and its activities was prepared as the first video production from the new Audiovisual Center of PMNH.

##### **b) Educational Activities**

As mentioned above, education of students and the public at large about the natural history resources of the country, is the main objective of PSD, thus guided tours of the Museum Display Center are regularly provided to visitors. During the year, tours were provided to 2015 students and 155 teachers of various educational institutions. Film shows on "Natural History and other scientific field" were also organized for students.

##### **c) Services Rendered to other Organizations/Professionals**

Design consultancy, manpower and supervision for the construction of "Maritime Museum" in Karachi, at the request of Pakistan Navy was provided. Also, provided expertise to the City School teachers for the planning and execution of a science exhibition. For Pakistan Science Foundation, tasks regarding the National Science & Technology Fair-1997, were carried out including designing of the logo, letterhead, colored visuals for the envelope, registration form etc.

##### **d) Visitors to Museum Displays**

The Museum has its main Display Center in Al-Markaz, F-7, Islamabad, while a Display Corner is set up outside the local Zoo, and every year a large number of students and general

public with their children visit the displays. During 1996-97, 13,260 visitors were received at the main Display Centre, while 38,230 persons visited the Display Corner.

**e) Audiovisual Equipment donated to PMNH**

The handing over ceremony of the Audiovisual Equipment donated by the Japanese Government took place in March, 1997. H E Takao Kawakami, Ambassador of Japan was the chief guest. A highly sophisticated set of audiovisual equipment including Video Cameras, Editing System, Rear View Projector etc. along with a field vehicle, worth 48 million yen (about Rs. 16.00 million) was handed over to PMNH during this ceremony. Secretary Ministry of Science and Technology and Chairman PSF were among those present on this occasion.

**f) Development Program of PMNH Block-II**

Tender documents for the construction of Block II of PMNH building were completed during the report period. Tenders were floated and a contract was awarded to M/S National Development Services, Islamabad on the basis of lowest bidding. The construction process is scheduled to start by July1, 1997. As soon as this block is completed, the Display Center, presently located in a rented building in F-7 Markaz will be shifted there along with the Public Services Division.

**Handing over Ceremony of Japanese Grant-in-Aid Audio Visual Equipment  
to the Pakistan Museum of Natural History, Islamabad**



His Excellency viewing the Audio Visual Equipment Installed in PMNH



H.E. Mr. T. Kawakami, Ambassador of Japan Presenting the Plaque to Dr. Khalid Mahmood Khan, Chairman, PSF

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

Pakistan Scientific and Technological Information Centre (PASTIC) is the premier organization in the field of information dissemination, serving thousands of researchers. It is a subsidiary of the Pakistan Science Foundation.

PASTIC has evolved from the erstwhile "Pakistan National Scientific and Technological Documentation Centre (PANSDOC)", which was established in 1957 at Karachi with the assistance of UNESCO, under the Pakistan Council of Scientific and Industrial Research (PCSIR). In 1974, however, PANSDOC was transferred to the Pakistan Science Foundation (PSF), and was renamed as the Pakistan Scientific and Technological Information Centre (PASTIC). After transfer to PSF, the scope and facilities of PASTIC were expanded with the following objectives.

1. To procure, process and disseminate scientific and technological information to the researchers.
2. To interact with regional and international information agencies/networks.
3. To develop inter-library cooperation and resource sharing at national level.
4. To train information personnel in contemporary techniques and methods of information handling.
5. To develop and strengthen the National Science Reference Library.
6. To provide bibliographic and translation services.
7. To compile Directory of S&T Periodicals of Pakistan, Union Catalogue of S&T Serials and Bulletin of Technology Information.
8. To publish an abstracting and indexing journal entitled "Pakistan Science Abstracts".

PASTIC has a National Centre in Islamabad housed in its own building located at the Quaid-i-Azam University Campus, and four Sub-Centres at Karachi, Lahore, Quetta and Peshawar. The Centre offers numerous specialized services to the scientific community of Pakistan as described below.

## **1. DOCUMENT PROCUREMENT AND SUPPLY:**

Under the Document Procurement and Supply Service, queries are received from various R&D organizations for supply of reprints of research articles/conference papers and reports which are procured either from local sources or from abroad. A total of 2305 S&T documents were procured and supplied against 2656 requests received.

## **2. BIBLIOGRAPHY SERVICE:**

References from International databases on CD ROM are supplied to users according to their research topics on request. Against 404 orders, 22622 references were collected and supplied on various S&T topics to the researchers.

## **3. CURRENT CONTENT SERVICE:**

Under the Current Contents Service, table of Contents from 96 S&T journals of Chemistry, Biology, Physics, Computation, Earth Sciences, Mathematics and Medicine are provided to 512 scientists. During the period under review, copies of 115 articles were supplied to users.

#### **4. ABSTRACTING AND INDEXING SERVICES:**

PASTIC publishes a quarterly journal viz., "Pakistan Science Abstracts (PSA)", which contains abstracts of research articles published in recent S&T Journals of Pakistan. During the report period the following volumes were finalized and composed.

- I. PSA 1994 Vol. 34 (3-4) was published and distributed to 30 Local & Foreign Organizations on subscription basis, 80 organizations on exchange basis and 40 copies to four PASTIC Sub-Centres.
- II. PSA 1995 Vol 35 (1-2) was composed and sent for printing.
- III. PSA 1995 Vol 35 (3-4) was proof read, author and keyword index were prepared.
- IV. PSA 1996 Vol 35 (1-2) was composed.

#### **5. UNION CATALOGUE:**

A Union Catalogue of about 103 Libraries was published in 1994. During the report period the updating of the Catalogue continued and about 150 organisations/institutions were contacted for acquiring serial holding record of the libraries. PASTIC library has been updated.

#### **6. PASTIC NATIONAL SCIENCE REFERENCE LIBRARY:**

About 943 issues of various S&T periodicals, 157 documents and 125 books were received in the libraries of PASTIC National Center and Karachi Sub-Center. The number of references supplied were 1584. The subscription of following databases on CD-ROM were renewed.

- i) Life Sciences, ii) POLTOX, iii) PROQUEST, iv) Medline and
- v) Physical Chemical & Earth Science (Abstract).

#### **7. TECHNOLOGY INFORMATION:**

PASTIC publishes a monthly Bulletin, namely Technology Information based on information on technologies collected from 27 countries.

- I. The Jan 1995 - June 1996 issues of Technology Information were supplied to 120 Industrial & Technological Establishments.
- II. The July-December 1996 issues were printed and supplied to 150 Industrial & Technological Establishments, Trading firms, Business Enterprises, four PASTIC Sub-Centres.
- III. The combined January - February, 1997 issue is in press.

#### **8. REPROGRAPHIC SERVICES:**

The Reprographic Section of PASTIC has facilities ranging from photocopying to offset printing. During 1996-97 about 6,11,117 impressions, 1,673 pages and 1,04,822 copies were produced by the Reprography Unit against 103 jobs received from 11 organizations.

## 9. COMPUTERIZATION ACTIVITIES:

The following computer and accessories were purchased under the report period.

- I. Intel Pentium Notebook, 133 Mhz Process, 16 MB RAM, 1.44 MB 3.5" Floppy Drive, 2.1 GB Hard Disk, 10x speed CD-ROM Drive, 12.1" Dual Scan, PC Card Expansion slots, 16 Bit Sound Speaker & Microphone, Infra-red post-wireless data transmission, Modem Card for accessing Internet
- II. Internal Fax/Modem Card.
- III. Two 386SX Computer upgraded to Pentium 133 Mhz, Heat sink, 256KB Cache Memory, 8MB RAM, 1MB 64 bit PCI VGA Card.
- IV. Four 386SX computer upgraded to 486DX, Processor 5x86, 133Mhz, 256KB Cache Memory and 8MB RAM.
- V. MB Hard Disk.
- VI. HP 4M Laser Jet Tonner (2).

### Data Analysis:-

- I. 8981 pages composed for different jobs.
- II. PSA 1994 Vol,34 No. (3-4 )was composed.
- III. Miscellaneous jobs of PASTIC were undertaken.
- IV. Computer Software and Desk-top publishing services/facilities were provided to other S&T organizations.
- V. TIPS Urdu Book (Baroon-e-Mulk Tijarat) was composed and advertisements were designed.
- VI. Pakistan Academy of Science's Publication was composed.
- VII. Pakistan Science Foundation's publication on Projects for High School in English and Urdu and Service Rules were composed.
- VIII. Secretariat Services were provided in SAARC meeting of S&T Technical Committee.
- IX. Assisted in the organization of Computer Exhibition in Lahore.

## 10. INTERNATIONAL LIAISON:

PASTIC is the National Focal Point of International/Regional Information Networks, like SAARC Documentation Centre, WHO/CEHANET and UNEP/INFOTERRA. PASTIC is also the coordinating/collaborating body for UNDP/TIPS, UNESCO/ASTINFO and AIT/ENSICNET. The following collaborating activities were undertaken:

### a) INFOTERRA

INFOTERRA is the United Nations Environment Programme's Global Information Network based at Nairobi comprising of National Focal Points in about 200 member states. INFOTERRA provides information by searching the database on Environmental Information Sources, it has developed with the assistance of the NFPs. All Information services such as articles service, bibliographic service, reference and referral services are supplied free of charge through INFOTERRA. During the period under consideration the following activities were undertaken.

Information was supplied in response to queries pertaining to Fish toxicology, Industrail noise control, Mountains development, Chrome tannery effects, Oil yield of Sunflower, Lead Industrail/dust pollution, Tanneries & the environment, Trace metals & crops, Precipitation of Cr, Endrometrial Carcinoma, Hepatitis & Blood donors, Flourides in drinking water, Nitrates.

Infant respiratory syndrome, Phytochemical study of *Serpentaria Rauvolfii*, Fertilizers effect on crops, Se in plasma, Industrial waste disposal, Pollution effect on thyroid gland, Cancer & atmospheric pollution, Effects of pesticides on histology & hematology, Trace metals in psychiatry, Chemical analysis of toxic wastes, Birds & biodiversity, Industrial effluents, Air pollution & agriculture, Liver cancer & its relation to trace elements on hair scalp, Ecology of Urial in the salt range, Bentonite & adsorption, Wastes of Electroplating, Waste of pharmaceuticals, Water analysis & reduction of Nitrate, Nitrite in water, Estimation of ghee, fats & margarine, Iodine, Trace metal analysis in plants by different techniques, Toxicity in chicks, Environmental Education, Iodized salt, Environment, Nutrition and Hormones synthesis, release & transport, etc.

**b) CEHANET:**

The World Health Organization's Centre for Environmental Health Activities Information network gathers information about published material on environmental health with the help of NFPs which are 22 in number. Information is then provided through the bibliographic database on environmental health documents which can be obtained from the member states. During 1996-97, following activities were undertaken. CEHANET publications like technical reports, training manuals, and information materials were distributed. From the data collected during the last year, two databases are being developed on Environmental Institutions and Professionals.

**c) ASINTFO:**

It is a UNESCO supported network for the exchange of experience and information in Science and Technology in Asia and the Pacific. It aims to build and strengthen the information infrastructure in the member states. Under this network PASTIC is responsible for distributing the UNESCO developed software package CDS/ISIS and for providing training on this package. During the year, following activities were undertaken.

- I. CDS/ISIS and IDAMS Packages were provided to 4 and 3 Organizations respectively.
- II. ASTINFO newsletter/promotion material were distributed.
- III. License Numbers were allotted to the organizations which have acquired CDS/ISIS Package from PASTIC.

**d) SAARC Documentation System (SDC):**

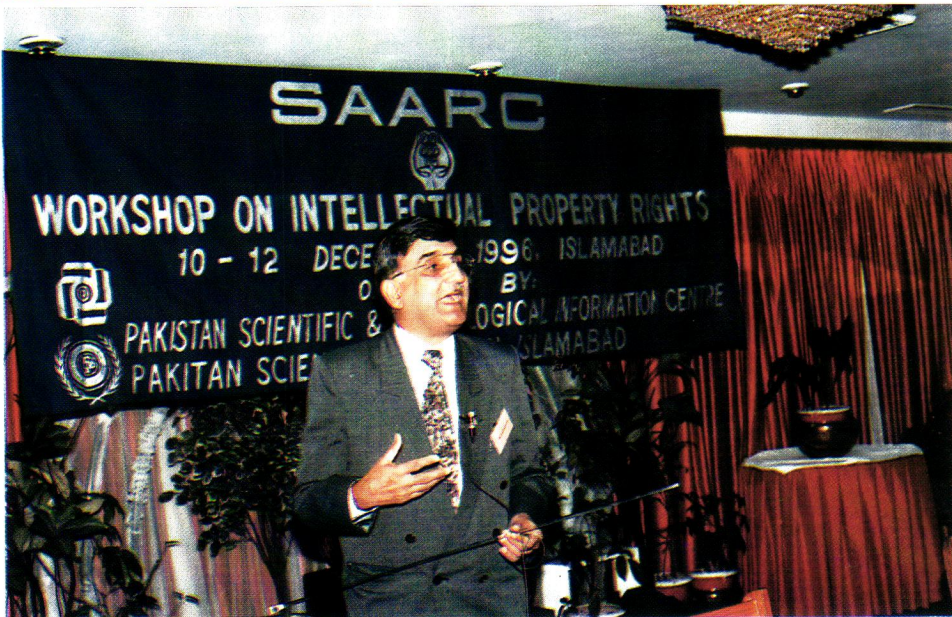
SDC was established in 1994 for facilitating exchange of information amongst the SAARC Member States. The following information activities were undertaken during the year.

- I. Reprints were procured from INSDOC under the SAARC program.
- II. SDC Newsletters were distributed.
- III. A concept paper was prepared for the course on Wide Area Networking to be organized by PASTIC for SAARC countries.
- IV. Regional Workshop on "Intellectual Property Rights" was organized during 10-12 December 1996.

**e) MISCELLANEOUS:**

Information was searched and supplied mostly on Environmental and S&T topics.

- I. Reference and referral services were provided to researchers.



Workshop on Intellectual Property Rights at Islamabad



- II. Services were provided to COMSTECH for their Directory on Muslim Scientists.
- III. PASTIC Brochure was prepared.
- IV. Draft Report on Girls Science Education in Pakistan assigned by Commonwealth was compiled.
- V. Election of the Zoological Society of Pakistan were carried.
- VI. A breif was prepared on Information Technology in Pakistan for the 9th Five Year Plan.
- VII. Training provided on Ms Word and Excel Packages.
- VIII. PASTIC services and activities were promoted by distributing leaflets to various research organisations and researchers.
- IX. Budget Speech, Annual and Quartley reports were compiled.

## **11. MEETINGS/VISITS/FUNCTIONS**

- I. Seretariat Services were provided in SAARC meeting of S&T Technical Committee.
- II. Groups of several students and teachers visited PASTIC from Islamia University, Bahawalpur and Bahauddin Zakariya University, Multan.

## **12. TRAININGS:**

### **a) Training received:**

Mrs. Kausar Sohail and Mr. Zaheer Nasir, Assistant Programmers attended a Workshop on Library Automation from 15-23 October 1996 in New Delhi, India.

### **b) Training/Lectures Imparted**

The following trainings were provided by the International Liaison Section.

- Training on CDS/ISIS package to a Librarian from Ministry of Foreign Affairs.
- Training on CDS/ISIS package from 3-7 November 1996 to an Assistant Librarian from Foreign Service Academy.
- PASTIC/PSF and SAARC organised a Workshop on "Intellectual Property Rights" from 10-12 December 1996 in Islamabad.
- A lecture was delivered by Dr. Mohammad Afzal at the National Defence College on Science & Technology Development in Pakistan.
- A lecture was delivered by Mrs. Kausar Sohail on Advance Features of CDS/ISIS for the Training Course on Application of Information Technology on Pakistani Libraries organised by Academy of Educational Planning and Management, Ministry of Education.

## **13. TECHNOLOGY INFORMATION PROMOTION SYSTEM (TIPS):**

Technological Information Promotion System based at PASTIC has been regularly publishing daily and weekly bulletins in Pakistan which provides up-to-the-minute and detailed information on technology and trade opportunities. It covers 14 different sectors and has the largest data base in the world on trade/technology information from the developing countries. The sectors are; i) Agro-Industries, ii) Energy, iii) Electronics, iv) Pharmaceuticals, v) Business Opportunities, vi) Food Processing, vii) Machinery, viii) Biotechnology, ix) Textiles, x) Fisheries, xi) Building Materials, xii) Chemicals, xiii) Mining, and xiv) Packaging.

- I. In 1996-97, 5500 technology/trade offers and requests came from 25 countries and were sent to users in Pakistan. 260 Pakistani entrepreneurs/business organizations provided information on products/processes/technologies which were advertised abroad through TIPS network.
- II. TIPS has successfully launched the Computer Exhibition in Lahore from 14-16 June, 1997.
- III. TIPS third book on Trade and Technology Information in Urdu language has been published and is out in the market for sale.

## CHAPTER 2

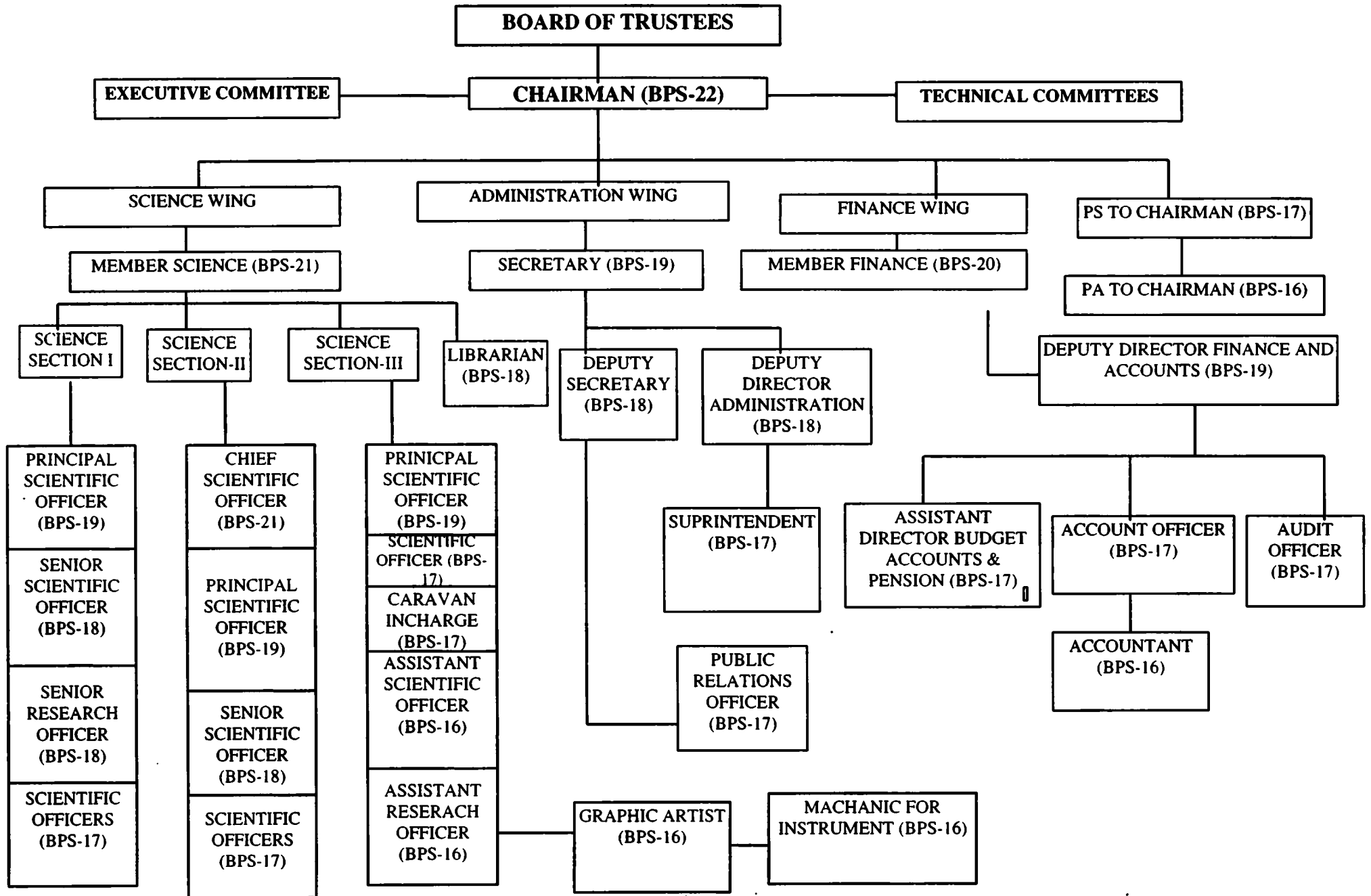
### ORGANIZATION AND ADMINISTRATION

The organizational structures of the Pakistan Science Foundation, Pakistan Museum of Natural History and Pakistan Scientific and Technological Information Centre are given on the forth coming pages. The sanctioned strength of staff in the Foundation, PMNH & PASTIC during the period was as under:

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

<b>Sr. No.</b>	<b>Designation</b>	<b>Number</b>
1.	Chairman	1
2.	Member (Science)	1
3.	Member (Finance)	1
4.	Chief Scientific Officer	1
5.	Secretary	1
6.	Principal Scientific Officer	4
7.	Senior Scientific Officer	2
8.	Senior Research Officer	1
9.	Deputy Director (F&A)	1
10.	Deputy Secretary	1
11.	Deputy Director (Admn)	1
12.	Public Relations Officer	1
13.	Accounts Officer	1
14.	Assistant Director (Budget, CP Fund & Pension)	1
15.	Research Officer	1
16.	PS to Chairman	1
17.	Librarian	1
18.	Scientific Officer	5
19.	Internal Audit Officer	1
20.	Caravan Incharge	5
21.	Graphic Artist	2
22.	Superintendent	1
23.	Assistant Research Officer	1
24.	PA to Chairman	1
25.	Mechanic for Instrument	1
26.	Assistant Scientific Officer	1
27.	Accountant	1
28.	Supporting Staff	125
	<b>Total :</b>	<b>165</b>

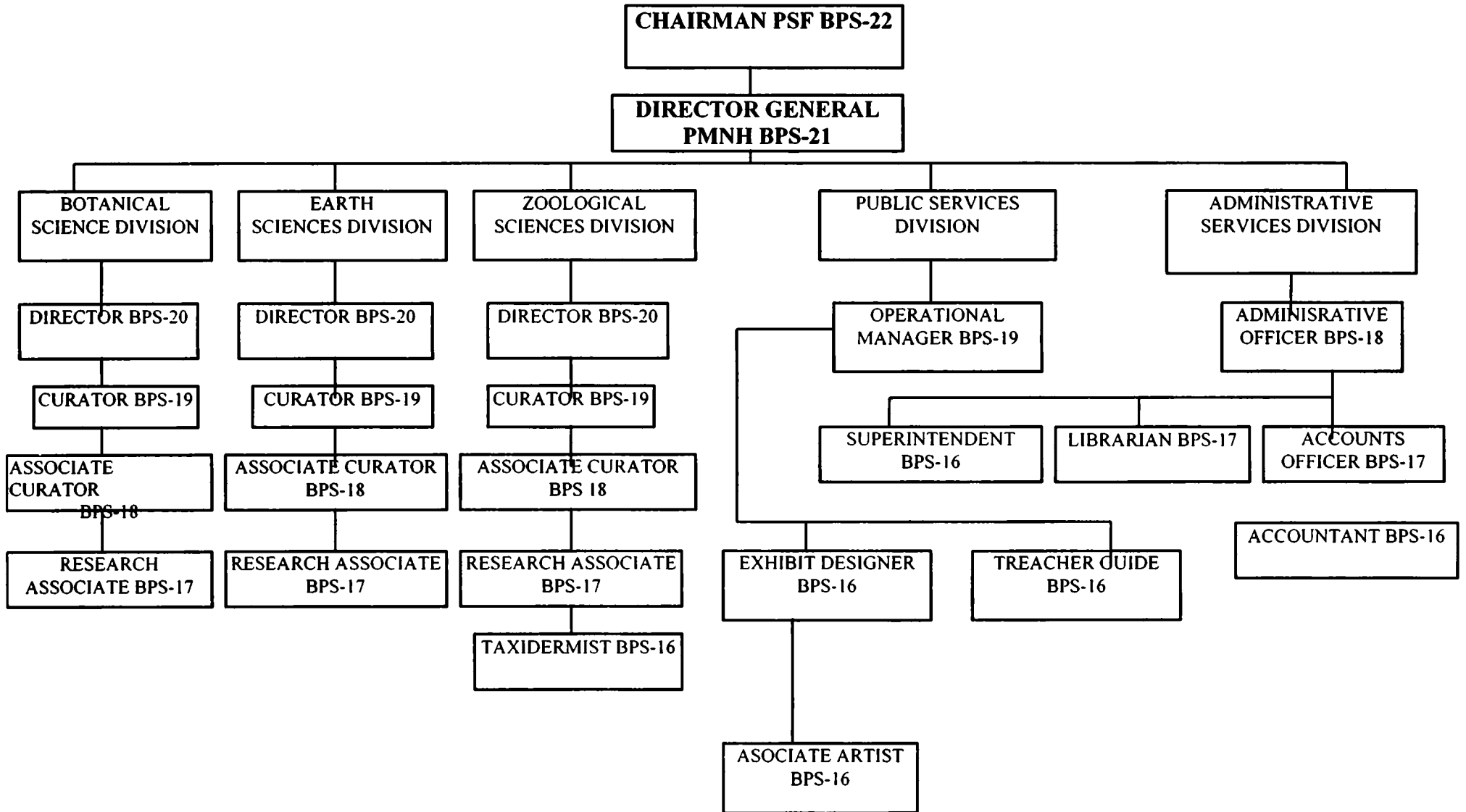
**PAKISTAN SCIENCE FOUNDATION  
ORGANIZATIONAL CHART**



## PAKISTAN MUSEUM OF NATURAL HISTORY (PMNH)

<b>S. No.</b>	<b>Designation</b>	<b>Number</b>
1	Director General	1
2	Director	3
3.	Curator	6
4	Associate Curator	10
5	Manager Operations	1
6	Research Associate	19
7.	Exhibit Designer	1
8	Senior Administrative Officer	1
9.	Senior Accounts Officer	1
10.	Librarian	1
11.	Taxidermist	1
12.	Associate Artist	2
13	Teacher Guide	1
14	Superintendent	1
15	Accountant	1
16	Supporting Staff	85
	<b>Total</b>	<b>136</b>

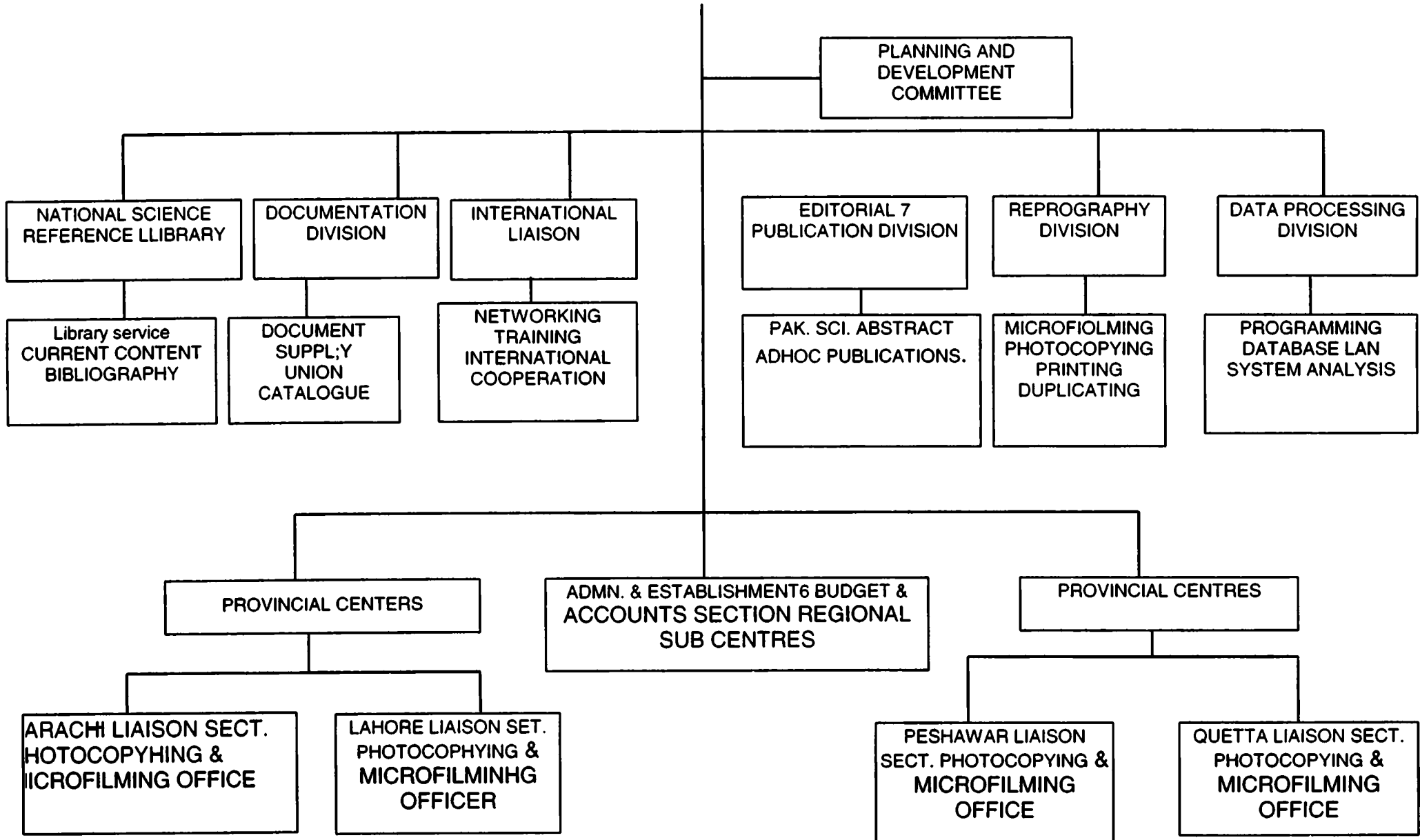
**PAKISTAN MUSEUM OF NATURAL HISTORY  
ADMINISTRATIVE CHART**



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

<b>S.No.</b>	<b>Designation</b>	<b>Number</b>
1	Director General	1
2	Deputy Director (Doc )	1
3	Deputy Director (Admn & Estt)	1
4.	Senior Bibliographic Officer	1
5	Chief Editor	1
6	Senior Documentation Officer	1
7	Senior Translating Officer	1
8.	Senior Information Officer	1
9	Senior Librarian	1
10	Manager Reprographic Unit	1
11	Senior System Analyst	1
12.	Chief Liaison Officer (Karachi & Lahore)	2
13	Senior Accounts Officer	1
14.	System Analyst	2
15.	Translating Officer	1
16.	Photographic Officer	1
17	Printing Officer	1
18	Graphic Artist	1
19	Bibliographic Officer	1
20	Patent Officer	1
21	Scientific Information Officer	3
22	Manager Technology Information	1
23	Admn-cum Accounts Officer (Karachi)	1
24.	Liaison Officer PSC, Quetta/Peshawar	2
25	P.A. To Director General	1
26	Assistant Information Officer	1
27	Assistant Programmer	4
28.	Superintendent	2
29	Assistant Scientific Information Officer	4
30	Assistant Manager Reprographic Unit	1
31.	Accountant	1
32.	Assistant Documentation Officer Karachi/Lahore/Quetta	3
33	Supporting Staff	108
	<b>Total:</b>	<b>154</b>

# ORGANIZATIONAL STRUCTURE OF PAKISTAN SCIENTIFIC & TECHNOLOGICAL INFORMATION CENTRE





**CHAPTER-3**

**PAKISTAN SCIENCE FOUNDATION  
FINANCIAL STATEMENTS  
JUNE 30, 1997**

**AUDITORS' REPORT TO THE BOARD OF TRUSTEES**

We have audited the annexed Balance Sheet of PAKISTAN SCIENCE FOUNDATION as on June 30, 1997 and the related Receipts and Expenditure Account together with the notes forming part thereof for the year then ended and state that in our opinion the Balance Sheet, Receipts and Expenditure Account together with the notes forming part thereof respectively give a true and fair view of the state of the Foundation's affairs as on June 30, 1997 and of the surplus for the year then ended.

We further certify that these accounts include receipts of Rs.27,395,250/- which comprise the grants received from Federal Government and we are satisfied with the propriety of disbursement thereof.

ISLAMABAD \_\_\_\_\_ 1997

CHARTERED ACCCOUNTANTS.

**PAKISTAN SCIENCE FOUNDATION  
BALANCE SHEET AS ON JUNE 30, 1997**

GRANT AND LIABILITIES	NOTE	1997 Rupees	1996 Rupees
GENERAL FUND	2	28,091,453	29,397,239
RESEARCH SUPPORT GRANT	3	<u>35,259,088</u>	<u>32,519,642</u>
		63,350,541	61,916,881
CURRENT LIABILITIES	4	<u>1,710,175</u>	<u>1,734,494</u>
		<b><u>65,060,716</u></b>	<b><u>63,651,375</u></b>

The report of the auditors is set out on page 1.

The notes set out on pages 5 to 9 form an integral part of these accounts

TRUSTEE

CHAIRMAN

**PAKISTAN SCIENCE FOUNDATION  
BALANCE SHEET AS ON JUNE 30, 1997**

<b>FIXED CAPITAL EXPENDITURE</b>	<b>NOTE</b>	<b>1997 Rupees</b>	<b>1996 Rupees</b>
Operating fixed assets	5	26,153,597	27,368,842
RESEARCH PROJECT IN PROGRESS		35,259,088	32,519,642
LONG TERM SECURITIES	6	1,617,195	1,617,195
<b>CURRENT ASSETS</b>			
Advances, deposits & Prepayments	7	401,849	487,318
Cash and bank balances	8	<u>1,628,987</u>	<u>1,658,378</u>
		2,030,836	2,145,696
		<b><u>65,060,716</u></b>	<b><u>63,651,375</u></b>

The report of the auditors is set out on page 1.

The notes set out on pages 5 to 9 from the integral part of these accounts.

TRUSTEE

CHAIRMAN

**PAKISTAN SCIENCE FOUNDATION  
RECEIPT AND EXPENDITURE ACCOUNT  
FOR THE YEAR ENDED JUNE 30, 1997**

<b>RECEIPTS</b>	<b>Note</b>	<b>1997 Rupees</b>	<b>1996 Rupees</b>
Development Grants		--	2,500,000
Non-Development		27,395,250	27,910,000
Research Grants		--	500,000
		<b><u>27,395,250</u></b>	<b><u>30,910,000</u></b>
<b>EXPENDITURE</b>			
Research Grants		--	500,000
Non-Development Grants			
Scientific Functions	9	11,893,755	10,545,050
Administrative Expenses	10	<u>16,807,281</u>	<u>16,213,143</u>
		<b><u>28,701,036</u></b>	<b><u>26,758,193</u></b>
		<b><u>28,701,036</u></b>	<b><u>27,258,193</u></b>
<b>SURPLUS/DEFICIT CARRIED OVER</b>		<b>1,305,786</b>	<b>3,651,807</b>
<b>Surplus/Deficit Carried Over to balance sheet</b>		<b><u>1,305,786</u></b>	<b><u>3,651,807</u></b>

The report of the auditors is set out on page 1.

The notes set out on pages 5 to 9 form an integral part of these accounts.

TRUSTEE

CHAIRMAN

**PAKISTAN SCIENCE FOUNDATION, ISLAMABAD**  
**NOTES TO THE ACCOUNTS FOR THE YEAR ENDED JUNE 30, 1997**

**STATUS AND OBJECTS**

PAKISTAN SCIENCE FOUNDATION (the Foundation) is a statutory organization established under Pakistan Science Foundation Act, 1973. The main object of its establishment is to promote and finance scientific activities having a bearing on the socio-economic needs of the country.

**1. ACCOUNTING POLICIES**

The principal accounting policies which have been adopted in the preparation of the Foundation's accounts are as follows.

**(i) GRANTS RECEIVED**

Grants from the Government of Pakistan have been accounted for on actual receipt basis.

**ii) RESEARCH SUPPORT GRANT**

Research support grant has been accounted for on actual payment basis.

**iii) FIXED ASSETS**

Fixed assets have been valued at cost less accumulated depreciation except lease hold land which is valued at cost. Depreciation on fixed assets is charged on reducing balances method, at the rates specified in note 5.

**iv) GENERAL**

a) Figures have been rounded off to the nearest rupee.

b) Figures of the previous year have been regrouped and rearranged wherever necessary for the purpose of comparison.

	<b>1997 Rupees</b>	<b>1996 Rupees</b>
<b>2. GENERAL FUND</b>		
Balance as on July 01	29,397,239	27,098,967
Development grant	--	(1,353,535)
(Deficit)/Surplus Balance transferred from Receipt and Expenditure Account	<u>1,305,786</u>	<u>3,651,807</u>
	<b>28,091,453</b>	<b>29,397,239</b>
<b>3. RESEARCH AND SUPPORT GRANT</b>		
Balance as on July 01	32,519,642	32,253,024
Add: Disbursement during the year (3.1)	<u>7,154,752</u>	<u>7,421,323</u>
	<b>39,674,394</b>	<b>33,588,163</b>
Less: Project completed during the year:	<u>4,415,306</u>	<u>7,154,705</u>
	<b>35,259,088</b>	<b>32,519,642</b>

### 3.1. DISTRIBUTE DURING THE YEAR

Mathematics and Computer Sciences	--	42,630
Physical Sciences	1,159,931	1,145,007
Chemical Sciences	1,150,579	1,617,595
Biological Sciences	1,961,763	1,882,857
Earth Sciences	45,590	1,000
Environmental Sciences	184,991	78,187
Engineering Sciences	518,542	65,675
Agricultural Sciences	1,638,887	2,049,835
Medical Sciences	24,325	400
Institutional Support	338,000	420,000
Board and Committee Meetings	<u>132,143</u>	<u>118,137</u>
	<b><u>7,154,751</u></b>	<b><u>7,421,323</u></b>

	<b>1997</b>	<b>1996</b>
	<b>Rupees</b>	<b>Rupees</b>
<b>4. CURRENT LIABILITIES</b>		
Security Deposits (4.1)	1,576,518	1,575,424
Accrued Expenses	121,157	146,570
Audit fee	<u>12,500</u>	<u>12,500</u>
	<b><u>1,710,175</u></b>	<b><u>1,734,494</u></b>
<b>4.1 SECURITIES DEPOSITS</b>		
Moderate Builders	767,773	746,754
Faisal associates	158,745	178,670
PCSIR Share for boundary wall	<u>650,000</u>	<u>650,000</u>
	<b><u>1,576,518</u></b>	<b><u>1,575,424</u></b>

## 5. OPERATING FIXED ASSETS

Particulars	C O S T				D E P R E C I A T I O N			
	As at July 01, 1996	Additions	As at June 30, 1997	RATE %	As at July 01, 1996	For the year	As at June 30, 1997	Writing Down Value As at June 30, 1997
Lease hold land	3,713,418	-	3,713,418	-	-	-	-	3,713,418
Building	19,484,540	--	19,484,540	5	974,227	925,516	1,899,743	47,584,797
Motor vehicles	3,496,059	--	3,496,059	20	2336,719	231,868	2,568,587	927,472
Office equipment	2,179,697	180,349	2,360,046	15	1,183,634	176,462	1,360,096	999,950
Science equipment	1,504,548	--	1,504,548	15	869,477	95,261	964,738	539,810
Furniture & fixture	1,656,346	152,914	1,809,260	6	507,882	78,083	585,965	1,223,295
Air conditioners	194,974	--	194,974	15	172,998	3,296	176,294	18,680
Library books & films	1,362,783	22,304	1,385,087	5	178,601	60,324	238,925	1,146,162
Bicycle	680	-	680	20	665	3	668	12
<b>1997. Rupees</b>	<b>33,593,045</b>	<b>355,567</b>	<b>33,948,612</b>		<b>6,224,203</b>	<b>1,570,812</b>	<b>7,795,015</b>	<b>26,153,597</b>
<b>1996 Rupees</b>	<b>11,608,392</b>	<b>21,984,653</b>	<b>33,593,045</b>		<b>4,532,781</b>	<b>1,691,422</b>	<b>6,224,203</b>	<b>27,368,842</b>



	1997 Rupees	1996 Rupees
<b>6. DETAIL OF LONG TERM SECURITIES</b>		
M/S WAPDA Islamabad	1,472,195	1,472,195
M/S SNGPL	<u>145,000</u>	<u>145,000</u>
	<b><u>1,617,195</u></b>	<b><u>1,617,195</u></b>
<b>7. ADVANCES, DEPOSITS AND PREPAYMENTS</b>		
Advances to Staff	112,694	188,329
Prepaid rent	<u>289,200</u>	<u>298,989</u>
	<b><u>401,849</u></b>	<b><u>487,318</u></b>
<b>8. CASH AND BANK BALANCES</b>		
Cash at Bank	1,590,268	1,590,268
Cash In hand	30,884	27,904
UNESCO Coupons	<u>7,835</u>	<u>40,206</u>
	<b><u>1,628,987</u></b>	<b><u>1,658,378</u></b>
<b>9. SCIENTIFIC FUNCTIONS</b>		
Research and Support Grant	7,154,752.	7,421,323
Scientific Societies and Professional Bodies.	650,024	690,000
Scientific Conferences, Meetings and Seminars.	562,772	584,000
Operation of Science Caravan.	2,565,622	728,598
Science centres & herbaria	--	376,680
Information and documentation	--	49,737
International Liaison	38,822	882
Science Promotion Activities	817,103	395,745
Science Fair	--	100,000
Exchange of Visits of Scientists and Technologists	74,660	198,085
Scientists Pool	30,000	--
	<b><u>11,893,755</u></b>	<b><u>10,545,050</u></b>

## 10. ADMINISTRATIVE EXPENSES

Salaries and other benefits	9,895,861	9,540,764
Travelling	199,586	557,558
Rent	2,413,079	1,822,144
Electricity, gas and water	271,039	230,137
Postage, telephone and telegram	901,266	1,075,784
Printing & stationery	122,624	159,581
Vehicle running and maintenance	663,548	626,898
Newspapers and periodicals	277,043	222,940
Liveries and uniforms	13,740	2,700
Entertainment	77,406	46,126
Repair and Maintenance	74,845	104,665
Audit fee	12,500	12,500
Law charges	25,000	3,000
Depreciation	1,570,812	1,691,422
Plantation	106,605	--
Miscellaneous	<u>182,327</u>	<u>116,924</u>
	<b><u>16,807,281</u></b>	<b><u>16,213,143</u></b>

**PAKISTAN SCIENCE FOUNDATION ACT 1973**

**National Assembly of Pakistan  
Islamabad, the 2nd February, 1974**

The following Acts of the National Assembly received the assent of the President on the 31st January, 1973 and 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 there to,

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 provision of this Act, to acquire, hold and dispose of property, both movable and immovable, and shall be 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 centers;
- 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 centers, 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.

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 the 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 Board. The Chairman of the Board shall be the Chairman of the Foundation and shall be appointed for a term of three years from amongst the eminent scientists of the country having experience of research and scientific administration.

7 Term of Members of the Board. The members of the Board, other than the ex-officio member, shall hold office for a term of three years and shall be eligible for re-appointment or re-nomination, as the case may be

8 Meetings of the Board (1) The meeting 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 whole-time members of the Board.

11. Delegation of Powers. The Board may, from time to time, delegate the Chairman or the Executive Committee such of its power and functions as it may consider necessary.

12. Adhoc Committees. The Foundation may set up adhoc 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 Governments;
- b) donation and endowments, and

c) 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 Reports.** (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 along with the audited accounts of the Foundation. (2) The annual report along with 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.

**LIST OF NEW PROJECTS APPROVED BY THE FOUNDATION DURING 1996-97**

<b><u>No.</u></b>	<b><u>Title and Number of Project</u></b>	<b><u>Name of PI and the Organization</u></b>	<b><u>Project Cost Supported:</u></b>
<b>a) Agricultural Sciences</b>			
1	Population Ecology of Whitefly and Fruit fly on Cucurbits in Sindh. S-AU/Agr(169)	Dr. Ghulam Muhammad Rahu Professor, Dept. of Entomology, Sindh Agriculture University, Tando Jam	Rs. 4,80,797/-
2.	Management of Onion Downy Mildew under IPM in the NWFP, Pakistan F-AU/Agr(182)	Dr Shabeer Ahmad Prof. Dept. of Plant Pathology, NWFP, Agricultural University, Peshawar	Rs. 4,59,377/-
3.	Evaluation of Cotton Germplasm for the Development of Multipurpose Variety P-AU/Agr(191)	Dr Ifukhar Ahmed Khan, Prof. Dept. of Plant Breeding and Genetics, University of Agriculture, Faisalabad	Rs. 5,12,417/-
4.	Development of Maize Population for Fodder Purposes P-PU/Agr(192)	Dr Syed Sadaqat Mehdi, Associate Prof. Dept of Plant Breeding and Genetics, University of Agriculture, Faisalabad.	Rs. 4,08,816/-
5	Electrophoretic Identification of Pakistani Wheats for Gliadin and HMW Glutenin Subunit Composition and their Relationship with End Use Quality P-AU/Agr(195)	Dr Faqr Mohammad Anjum , Associate Prof. Dept., of Food Technology, University of Agriculture, Faisalabad	Rs 2,52,266/-
6	Enhancement of Post Harvest Quality and Stability of Dhakki Date Using Advanced Technology. F-GU/Agr(198)	Prof. Dr Ahmed Khan Baloch, Chairman, Dept of Food Science and Technology, Gomal University, D I. Khan.	Rs. 4,05,246/-
7.	Breeding of Some Important Commercial Marine Shrimps of Pakistan in Captivity. S-KU/Agr(200)	Dr. Habib-ul-Hassan, Professor, Dept of Zoology, University of Karachi, Karachi.	Rs. 5,07,348/-
8	Identification and Control of Plant Parasitic Nematodes Associated with Rice using Organic Amendments in Thatta District, Sindh. S-KU/Agr(207)	Dr. Aly Khan, SSO, Crop Disease Research Institute, PARC, University of Karachi, Karachi	Rs. 1,46,268/-
9	Biology and Management of Black Scurf of Potato. P-BAC/Agr(209)	Mr Abdul Rauf, Assistant Professor, Dept. of Plant Pathology, University of Arid Agriculture, Rawalpindi	Rs. 4,11,131/-
10	Characterization of Soybean Mosaic Virus and Screening of Soybean Germplasm for the Sources of Resistance to it. F-AU/Agr(214)	Dr Muhammad Arif, Lecturer, Dept. of Plant Pathology, N.W.F.P, Agricultural University, Peshawar	Rs. 4,18,475/-
11.	Mating Types, Races and Genetic Variability in <i>Phytophthora infestans</i> , the Cause of Late Blight of Potato. C-NARC/Agr(216)	Dr. Ifukhar Ahmad, PSO/Director, Crop Disease Research Institute, PARC, Islamabad.	Rs. 5,20,608/-

12	Studies on the Entomopathogenic Nematodes in Sindh S-KU/Agr(217)	Dr. Shahina Fayaz, Scientific Officer, National Nematological Res Centre, University of Karachi, Karachi.	Rs. 4,81,400/-
<b>b) Biological Sciences</b>			
13.	Evaluation of the role of salt tolerant bacteria in developing resistance of plants to salt stress conditions P-PU/Bio(228)	Dr. Shahida Hasnam Associate Professor, Dept. of Botany, University of the Punjab, Lahore.	Rs.6,84,828/-
14.	Biodiversity: I. Studies on termites of Gilgit and Skardu with emphasis on Heterotermitinae. P-PU/Bio(251)	Prof. Dr. M. Saeed Akhtar Dept. of Zoology, University of the Punjab, Lahore.	Rs. 3,02,512/-
15	Study of hereditary disorders in Pakistani kindreds-II. C-QU/Bio(264)	Prof. Dr Mahmud Ahmad Dept. of Biological Sciences, Quaid-i -Azam University, Islamabad	Rs. 1,57,087/-
16.	Biology and host pathogen interaction in powdery scab of potato in Pakistan C-NARC/Bio(271)	Mrs. Shamim Iftikhar Senior Scientific Officer, Crop Diseases Research Institute (CDRI), NARC, Islamabad	Rs. 3,28,136/-
17.	Studies on the Role of Excitatory Amino Acid Neurotransmitters in Regulating Secretion of Growth Hormone in Non-Human Primates C-QU-Bio(273)	Dr. Muhammad Shahab Assistant Professor Dept. of Biological Sciences Quaid-i-Azam University, Islamabad.	Rs. 3,12,324/-
<b>c) Engineering Sciences</b>			
18.	Stress Corrosion Cracking (SCC) and Pitting Corrosion of Low Alloy Steel (LAS) ASTM A 516 G-70 in Sour Environment. C-PINSTECH/Engg (38)	Dr. K.A. Shahid PINSTECH, Nilore, Islamabad	Rs.3,30,837/-
19.	Compatibility Studies of Pressure Vessel Steel with Steel Cladding C-PINSTECH/Engg (39)	Dr. K. A. Shoaib PINSTECH, Nilore, Islamabad	Rs.2,95,973/40
20	Impact of Irrigation Management Practices on Nitrate Leaching at Farmers Fields. P-CEWRE/Engg (43)	Dr. M. Latif Professor, Centre in Excellence in Water Resources Engg. U E T. Lahore	Rs.3,59,499/-
21.	Comparison of Modern Irrigation System with Primitive Flood Irrigation. P-AU/Engg (52)	M. Asghar Rana Associate Professor, Dept. of Basic Engg., Faculty of Agri. Engg. And Tech., University of Agriculture, Faisalabad	Rs.4,07,388/-
<b>d) Chemical Sciences</b>			
22	Hypoglycemic Activity of the Medicinal Plants in Relation to Adenylyl Cyclase Signal Transduction. S-KU/Chem (297)	Dr. Farakhshanda Shanaz Assistant Professor H.E.J. Research Institute of Chemistry, University of Karachi, Karachi	Rs.4,26,544/-

23.	Flow Injection Enzymes Immunoassays Proteins and Drugs using Biotin-Avidin System and Solid State Reactors. P-BZU/Chem (304)	Dr M Younas Khokhar Assistant Professor, Dept of Chemistry, B Z University, Multan	Rs.5,44,955/-
24.	Isolation and Characterization of Antibiotics from Soil Fungi for the Development of Drugs. S-KU/Chem (311)	Dr. Viqar Sultana Assistant Professor Dept of Biochemistry, University of Karachi, Karachi	Rs.4,71,515/-
25.	Ion Exchange Properties of Metal (III) Phosphates F-PU/Chem (315)	Dr S Mustafa Professor of Physical chemistry, NCE in Physical Chemistry, University of Peshawar, Peshawar	Rs.4,15,732/-
26.	Control of Diastereo-selectivity by Remote Substituents. S-KU/Chem (318)	Dr. Humayun S Atteq Assistant Professor, H.E J. Research Institute of Chemistry, University of Karachi, Karachi	Rs.3,62,080/-
<b>e) Physical Sciences</b>			
27.	Laser Assisted Atomic Structure Studies. C-QU/Phys (104)	Dr M. Aslam Baig Professor, Dept. of Physics, Quaid-i- Azam University, Islamabad.	Rs.7,76,760/60
<b>f) Earth Sciences</b>			
28.	Geological and Geotechnical Study of Kirana Aggregates, Districts Sargodha and Jhang, Punjab. P-PU/Earth (49)	Prof Dr M. Nawaz choudhry Institute of Geology, University of the Punjab, Lahore	Rs.5,66,477/40
29.	Crustal Evaluation of the Kohistan Island Arc. Study of Structure Lithostratigraphy and Volcanism in Arc. Related Basins. F-PU/Earth (50)	Dr. M. Asif Khan Associate Professor National Centre of Excellence in Geology, University of Peshawar, Peshawar	Rs.6,27,131/70
30.	Measurement of Runoff and Sediment Load from Glaciers of the Rakaposhi and Haramosh Range, North Pakistan. F-PU/Earth (52)	Dr S Shafiru Rehman Assistant Professor, Department of Geology, University of Peshawar, Peshawar	Rs.6,98,037/-



**DETAILS OF MONITORING AND EVALUATION OF ON-GOING PSF PROJECTS DURING 1996-97**

**a) Semi-Annual Reports**

<b>No.</b>	<b>Project No.</b>	<b>Project Title</b>	<b>Reports</b>
1	F-AU/Agr (115)	Growth Pattern and Nutritional Status of Infants and Toddlers in North West Frontier Province, Pakistan	3 <sup>rd</sup> semi annual
2.	P-CSIR/Agr (129)	In-Vitro Selection for Salt Tolerant Strain of Poorbi-Raya: an Oil Crop.	3rd semi annual
3	P-PU/Agr(137)	Effect of Echinococcosis in Rabbits and Sheep alongwith its Control by Indigenous Plants of Pakistan	2 <sup>nd</sup> semi annual
4.	P-AU/Agr (138)	Studies on the Physiological Adaptations during Pregnancy and Lactation in Dwarf Goat to Improve its Production.	2 <sup>nd</sup> semi annual
5	AJK-UCR/Agr(142)	Studies on the Nature and Application of Fungi & Bacteria Controlling Insect Pests of AJK.	2 <sup>nd</sup> semi annual
6.	F-AU/Agr (149)	Biological and Chemical Transformation of Phosphorus and its Availability to Plants in NWFP Soils.	2nd semi annual
7.	P-NIBG/Agr(153)	Characterization and Improvement of Plant Growth Promoting Rhizobacteria (PGRP) and their Effects on Cereal Production.	2 <sup>nd</sup> semi annual
8	P-AU/Agr(155)	Breeding for Seedless Kinnow-A Biotechnology Approach	2 <sup>nd</sup> semi annual
9	S-AU/Agr (156)	Integrated Pest Management of the Pests of Chick Pea in Hyderabad District.	1st semi annual
10.	P-AU/Agr (157)	Free Living Nematode <i>Rhabditis</i> as Helminth Vaccine against <i>Toxocara Vitulorum</i> .	1st semi annual
11	F-GU/Agr (158)	Evaluation of the Economics of Various Rice Based Cropping Systems under Dera Ismail Khan Conditions.	1st semi annual
12	S-AEARC/Agr(171)	Exploitation Mutagenesis and Selection for the Genetic and Agronomic Improvements of <i>Oleiferous brassicae</i> .	1 <sup>st</sup> and 2 <sup>nd</sup> semi annual
13.	P-AU/Agr(175)	Factors Affecting Successful in Vitro Maturation, Fertilization and Culture of Buffalo Follicular Oocytes.	1 <sup>st</sup> semi annual
14	S-PCCC/Agr(183)	Breeding for Glandless Cotton.	1 <sup>st</sup> semi annual
15	S-KU/Agr(184)	Investigation on the Diseases of Betal Vine and their Cotrol.	1 <sup>st</sup> semi annual
16	S-KU/Bio(193)	Use of Rhizobia in the Integrated Control of Root Rot Diseases of Crop Plants.	1 <sup>st</sup> semi annual
17	S-SU/Bio(198)	Acrididae of Punjab.	2 <sup>nd</sup> semi annual
18	S-KU/Bio (209)	Lipasis: The Multifunctional Enzyme of Microbial Origin.	2 <sup>nd</sup> semi annual
19	S-AU/Bio (210)	Virus Free Clonal Propagation of Banana <i>In-Vitro</i> .	2 <sup>nd</sup> semi annual

20	S-AKU/Bio (217)	Effect o Benzodiazepines Administered to Pregnant and Lactating Rats on the Reproductive Functions of their off Springs	3 <sup>rd</sup> semi annual
21	AJK-UCR/Bio (218)	Survey of Rice Pests in Azad Jammu and Kashmir and Potential of Dragon Flies as Biocontrol Agents.	2 <sup>nd</sup> semi annual
22.	P-GC/Bio (221)	Development of <i>Aspergillus niger</i> Strains for Citric Acid Formation of Molasses	2 <sup>nd</sup> semi annual
23	S-KU/Bio (222)	Plasmids of Indigenous Pseudomonads: Molecular Characterization and Gene Manipulation.	3 <sup>rd</sup> semi annual
24	S-KU/Bio(233)	Cage Culture of <i>Lutjanus jhoni</i> (Suapers) and <i>Pomadasys kaakan</i> (Grunts), Marine Commercial Fishes	1 <sup>st</sup> semi annual
25	P-AU/Bio(238)	Potentials of Owls as Controlling Agents of Rats and Mice.	1 <sup>st</sup> semi annual
26.	S-AKU/Bio(239)	Elucidation of the Sturcture and Function of a New Form of Dihydropolate Reductase.	1 <sup>st</sup> semi annual
27	P-NIAB/Bio(243)	Production and Evaluation of Immunopotentiators adjuvanted Haemorrhagic Septicaemia Vaccine in Continuous Culture.	1 <sup>st</sup> semi annual
28.	F-GU/Bio (247)	Development of Salt Tolarant Sugarcane Cultivars through Genetic Engineering	1 <sup>st</sup> semi annual
29	S-KU/Bio(260)	Systematics and Ecology of Polycdhaete Worm of Pakistan Coastal Waters.	1 <sup>st</sup> semi annual
30	C-QU/Chem (268)	The Effect of Electromagnetic Field on the Viscosity and other Related Physical Properties of Ions in the Aquous Media.	1 <sup>st</sup> semi annual
31	F-PU/Chem (285)	Flash Pyrolysis of Indigenous Coal utilizing Effective Radical Transfer.	1 <sup>st</sup> semi-annual
32	F-PU/Chem (287)	Draining and Long range Interaction in Polymer Solutions.	2 <sup>nd</sup> semi-annual
33	P-BZU/Phys (84)	Electrical Properties of Aklali.	2 <sup>nd</sup> semi-annual
34	C-QU/Phys (87)	Characterization of Radiation Induced Defects in Semi-conductors	3 <sup>rd</sup> semi-annual
35	C-QU/Phys (89))	Design & Development of Laser light Propagation and Energy Deposition & thermal transport in laser produced Plasmas, & computational Study of z-8 Pinch Plasma.	2 <sup>nd</sup> semi-annual
36	P-PU/Phys (91)	Elastic and Diffractive Scattering and QCD based Phenomenology.	2 <sup>nd</sup> semi-annual
37	P-PU/Phys (94)	Theoretical/Computational Studies of Fractals in Material.	1 <sup>st</sup> semi-annual
38.	C-QU/Phys (101)	Design and Development of Gas-Puff Z-Pinch.	1 <sup>st</sup> semi-annual
39.	P-CEME/Phys (103)	Fabrication of Cadmium Telluride Photovoltaic Soft Cells by close-spaced Sublimation	2 <sup>nd</sup> semi-annual
40	C-PINSTECH/Phys	Study of Heavy Ion Reactions.	1 <sup>st</sup> semi-annual

#### **b) First Annual Reports**

1. S-AEARC/Agr (141) Host Plant Resistance of Bioregulator Treated Cotton to Bollworm and Sucking Complex and its Impact on Yield and Yield Components
2. S-AU/Agr (156) Integrated Pest Management of the Pests of Chick Pea in Hyderabad District.
3. F-GU/Agr (158) Evaluation of the Economics of Various Rice Based Cropping Systems Under Dera Ismail Khan Conditions.
4. AJK-UCR/Agr (159) Some Physiochemical Studies on Alternate Bearing in Apple in Azad Kashmir.
5. S-AEARC/Agr(171) Exploitation of Mutagenesis & Selection for the Genetic & Agronomic Improvement of *Oleiferus Brassicae*.
6. P-AU/Agr(175) Factors Affecting Successful in Vitro Maturation, Fertilization and Culture of Buffalo Follicular Oocytes.
7. S-PCCC/Agr(183) Breeding for Glandless Cotton
8. S-SU/Bio(198) Acrididae of Punjab
9. S-KU/Bio(209) Lipasis: The Multifunctional Enzyme of Microbial Origin
10. AJK-UCR/Bio(218) Survey of Rice Pests in Azad Kashmir and Potential of Dragon Flies as Biocontrol Agents
11. P-GU/Bio(221) Development of *Aspergillus Niger* Strain for Citric Acid Fermentation of Molasses
12. S-CSIR/Bio (223) Amaranthine Production through Cell Suspension Culture Of *Celasia Cristata*
13. P-NIAB/Bio(243) Production and Evaluation of Immunopotentiators Adjuvanted Seemorrhagic Septicaemia Vaccine in Continuous Culture
14. C-QU/Phys (82) A Study of the Electrical behaviour of Organometanic Polymers.
15. C-QU/Phys (89) Numerical/Theoretical Study of Laser light Propagation & Energy Deposition & thermal transport in laser produced Z-8 Pinch Plasma.
16. P-PU/Phys (99) Analytical Investigation of Non-Linear waves in Semi-conductor Superlattice Plasmas.
17. P-CFME/Phys (103) Fabrication of Cadmium Telluride Photovoltaic Soft Cells by close-spaced Sublimation.
18. F-PU/Chem (286) Preparation and Characterization Reforming Catalysts.

#### **c) Second Annual Reports**

1. P-AU/Agr(137) Effect of Echinococcosis in Rabbits and Sheep alongwith its Control by Indigenous Plants of Pakistan.
2. P-NIBGE/Agr (153) Characterization and Improvement of Plant Growth Promoting Rhizobacteria (PGRP) and their Effects on Cereal Production.
3. S-AKU/Bio (217) Effect of Benzodiazepines Administered to Pregnant and Lactating Rats on the Reproductive Functions of their Offsprings.

4. P-NIBGE/Bio (219) Construction of Genetically Engineered Noval Cellulolytic Yeast Strain for Step Conversion of Mass Produced on Saline Land for Ethanol Production.
5. S-KU/Bio (222) Plasmids of Indigenous Pseudomonads: Molecular Characterization and Gene Manipulation
6. C-QU/Phys (92) An Experimental Study of Plasma Focus Discharge.

- Qadeer, M.A., Choudhry, M.Y., Younus, O. & Qadeer, A. 1995 Kinetic studies of the hydrolysis of penicillin G. to 6-Amino penicillanic acid (6-APA) by free and immobilized penicillin amidase of *B. megaterium* ATCC 13639. *Proc. V Nat. Conf.* 25-28 Oct. 1995.
- Asghar, I., Zia-ul-Hasnain, and Iqbal, M.Z. 1994. Photoluminescence spectroscopy and its application to the study of silver doped silicon. *Baragali School of Electronics*, 18-23 June, 1994.
- Qureshi, U. S., Iqbal, M. Z., Baber N. and Andersson T.G. 1995. Influence of Al doping on deep levels in MBE GaAs. *18<sup>th</sup> Int. Conf. Defects in Semi-conductors*, July 23-28, 1995, Sendai, Japan.
- Qureshi, U.S., Iqbal, M. Z. and Andersson, T.G. 1996. Photoluminescence study of Al doping in GaAs grown by molecular-beam epitaxy *Appl Phys.*, :80,5932
- Khalid, K.M., Qureshi, U.S. Iqbal, M.Z. and Zatar, N. Effects of radiation on MOCVD grown p-type InP studies by photoluminescence (submitted).

**LIST OF PUBLICATIONS PRODUCED THROUGH PSF SUPPORTED PROJECTS  
COMPLETED DURING 1996-97**

- Shah Z., W. Mohammad and M. Afzal 1997. Transformation of ammonium as influenced by nitrapyrin under field conditions. *Sarhad Journal Agriculture* ( In Press)
- Shah Z., W. Mohammad and M. Afzal 1997. Yield and nitrogen content of wheat as influenced by nitrification inhibitor. *Scientific Khyber* (In press)
- Shah, Z. 1997. Enhancing efficiency of nitrogen fertilizer through nitrapyrin vs split application on wheat crop. *Sarhad Journal Agriculture* (In press).
- Shah, Z. 1997. The crop and nitrogen yield of wheat as influenced by single and split fertilizer N application *Pakistan Journal of Soil Science* ( In press).
- Shabeer, A., Attauddin and Hakim Khan. 1995. Evaluation of maize germplasm under artificial epiphytotics for resistance to maize common smut in the NWFP, Pakistan. *Sarhad J. Agric.* 11(2): 201-203.
- Shabeer, A., Attauddin and Hakim Khan 1995. Influence of plant density on intensity of maize common smuts at high elevations in the NWFP, Pakistan. *Sarhad J. Agric.* 11(2): 195-200.
- Shabeer, A., Attauddin and Hakim Khan 1995. Effect of various levels of fertility on incidence of maize common smut in Hazara and Malakand Divisions of Pakistan. *Pak. J. Phytopathol.* 7 (2): 196-173
- Shabeer, A., Attauddin and Hakim Khan. 1995. Integrated control of maize common smut in the NWFP: A proposal model. Abstract Crop Protection Conference 1996, NWFP Agri. Univ. Peshawar, Pakistan.
- Gerdezi, S.D.A. and T. Hanif (1993). Biological nitrogen fixation and the use of Rhizobium under low temperature and low pH in Azad Kashmir. *Proceedings of the International Symposium on Biotechnology for Sustainable Development*. December 15-20 (1993). NIBGE Faisalabad Pakistan.
- Gerdezi, S.D.A (1993). Diversification of Agriculture. A prospect in temperature regions of Pakistan. *Proceedings of the 2<sup>nd</sup> All Pakistan Science Conference*. Pp. 136-138. December 26-31, Aitchison College, Lahore, Pakistan
- Ahmed, S.D. and M. B. Choudhary (1995). Development of Grass-legume mixture; A potential source of sustainable development of Agriculture in Hilly areas of Pakistan. *Science Technol. Dev.* Vol. 14 (4), 15-22.
- Gerdezi, S.D.A. (1996). Soil erosion.; Problems in Azad Kashmir. Presented as a popular lecture for 5<sup>th</sup> All Pakistan Science Conference. September 15-19, 1996. University College of Agriculture Rawalakot. The paper will appear in Science International Lahore (in press).
- Gerdezi, S.D.A (1996) The relationship between Plasmid profiles, protein profiles and the field performance of *Rhizobium trifolii* in Azad Kashmir (in preparation).
- Habib, S.B A. Shah, K. Inayat (1995) Genetic variation in morphological characteristics, chemical composition and in vitro digestibility of straw from different wheat cultivars. *Journal on Animal Feed Science and Technology*, Vol. 55, pp 263-274.
- Attaur-Rehman., Choudhary M.I., Ata, A., Alam M., Farooq, A., Parveen, S., Shekhani, M.S., and Ahmed, N. 1994. Microbial transformations of 7 $\alpha$ -hydroxyfrullanolide. *J. Nat. Prod.*, 57, 1251.
- Ata, A., Atta-ur-Rahman, and Choudhary, M.I. 1994. Xenobiotic microbial transformations of a cytotoxic natural sesquiterpene lactone. *Proceedings of 5<sup>th</sup> National Chemistry Conference*, 1994, Islamabad.
- Atta-ur-Rahman, and Choudhary, M.I. 1996. Microbial oxidations of sclareolide by *Curvularia lunata*. *Proceedings of 7<sup>th</sup> National Chemistry Conference*, 1996, Quetta.
- Atta-ur-Rahman, Choudhary, M. I., Shaheen, F., Farooq, A., and Raza, A.R. Microbial transformations of some bioactive natural products. (submitted for publication in Heterocycles).
- Atta-ur-Rahman., Choudhary, M.I., Shaheen, F., and Farooq, A. Microbial transformations of Z-Gugglosterone, (manuscript in preparation for *Phytochemistry*).
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- Hasan. A., Ahmed, I., Khan, M.A., and Choudhary, I. 1995 A new anthraquinone glycoside from *Rumex chalepensis*. *J. Nat. Prod.* (accepted for publication).
- Hasan. A., Ahmed, I., Khan, M.A., and Choudhary, I. 1996. Flavonoid glycosides from leaves of *Rumex napalensis*. *Isb. J. Sci* (accepted for publication).
- Hasan, A. and Jay, M. 1996. High performance liquid chromatography-photo diode array spectroscopy-electrospray mass spectroscopy identification of flavonoid glycosides of *Bauhinia verigat*. *XVIIIth International Conference of the Polyphenolic Group*. 15-18 July, 1996, Bordeaux, France.
- Qdeer, M.A., Choudhry, M.Y., Younus, O. & Qadeer, A. 1992. Studies on the microbial production of penicillin amidase for the conversion of penicillin G to 6-Amino penicillanic acid. First All Pakistan Science Conference, 15-21 May, Khanaspur.

## GRANTS SANCTIONED FOR CONFERENCES, SEMINARS, SYMPOSIA ETC. DURING YEAR 1996-97

S.NO	NAME OF DEPARTMENT	NAME OF EVENT	AMOUNT SANCTIONED
1	Department of Chemistry, University of Peshawar, Peshawar.	1st National Conference on "Fuel and Environment" held at Bara Gali, 20-24 July, 1996	Rs.15,000/-
2	Society of Economic Geologists and Mineral Technologists, PCSIR Laboratories, Peshawar.	International Training Course on "Ground Water Geology and Potable Water Supply to Rural Area" 6-10 October, 1996.	Rs.15,000/-
3	National Institute for Biotechnology and Genetic Engineering (NIBGE), Faisalabad.	7 <sup>th</sup> International Symposium on "Nitrogen Fixation with Non-Legumes", 16-21 October, 1996	Rs.35,000/-
4	Department of Statistics, University of Agriculture, Faisalabad.	National Seminar on "Statistical Applications in Agriculture and Industry", 25-26 September, 1996.	Rs.15,000/-
5.	Dr. A.Q Khan Research Laboratories, Kahuta, Rawalpindi.	1st International Conference on "Phase Transformation", held at Islamabad, 1-3 September, 1996.	Rs.20,000/-
6	University College of Agriculture, Rawalakot, Azad Kashmir.	5 <sup>th</sup> All Pakistan Science Conference, Rawalakot, 15-19 September, 1996.	Rs.15,000/-
7	National Museum of Science and Technology, Lahore	National Science Day - 1996: Holding of Science Quiz and Science Models Competition, at Lahore, 29-31 Oct., 1996.	Rs.25,700/-
8.	Faculty of Pharmacy, University of Karachi, Karachi	2 <sup>nd</sup> Biennial National Conference on "Pharmacology & Therapeutics", 21-22 September, 1996	Rs.15,000/-
9	Board of Intermediate and Secondary Education, Gujranwala.	12 <sup>th</sup> Summer School in Science for Talented Students at Khanaspur (Ayubia), 12-22 July, 1996	Rs.30,000/-
10	HEJ Research Institute of Chemistry, University of Karachi, Karachi	5 <sup>th</sup> International Symposium on "Protein Structure Function Relationship" 6-9 January, 1997	Rs.40,000/-
11.	The Aga Khan University, Karachi.	5 <sup>th</sup> International Seminar on "Higher Education-A Pathway to Development", 20-21 November, 1996.	Rs.30,000/-
12.	Pakistan Institute of Physics, Dept of Physics, UET, Lahore	PIP International Conference, 1997, March 30 to April 3, 1997.	Rs.15,000/-
13.	Pakistan Genetical Society, NARC, Islamabad.	Inaugural International Conference on Genetics, 26-29 November, 1996.	Rs.15,000/-
14.	Soil Science Society of Pakistan, Islamabad	6 <sup>th</sup> National Congress of Soil Science, 2-3 December, 1996.	Rs.15,000/-

15.	Department of Statistics, University of Karachi, Karachi.	6 <sup>th</sup> Statistics Seminar 1996, 23-24 December, 1996.	Rs.10,000/-
16	Centre of Excellence in Water Resources Engineering, University of Engineering & Technology, Lahore.	A short course on "Surface Water Pollution and Management", 14-23 December, 1996.	(Rs.10,000/- Adjusted against the previous unspent grant).
17.	Centre of Integrated Mountain Research, University of the Punjab, Lahore	Colloquium on "Geology and the Human Life", 14-23 December, 1996	Rs 25,000/-
18	The Institution of Engineers, Pakistan Engineering Centre, Lahore.	6 <sup>th</sup> International Colloquium on "Concrete in Developing Countries" on 4-6 January, 1997.	(Rs.20,000/- Adjusted against the previous unspent grant)
19.	Pakistan Society for Microbiology, University of Karachi, Karachi.	2 <sup>nd</sup> Biennial Conference of Pakistan Society for Microbiology, 8-11 April, 1997.	Rs.20,000/-
20)	Pakistan Atomic Energy Commission, Islamabad.	3 <sup>rd</sup> National Symposium on Modern Trends in Contemporary Chemistry and "Environmental Pollution", 24-26 February, 1997	Rs.20,000/-
21.	International Study group for Biochemical & Biophysical Research in Pakistan, Dept. of Biochemistry, Univ. of Karachi, Karachi.	2 <sup>nd</sup> ISBBP Symposium on Biochemistry and Biophysics, 5-6 March, 1997	Rs.15,000/-
22.	Pakistan Museum of Natural History, Islamabad.	National Symposium on "Economic Geology of Pakistan", 30-31 March 1997.	Rs.40,000/-
23	Pakistan Society of Biochemistry and Molecular Biology, NWFP Agricultural University, Peshawar.	4 <sup>th</sup> National Conference of the Pakistan Society of Biochemistry and Molecular Biology, 7-10 April, 1997.	Rs.25,000/-
24.	Punjab Mathematical Society, Department of Mathematics, Government College, Faisalabad.	All Pakistan Mathematical Conference, 24- 27 March, 1997	Rs.12,000/-
25.	Institute of Education & Research, Department of Science Education, University of the Punjab, Lahore	10 <sup>th</sup> International Council of Associations for Science Education (ICASE) Symposium, 5-10 April, 1997.	Rs.15,000/-
26	Zoological Society of Pakistan, C/O Department of Zoology, University of the Punjab, Lahore	17 <sup>th</sup> Pakistan Congress of Zoology, held at Karachi, 5-7 April, 1997.	Rs.35,000/-
27	Centre of Excellence in Water Resources Engineering, University of Engineering and Technology, Lahore.	International Symposium on "Water for the 21 <sup>st</sup> Century", 17-19 June, 1997.	Rs.25,000/- (Rs.10,000/- to be adjusted from our previous balance).
28.	Department of Botany, University of Peshawar, Peshawar.	4 <sup>th</sup> Meeting of Plant Tissue Culture on 15- 19 June, 1997.	Rs.20,000/-



**LIST OF PARTICIPANTS IN THE MEETING OF SCIENTISTS AND ENGINEERS REGARDING PRIME MINISTER'S PAKISTAN 2010 PROGRAM, HELD IN PSF ON 23-5-1997**

Engr Ahsan Iqbal  
Minister of State & Chief Coordinator, Pakistan 2010 Program, Islamabad.

Lt. Gen (R.) Javed Ashraf  
Secretary, Ministry of Science & Technology, Islamabad.

Dr. A. Q. Khan  
Project Director, A.Q. Khan Labs. and President Pakistan Academy of Sciences, Islamabad.

Dr. Khalid Mahmood Khan  
Chairman, Pakistan Science Foundation, Islamabad.

Dr. Salim Mahmood  
Chief Scientist & Scientific Adviser, DESTO Headquarters, Islamabad.

Dr. M.D. Shami  
Ex- President, Pakistan Academy of Sciences and Ex- Chairman, Pakistan Science Foundation, Islamabad.

Prof Dr. M. Arsalan  
Vice-Chancellor, Quaid-i-Azam University, Islamabad.

Prof. Dr. Muhammad Sharif Bhatti  
Vice Chancellor, University of Engg & Technology, Taxila.

Dr. A. Q. Ansari,  
Chairman, PCSIR, Islamabad.

Dr. Bashir Ahmed Chandio  
Chairman, PCRWR, Islamabad.

Malik Shahryar Khan  
Chairman, Pakistan Council for Appropriate Technology  
(PCAT), Islamabad

Mr. Muhammad Iqbal Rana  
Director General, National Institute of Electronic (NIE), Islamabad.

Dr. Pervaiz Akhtar  
Director General, National Institute of Silicon Technology, Islamabad.

Prof Dr.S. Riazuddin  
Director, Center of Excellence in Advanced Molecular Biology, University of the Punjab, Lahore.

Prof. Dr. Wahid Akhtar  
Chairman, Department of Biochemistry, University of the Punjab, Lahore.

Dr. Kauser A. Malik  
Director General, NIBGE, Faisalabad.

Mr. Hilal A. Raza  
Director General, Hydrocarbon Development Institute of Pakistan, Islamabad.

Dr. Hameed Ahmed Khan  
Director General, PINSTECH, Nilore, Islamabad.

S. Maqsood Ali  
Dy Registrar, Pakistan Engineering Council, Islamabad

Prof. Dr. M. Qasim Jan  
Director, Center of Excellence in Geology, University of Peshawar, Peshawar.

Mr. Muhammad Ishaq  
Joint Electronics Adviser, Ministry of Science & Technology, Islamabad.

Mr. Pervaiz Ahmed Butt  
Executive Director, COMSATS, and Ex-Secretary, Ministry of Science & Technology, Islamabad

Air Com (R) Dr. N.B. Paracha  
National University of Science & Technology, Rawalpindi Cantt

Dr. Shahid Khalil  
Deputy Technological Adviser, (N.T.P.W.), Ministry of Science & Technology, Islamabad

Mr. Hussem Mullick  
Professor of Economics Quaid-i-Azam University, Islamabad.

Dr. Munawar N.B. Ahmed  
Chief Executive, Computer Graphic Systems, Lahore.

Dr. Farid A. Malik  
Metals, Material & Electronics, Lahore

Dr. Q. Isa Dauodpota  
Program Director, Sustainable Development Networking Program, Islamabad

Dr. Rashid Mahmood  
SUPARCO Headquarters, Karachi

Dr. Shahzad A. Mufti  
Director General, PMNH, Islamabad

Dr. M. Atzal  
Director General, PASTIC, National Center, Islamabad.

Dr. Munir Ahmed Bhatti  
Member Science, PSF, Islamabad

Dr. Azra Sultana Ahmed  
Chief Scientific Officer, PSF, Islamabad.

Dr. Azra Qureshi  
Director, Agriculture Biotechnology Institute, NARC, Islamabad

Dr. Shahida Hussain  
Asso. Professor, Botany, University of the Punjab, Lahore

Dr. G. Murtaza  
Professor of Physics, Quaid-i-Azam University, Islamabad

Co. Dr. Nasim A. Khan  
F.M.E. College, Rawalpindi.