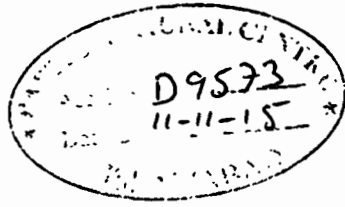


ANNUAL REPORT

2001 - 2002



Pakistan Science Foundation



PAKISTAN SCIENCE FOUNDATION

**ANNUAL REPORT
2001-2002**

**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 2001-2002, 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. Farid A. Malik
Chairman
Pakistan Science Foundation
Islamabad

Secretary
Ministry of Science and Technology
Government of Pakistan
Islamabad

PAKISTAN SCIENCE FOUNDATION

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Prof. Dr. Shahzad A. Mufti (*Additional Charge*)

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18. Dr. Fazal Ghani Khattak, Principal Engineer, Hydrocarbon Development Institute of Pakistan, Sector H-9, Islamabad.
19. Prof. Dr. Zafar H. Zaidi, Ex-Vice Chancellor, University of Karachi, Karachi
(Deceased)

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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, Karachi
ARIQ	Agriculture Research Institute, Quetta
P-AU	Agricultural University, Faisalabad
BU	Balochistan University, Quetta
BZU	Bahauddin Zakaria University, Multan
CEMB	Centre of Excellence in Molecular Biology, Lahore
CEME	College of Electrical and Mechanical Engineering, Rawalpindi
CEWRE	Centre of Excellence in Water Resources Engineering, Lahore
GC	Government College, Lahore
GU	Gomal University, D.I. Khan
KU	Karachi University
NARC	National Agricultural Research Centre, Islamabad
NIBGE	National Institute for Biotechnology and Genetic Engineering Faisalabad
NSFC	National Science Foundation of China
PMNH	Pakistan Museum of Natural History, Islamabad
PINSTECH	Pakistan Institute of Nuclear Science and Technology, Islamabad
F-PU	Peshawar University
P-PU	Punjab University, Lahore
QAU	Quaid-i-Azam University, Islamabad
SALU	Shah Abdul Latif University, Sindh
SIUT	Sindh Institute of Urology & Transplantation, Karachi
SU	Sindh University, Jamshoro
PCCC	Pakistan Central Cotton Committee, Sakrand
UAA/UAAR	University of Arid Agriculture, Rawalpindi

Disciplines

Agr	Agricultural Sciences
Bio	Biological Sciences
Biotech	Biotechnology
Eng	Engineering Sciences
Med	Medical Sciences
Phys	Physical Sciences
Chem	Chemical Sciences
Earth	Earth Sciences
Envr	Environmental Sciences

EXECUTIVE SUMMARY

PAKISTAN SCIENCE FOUNDATION (PSF)

Pakistan Science Foundation is the apex body for promotion and funding of scientific and technological research and other related activities in the country. The tasks undertaken by the Foundation for the performance of its statutory functions are divided into 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 museums, 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 by Pakistan Museum of Natural History (PMNH) and Pakistan Scientific and Technological Information Centre (PASTIC), the two subsidiary organizations of PSF, while others are performed by the PSF Science Wings, and are reflected as under:

RESEARCH SUPPORT

Research support is the principal programme of the Foundation for the promotion of basic and fundamental research relevant to the socio-economic needs of the country. During 2001-2002, 87 projects in the fields of Agriculture, Biology, Biotechnology, Chemistry, Earth, Engineering, Environment, Medicine and Physics were processed for funding. Among these, 39 new projects were received while 48 had been carried over from the previous year. Out of these, 13 projects costing Rs. 6.33 million were sanctioned in various fields. In addition, an amount of Rs.0.3 million was released to various institutions as institutional support grant for purchase of laboratory equipment, and accessories.

Monitoring and evaluation of the on-going research projects sponsored by PSF is an important function of the Research Support Programme. During the year, 41 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, 13 studies/projects in various fields were completed. The final reports of these projects were reviewed by the PSF experts.

One of the main achievements and usefulness of any research is the publication of its results in scientific journals. As many as 18 research papers from PSF funded projects were published in different scientific journals. In addition, 1 Ph.D. and 1 M.Phil. degrees were awarded to the Research Associates employed under PSF supported projects.

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. The Foundation provided financial assistance amounting to Rs. 0.198 million to various Universities and R&D Organizations for organizing 8 National and International Science Conferences, Seminars, Symposia, etc.

Scientific research is further supported by giving annual grant-in-aid to various Societies for publication of technical journals. During the year, a total amount of Rs. 0.235 million was released for the purpose.

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 a nation. 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 Caravan is a mobile Science Exhibition that has been designed to increase public awareness about science and to motivate the younger generation of Pakistan towards 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 Balochistan, Sindh, NWFP, Punjab and Federal Area. During the year under report, the Caravan units organized 31 mobile exhibitions and planetarium shows, wherein 550 schools brought their students to witness the exhibition and planetarium/film shows.

To strengthen the Science Caravan Units, equipment like VCP, Slide Projector, Computers alongwith Printers were provided to all five Units. It is worth mentioning here that to enhance the Caravan program the Government of Pakistan has approved a project entitled "Popularization of Science in the Rural Areas" worth Rs.22.00 million. This

project shall enable the Foundation to prepare four new Caravan Units alongwith four supporting vehicles and additional staff for its operation.

The Foundation continued its science promotion activities such as Essay and Poster competitions, distribution of Science Magazines, Books, Posters and Leaflets among the schools, colleges and S&T organizations.

Laboratory equipments were provided to four high schools of Sindh and Balochistan Provinces and order for the supply of equipment to four other schools was placed. An additional amount of Rs.50,000/- was released to Children Library Complex, Lahore (CLC) for the completion of the Science Corner at CLC under the PSF program to establish Science Centers and Science Corners in the country.

Moreover, financial support worth about 0.2 million was given to various scientific and educational institutions like National Museum for Science & Technology, National University for Science and Technology, Adventure Foundation of Pakistan and Pakistan Military Academy, Kakul to carry out different science promotion activities.

PLANNING & DEVELOPMENT

During the report period, development funds amounting to Rs. 15.18 million were received against the total allocation of Rs. 32.80 million for the following five development projects.

1. Financial Support to Scientific Societies in Pakistan.

During the report period, an amount of Rs. 2.998 million was paid to 16 Scientific Societies for the achievement of their approved objectives.

2. Participation of Scientists and Technologists in International Conferences, Seminars and Workshops.

During the report period, as many as 120 travel grant requests were received, out of which 43 requests were approved by the Foundation at a total cost of Rs.29.00 million. However, only 21 scientists could avail the grants. The remaining could not attend the conferences due to visa restrictions/non-availability of flights after the event of 11th September, 2001.

3. Funding of Scientific and Technological Research in Universities and other R&D Organizations.

During the period under report, 195 research projects in various disciplines, costing Rs.175.00 million, were received by the Foundation. Out of these, twenty (21) projects, were approved for funding by the Foundation at an estimated cost of Rs. 13.50 million. The remaining projects are being processed through experts and technical committees.

INTRODUCTION

Pakistan Science Foundation was established on June 30, 1973 under the Pakistan Science Foundation Act No. III of National Assembly (Annexure I) as an autonomous body to promote and finance scientific and technological activities having a bearing on the socio-economic needs of the country. 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.
- ix) Special scientific surveys not undertaken by any other organization and collection of scientific statistics related to the scientific efforts of the country.

The Foundation shall also:

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

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

CHAPTER - 1

ACTIVITIES & PROGRAMMES

The activities and programmes 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. While other functions i.e., research support and 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/funding of Scientific Societies/Learned Bodies
4. Funding of Conferences, Symposia, Seminars & Workshops.
5. Travel Grants
6. International Liaison
7. Awards and Fellowships
8. Survey and Statistics
9. Scientists Pool
10. Planning and Development Program

(II) Science Popularization Section, which carries out science popularization activities including Science Caravans, Science Clubs, Science Fairs and holding Popular Science Lectures, Workshops, Conferences and Symposia.

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 2001-2002 is summarized in the following pages.

PAKISTAN SCIENCE FOUNDATION (PSF)

1. RESEARCH SUPPORT

During the year under report, the Foundation carried out a number of programme 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 programmes 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 programmes.

a) Grants for Research Projects

Research Support is the principal programme of the Pakistan Science Foundation for the promotion of basic and fundamental research having relevance to the socio-economic needs of the country. Under this programme, research proposals are received on a prescribed format and processed for funding by the Foundation. The criteria for funding of research projects by the Foundation are; competence of the scientific personnel to carry out research, institutional capabilities i.e., availability of basic equipment and laboratory facilities, scientific merit of the proposed research projects and likelihood of completion of the proposed research within the stipulated time. These proposals are sent to the subject experts for evaluation in the light of their scientific merit and relevance to national needs. Each proposal, after getting review report from expert in the particular field, is placed before the Relevant Technical Committee for technical evaluation and recommendations regarding provision of funds under various heads of expenditure proposed by the researchers. The proposal, if recommended by the Technical Committee, is then submitted to PSF Executive Committee for final approval.

During the report period, a total of 87 proposals remained under active consideration of the Foundation. Out of those, 39 were new proposals requesting funds totaling to Rs. 34.813 million in the fields of Agriculture, Biology, Chemistry, Biotechnology, Earth, Engineering, Environment, Medical, and Physics. While 48 proposals, at various stages of their processing were carried over from previous year.

During the year under report, 13 project proposals succeeded in getting the approval of the Foundation at a total cost of Rs. 6.334 million. List of the approved projects is at Annexure-II.

b) Institutional Support

Pakistan Science Foundation assists the universities and research institutions by providing them Institutional Support Grants for the purchase of equipment, chemicals, literature etc. for research workers, who for one reason or another are unable to obtain these from their own institutions. This is meant to strengthen the research capabilities of those institutions to enable them to conduct research directed towards the solutions of the problems of national importance. During the report period, institutional support grants amounting to Rs. 0.3 million were sanctioned to the following institutions for the purchase of equipments.

<u>S. No.</u>	<u>Institution</u>	<u>Purpose</u>	<u>Amount</u>
1.	Department of Zoology, University of the Punjab Lahore	For the purchase of chemical and Plastic consumables.	Rs.50,000/-
2.	Pakistan Museum of Natural History, Islamabad.	For the purchase of equipment (consumable and non-consumable items)	Rs.150,000/-
3.	Mineral Testing Lab. Sarhad Development Authority Govt. of NWFP, Peshawar	For the purchase of Computers and one printer.	Rs.100,000/-
		Total:	Rs. 300,000/-

2. RESEARCH MONITORING AND EVALUATION

The Foundation evaluates the technical progress as well as financial position of on-going projects continuously till the completion of the projects. During the report period, fifty four (54) progress reports (semi-annual, 1st annual, 2nd annual and final) were received and their progress evaluated as per procedures laid down by the Foundation.

a) On-Going Projects

During the year, forty one (41) (semi-annual, 1st annual and 2nd annuals) reports were received. The semi-annual reports were scrutinized at PSF, whereas the annual reports, after initial scrutiny, were sent for evaluation to the subject experts to assess interim progress of the projects. It may be mentioned that due installments of on-going projects are released only if their interim progress at the end of each project year is satisfactory. An amount of Rs.10.629 million was released on account of due installments of ongoing and newly approved projects. A list of the semi-annual and annual reports is given in Annexure-III.

b) Completed Projects

Final Technical Reports of thirteen (13) research projects were received during the year under report. The subject experts evaluated these reports and were subsequently

submitted along with their evaluation reports to the relevant Technical Committees for consideration and adoption. A list of the completed projects followed by their summaries is given below.

i) List of Completed Projects

S.No.	Project No.	Project Title
1.	S-PCCC/Agr (183/1)	Breeding for glandless cotton
2.	F-GU/Agr (198)	Enhancement of post harvest quality and stability of Dhakki dates using advanced technology.
3.	P-AU/Agr (223)	Development of commercial diet for rearing of lacewing, <i>Chrysoperla carnea</i> – A biological control agent.
4.	F-AU/Agr (214)	Characterization of soybean mosaic potyvirus and screening of soybean germplasm for the source of resistance to it.
5.	C-PMNH/Bio (295)	Studies on taxonomy and traditional uses of economically important plants of Chitral.
6.	S-SU/Chem (294)	Spectrophotometric and high performance liquid chromatographic determination of copper, nickel, iron, cobalt, vanadium, cadmium, lead and mercury using new semicarbazones as complexing reagents.
7.	S-NCEAC/Chem (269)	High Resolution NMR Studies of Chemical shifts and Relaxation Times in Quinoline, its various derivatives and some Metal Complexes formed by its Hydroxquinoline Derivatives.
8.	S-DRIP/Engg (33)	On-farm drainage and water management strategies to minimize environmental impacts of saline drainage effluents.
9.	C-PINSTECH/Engg (38)	Stress corrosion cracking & pitting of low alloy stress (las) corrosion in sour environment.
10.	S-SALU/Env(45)	Floristic study of arid zone (Desert Nara Region) Sindh.

- | | | |
|-----|-----------------|--|
| 11. | S-DMC/Med(180) | Haem degradation products in the feces of jaundiced & normal newborn infants. |
| 12. | P-PU/Phys (106) | Fabrication and study of mechanical properties of high strength, high temperature zirconia based composites. |
| 13. | C-QU/Phys (115) | Quantum state measurements. |

ii) Brief Summaries of Completed Projects

Project No.	S-PCCC/Agr (183/1)
Project Title:	Breeding for glandless cotton
Duration:	3-years
Date of Initiation:	07.05.1999
Date of Completion:	06-05-2001
Location of Scheme:	Central Cotton Research Institute, Sakrand, Nawabshah Sindh
Principal Investigator:	Abdul Razaque Soomro
Total Expenditure:	Rs. 5,15,365/-
Main Objectives:	<ul style="list-style-type: none"> • To address the problem of gossypol glands present in cotton seed which are toxic to human and animal health. • To develop glandless (gossypol-free) variety of cotton.

Summary of work done

After the discovery of glandless genes the development of cotton variety without gossypol have become possible. These variety will play an important role in solving the problems of human food in the near future. In this study, hybridization between 12 exotics and 1 local glandless and 6 local glanded genotypes was initiated. In all 30 cross combinations were made for sowing F1 germination during 1997 seasons. Selfing in various glandless parents was also done for further utilization in hybridization program. Further, thirty cross combinations were sown during May 1997 along with their respective parents. Unfortunately due to rains, only 7 combinations germinated. 14 single plant progenies were selected and sown as F2 in green house during November 1997.

Fresh crosses were also attempted between cotton leaf curl virus (CLCV) disease resistant (female parents) and exotic glandless (male parents) genotypes. Successful bolls from 11 cross combinations were harvested for sowing F1 germination during next year. Maximum useful heterosis (39.7%) for seed cotton yield was observed against two commercial varieties i.e. NIAB-78 and 32.8% against CRIS-9 both commercial varieties. Out of 11 cross combinations, 35 single plant progenies were selected and sown as F1 along with two commercial checks. Seven best performing progenies were isolated which yielded above 100% than commercial variety such as CRIS-9 and NIAB-78. The range of increase of seed cotton yield of these progenies over two commercial checks was 101.8 to 218.9 percent.

In addition, fourteen single plant progenies were also selected and sown as F2 germination during May 1998. Seed cotton yield per plant of these progenies ranged from 29.6 to 86.8g as compared to 57.3 g of NIAB-78 and 67.5g of CRIS-9. Twenty single plant progenies selected from five cross combinations were also sown as F3 germination in the month of June 1998. All the 20 progenies performed better than two commercial checks CRIS-9 and NIAB-78 in respect of seed cotton yield per plant.

During 1999-2000 cross combinations made between clcv resistant parents and exotic glandless parents were sown as F2 generation simultaneously at CCRI, Sakrand farm and Cotton Research Station Ghotki (hot spot of clcv disease). It was necessary to screen out the segregating material against clcv resistance at the place where severe attack of this disease was observed because at CCRI Sakrand or its surroundings the disease did not appear or if appeared it was with very low intensity.

F3 generation was also sown at Sakrand and Ghotki. Though clcv resistant parent was not used in these combinations, yet it was sown at above two centers to maximize the selection pressure against desired traits. Single plant progenies of F4 generation were sown to select the best performing glandless progenies in respect of high yield potential. Early maturity and desirable fiber quality characters. Two single plant progeny rows having F-280 gl x CRIS -133 and F-201 gl x CRIS-133 parentage consisting of 20 and 22 true glandless plants respectively were bulked and two new glandless strains CRIS-1 gl and CRIS-2 gl were formed. All the plants bulked were true glandless, high yielding and early maturing with average 36.5 and 37.0 lint percent. Other high yielding and early

maturing single plant progenies with glandless trait were also selected for further studies and sowing in F5 generation during next season.

A small quantity of seed of both newly bulked glandless strains along with commercial varieties NIAB-78 and CRIS-9 was tested for gossypol, oil and protein contents. Both glandless strains had 0.01% gossypol as against 1.1% of CRIS-9 and 1.25% of NIAB-78

During 2000-01 cross combination made between cotton leaf curl virus (CLCV) disease resistance and glandless exotic were sown as F3 generation at Cotton Research Station, Ghotki, Bandhi (hot spot of clcv at growers field) and CCRI, Sakrand. The moderate incidence of clcv disease was recorded in Ghotki district as compared to last year, this may be due to sowing of clcv resistant varieties brought from Punjab. F4 generation was also sown at both the places. Single plant progenies of F5 generation were also sown to isolate and select the best performing glandless progenies in terms of high yield potential, early maturity and desirable fiber characters. A micro-varietals trial (strain test trial) consisting of two true glandless stains CRIS-1 gl and CRIS-2 gl and two local checks (CRIS-9 and NIAB-78) was also laid out in randomized complete block design to assess the yield performance of the two newly bulked strains against the checks. According to seed cotton yield data, both new glandless strains were statistically at par with NIAB-78.

Project No.	F-GU/Agr (198)
Project Title:	Enhancement of post-harvest quality and stability of Dhakki dates using advanced technology.
Duration:	2-years
Date of Initiation:	01.06.1997
Date of Completion:	31.05.1999
Location of Scheme:	Gomal University, Dera Ismail Khan.
Principal Investigator:	Dr. Ahmad Khan Baloch
Total Expenditure:	Rs.4,05,246/-
Main Objectives:	To conduct a comprehensive investigation on growth, maturation, curing, ripening and drying of Dhakki dates on scientific basis .

- To define/follow changes in various physio-chemical parameters related to different development stages.
- To use green-house technology to induce or hasten growth, maturation, curing and ripening of the fruits.
- To conduct research on stability of the processed date to extend the shelf life of the products by the use of the water activities technology.

Summary of work done

The dates are the largest dried fruit produce in the world and Pakistan is the 5th leading country for dates production and export. This study was undertaken to improve commercial quality of Dhakki date to increase its production. Initially the survey was conducted to estimate the amount of produce and find causes of quality deterioration and to assess the extent of damage to the produce. The attention was focused to examine determinants affecting ripening curing of Dhakki dates, optimization of the post harvest process(es), evaluating the stability of the processed dates taking advantage from the advances made in this field exploiting the potentials of Drive/Hurdle technology, and UV and Microwave radiations.

Several localities including village Dhakki were selected for conducting trials and collection of samples. Samples were brought in the laboratory of the Department of Food Science & Technology, Faculty of Agriculture for investigation. Extra efforts over two years period of a short duration were focused to examine the root causes and nature of quality degradation after the harvest and during storage of the dates. The following appropriate measures are suggested in order to up-grade the local technology.

1. High quality date fruits shall be selected for processing, as the quality over and above the fresh commodity, can't be improved by any after processing technology.
2. Fruits of an optimum maturity stage at late "Doka" or Dong are required. This is one of the most important factors responsible to achieve better yield of quality product. The fruits are cleaned and well washed before further processing.
3. Ripening is enhanced and superior quality produce can be accomplished by chilling the fruits over night before curing and drying.
4. Blanching of fruits for 5 minutes at 70°C in clean water preferably containing NaCl (0.1%) and NaOH (1.0%) or acetic acid, accelerates ripening. Instead of blanching, an application of physical injury.

5. Sun drying may be performed under cleaned and hygienic conditions using solar driers. Or the fruits can be dried by keeping on clean mats completely enclosed in a hood of transparent plastic sheet with proper air ventilation.
6. By the isothermic studies, it is predicted that the processed Dhakki dates be dried to a level until to attain water activity in the range of 0.62 to 0.65 Aw, at which microbial, biochemical and chemical deteriorative changes are minimum. The produce can maintain its high quality over a long period of one year by keeping the processed fruits at a room temperature with 0.62 to 0.65 Aw, and packaged sealed in cellophane sheets or using materials which help maintaining water activity constant.
7. An acceptable quality of *chhohara* from the unfertile and otherwise waste fruits can be obtained by boiling the fruits in water for 35 min until change in the colour occurs. The taste is much improved if 1-2% sugar or 5% waste date pulp juice is added to the boiling water.
8. Microwaves are potentially capable for ripening/curing of fruits and maintaining original fruit size without causing deformation in appearance of the product provided the intensity of radiation is precisely calibrated. By proper use of microwave radiation of medium intensity (480 watts) for about a minute, picking of fruits even before reaching the optimum maturity level becomes possible, while keeping the desirable qualities of the dates intact. Hence the problem caused by monsoon rain might be resolved by the use of microwave radiation. Microwave treatment also improves yield. Solar drying further furnishes shines.

Project No.	P-UAAR/Agr (223)
Project Title:	Development of commercial diet for rearing of lacewing <i>Chrysoperla carnea</i> – a biological control agent.
Duration:	2-years
Date of Initiation:	01.07.1999
Date of Completion:	31.12.2001
Location of Scheme:	University of Agriculture, Faisalabad.
Principal Investigator:	Dr. Muhammad Yousaf
Total Expenditure:	Rs.3,17,608/-

Main Objectives:

- To develop artificial diets separately for larvae and adults of *Chrysoperla carnea*.
- To develop an economical methods for its mass rearing.
- Mass- rearing of the lacewing in the laboratory.

Summary of work done

The mass-rearing of the green lace-wing, *Chrysoperla carnea* was studied in the laboratory conditions. The two sets of artificial diets, one for the adults and the other for the larvae of this predator, were prepared for testing. The artificial diets prepared for rearing of the adults were tested by studying the fecundity and oviposition period of the insect. The diets for larval rearing were tested by studying the larval developmental time, per cent pupation and emergence of the adults.

The number of eggs laid on diet A ranged from 352-611 (avg. 474.75) with an oviposition period of 33-44 (avg.38.75) days. The diet B provided 296.5 eggs on an average with productive life span of 26-25 days. The diet C showed promising results with the highest range of 639-657 (avg.646.25) eggs and 43-44 (avg 43.5) days of productive life span. When these averages of fecundity and productive life span of females were compared with those obtained by feeding the natural diet of honey-water solution (50.50), it was found that all the three diets were good enough to rear the adults successfully in the laboratory. But when the three artificial diets were compared with each other, it was seen that diet C was much better than the diets B and A for mass-rearing of the adult insects.

Out of three artificial diets tested for larvae, two diets showed successful development of larvae. The larval span on diet A ranged from 15-17 days with an average of 16.25 days. The pupation and emergence of adults from pupae ranged from 76-89 and 73-90 per cent respectively. The larval span on diet B ranged from 21-24 days with an average of 22.75 days. The pupation and emergence of adults from pupae ranged from 51-55 and 62-78 per cent respectively. The diet C showed very poor results because even a single larva could not pupate successfully. When the average figures of larval span and per cent pupation and emergence of larvae of the green lace-wing fed on artificial diets A and B was compared with those obtained by feeding the larvae on natural diet of aphids, it is found that the artificial diet A showed satisfactory results with slightly prolonged larval span and less per cent pupation and emergence, while the diet B showed double period of larval development than the natural diet of aphids. It was concluded that the artificial diet A can be used for mass-rearing of the larvae in laboratory due to its cheapness and easy formulation than the natural diet.

Project No.	F-GU/Agr (214)
Project Title:	Characterization of soybean mosaic poty virus and screening of soybean germ plasm for the source of resistance to it.
Duration:	3-years
Date of Initiation:	01.06.1997
Date of Completion:	31.05.2000
Location of scheme:	NWFP Agricultural University, Peshawar.
Principal Investigator:	Dr. Muhammad Arif
Total expenditure:	Rs.4,18,475/-
Main Objectives:	<ul style="list-style-type: none"> • To conduct comprehensive surveys in all soybean growing areas of NWFP and to record the incidence of SbMv in soybean. • To isolate, identify, characterize SbMv strains and develop routine methods for its identification. • To screen soybean germplasm/cultivars against SbMv and evaluate resistant/tolerant soybean cultivars/lines.

Summary of work done

Soybean Mosaic potyvirus (SMV) occurred widely in major soybean growing areas of the NWFP. Infected plants exhibited predominantly mosaic and mottling symptoms on leaves and stunted growth due to shortened petioles and internodes. Incidence of the virus ranged from mild to severe infection between 8-72% (average of 40%) in areas surveyed. ELISA test further confirmed incidence of the virus from 7 to 64% (average of 35.5%) during 1997-1998 and 10-47% (average of 30.6%) during 1999-2000 in major soybean growing areas of the NWFP.

A total of twelve soybean isolates were collected from soybean crop grown in different areas, which caused characteristic and distinguishable mosaic and mottling symptoms. Of these, six isolates, three each from Swat (SMV-SI,S2,S3) and Peshawar

area (SMV-P1,P2,P3) were selected for further biological characterization. SMV-S1,S2, S3 produced severe mosaic on mechanically inoculated soybean (*Glycine max*) cv. Weber-84, leaf chlorosis and chlorotic local lesions on *Phaseolus vulgaris* and *P. lunatus*, and local lesions on *Chenopodium amaranticolor* and *C. quinoa*. SMV-P1, P2, and P3 isolates caused mild mosaic on soybean cv. Weber-84, while identical reaction was recorded in *P. vulgaris* and *Chenopodium* species. On the basis of biological characterization SMV isolate S1 and P1 were selected for further studies. The dilution end point of both isolates was 1/512.

None of the 29 soybean cultivars and 40 breeding lines screened for resistance, was found immune to two isolates of soybean mosaic potyvirus (SMV-S1 and SMV-P1). Malakand-96 was the only cultivar found highly resistant to both S1 and P1 isolates. Swat-84, Bryan, Hobbit-87, Kingsay, Lugan, Sherman and Harper-87 were resistant to S1 and P1 whereas Rincondita was resistant to S1 and moderately resistant to P1 isolate. Similarly, Clark, Nare, NARC-V and Wahab-93 were resistant to P1 but not to S1 isolate. Wahab-93, Kharif-93, Ajmeri, Hodgson, Mid-Spray, Full-Walter, NARC-II, NARC-IV, NARC-VI, Clark and Nare were moderately resistant to S1 whereas Kharif-93, Ajmeri, Hodgson, Full-Walter, NARC-IV, Rincondita, Mid-Pharoah, NARC-VI and Winchester were moderately resistant to P1 isolate. William, Rawal-I, Mid-Pharoah, Bass, NARC-III, NARC-I, NARC-V and Winchester were susceptible to SMV-S1 whereas William, Rawal-I, Mid-Spray, Bass, NARC-I and NARC-III were susceptible to P1. Weber-84 was highly susceptible to both isolates of SMV. Among 40 soybean lines, GC-81083-63, GC-81084-51, GC-80072-2-6, AGS-253 and AVRDC-12, AVRDC-13 and AVRDC-15 were highly resistant to both isolates of SMV. Lines GC-81075-44, GC-81090-108, GC-81084-147, GC81090-10, AGS-85, AGS-249, AVRDC-10, AGS-297, AVRDC-7 were resistant to both S1 and P1 isolates whereas L-85-2308, AVRDC-5, AVRDC-14, were resistant to S1 and moderately resistant to P1 isolate. Line L-77-1863 was resistant to P1 but moderately resistant to S1 isolate. Similarly, GC-81080-13, GC-82117-8, AGS-154, L-88-8502, AVRDC-3, AVRDC-4, AVRDC-8 were moderately resistant to S1 and P1 isolates and AVRDC-II, GC-81084-134, GC-81084-41, GC-81080-36, GC-81090-94, AVRDC-2, AVRDC-6 were moderately resistant to only P1 isolate. Ten Ten soybean lines were susceptible and 3 highly susceptible to S1 whereas 4 lines were susceptible and only one line was highly susceptible to P1 isolate.

Soybean germplasm found highly resistant or resistant to two prevalent SMV isolates in screen house experiments were exposed to field conditions. Among 13 soybean cultivars, Malakand-96, Bryan and Sherman developed no symptoms and no virus was detected by ELISA. Wahab-93, Lugan, Hobbit, Kingsay, Harper, Nare, NARC-V and Clark developed a mild mosaic and light vinal chlorosis on a few young leaves. Rincondita and Swat-84 exhibited mosaic and vein clearing on many young leaves. Among soybean lines, GC-81083-63, GC-81084-51, GC-80072-2-6, AGS-253 and AVRDC-13 no visible host reaction was observed. AVRDC-12 and AVRDC-15 responded mild mosaic on a few leaves. The soybean cultivars such as Malakand-96, Bryan and Sherman and lines such as GC-81083-63, GC-81084-51, GC-80072-2-6 and AGS-253 and AVRDC-13 were further tested in screen house experiments by inoculating isolate S1 through green peach aphids (*Myzus persicae*). Three soybean cultivars and four lines

exhibited a mild mosaic on young leaves. A low virus concentration has been detected in resistant soybean germplasm.

Project No.	C-PMNH/Bio (295)
Project Title:	Studies on taxonomy and traditional uses of economically important plants of Chitral.
Duration:	2-years
Date of Initiation:	08.08.1999
Date of Completion:	07.08.2001
Location of Scheme:	Pakistan Museum of Natural History, Islamabad.
Principal Investigator:	Dr. Muhammad Rashid Awan
Total Expenditure:	Rs.2,94,984/-
Main Objectives:	<ul style="list-style-type: none">• To identify the economically important plants resources of the area for further scientific studies.• To generate awareness among general public/locals about the threatened plants species of Chitral District.• To strengthen the plant material of Herbarium of Pakistan Museum of Natural History, Islamabad and identify flora of Chitral District in general and the economically important plants in particular.

Summary of work done

A total of 2272 plant specimens were collected from various areas of Chitral alongwith ecological and ethno botanical information. This information was obtained from local inhabitants during four periodical field trips. Fieldwork was conducted according to the flowering fruiting seasons. All collected plant material was dried, pressed, preserved, accessioned and identified for PMNH Herbarium.

A total of 435 species. 235 genera belonging to 86 families were studied and described. These include 83 families of Angiosperms and 3 families of Gymnosperms. Eighty-seven plant species have been described having well defined traditional uses. It was also recorded that majority of plants are being utilized in indigenous medicine for remedy of various diseases. This report will generate general awareness about economically important species of Chitral among students, general Public, pharmacist and plant scientists for long term preservation and exploitation on sustainable basis. These plant species have been utilized over many generations. Information regarding traditional uses of economically important plants of Chitral was obtained from various ethnic groups Kalash, Ismaili, Pathan Gujar, Ashrite, Sunni. etc. on questionnaire during field work . These ethnic groups have their distinct ways of life, beliefs, traditions and cultural heritage. Based on this information, the economic importance of plants has been determined.

Quercus baloot and *Betula utilis* were found heavily lopped and the latter species is on the verge of extinction. Most of the forests are virgin because so far it has not been economical to exploit them due to the lack of proper transport facilities in some areas. One research paper based upon the results of above study was presented in a conference.

Project No.	S-SU/Chem (294)
Project Title:	Spectrophotometric and high performance liquid chromatographic determination of copper, nickel, iron, cobalt, vanadium, cadmium, lead and mercury using new semicarbazones as complexing reagents.
Duration:	2-Years
Date of initiation:	01.05.1997
Date of Completion:	30.04.2000
Location of Scheme:	University of Sindh, Jamshoro
Principal Investigator:	Dr. Muhammad Yar Khuhawar
Total Expenditure:	Rs.4,90,105/-
Main Objectives:	<ul style="list-style-type: none">• To develop new analytical methods and apply these for the determination of metal ions in deferent samples including natural water, industrial influence sediments and soil samples. The analysis of such a diverse nature of the samples have been included in the project to validate the methods adequately for metal analysis.

Summary of work done

During the report period 8-complexion reagents were prepared and characterized by elemental micro-analysis, infra red, UV and visible spectroscopy. The reagents react with metal ions to form colored complexes. The effect of pH, reagent concentration, solvent and solution stability were examined. The optimized conditions were used to examine the effect of concentration on the absorbencies. Beer's law was obeyed by each of the element at the wavelength of its maximum absorbance. The results of spectrophotometer studies are tabulated.

The reagents 2-pyrrolcarboxaldehyde-4-phenyl-3-thiosemicarbazone, 6-methyl-2-pyridinecarboxaldehyde-4-phenylsemicarbazone, 2-pyrrolcarboxaldehyde-4-phenylsemicarbazone, 2-pyridinecarboxaldehyde-4-phenyl-3-thiosemicarbazone and 2-thiophenecarboxaldehyde-4-phenyl-3-thiosemicarbazone were examined for the HPLC determination of metal ions. The reagent 2-pyrrolcarboxaldehyde-4-phenyl-3-thiosemicarbazone was used for solvent extraction and HPLC determination of copper (II), iron(II), nickel(II), and mercury (II). The complexes were eluted from Microsorb C-18, 5 μ m (150 x 4.8 mm id) column with methanol: acetonitrile: water: sodium acetate (1mM): tetra butyl ammonium bromide (1mM) 60:28:10:1:1 v/v/v/v/v using a flow rate of 1 ml/min. Detection UV was at 254 nm. The method was applied for the determination of the metal in a canal water and amount found were within 27-250 μ g/L with coefficient of variation (C.V) within 2.7 to 5.1%. The method was also applied for the determination of copper(II), nickel(II), iron(II) and mercury (II) in the surface water fishes in the range of 0.021-1.2 μ g/g with C.V 1.1-6.4%.

Nickel(II), lead(II) and mercury(II) complexes of 6-methyl-2-pyridinecarboxaldehyde-4-phenylsemicarbazone separated from the column Microsorb C-18, 5 μ m (150x 4.6 mm id), when eluted with methanol-water-chloroform using the flow rate 1.0 ml/min. The copper (II), nickel(II), palladium(II) and silver(I) complexes of 2-pyrrolcarboxaldehyde-4-phenylsemi-carbazone separated from the column Microsorb C-18 (150 x 4.6 mm id) when eluted with methanol: water: acetonitrile: sodium acetate (1mM) (68:6.5: 0.5) (v/v/v/v/v) using flow rate 1 ml/min. The detection UV was at 280 nm. The copper(II), iron(II) and mercury(II) complexes of 2-thiophenecarboxaldehyde-4-phenyl-3-thiosemicarbazone were separated from Microsorb C-18, 5 μ m (150 x 4.6 mm id) column, when eluted with methanol: acetonitrile: water: aqueous sodium acetate (1mM) 68:25:6.5:0.5 v/v/v/v) using flow rate of 1 ml/min. The detection UV was at 280 nm. The separation of copper (II), iron(II) and mercury(II) complexes of 2-pyridinecarboxaldehyde-4-phenylthiosemicarbazone was carried out from phenomenex Sil C-18, 5 μ m column (150 x 4.6 mm id), when eluted with a mixture of methanol: acetonitrile: water: sodium acetate (1mM): tetrabutyl ammonium bromide (0.16%) (68:4:27:0.5:0.5 v/v/v/v/v) using flow rate of 0.8 ml/min/ the detection was at 390 nm. The linear calibration range and detection limit for each of the metal ion at the optimized conditions was determined. The methods were applied for the determination of metals from nickel-aluminum alloy, synthetic mixtures of metal ions, palladium charcoal, ghee samples and fresh water fishes. The results obtained were compared with atomic absorption spectrophotometer.

During the report period 5-papers were published

Project No.	S-NCEAC/Chem (269)
Project Title:	High Resolution NMR studies of chemical shifts and relaxation times in quinoline, its various derivatives and some metal complexes formed by its hydroxquinoline derivatives.
Duration:	3-Years
Date of Initiation:	05.12.1994
Date of Completion:	04.12.1997
Location of Scheme:	University of Sindh, Jamshoro.
Principal Investigator:	Dr. A. W. K. Khanzada
Total Expenditure:	Rs.4,39,160/-
Main Objectives:	<ul style="list-style-type: none">• The objectives of present work is to study ^1H and ^{13}C resonances in<ol style="list-style-type: none">a) Quinoline and its derivatives i.e. methyl-Quinolines, methoxy quinolines, aminoquinolines and monohalo and dihalo-quinolines.b) 8-hydroxyquinoline (oxine) its methyl derivatives, and dihalo-derivatives, sulphonic acid and carboxylic acid derivatives.c) Metal complexes of Oxine and its derivatives.• The first part of this study is chemical shifts of above nuclei in the give compounds. In case of ^1H and ^{13}C detail chemical shift study and assignment will be made. If possible 2-D NMR study will be carried out to supplement the results.

Summary of work done:

The project is concerned with the Nuclear Magnetic Resonance NMR studies of chemical shifts, mostly proton and ^{13}C of quinolone and its various commercially available derivatives using high resolution NMR of 2.1, 7.1 and 11.7 Tesla (T) fields. The study is related with solvent dependent proton ^1H and ^{13}C shifts in the first instance. Proton spectra are very complex and shifts are strongly solvent dependent. These spectra need a theoretical analysis so that experimental values can be assigned to the complex peaks. The theoretical analysis needs complex computer simulation program LAOCOON3 or 2-D analysis which has not been possible before. From the proton spectra published before at 200 MHz in dimethylsulfoxide- d_6 (DMSO- d_6) solvent and the recently recorded spectra in chloroform- d solvent at 300 MHz, it is apparent that the shifts are sensitive to solvents. Polar solvents make hydrogen-bonds with nitrogen of quinolone, thus affecting the ^1H -shifts. ^{13}C are less sensitive to solvents. However the carbon atoms attached to nitrogen atom of quinolone and its derivatives are effected by various solvents. In high field only two solvents e.g. DMSO- d_6 and chloroform- d have been tried. In the present case the cheapest deuterated solvent chloroform- d has been used. Assignment of ^{13}C peaks on non-reported compounds has been done tentatively. Proper assignment required 2-D NMR. For some compounds 2-D NMR has been reported.

Quinolone derivatives which contain hydroxyl-OH group like 8-hydroxyquinolone are very important compounds. These are used in metal analysis and separations. Hydroxyl-OH group makes H-bonds and complexes with solvents and metals. For such compounds, a detailed H-bond study has been undertaken. This study has not been conducted on such important compounds before. The hydroxyl-OH peak in proton spectra of these compounds has not been reported in literature accurately. It exchanges with protons of solvent water and becomes broad and non-detectable. It makes H-bonds with polar solvents. Hydrogen-bond study needs non-polar solvents, like carbon tetrachloride CCl_4 and cyclohexane C_6H_{12} . For 8-hydroxyquinolone (oxine) and some of its derivatives H-bonding study in CCl_4 used as non-polar solvent has been carried out. This study shows that proton shift of OH group decrease with the decrease of concentration of these compound in CCl_4 . This is what one expects from such compounds. A quantitative treatment is required for which work is in progress.

Proton and ^{13}C relaxation time study has been carried out on methyl-derivatives of quinolone at low field of 2.1 Tesla (89.55 MHz for proton and 22.5 MHz for ^{13}C) The spectra of proton are complex but methyl group gives a single peak. Methyl group shows rotation nearly at all temperatures. The present case study has been restricted above room temperature, where rotation is predominant. Relaxation time T_1 is recorded at various temperatures. Relaxation of proton follows usual behavior. ^{13}C predominantly follows dipolar relaxation mechanism. Various mechanisms have been separated from each other. From variable temperature study energy barrier E_a hindering methyl group rotation has been calculated from both proton relaxation and ^{13}C dipole-dipole relaxation.

Project No.	S-DRIP/Engg (33)
Project Title:	On-Farm drainage and water management strategies to minimize environmental impacts of saline drainage effluents.
Duration:	3- Years
Date of Initiation:	08.04.1993
Date of Completion:	07.04.1996
Location of Scheme:	PCRWR, Tando-Jam, Sindh
Principal Investigator:	Mr. Moula Bux Mirbahar
Total Expenditure:	Rs. 8,05,742/-
Main Objectives:	<ul style="list-style-type: none"> • To evolve efficient use of drainage effluent under suitable cropping pattern. • To study the feasibility of evaporation ponds and injection wells for disposal of saline drainage effluent. • To develop computer simulation model for Injection wells. • To promote post graduate research studies on competitive basis within the Engineering or Agriculture Universities of Sindh in the field of Water Resources Management. • To develop the spirit of co-operation and collaboration among land owners to assume the responsibility of drainage and water management on their farms.

Summary of work done

Artificial drainage is inevitable for water table and salinity control in irrigated lands of Indus plain. In addition, judicious use of water is utmost necessary for an efficient integrated on farm water management. The lands adjacent to rice belts are severely waterlogged due to excessive application of water for rice crops. For an efficient irrigation water management and operation the maintenance of drainage system in lower Indus region needs special attention. The disposal of saline drainage effluent is a major

problem of isolated farms. Drainage effluent disposal in canals and surface drains is merely shifting the problem from one area to another. It is therefore important to study the possibilities to use the saline drainage effluent for cultivation of suitable crops with proper management practices or to dispose it in evaporation ponds or inject it in the deep aquifer through injection wells.

In arid and semi arid areas profitable agriculture is mainly dependent on the availability of good quality water for irrigation. Unfortunately our surface water supplies are short of requirement. Inspire of vast groundwater aquifers we are constrained with water quality problems and in some areas poor quality groundwater is being used for irrigation without any scientific management. This approach has resulted in deterioration of soils mostly with respect to their physical properties. Having argued that relatively saline water can be used successfully to grow crops, a crop water management strategy is required to enhance scope of using saline waters for irrigation.

The objective of the project was to carryout the research on tile drainage system and its performance, use of saline drainage effluent for crop production and disposal of saline drainage effluent through injection wells. The total area comprised of 210 acres in which tile drainage was provided with composite layout system. Area was divided in to two units. Before the construction of tile drainage system the bench mark data of the project was collected. Minor effect was observed in groundwater levels during pumping in non-rice season after harvest of rice crop as water-table was close to drain depth.

Experiment on conjunctive use of canal water and drainage effluent was conducted at Block -2A, East Khairpur Tile Drainage pilot project from Rabi 1992-93 to Kharif 1995. Wheat and cotton rotation was adopted. The treatments were T₁ canal water irrigation, T₂ saline drainage effluent, T₃ mixed irrigation at 1:1 ratio and T₄ alternate irrigation with canal water and saline drainage effluent. Each treatment was replicated three times in a randomized block design. Sol was medium textured i.e. silt loam. Non saline, non soda and porous. It was concluded from the experiment that saline drainage water having EC 3 dsm⁻¹ increased sol salinity and reduced crop yields of wheat and cotton significantly. Combination of 50% canal water and 50% saline drainage effluent (EC 3 dSm⁻¹) did not deposit salts in the root zone.

Efficacy of injection well for disposal of drainage effluent was studied at Agriculture Research Farm of Atomic Energy Agriculture Research Centre, Tandojam for injection of drainage effluent deep into the aquifer and observe effect on performance of tile drainage. Drainage effluent for first four hours was collected at a rate of 3.046 liters per second in an empty channel till the lateral lines operated under free flow conditions. The drainage effluent of tile drainage system was supplied to the injection well at rate of 3.13 lps. It was found that in the inter tile drainage project areas injection had no adverse effect on water table, controlled by the tile drainage system.

Two (2) papers were published during the report period.

Project No. C-PINSTECH/Engg (38)

Project Title: Stress crossion cracking & pitting of low alloy stress (LAS) corrosion in sour environment.

Duration: 3-Years

Date of Initiation: 17.05.1997

Date of Completion: 16.05.2000

Location of Scheme: PINSTECH, Islamabad.

Principal Investigator: Mr. Nazar Hussain

Total Expenditure: Rs.2,59,763/-

Main Objectives: To look for the behavior of stressed LAS in sour environments with respect to varying pH and CI levels. In addition to mitigation of corrosion problems. It can also useful for prediction of useful life of a component. Thus contributing to industrial safety. The electro-chemical studies may lead to determination of pitting potentials which can then be avoided for its components.

Summary of work done

For the safe operation of plants it is necessary to eliminate the causes of catastrophic failure. So to eliminatè the cause it is necessary to understand the reasons and mechanisms involved in the materials failure. In the light of such information the plant life can be assessed and operated in safe mode. As in the case of oil and power generation plants the one of the most important causes of failure is the corrosion problem of alloys in aggressive environments. For the safe and economical use of alloys the selection of materials with sufficient corrosion resistance to a particular environment is of great concern. The environments usually encountered in oil field, power industry and nuclear industry containing, substantial amount of hydrogen sulfide. Where low alloy steels (LAS) are widely used but mostly suffers the corrosion attack quite severely. Since all part made of LAS can not be simply replaced altogether with high alloy steels because of economy and other beneficial properties of LAS. It is therefore important to asses the rate of damage being encountered in sour environment which may restrict its usage at some selective sitesr to control the environment at such places if possible and finally best choice of LAS be made. However, many investigations for various types of LAS have already been made by various researches but a very little is known about the behavior of low alloy A516 G-70 in this environment. There are other areas of research where this particular alloy had already been studied i.e. it general corrosion behavior,

electrochemical corrosion, stress corrosion cracking (SCC) etc, but in sour environment (containing hydrogen sulfide), no research about this has ever been made

In the present study because of its importance in oil and power generation industries the SCC behavior evaluations of alloy A516 G-70 in hydrogen sulphide atmosphere was undertaken. Since it is well known that hydrogen sulfide (H₂S) is one of the most toxic, flammable and corrosive substances. So arranging all protective measure it is very expansive to tests the material in H₂S environment. According to literature, solutions containing thiosulphate ions can be used as substitute of hydrogen sulfide and it needs no specific preventive measure. Therefore all investigations were planned and the testing of alloy A516 G-70 in solutions containing thiosulfate ions were made as a substitute of. H₂S. The alloy was further investigated by electrochemical techniques to study its pitting behavior in sour environments because pitting corrosion is another most dangerous type of corrosion. Some sudden failures and perforations in strikers are responsible by pitting in.

The project objectives were accomplished by using different corrosion testing methods, metallurgical tools, published literature, discussion with related field experts etc. Test specimens were fabricated according to ASTM standards. Slow strain rate test (SSRT) were carried out to study the stress corrosion cracking (SCC) behavior using electromechanically loaded SSRT machine. The mechanical properties of the material tested in different solutions were compared with the material tested with out aggressive solution.

The electrochemical studies were conducted at anodic polarization potential and open circuit potential by using a corrosion measurement system Amel Mole 568 to study the pitting corrosion behavior of the alloy.

On the basis of the research results it is proposed that the solution containing thiosulfate ions can be used for evaluation the SCC susceptibility and pitting corrosion of low alloy steel in sour environments at elevated temperature. These results suggested the possibility of using thiosulphate ion as an alternate to H₂S for evaluating the sour gas resistance of low alloy steel. From this research project, useful data and technical know how regarding the SCC/Pitting behavior flow low alloy steel in sour environment are available, which can be helpful to improve the performance of the existing materials other low alloy steels and the development of the new materials. This study also provides the information regarding careful selection of material for oil field and heavy water plant

Project No.	S-SALU/Envr (45)
Project Title:	Floristic study of arid zone (Desert Nara Region) Sindh, Pakistan.
Duration:	3-years

- Date of Initiation:** 20.05.1998
- Date of Completion:** 31.12.2001
- Location of Scheme:** Shah Abdul Latif University, Khairpur, Sindh
- Principal Investigator:** Dr. Ghulam Raza Bhatti
- Total Expenditure:** Rs.5,11,239/-
- Main Objectives:**
- To establish Herbarium along with Museum for special purposes with reference to ecological significance of “Thar Desert” and its Flora. It will be used as a tool in teaching taxonomy and ecology.
 - To depict a diversity of evolution of vegetation by establishing Botanical Garden. The Botanical Gardens are of multiple significance with special reference to the comparative study of plants assisted by herbaria for taxonomic studies, categorization and nomenclature. It also provide material for cytological, anatomical, tissue culture and biochemical investigations. Botanical Garden has to serve as acclimatization centres for various economic important plants.
 - To exploit the discovered economically important species by students, general public pharmaceutical companies and plant scientists. Such species will be given more attention for their long term preservation.
 - To explore wider usage of less known economic plants so far confined to only “Thar” area.

Summary of work done

One hundred forty nine plant species belonging to 110 genera and 42 families collected from Nara desert were identified. Of them, one species of gymnosperm, three

sedges and twenty species of Poaceae (grasses) were determined. Collected Plant specimens from the project area were identified and preserved. Botanical names of all the taxa along with their family and local names, life-form and life-span are provided in table The potential uses of plants by local people of Nara Desert as folklore in various ways (Ethnobotany) in their daily life were recorded and presented/published under different research articles.

Statistically the area containing the plant families ca. 19.81%, genera 5.76% and species 2.75 of the total species of Pakistan so far recorded. The vegetation in this region is sparse consisting mainly of stunted, thorny or prickly shrubs and perennial herbs capable of drought resistance. *Calligonum polygonoides*, *Aerva javanica*, *Salvadora oleoides*, *Capparis decidua*, *Tamarix aphylla*, *Leptadenia pyrotechnica* and *Ziziphus nummularia* have formed the common vegetation cover in this area. Trees *Salvadora oleoides*, *Prosopis cineraria*, *Capparis decidua*, *Tamarix aphylla*, are few and scattered. The ephemeral emerge during the rainy season complete their life cycle before the advent of summer and the bulk of the area is once more transformed into open sandy plain desolate and barren.

Four distinct habitats for plant communities have been recognized in the project area which are as under:

1. Crest habitat (top of the sand dune):
2. Slopes/Swale/Flank habitat;
3. Sandy plains habitat (Tar-Tarai-low laying flat areas).
4. Lake/wetland habitat.

Project No.	S/DMC/Med(180)
Project Title:	Haem degradation products in the feces (meconium and stools) of jaundiced and normal newborn infants.
Duration:	1-year
Date of Initiation:	15-09-2000
Date of Completion:	14-09-2001
Location of Scheme:	Sindh Institute of Urology and Trans plantation Dow Medical College, Karachi
Principal Investigator:	Dr. Sina Aziz

Total Expenditure: Rs. 1,01,839/-

- Main Objectives:
- To quantify the total bilirubin in the first meconium of the newborn infant
 - To relate the bilirubin in meconium with the clinical parameters and neurological outcome.
 - To study and identify haem degradation product (bilirubin) in the meconium of the newborn infant admitted at the neonatal care of CKH.

Summary of work done

Meconium accumulates continuously in the fetal intestine. Analysis of this postnatally excreted material i.e. meconium yield important information of intrauterine metabolism. Meconium has a characteristic black green color whereas the stools of the neonate are pale yellow due to high intake of milk. The pale golden yellow stools therefore gradually replace the black green color as milk is added to the newborn infants diet. Data on total bilirubin in faces obtained by Diazo method are available. However these methods do not allow individual bilirubin to be studied quantitatively.

A total of 45 newborn infants of various gestational ages were included in this study Random sampling from the neonatal unit was done. Two newborns being included every week. Thirty seven newborns were finally included as 8 expired before passage of meconium. Meconium was collected carefully and stored at 20 C, protected by aluminum foil. Samples were defrosted, vortex mixed with equal amount of dimethylsulfoxide, centrifuged, and submitted to analysis on high pressure liquid chromatography using newly developed methods.

Unconjugated Bilirubin-IXa and Bilirubin-IXB were identified and quantitative estimation of bilirubin IXa was done. Bilirubin IXB was the predominant pigment greater than 50% of the total, in the first meconium of the newborn. The amount of bilirubin excreted in the meconium was 29.2-90.8 mg (0.051-0.155 pmol) per sample of meconium passed. The amount was 9.7 mg/kg of body weight in the term newborn and 12 mg/kg in the preterm. In some newborns (2 samples) the amount of bilirubin excretion was increased to 20 mg.

The estimation of bilirubin can easily be done quantitatively in both HEJ/SIUT, both of which have the personnel and analytical facilities like the HPLC. This procedure highlights the importance of bilirubin as a prenatal marker and reflects fetal development in terms of maturity. As the preterm tends to pass more bilirubin and of the IX beta variety.

Project No.	P-PU/Phys (106)
Project Title:	Fabrication and study of mechanical properties of high strength, high temperature zirconia Based composites.
Duration:	2- Years
Date of Initiation:	01.10.1999
Date of Completion:	30.09.2001
Location of Scheme:	University of the Punjab, Lahore.
Principal Investigator:	Dr. Salah-ud-Din
Total Expenditure:	Rs. 2,80,448/-
Main Objectives:	<ul style="list-style-type: none"> • To develop Zirconia composites resistant to erosion, creep and thermal shock having high fracture toughness for industrial and defense applications.

Summary of work done

The application of zirconia based ceramics is extended to many aspects of advanced materials because of its good mechanical, thermal, chemical and electrical properties. Monoclinic zirconia has been partially stabilized into the tetragonal phase with the addition of rare earth oxides such as ceria, dysprosia, and gadolinia. Other rare oxide additives such as Lanthana and Erbium did not stabilize this phase. However, a Pyrochlore-type structure was formed by their addition in zirconia.

Zirconia containing 13 mol% ceria showed highest percentage of retained tetragonal phase. The mechanical properties such as the diametrical compression and hardness of $ZrO_2 + CeO_2$ have been further improved with the addition of aluminum nitride.

The alumina partially stabilized zirconia ceramics were strengthened by adding Si_3N_4 (grain size 40-60 μm). Remarkable high hardness and flexural strength have been achieved. The steady state creep rate of the system $ZrO_2 + Si_3N_4$ has been studied. The stress component and the creep activation energy have been determined.

Project No.	C-QU/Phys (115)
Project Title:	Quantum state measurements.
Duration:	2-Years
Date of Initiation:	01.09.1999
Date of Completion:	31.08.2001
Location of Scheme:	Quaid-i-Azam University Islamabad.
Principal Investigator:	Dr. M. Suhail Zubairy.
Total Expenditure:	Rs.2,72,580/-
Main Objectives:	<ul style="list-style-type: none"> • To carry out studies to the measurement of the Quantum state of radiation field and Atomic centre of Mass Wave Function

Summary of work done

In twentieth century the quantum theory of physics has been a fascinating playground to study the nature of electromagnetic radiations and matter. In this subject, the forces on atom by light have received much theoretical and experimental attention during past may years not only because of interest in the basic atom field interaction, but also for the measurement of an unknown state of electromagnetic field which posed an interesting question in it. The measurement of the cavity field had gained a very high attention because of the possibility of the quantum computers, quantum teleportation, quantum cryptography, dense coding and many more.

This project is undertaken to do research in these areas. There are many schemes presented for the quantum state measurement. One of the most widely used ways is the reconstruction of Winger function. Work has been done in this area and presented new schemes for the reconstruction of Winger function of the field from the recovered photon statistics of the field. Photon statistics can be recovered in no of ways. In this report it present five different new schemes for the measurement of photon statistics of the field. These are based on Deflection of atomic beam from the cavity field in Raman-Nath regime, Electromagnetically induced transparency, Resonance florescence, Ramsey interferometry. Autler Towns time dependent spectroscopy and Deflection of atomic beam in Bragg's regime.

Apart from these schemes another scheme is proposed for the reconstruction Winger function using tomography by phase sensitive amplification of the field. Three level atoms of two photon processes are passed through the cavity amplifying the field to

be measured. The two cases are discussed here. One in which the phase of the atoms are controlled outside the cavity and the other in which the phase is controlled inside the cavity. The complete quadrature distribution is obtained by varying the quadrature of the different phase. The inverse Radon transformations are then employed to reconstruct the original quantum state.

Most of these schemes are based on the atom field interaction and the role of phase and intensity of the field. During the study, spontaneous emission in a four level atomic system driven by three fields is considered. It has been observed that by controlling the phase and the amplitude of the driving fields a wide variety of spectral behavior can be obtained ranging from a very narrow single spectral line to six spectral lines of varying widths.

An exciting application of the new emerging field of Quantum Informatics i.e. Quantum Teleportation is presented. The teleportation of entangled two particles and multiparticle states present a scheme for the teleportation that may be suitable for both entangled atomic states or field states inside high Q cavities.

During the report period 5-papers were published and a Ph.D. degree was awarded.

iii) Scientific Publications Produced through PSF Supported Projects

An important achievement of the Foundation is the research publications resulting from the research conducted under PSF funded projects. Through the projects completed during the report period, eighteen (18) research papers were published or presented in National and/or International Conferences/Symposia. A list of these papers is placed at Annexure-IV.

iv) Higher Degrees Earned through PSF Supported Projects

One of the major goals of the Foundation is the training of scientific manpower in the country. This in turn would result in strengthening of R&D infrastructure of various scientific organizations. In order to achieve this goal, PSF has been developing scientific manpower, through its research projects. For this purpose, Research Associates are provided in the projects, they are required to register for Ph. D or M. Phil degrees. During the report period, 1 Ph.D., 1 M.Sc.(Hons) and 1 M.S degree was awarded to research workers under PSF funded projects in the fields of Agriculture, Physics and Engineering. List of the scholars who obtained the degrees is given below.

S. No.	Project No.	Name of Researcher	Degree awarded
1.	C-QU/Phys. (115)	Mr. Ashfaq Hussain Khosa	Ph.D
2.	F-AU/Agr(232)	Ijaz Ali Malak Zai	M.Sc (Hons)
3.	S-DRIP/Engg(33)	Mr. Abdul Samad Chandio	M.S.

3. 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. 0.235 million were released to the following Scientific Societies and Journals during the year 2001-2002.

No.	Name of Society/Association/Journal	Amount of Grant (Rs.)
1.	Pakistan Academy of Sciences, Pakistan Academy of Sciences, Constitution Avenue, G-5 Islamabad	50,000/-
2.	Pakistan Medical Association, Center, National Headquarters, PMA House, Sir Aga Khan III Road, Karachi	35,000/-
3.	Institution of Engineers, Pakistan, Headquarters Office, I.E.P. HQ. Building, I.E.P. Round About, Gulberg-III, Lahore	15,000/-
	Total:	100,000/-

Publications/Journals

1.	Mehran University Research Journal of Engineering & Technology, Directorate of Research & Publication Mehran University of Engg. & Technology, Jamshoro	20,000/-
2.	Pakistan Veterinary Journal Faculty of Veterinary Science, University of Agriculture, Faisalabad	15,000/-
3.	Pakistan Oral & Dental Journal, H.No. 19, Street-63, F-7/3, Islamabad	15,000/-
4.	Pakistan Journal of Pharmaceutical Sciences, Faculty of Pharmacy, University of Karachi	10,000/-

5.	Journal of Natural Science & Mathematics, Dept. of Physics, Govt. College, Lahore	10,000/-
6.	Pakistan Journal of Agriculture, Agricultural Engineering and Veterinary Sciences, Faculty of Crop Production Building, Sindh Agriculture University, Tandojam	10,000/-
7.	Pakistan Journal of Arid Agriculture, University of Arid Agriculture, Rawalpindi.	25,000/-
8.	Journal Geographic, Pakistan Geographic Association, Department of Geography, Gov. Arts and Commerce College, Karachi	15,000/-
9.	J. Farming out Look, Islamabad	15000/-
	Total:	135,000/-
	Grand Total:	235,000/-

4. FUNDING FOR CONFERENCES/SEMINARS/SYMPOSIA/ WORKSHOPS

To enable scientists to share their knowledge and research experience with each other, the Foundation provides partial financial assistance to Scientific Societies/Universities and R&D Organizations for organizing Science Conferences, Seminars, Symposia and Workshops etc. This is a continuing activity of the Foundation. During the report year, grants amounting to Rs 0.198 million were released to various Organizations for holding National/International Conferences, Seminars, Symposia and/or Workshop etc. (Annexure-V).

5. TRAVEL GRANTS

One of the functions of the Foundation is to provide travel grants from its annual budget to Pakistani scientists for their participation in international conferences, seminars, symposia etc. for presentation of their research findings at international forums. However, this activity of the Foundation has remained suspended during the last several years due to a ban imposed by the Govt. on utilization of GoP funds for travel abroad for participation in meetings, conferences, seminars etc.

6. PROVISION OF FELLOWSHIPS

The Foundation on a partial effort towards the training of high level man power in the country provides fellowships to talented students for completing their M.Phil/Ph.D studies. During the report period, an amount of Rs. 60,000/- was released to Quaid-i-Azam University, Islamabad on account of partial financial assistance to a research fellow (Miss Maryam Akram) for completion of her PhD studies.

7. INTERNATIONAL LIAISON

Visit of PSF Delegation to China Under S&T Protocol Between Pakistan and China

A five member delegation of Pakistani Scientists visited China from 8 to 15 April 2002 under item 15-201 of the S&T Protocol between Pakistan and China. The host organization in China was the National Natural Science Foundation of China (NNSFC). The Delegation comprised of the following members:

- i. Dr. Shahzad A. Mufti,
Chairman,
Pakistan Science Foundation,
Islamabad. Leader of Delegation
- ii. Prof. Dr. M. Aslam Baig,
Department of Physics
Quaid-i-Azam University,
Islamabad.
- iii. Dr. Muhammad Mohsin Iqbal,
Director,
Nuclear Institute of Agriculture
and Biology (NIAB),
Faisalabad.
- iv. Prof. Dr. M. Iqbal Chaudhry,
HEJ Research Institute of Chemistry,
University of Karachi,
Karachi.
- v. Mr. Subhan-ud-Din,
Principal Scientific Officer,
Pakistan Science Foundation,
Islamabad.

The main purpose of the visit was to strengthen S&T cooperation between scientists of the two countries. Three main disciplines, i.e. Chemistry, Physics and Soil Sciences, were identified for possible collaboration.

In Beijing the Delegation held meeting with scientists of NNSFC, wherein it was mutually agreed that the existing S&T Cooperation will be further strengthened. It was also decided that a bi-national workshop in selected areas of Chemistry will be held regularly in HEJ, Karachi and Beijing on annual basis.

The delegation visited various Institutes of Chinese Academy of Sciences and the Agriculture University in Beijing. The delegation also visited Huazhong University of Science and Technology in Wuhan, Hubei Province and held very useful discussions with the authorities and researchers of the University. It is considered to be one of the best universities of China. On the last leg of its visit the delegation visited various Institutes of Nanjing University.

Overall the visit was very fruitful in that several key areas were identified for future collaboration between scientists of the two countries.

II. SCIENCE POPULARIZATION

Popularization of Science is one of the statutory functions of Pakistan Science Foundation. The Foundation is engaged in various science popularization activities at national level with the aim of increasing awareness of science education in the society. In order to achieve this objective the Foundation has initiated a number of programs including science exhibitions, fairs, science film shows, popular science lectures and science quiz competitions, science essay & poster contests, establishing of Science Centers/Corners, strengthening of laboratories of high schools etc.

1. SCIENCE CARAVANS (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 towards the study of science. Through mobile science exhibition, the people living in rural/backward areas of the country are exposed to some of the most fascinating scientific and technological developments of the modern world. All narrations are in national language and are accompanied by simple illustrations. At present five Science Caravan Units are operating one each in 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.

Federal Unit

Exhibition

Duration

Thirty seven (37) Schools visited Exhibition at Taxila.	24.9.2001 to 3.11.2001
Planetarium Shows were arranged at the Joint Services Public School, Chaklala, Rawalpindi	11.12.2001 to 13.12.2001
Film Shows were arranged at Pakistan Model Secondary School, Muslim Town, Rawalpindi	16.01.2002
Planetarium Shows were arranged at Schools Nova, Islamabad	21.01. 2001 to 22.1.2002
Planetarium Shows were arranged at Pakistan Model Secondary School, Muslim Town, Rawalpindi.	11.1.2001
Planetarium Shows were arranged at Grammar School, Lalazar, Rawalpindi.	11-3 –2001 to 13.3.2001
Planetarium Shows were arranged at Grammar School, Chaklala, Rawalpindi.	18-3 –2001 to 20.3.2001
13 Schools visited the Exhibition at Tehsil Kahuta..	24.5.2002 to 7.6.2002

Sindh Unit

36 schools visited the Exhibition at District Thatta.	5.9.2001 to 7.10.2001
75 schools visited Exhibition at Taluka, Sajawal, Mirpur Buthoro, Jati, Shah Bunder, & Keti Bunder.	15.10.2001 to 18.11.2001
61 schools visited Exhibition at Malir, Karachi.	1.1.2002 to 4.2.2002
59 Schools visited Exhibition at Taluka Khipro and Sangar	8.4.2002 to 6.5.2002

Balochistan Unit.

Pre-exhibition visit of District Zhob was made for arranging the Science Caravan Exhibition.	6.9.2001 to 8.9.2001
Pre-exhibition visit of Noshki, Kharan and its surroundings was made for arranging the Science Caravan Exhibition	20.11.2001 to 22.11.2001
16 schools visited Exhibition at Noshki, Kharan and its surroundings.	8.1.2002 to 18.1.2002
6 schools visited the Exhibition at Pishin.	27.5.2002 to 8.6.2002
11 schools visited Exhibition at Khuzdar.	28.5.2002 to 9.6.2002

Punjab Unit

Pre-exhibition visit of Chiniot, Distt. Jhang was made for arranging the Science Caravan Exhibition.	15.9.2001
13 schools visited at Chiniot, Distt. Jhang	19.9.2001 to 9.10.2001
25 schools visited the Exhibition at Bhalwal, Distt. Sargodha.	25.11.2001 to 14.11.2001
19 schools visited the Exhibition at Bhalwal.	8.1.2002 to 26.1.2002
18 schools visited Exhibition at Sargodha	1.2.2002 to 16.2.2002
14 Schools visited the Exhibition at Sargodha.	9.5.2002 to 25.5.2002
13 Schools visited the Exhibition at Noshera, Distt. Khushab.	28.5.2002 to 9.6.2002



Students visiting the Science Caravan Exhibition organized at the Government High School, Phularwan (District Sargodha).



Science Film Show arranged for the students during the Science Caravan Exhibition.

NWFP Unit

21 Schools visited Exhibition at South Waziristan Agency.	7.8.2001 to 22.8.2001
12 Schools visited Exhibition at District Shangla, Swat.	11.9.2001 to 23.9.2001
20 Schools visited Exhibition at District Haripur.	9.10.2001 to 21.10.2001
9 Schools visited Exhibition at District, Kohat.	7.11.2001 to 16.11.2001
23 Schools visited the Exhibition at District Bannu	3.1.2002 to 18.1.2002
6 Schools visited the Exhibition at District Charsadha.	11.2.2002 to 19.2.2002
17 Schools visited the Exhibition at Bunner	9.4.2002 to 19.4.2002
20 Schools visited the Exhibition at Northern Areas.	27.5.2002 to 20.6.2002

2. INSTITUTIONAL SUPPORT TO CHILDREN LIBRARY COMPLEX, LAHORE

An amount of Rs.700,000/- was sanctioned and released to the Children Library Complex, Lahore) for the establishment of science corner at the complex. An additional grant of Rs.50,000/- was also sanctioned for the purpose.

3. SCIENTIFIC LITERATURE TO HIGH SCHOOLS

One thousand copies of the book entitled "*HTML – FTP Aur Web Hosting Kay Saath*" were purchased for donation to 1000 schools all over the country.

One thousand copies of the book entitled "*KHULYAI KEY DUNIYA*" were purchased for donation to 1000 schools all over the country.

4. POPULAR SCIENCE LECTURES BY EMINENT SCIENTISTS

In connection with its Popular Science Lecture series the Foundation organized lectures by Dr. Khalid Rashid, Lt. Gen. (R) Fahim Ahmed Khan, Dr. Salman Hameed and Mr. Muhammad Abdul Wahid on different scientific topics, during the report period. Furthermore, launching ceremony of a TV serial "*Asrar-e-Jehan*" produced by Dr. Pervaiz Hoodbhoy was also arranged by the Foundation.

5. DONATION OF COMPUTERS/EQUIPMENT

An amount of Rs.20,000/- was sanctioned to National Museum of Science & Technology, Lahore for purchase of VCR and Screen for Science film shows in the Museum.

A sum of Rs.151,560/- was sanctioned to various Scientific & Educational Organizations like National University of Sciences & Technology, National Museum of Science & Technology, Adventure Foundation and Pakistan Military Academy, Kakul for different science promotion activities.

Four high schools of Sindh and Balochistan provinces were provided with the laboratory equipments. The PSO (Science Promotion) alongwith other staff members personally donated the equipments.

6. DONATION OF LAB EQUIPMENT TO SCHOOLS

Laboratory Equipment amounting to Rs.472,000/- were provided to four high schools of Sindh & Balochistan provinces. The Foundation also placed order for supply of two sets of Lab. Equipment to National Equipment Centre, (NEEC) Lahore. The equipment will be donated to four/five high schools of the country.

7. 12th INTRA BOARD SCIENCE ESSAY COMPETITION

Foundation arranges Intra Board Science Essay Competition and Intra Board Science Poster contests in collaboration with the Boards of Intermediate and Secondary Education of the country. In this regard, 12th Intra & Inter Board Science Essay Competition on the topic “National Development is indebted to Scientific Development” & 12th Intra Board Science Poster Contests on the theme “Uses of Solar Energy in 21st Century” are on going these days.

III. PLANNING AND DEVELOPMENT WORK

During the report period, development funds amounting to Rs. 15.18 were received against the total allocation of Rs. 32.80 million for the following five new/on-going development projects.



Donation of Lab. Equipment to the Principal, Government Girls High School, Pishin, Balochistan.



Handing Over of Lab. Equipment to Government Boys High School, Daur, Sindh.



Popular Science Lecture on "Human Resource Development" by Mr. Muhammad Abdul Wahid.



Lt. Gen. (R) Fahim Ahmad Khan delivering lecture on "Thalassaemia in Pakistan".

S.No	Name of Project	Total Cost (Million Rs.)	Allocation	Release
1.	Financial Support to Scientific Societies in Pakistan. (On-going)	39.00	7.40	5.00
2.	Participation of Scientists and Technologists in International Conferences, Seminars and Workshops. (on-going)	17.00	4.80	2.16
3.	Funding of Scientific and Technological Research in Universities and other R&D Organizations. (new)	39.00	10.00	4.50
4.	Career Development of Young Scientists. (New)	28.00	5.60	2.520
5.	Popularization of Science in Rural areas (New)	22.212	5.00	1.00
	Total	145.212	32.80	15.18

In addition, a new development projects entitled, "Research Support Programme for Active Scientists" was approved by the DDWP in its meeting held on 19.4.2002 for a period of one year at a total cost of Rs.39.50 million. The project, however, could not be initiated due to non-allocation of funds.

Brief summary of the progress made under each development project during the report period is as under:

1. Financial Support to Scientific Societies in Pakistan

There are many scientific societies and learned bodies, disciplinary as well as general, in the country who are actively engaged in the promotion of Science and Technology. They are rendering their services by holding conferences, seminars, workshops on various scientific topics and publication of scientific journals/periodicals/newsletters in their respective fields. These societies and learned bodies, however, do not have any regular source of funding/income to support their activities. Moreover, they work in isolation and do not have sufficient resources to develop linkages with similar bodies in the advanced countries and to expose themselves to the latest S&T developments. Holding of conferences and publication of journals have become quite expensive activities and scientific societies/learned bodies, under financial

constraints, cannot carry out their activities effectively due to lack of funds. The Pakistan Science Foundation does provide grant-in-aid to some of the societies and learned bodies from its non-development budget for their activities and for the publication of few scientific journals but the amount allocated for the purpose is negligibly small.

In order to strengthen the role of scientific societies/learned bodies and to enable them to develop linkages with their counter part societies in the advanced countries, PSF submitted a development project to the Government of Pakistan for acquiring funds under PSDP. The project was approved at a total cost of Rs. 39.00 million for a period of five years. Under this project financial assistance is provided to scientific societies for;

- Holding of National and International conference, seminar workshop etc. on important scientific topics.
- Publication of scientific journals and
- Development of linkages with their counterpart societies in advanced countries to remain update in the contemporary Science and Technology and to draw the benefit of R&D to Pakistan industry by adopting the ways and means as done by those countries.

During the year under report an amount of Rs. 2.998 million was paid to 16 Scientific Societies as per details given below:

S. No.	Name of the Society.	Amount Released (Rs).
1.	Pak. Thalassaemia Welfare Society.	1,00,000/-
2.	Zoological Society of Pakistan.	4,00,000/-
3.	Pak. Society of Nematologists.	1,00,000/-
4.	Soil Science Society of Pakistan.	5,00,000/-
5.	Islamic Society of Statistical Sciences.	50,000/-
6.	Pakistan. Nuclear Society.	1,00,000/-
7.	The Chemical Society of Pakistan.	5,13,115/-
8.	Pakistan Botanical Society.	3,00,000/-
9.	Pakistan Society of Microbiology.	2,00,000/-

10.	Society of Economic Geologists and Mineral Technologists (SEGMITE).	50,000/-
11.	Pakistan Association of Scientists and Scientific Professions (PASSP).	50,000/-
12.	Pakistan Phytopathological Society	40,000/-
13.	Pakistan Vacuum Society.	95,642/-
14.	Pakistan Pharmacological Society,.	1,00,000/-
15.	Pakistan Association for the Advancement of Science.	3,00,000/-
16.	Horticultural Foundation of Pakistan.	1,00,000/-
	Total	29,98,757/-

2. **Participation of Scientists and Technologists in International Conferences, Seminars and Workshops**

A major weakness of Pakistani Scientists is their isolation from international scientific developments. Due to lack of contact with the scientists in the advanced countries and the absence of intellectual interaction, many of our scientific workers become obsolescent and lose enthusiasm and freshness. Science Conferences, Seminars and Workshops provide a forum to scientists for presentation of their research findings, sharing knowledge and exchange views with their counter parts in the developed world.

One of the functions assigned to Pakistan Science Foundation under its charter is to provide financial support to scientists for presentation of their research papers in international conferences. Accordingly the Foundation has been providing financial assistance to scientists from its non-development budget for this purpose. The allocation under this head is, however, very meager and cannot fulfill requirement of scientists. The Foundation, therefore, submitted the above project to MoST for acquiring funds under the development budget. The project was approved at a total cost of Rs.17.00 million for a period of five years. The main objective of the project is to provide financial assistance to Pakistani scientists, technologists, doctors and engineers for their participation and presentation of their research findings in international conferences, seminars & workshops. This will provide them an opportunity to learn about the latest developments in scientific research and remain update in the contemporary Science and Technology and to draw the benefits of R&D to Pakistani Industry by adopting the ways and means as done by the developed countries.

Under this scheme, besides scientists, engineers and doctors working in public sector organizations, those working in the private sector organizations are also eligible

for funds/support for participation in the conferences abroad to participate through research papers based on research work of national relevance undertaken in Pakistan.

During the year under report as many as 120 travel grant requests were received, out of which 43 requests were approved by the Foundation at a total cost of Rs.29.00 million. However, only 21 scientists could avail the grants. The remaining could not attend their conferences due to visa restrictions/non-availability of flights after 9th September, 2001. The list of scientists who succeeded in availing the PSF grants is as under.

S.No	Name & Address of Applicant	Conference Attended	Amount Utilized
1.	Mr. Qamar-ul-Haq, SSO, Nuclear Physics Division, PINSTECH, Islamabad. T.G (81)	Symposium and Autumn College, held at Trieste, Italy, from Oct.8 to Nov. 2, 2001.	Rs.67,000/-
2.	Dr. Elizabeth Stephen, SSO, Pest Management Institute, NARC, Islamabad. T.G (97)	XXXVI International Apiculture Congress, held at Durban, South Africa, 28 th Oct to 1 st Nov 2001.	Rs.87,220/-
3.	Dr. Saifullah Khan, Associate Professor, and Incharge Tissue Culture and Biotech Divisions, HEJ Research Institute of Chemistry, University of Karachi, Karachi. T.G (104))	4 th International Tissue Culture Conference, held at Dhaka, Bangladesh, from 1-3 Nov. 2001.	Rs.16,605/-
4.	Mr. Abdur Rehman, Deputy Chief (S&T), P & D Division, Islamabad. T.G (111)	10 th Pacific Basin Conference on Hazardous Waste, held at Okayama, Japan, from 5-7 Dec. 2001.	Rs.35,800/-
5.	Prof Dr. M. Aslam Baig, Department of Physics, Quaid-i-Azam University, Islamabad T.G (113).	Synchrotron Light for Experimental Science and Application in the Middle East (SESAME) 7 th Meeting of the International Council, held at Amman, Jordan, from 17-18 Dec. 2002.	Rs.80,716/-
6.	Prof. Dr. M. Ajmal Khan, Department. of Botany, University of Karachi, Karachi.	International Symposium on Optimal Resource Utilization, in Salt Affected Ecosystems in	Rs.98,040/-

T.G (115)	Arid and Semi Arid Regions, held at Cairo, Egypt from 8-10 April 2002.	
7. Dr. M. Rasul Jan, Associate Professor, Department of Chemistry, Peshawar University, Peshawar. T.G (117)	International Conference on Environmental and Public Health Management, held at Hong Kong from 12-15 March 2002	Rs.70,000/-
8. Dr. Syed Abdul Rehman, Programme Director, National Allergy and Asthma Centre, Gulshen-e-Iqbal, Karachi. T.G (118)	58 th Annual International Conference of American Academy of Allergy, Asthma and Immunology, held at Newyark, USA, from 1 st to 3 rd march 2002.	Rs.55000/-
9. Dr. M. Ashraf Moten, Chief (S&T) P&D Division, Islamabad. T.G (120)	“R” 02, The 6 th World Congress on Integrated Resource Management, held at Switzerland from 12-15 Feb. 2002	Rs.29,280/-
10 Dr. Mrs. Yasmin Ashraf Moten, Faculty Member, National University of Science and Technology, Rawalpindi. T.G (121)	“R” 02, The 6 th World Congress on Integrated Resource Management, held at Switzerland from 12-15 Feb. 2002	Rs.29,280/-
11 Brig. Afzal Pervaiz, Registrar, NUST, Rawalpindi. T.G (122)	“R” 02, The 6 th World Congress on Integrated Resource Management, held at Switzerland from 12-15 Feb. 2002.	Rs.33,600/-
12 Dr. Khalid Naeem, CSO, Virology and Molecular Biology Lab, Animal Sciences Institute, NARC, Islamabad. T.G (125)	5 th International Symposium on Avian Influenza, held at Atlanta, Georgia, USA, from 14-17April 2002.	Rs.87.280/-
13 Mr. Abdul Hameed, SSO, Biomedical and Genetic Engineering Division, Dr.A.Q.Khan Labs, G-9/1, Islamabad. T.G (129)	Human Genome Mapping 2002, held at Shanghai, China, from 14-17 April 2002.	Rs.1,02,815/

14	Dr. S.T.K Naeem, Chairperson, Pakistan Council for Science and Technology, Islamabad. T.G (134)	Pak Millennium Conference on Higher Education in Pakistan - Challenges and Reforms, held at Boston, Massachusetts. USA, from 13-14 April 2002.	Rs.94,276/-
15	Prof Dr. Khanzada, Department of Agronomy, NWFP University of Agriculture, Peshawar. T.G (143)	CRIDALA – 2002, 2 nd Conference on Research in Distant and Adult Learning in Asia, held at Hong Kong, from 5-7- June 2002.	Rs.16,268/-
16	Dr. Sohail Aslam, Medical Officer, Department of Cardiology, Govt. Lady Reading Hospital, Peshawar. T.G (148)	5 th International Congress of the Asian Vascular Society, held at Singapore, from 23-26 May, 2002.	Rs.59,290/-
17	Dr. Muhammad Ibrahim, Agricultural Chemist, Ayub Agricultural Research Institute, Faisalabad. T.G (153)	13 th International Symposium of the International Scientific Centre of Fertilizers, at Tokat, Turkey, from 10-13 June 2002.	Rs.72,600/-
18	Dr. Muhammad Aleem Khan Medical Officer, Punjab Institute of Nuclear Medicines, Faisalabad. T.G.(155)	18 th UICC-ICC International Cancer Congress from 30 th June to 5 th July, 2002 at Oslo, Norway	Rs.54,990/-
19	Captain Tariq Maqsood, Pakistan Army, Rawalpindi. T.G.(164)	a) International Union of Mathematicians and b) China International Conference Centre for Science and Technology. from 20-28 August, 2002 at Beijing, China.	Rs.55,290/-
20	Mr. Ejaz Rafique, Senior Scientific Officer, Land Resources Institute, NARC, Park Road, Islamabad. T.G.(169)	17 th World Congress of Soil Science, 14-20 August, 2002 at Bangkok, Thailand..	Rs.70,680/-

21 Dr, Muhammad Abid,
Assistant Professor,
Faculty of Mechanical
Engineering,
GIK Institute of Engg. Science &
Technology, Topi.
TG(171)

6th Biennial Conference on
Engineering System Design
and Analysis ESDA2002.

Rs.59,600/-

3. **Funding of Scientific and Technological Research in Universities and other R&D Organization.**

Scientific Research Support is a major function of the Pakistan Science Foundation, which is successfully being implemented since inception of the Foundation in 1973. The Foundation has developed all the requisite infrastructure in the form of trained manpower for processing and monitoring of the programme, rules, regulations and procedures for management of research grants and evaluation & monitoring of projects during their implementation. Moreover, the Foundation has got the cooperation of senior scientists, who are/were actively engaged in scientific research, for assessing the technical merits and budgetary requirements of projects submitted to the Foundation for funding. They assist the Foundation in evaluating the progress of projects during implementation as well as on completion. They also provide guidance to the researchers in the conduct of PSF supported projects. These scientists are placed on PSF list of experts/reviewers and Technical Committees in ten (10) disciplines of natural and physical sciences.

Each year, the Foundation receives considerable number of projects for funding. However, due to limited funds at its disposal the Foundation has been very selective while considering projects for funding. In order to strengthen its Research Support Programme, the Foundation succeeded in getting approved the above development project at a total cost of Rs.39.00 million over a period of three years. The main objective of the project is to strengthen the Scientific and Technological Research activities in the Universities and other R&D Organizations by providing them more funds for:

- i. Undertaking basic and applied basic research on problems having direct relevance to the socio-economic needs of the country. Projects will be funded in the subject areas pertaining to Information Technology, Bio-Technology, Chemistry (Medical Chemistry, Bio-Chemistry, Industrial Chemistry) Engineering Sciences, Agriculture Sciences, Electronics, Physics, Mathematics,.
- ii. Procurement of specialized research equipment, chemicals and/or literature which are required by the research workers in different organizations for carrying out their research activities and which they are unable to purchase due to paucity of funds.

iii. Training of manpower for undertaking scientific research on advanced laboratory techniques

During the period under report, 195 research projects in various disciplines, costing Rs.175.00 million, were received by the Foundation. Out of these, twenty (21) projects, were approved for funding by the Foundation at an estimated cost of Rs. 13.50 million. The remaining projects are being processed through experts and technical committees. List of new projects approved during the year 2001-2002 under this development project is given below.

List of New Approved Projects

S.No	Project Title & No.	Name & Address of P.I.	Duration	Total Sanctioned cost in Rs.
1	Balanced Nutrient Management Studies for Cotton Wheat –Cropping System in Sindh. R&D/S-CCRI/Agr (4)	Mr. Abdul Waheed, S.S.O.,Central Cotton Research Institute, Sakrand, Nawabshah.	2-Years	4,53,379/-
2.	Sustainable crop Production Drainage Management of Legume N2 Fixation. R&D/C-NARC/Agr(7)	Dr. Muhammad Aslam, Head, Soil Biology & Biochemistry, NARC, Islamabad.	3-Years	6,40,764/-
3.	Studies on the population genetic of Phytophthora infestans the cause of late blight of potato. R&D/C-NARC/Agr (13)	Javed Iqbal Mirza, Scientific Officer, CDRI, NARC, Islamabad.	3-Years	4,42,262/-
4.	Integrated management of Powdery scab of Potato in Pakistan. R&D/C-NARC/Agr(14)	Mrs. Shamim Iftikhar, S.S.O, CDRI, NARC, Islamabad.	3-Years	5,46,169/-
5.	Simplification of urea treatment of cereal straw method for its easy adoption by the Farmers R&D/P-LPRI/Agr (30)	Dr. Makhdoom Abdul Jabbar, Livestock Production Research Institute, Okara.	2-Years	2,11,068/-

6.	Evaluation of Phytobiocides for control of Powdery Mildew in Pea. R&D/F-AU/Agr(36)	Prof.Dr. Shabeer Ahmad, Department of Plant Pathology. NWFP Agriculture University, Peshawar.	3-Years	7,35,073/-
7.	Potential of Mungbean and Mashbean to Fix Nitrogen and Benefit the Subsequent Wheat Crop in Potowar. R&D/P-UAAR/Agr (85)	Dr. Safdar Ali, Associate Professor, Soil Science Department, University of Arid Agriculture, Rawalpindi.	3-Years	5,87,652/-
8.	Validation of Milk-Urea as an On-Farm Diagnostic Test for Evaluating Protein Status of Milking Cows and Buffaloes R&D/F-AU/Agr (107).	Dr. Ghulam Habib, Associate Professor, Department of Animal Nutrition, NWFP Agriculture University, Peshawar.	3-Years	8,10,553/-
9.	Management of Soil Born Diseases in Vegetable Nurseries using Solarization and Amendments. R&D/C-NARC/Agr (115)	Dr. Yasmin Ahmed, S.S.O, CDRI, NARC, Islamabad.	3-Years	4,37,170/-
10.	Assessment of toxinogenic fungi and mycotoxin contamination in stored food grain. R&D/C-NARC/Bio (1)	Dr. Samina Khalil, Food Technology Research Laboratory, National Agricultural Research Centre (NARC), Islamabad	3-years	8,47,865/-
11.	Collection, conservation and characterization of vegetable crop biodiversity. R&D/C-NARC/Bio (18)	Dr. Rashid Anwar, Plant Genetic Resource Institute, NARC, Islamabad	3-years	5,79,319/-
12.	Screening of nematode population of beetal goats for development of resistance against commonly used	Dr. Zafar Iqbal, Department of Veterinary Parasitology, University of Agriculture, Faisalabad	2-years	4,11,580/-

	anthelmintics at livestock farms of Punjab. R&D/P-AU/Bio (41)			
13.	Studies on the prevalence, biology, control and economic significance of hypoderma species in some semi-hilly districts of Punjab R&D/P-AU/Bio (42)	Dr. Muhammad Nisar Khan, Department of Veterinary Parasitology, University of Agriculture, Faisalabad	3-years	7,91,469/-
14.	Enhancing the nutritional worth of low quality crop residue by escalating nitrogen fixation through chemical and biological treatments and its influence on palatability, voluntary feed intake, digestion kinetics and productive performance of buffaloes. R&D/P-AU/Bio (46)	Dr. Muhammad Sarwar, Department of Animal Nutrition, University of Agriculture, Faisalabad	3-years	7,15,010/-
15.	Exploitation of maximum productive potential of spent layers through induced moults by varying nutritional regimes. R&D/P-AU/Bio (49)	Dr. Zia-ur-Rehman, Department of Physiology and Pharmacology, University of Agriculture, Faisalabad.	2-years	6,43,814/-
16.	Does leptin play a role in sex and age related release of gonadotropin from the pituitary gland? R&D/S-AKU/Bio (81)	Dr. Sheikh Abdul Saeed, Department of Biological and Biochemical Sciences, The Aga Khan University, Karachi	3-years	7,82,350/-
17.	Immunohistochemical & molecular characterization of T-non-Hodgkin's lymphoma and its	Dr. Shahid Pervaz, Department of Pathology, The Aga Khan University, Karachi	2-yeras	6,93,804/-

	association with Epstein-Barr virus R&D/S-AKU/Bio (82)			
18.	Association of rhizobium and plant growth promoting bacteria in rice growth, nitrogen fixation and yield R&D/C-QU/Bio (164)	Dr. Asghari Bano, Department of Biological Sciences, Quaid-i-Azam University, Islamabad	3-years	7,41,336/-
19.	Molecular and biochemical analysis for characterization of genetic diversity in barley land races from west Asia and north African region R&D/C-QU/Bio (165)	Dr. Bushra Mirza, Department of Biological Sciences, Quaid-i-Azam University, Islamabad	3-yeras	5,22,066/-
20.	Ecology and zoogeography of butterfly fauna of moist temperate montane of Pakistan R&D/C-PMNH/Bio (166)	Dr. Syed Azhar Hasan, Zoological Sciences Division, Pakistan Museum of Natural History, Islamabad	3-years	10,38,350/-
21.	Studies on calcium channel blocking activities of indigenous medicinal plants R&D/S-AKU/Bio (178)	Dr. Anwar-ul-Hassan Gilani, Department of Biological and Biochemical Sciences, The Aga Khan University, Karachi	3-years	9,46,621/-

An amount of Rs.4.226 million was released to the newly sanctioned projects on account of their 1st installment for initiation of work.

4. Career Development of Young Scientists and Technologists

Trained manpower, especially in the field of Science and Technology, is the biggest asset of any nation. In today's world the only mean to achieve economic self reliance is through scientific and technological development. During the year 2001-2002, the Foundation initiated a development project entitled "Career Development of Young Scientists and Technologists". The objectives of the project are (i) to utilize expertise of highly qualified S&T manpower for the development of science and technology in the country, (ii) to provide career opportunities to young scientists and technologists and to encourage them to settle within Pakistan and (iii) to arrest brain drain of highly qualified scientists and technologists from the country.

It is planned that each year ten (10) employed and fifteen (15) unemployed young scientists and technologists will be awarded R&D projects under this scheme. Those scientists and technologists, who are unemployed will be provided monthly stipend @ Rs. 15,000/- per month and Rs. 0.2 million as project research grant over a period of 2 years. They will be attached with the relevant departments of local universities or other R&D organizations relating to their respective fields of specialization. Those, who are employed, but their parent organizations are unable to provide them funds for research activities will be provided research grants only, amounting to Rs. 0.2 million over a period of 2 years.

During the report period, a total of 31 research projects in the fields of Biological Sciences, Biotechnology and Genetic Engineering, Agricultural Sciences, Chemical Sciences and Physics were received by the Foundation.

Ten (10) research projects in Biological Sciences, Biotechnology and Genetic Engineering, Agricultural Sciences were approved for funding by the Foundation at a total cost of Rs. 2.50 million. In this way, one (1) unemployed and nine (9) employed young scientists were provided grants for initiation of research work.

List of the newly approved projects under the above development project is given below.

S. No.	Title & Number of Project	Name of P.I. & Organization Supported	Project Cost
1.	Influence of different copper and aluminum levels on feather renewal and production characteristics of layers in second production cycle CDYST/P-PRI/Bio (1)	Dr. Muhammad Yousaf, Poultry Research Institute, Rawalpindi	Rs. 2,32,101/-

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|----|--|---|----------------|
| 2. | Marine nematodes as pollutant indicator
CDYST/S-KU/Bio (3) | Dr. Nasira Kazi,
National Nematological
Research Centre,
University of Karachi,
Karachi | Rs. 2,28,245/- |
| 3. | Identification of drought-tolerant chickpea genotypes using physiological and agronomic traits.
CDYST/C-NARC/Bio (4) | Dr. Habib ur Rehman,
Pulses Program
NARC, Islamabad | Rs. 2,54,607/- |
| 4. | Preparation and evaluation of tick vaccine.
CDYSTP-LPRI/Bio (6) | Dr. Tahir Yaqub,
Livestock Production
Research Institute,
Bahadurnagar, Okara | Rs. 1,97,196/- |
| 5. | Gene transfer technology for the induction of disease resistance in rice.
CDYST/C-NARC/Bio (11) | Dr. Hamid Rashid,
Agricultural Biotechnology
Institute NARC, Islamabad | Rs. 2,62,252/- |
| 6. | Developing disease resistance in tomato through genetic engineering.
CDYST/C-NARC/Bio (12) | Dr. Zubeda Chaudhary,
Agricultural Biotechnology
Institute NARC, Islamabad | Rs. 2,32,182/- |
| 7. | Bio-control of nematodes by vesicular arbuscular mycorrhizal (VAM) fungi
CDYST/S-KU/Bio (14) | Dr. Firoza Kazi,
National Nematological
Research Centre,
University of Karachi,
Karachi | Rs. 5,69,160/- |
| 8. | Impact evaluation of water resource development in command area of small dams.
CDYST/C-PCRWR/Agr (15) | Dr. Muhammad Ashraf,
Pakistan Council of
Research in Water
Resources, Islamabad | Rs. 99,088/- |

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|-----|---|---|----------------|
| 9. | Radiation decontamination of poultry feed.
CDYST/F-NIFA/Bio (17) | Dr. Aurang Zeb,
Nuclear Institute for
Agriculture and Biology
(NIFA), Peshawar | Rs. 2,00,133/- |
| 10. | Ecological Studies on <i>Artemisia herba alba</i> in highland Balochistan.
CDYST/B-AZRI/Bio (18) | Dr. Sarfraz Ahmad,
Azid Zone Research
Institute, Quetta | Rs. 2,38,670/- |

5. POPULARIZATION OF SCIENCE IN RURAL AREAS

One of the functions entrusted to the Pakistan Science Foundation under its charter is the promotion of scientific awareness at gross root level to develop a culture of science in the country. In order to achieve this objective the Foundation has developed a number of programmes including the establishment of Museums, Science Centers etc. Since the population of rural areas has few contacts with the world of science or have no access to the museums and science centers, nor it was possible to bring them to cities to visit these museums it was, therefore, deemed proper that such facility be taken to their door steps. The Foundation accordingly developed the Science Caravan (Mobile Exhibition) Project with a view to reach out to a wide spectrum of population of rural areas more frequently and at shorter intervals for consistently motivating the students towards science subjects and creating science awareness among people at large.

Thus Science Caravan is a Mobile Exhibition that has been launched to popularize science and create science awareness among people living in rural/backward areas of the country. The mobile science exhibition is a specially designed Van which carries a consignment of scientific and technological concepts displayed through simple exhibits, colorful diagrams/photographs, specimens alongwith their write-ups; eye catching mechanical visuals and working models on various subjects. The Science Caravan is also equipped with film projectors and video cassette players to show science documentaries, computers with a number of interesting educational programmes and mobile Planetarium which helps in teaching about constellations, solar system, astronomical concepts etc.

The Science Caravan makes tours of the schools and even colleges in the rural areas and sets up the exhibition for a week or more in one of the school. These science exhibitions are visited by students of neighboring schools as well as rural population. The visits to various schools are arranged in collaboration with the relevant Directorate of Education.

Five Science Caravan Units are already operational, one each in the Federal Territory of Islamabad, Punjab, Sindh, NWFP and Balochistan. It was felt that these five units cannot effectively cover the whole of rural population. Strong need was felt for

launching of some more Caravans to cover more and more area. Accordingly, a development project, proposing the construction of four more Caravans, one for each province was submitted to MoST. The same was approved at a total cost of Rs. 22.212 million to be completed in two years.

The main objectives of the project are:

- i) To stimulate interest of students in science through the display of attractive scientific models, charts and exhibits;
- ii) To disseminate information on the achievement and accomplishments of science and portray the blessings and facilities provided by of science and technology which are being enjoyed by us in our every day life;
- iii) To stimulate the interests of students in the natural science phenomena by arranging scientific film shows on topics of interest to common man;
- iv) To arrange planetarium shows to explain the astronomical concepts;
- v) To arouse interest of students for science and technology and to create in them a thirst for acquiring more knowledge;
- vi) To inculcate in the minds of students the idea of solving every day problems by application of science and technology, such as use of mechanized agriculture practices, pest management and control, problems related to hygiene and sanitation, scientific management of human and animal diseases etc.

During the year 2001-2002, an amount of Rs.1.00 million was released to the project against an allocation of Rs.5.00 million. The amount released was too little to achieve the targets fixed for the first year. It is being felt that if allocation/releases are not made by the Government in accordance with the provisions of the PC-I then completion of the project within the stipulated time will not be possible.

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.

Pakistan Museum of Natural History remained engaged in the collection, curation and preservation of natural history specimens and research on flora, fauna and geology of Pakistan. The scientists of the three Divisions of PMNH viz., Botanical, Earth Sciences and Zoological Sciences Divisions carried out 18 field tours to various localities of Sindh, Punjab, NWFP, Northern Areas and AJK. About 20000 natural history specimens, comprising of plants, animals, rocks, minerals and fossils were collected. The collected material was curated and preserved in the reference collection of PMNH. Besides samples, numerous photographs showing details of the area of study were also taken. Research was conducted on various aspects of the natural history of the country, which resulted in the production of many research articles. During this period 10 research articles were published in national and international journals.

PMNH continued international collaboration on research with various Universities/ Research organizations of USA, France, Japan, Canada and Switzerland. Expert help was provided to agencies like IUCN, WWF, UNESCO, etc. Several University students were guided in their research work.

The preparation of new display dioramas and other exhibits of PMNH Display Halls was continued. The work was carried out by Design section, with technical assistance from the scientists of the three Divisions of PMNH.

A division-wise account of activities during the year 2001-02 is given below.

1. BOTANICAL SCIENCES DIVISION (BSD)

a) Reference Collection

The scientists of the Division carried out 7 field tours to various localities of Northern Pakistan, Azad Jammu & Kashmir, North West Frontier Province and Punjab to collect higher and lower plant specimens along with ecological and ethnobotanical data. A total of 3500 plant specimens comprising of flowering plants, algae and fungi were collected and added to the reference material of the PMNH.

b) Laboratory Work

About 2600 higher and 500 lower plant specimens were preserved and mounted. Some 25 physico-chemical properties of water samples were found out,

microphotographs of about 1000 algal samples were produced. Identified 600 higher and 500 lower plants. Provided data on many plants for Virtual Orientation Gallery project. A PC-I for mushroom cultivation and biotechnology was prepared as advised by the Minister for Science & Technology during his visit to PMNH.

c) Extension Work and Service to Other Organizations

- Many student groups from various institutions were provided guided tours to the laboratories and reference halls of the division.
- Guided 4 M. Phil. students from Quaid-i-Azam University, Islamabad.
- Worked as External Examiners for 4 M. Phil. students of Quaid-i-Azam University, Islamabad.
- An American scientist was guided in the search for a rare mushroom in Northern Pakistan, which the scientist expects will be used in the treatment of AIDS disease.
- Expert guidance on the economically important plants of Pakistan was provided to agencies like WWF and UNICEF.

d) Publications

- Shah, M. (2001). "Flavonoid studies in family Rosaceae of Pakistan with special reference to the genus *Potentilla* and allied genera" in M. Afzal & S.A. Mufti (eds.), Natural History Research in Pakistan, 115-122.
- Afzal, M., M. Shah, S. Sikandar, M.I. Shinwari (2001). "Ecological zones of Pakistan" in M. Afzal & S.A. Mufti (eds.), Natural History Research in Pakistan, 123-146.
- Qureshi, R., G. R. Bhatti, & M. Shah (2001). "Ethnobotanical properties of *Aloe barbadensis* Mill. with particular reference to the people of Nara desert". Hamdard Medicus XLIV (3): 46-50.
- Ahmad, S. & Z.D. Khattak, (2001). "Quantitative studies on the vegetation of Islamabad". Pak. J. Sci. Ind. Res. 44(5): 279-285.
- Awan, M.R., M. Shah, S. Ahmad & M. Idris. (2002). "Impact of soil characteristics on the vegetation of Swat District". Pak. J. Agric. Res. 17(1): 76-80.

- M.K. Leghari & M.Y. Leghari. (2002). Comparative ecological study of Phytoplankton of Bakar and Phoosna Lakes- Pakistan.” Pak. J. Sci. Ind. Res. 45(3): 182-190.
- Several Abstracts in national and international journals were also published.

2. EARTH SCIENCES DIVISION (ESD)

a) Reference Collection

The Geologists of PMNH carried out 7 field tours in various localities of NWFP, Punjab, Sindh, AJK and Northern Areas of Pakistan. Numerous geological samples such as rocks, minerals and fossils were collected, including 550 rock and fossil samples. The collected material was added to the reference collection of PMNH.

b) Laboratory Work

About 300 megascopic rock samples were prepared and identified, also identified several Foraminifera fossils. Separated 17 alkaline igneous rocks and ophiolites. Some 100 microfossils were identified and catalogued. Labeled and catalogued about 100 of rock, mineral and mega- fossil samples. Provided data on numerous rocks, minerals and fossils for Virtual Orientation Gallery project.

c) Extension Work and Service to Other Organizations

- A large number of student groups from various schools and colleges were guided through the labs and reference material of the division.
- Identified many rock, mineral and fossil samples brought by various visitors, including students, researchers, professionals, etc.
- Collaborated with University of Wisconsin, University of Arizona, Northern Ohio University, Harvard University, USA; University of Montpellier, France; Swiss Institute of Technology, ETH, Switzerland; National Science Museum, Tokyo on geological research was continued during the report period .

d) Publications

- Baqri, S.R.H., N. Iqbal and G. Roohi. (2001). “The study of some Gastropod fossils from Bhadrar beds (Chorgali Formation), Nurpur area, Salt Range (Punjab), Pakistan”. Geol. Bull. Univ. Pesh. 34:105-111.

- Baqri, S.R.H., N. Iqbal and G. Roohi. (2001). "A new record of trace fossil Polychaete (Annelid) from the Cambrian of the Salt Range, Punjab, Pakistan". Geol. Bull. Univ. Pesh. 34:113-117.
- Several abstracts in national and international journals were also published.

3. ZOOLOGICAL SCIENCES DIVISION (ZSD)

a) Reference Collection

During the report period the zoologists of the PMNH undertook 7 field trips to different localities of Hazara, Cholistan and Northern Pakistan. A total of 262 invertebrates, 260 amphibians and reptiles, 190 fish and 16 rodents were collected, besides 14 live reptiles. These specimens were preserved and added to the PMNH Zoological reference collection.

b) Laboratory Work

Preserved and mounted some 2300 invertebrates including butterflies, beetles, Cicadas, etc. and 30 amphibians and reptiles. Catalogued 100 herpetological specimens. Identified 184 invertebrate and 190 vertebrates. Carried out Taxidermy of Barking Deer, Markhor, Snow Leopard, Blind Dolphin, Hog Deer. Articulated the skeleton of whale. Prepared study skins of 30 birds. Provided data on numerous animals for Virtual Orientation Gallery project. Continued laboratory studies pertaining to the ongoing international collaborative research project "The Biology of Butterflies of Northern Pakistan: Gilgit to Khunjerab" between PMNH and University of Oxford, U.K.

c) Extension Work and Service to Other Organizations

- Evaluated studies on Heavy Metals conducted by Pakistan Environment Protection Agency with financial assistance by JICA.
- Reviewed a research proposal submitted to PSF for funding.
- Submitted a report on Baseline studies on Palas valley to designate it as a Biosphere Reserve, for UNESCO.
- Provided help to IUCN Environmental Rehabilitation in NWFP and Punjab (ERNP) for the preparation of management plan of Ayubia National Park.
- Evaluated technical report on "Beautification of Lalsuhanra Biosphere Reserve and recommended conservation and education plans.
- Published a popular article on "Snakes" in the daily Al-Akhbar, in Urdu.

- Prepared a joint research project in the field of biodiversity between Pakistan and Bangladesh.
- Prepared PC-1 “Biodiversity of Pakistan: Databases and Global Networking for onward submission.
- Guided 2 Ph.D. students in their thesis research.
- Guided tours to the Division were provided to student/teacher groups of various Colleges and Universities.

d) Publications

- Hasan, S.A. (2001). “Research on butterflies of Pakistan”. In Afzal, M. & S.A. Mufti (eds.), Natural History Research in Pakistan. 107-114.
- Khatoon, S., S.R.H. Baqri, N. Iqbal, G. Roohi, S.A. Hasan. (2001). “The study of some Gastropod fossils from Bhadrar beds (Choragali Formation), Nurpur area, Salt Range (Punjab), Pakistan.” Pak. Geol. Bull. Univ. Pesh. 105-111.
- Baig, K.J. (2001). “Annotated checklist of amphibians and reptiles of the northern mountain region and Potwar Plateau of Pakistan”. Proc. Pak. Acad. Sci. 38(2): 121-130.
- Baig, K.J. (2001). “Threatened Herpetofauna of Pakistan”. In Bambaradeniya, C. and Vishida, S. (eds.) Threatened Herpetofauna of South Asia. IUCN, Sri Lanka.
- Rafique, M. (2001). “Fish fauna of the Himalayas in Pakistan with comments in the origin and dispersal of its High Asian Elements.” Pak. J. Zool. 33(4): 279-288.
- Hasan, S.A. & Rizvi, S.H.N. (2002) MAB Programme and Biosphere Reserve: Pakistan. In Ramakrishnan. P.S., Rai, R.K., Katwal, R.P.S. and Mehndiratta, S. (eds.) Traditional Ecological Knowledge for managing biosphere reserves in South and Central Asia 285-297.
- Hasan, S.A. Biodiversity of Pakistan: Status and Issues “accepted for publication in the Proceeding of the First Regional GTI workshop in Malaysia”.

4. PUBLIC SERVICES DIVISION (PSD)

a) Museum Display & Maintenance

Preparation of various dioramas in the display halls and galleries of PMNH have been nearly completed, which include Dioramas like Biodiversity, Ocean, Pre-Historic Life, Evolution, Salt Range, Rocks and Minerals, Children Discovery Room, etc.

Computer-generated Information Keys for the dioramas, including write-ups in Urdu and English has also been nearing completion. Pedestals of large animals on display, like whale, elephant and giraffe have been prepared. Necessary renovation, maintenance and repair work of the halls were carried out.

b) Educational Activities

- Numerous students from various schools and colleges were provided guided tour of the Museum.
- Several student groups were shown films on Natural History in the audio-visual hall of the PMNH.

c) Extension Work and Services to Other Organizations

- Work on development of Science Corner at Children Library Complex, Lahore, was continued.
- In connection with the Golden Jubilee Celebrations of Pakistan Academy of Sciences, flags, three-dimensional medals, invitation cards, etc. were designed and sent in a CD.
- Prepared Urdu calligraphy on the medicinal plants of Margalla hills, for WWF.
- Prepared design of float of Ministry of Science & Technology for Pakistan Day Parade, 2002.

5. Development Projects of PMNH

Following two development projects, financed by Ministry of Science & Technology, are being implemented by PMNH.

1. Biodiversity of Pakistan: Databases and Global Networking (BGN)

The purpose of this project is to develop a system of storing, access and retrieval of biodiversity information in a quick and efficient manner. Information pertaining plants, animals, rocks, minerals, fossils, etc found in Pakistan will be made available on the Internet. The information can be updated as new collections are added.

During the report period, following tasks were accomplished:

- Networking of the building was completed
- Server room and computer labs were equipped.
- Completed configuration of networking and installation of software.

- Software for entering data on different groups of plants, animals, rocks, minerals and fossils was developed.
 - Computer training of 22 personnel of PMNH was completed.
 - Several field tours were carried out to collect natural history specimens and field data.
- Web page for the project is being developed.

2. Virtual Orientation Gallery (VOG)

Under this project a gallery is being developed which will have the facility of computerized introduction and information about various exhibits of PMNH Display Halls. This information will be made accessible to the students and general visitors through computer terminals. These computers will have touch screens and will guide the user through the galleries using 3-D images and guiding links.

During the report period, following tasks were accomplished:

- Computer sets, accessories, digital cameras, laptops, etc. were purchased.
- Software was developed with consultation of Ms. Xorlogics.
- Digital images of the display galleries were made and stored in computer.
- Data on the plants, animals, rocks, minerals and fossils were received from the scientific staff of PMNH.
- Entry of the data, along with images, was started.

PAKISTAN SCIENTIFIC AND TECHNOLOGICAL INFORMATION CENTRE, (PASTIC)

Pakistan Scientific and Technological Information Centre, PASTIC is the premier organisation in the field of information dissemination serving thousands of researchers. It is a unit of Pakistan Science Foundation, an autonomous organisation under the Ministry of Science & Technology.

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. In 1974 PANSDOC was transferred to Pakistan Science Foundation (P.S.F) and was renamed as Pakistan Scientific and Technological Information Centre (PASTIC). After transfer to P.S.F. its scope and facilities were expanded.

The National Centre is housed in its own building situated in the Quaid-i-Azam University Campus, Islamabad. It has five Sub-Centres at Karachi, Lahore, Peshawar, Faisalabad and Quetta. It employs about 100 persons which include Technical and Administrative Staff.

AIMS & 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, 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 service.
7. To compile Directory of S&T Periodicals of Pakistan, Union Catalogue of Scientific Periodicals in the Libraries of Pakistan and Technology Information Bulletin.
8. To publish an abstracting and indexing journal entitled "Pakistan Science Abstracts".

TECHNICAL SERVICES AND ACTIVITIES

The activities undertaken during the period July 2001 - June 2002 are briefly described below:

1. DOCUMENT PROCUREMENT AND SUPPLY SERVICE

Under the Document Procurement and Supply Service queries were received from different R&D organizations for supply of reprints of research articles, conference papers, reports etc. which were procured either from local sources or from abroad. A total number of 998 S&T documents were procured and supplied against 1388 requests received from scientists and researchers.

2. BIBLIOGRAPHIC INFORMATION SERVICE

References from International databases on CD ROM were supplied to users according to their research topics on request. Against 575 orders 15644 references on S&T topics were supplied to 575 researchers.

3. CURRENT CONTENTS SERVICE

Under the Current Contents Service table of Contents from 44 journals were provided to 330 Scientists from S&T journals on Chemistry, Biology, Physics, Computation, Earth Sciences, Mathematics and Medicine.

4. ABSTRACTING AND INDEXING SERVICE

PASTIC provides abstracting and indexing service by publishing an abstracting journal entitled "Pakistan Science Abstracts". The scientific information generated in Pakistan or abroad and published in Pakistani journals is documented in this secondary journal. The abstracts of research articles along with detailed author index and keyword index are published in Pakistan Science Abstracts.

Pakistan Science Abstract serves as secondary information source to give support to research and development activities of the country. Under this activity 400 research articles were abstracted, classified, indexed and published in Pakistan Science Abstracts of 1999, Vol. 39, No. 1- 4.

5. UNION CATALOGUE

PASTIC undertakes screening and survey of the libraries of S&T and R&D institutions and universities of the country to collect information about serial holdings record of these libraries. The information collected from these libraries is standardized, computerized and published in the form of "Union Catalogue". At present PASTIC is on its way for preparation of revised edition of Union Catalogue of major libraries of Pakistan. In this regard during the period under report 135 libraries were contacted for

screening of their serial holdings record. Serial holdings record of 35 new libraries was received. This data of serial holdings of these libraries was standardized and entered in the database established for preparation of Union Catalogue. Serial holdings data of other 60 libraries was updated. All the data of serial holdings of libraries was proofread after computerization. The present activity of Union Catalogue is being undertaken under a development project; therefore, screening and survey of libraries for collecting their serial holdings record in continued which will be completed along with completion of the project and union catalogue will be published.

6. PASTIC NATIONAL SCIENCE REFERENCE LIBRARY

About 505 issues of various S&T periodicals, 92 documents and 279 books were received in the PASTIC National Science Reference Library. A total number of 1650 references were supplied to the users from library during the period under review.

The subscription of following bibliographic information databases on CD-ROM was renewed.

- i) Life Sciences
- ii) POLTOX
- iii) Applied Science and Technology
- iv) Medline

7. REPROGRAPHIC SERVICES

The Reprographic Section of PASTIC has facilities ranging from photocopying to offset printing. During the period July 2001 to June 2002 about 5,94,275 impressions, 17,308 pages and 56,866 copies were printed and produced by the Reprography Unit against 83 jobs received from 13 organizations.

8. COMPUTERIZATION ACTIVITIES

Following activities were carried out by the computer section during the period under review.

Composing of 4536 pages for laser printing, 2260 pages for Dot Matrix printing and 7 colour printout was undertaken in the computer section. This job of composing was carried out for Quaid-i-Azam University, PSF, TIPS, MoST, COMSATS, PMNH, and PCST.

- Miscellaneous jobs of PASTIC were undertaken.
- PSF Annual Report 2000-2001 finalized.
- Computer Software/Hardware Service was provided to other S&T organizations.

“NATIONAL SCIENCE AND TECHNOLOGY DATABASE / INFORMATION NETWORK AT PASTIC”.

PASTIC is establishing a National Science and Technology Database/Information Network at its head office under a development project. 14 Network Members has been designated under this project. Financial support was provided to 7 network members out of these 14 network members up till now for strengthening of their information resources and procurement of bibliographic and full text CD-ROM databases according to their needs and field of specialization. A full text database of Medical Journals and five other bibliographic information databases on CD-ROM were acquired by PASTIC in this regard. Networking will be established with all the PASTIC Sub-Centres and other designated network members through establishment of this National Science and Technology Database/Information Network at PASTIC.

In this regard a well equipped Computer Lab was established under this project and PASTIC website was also developed and launched. Technical layout of the project for LAN and WAN facility at PASTIC and enhancement of networking at National Level was finalized.

Preparation of a Union Catalogue of serial holdings of major libraries of Pakistan is also underway under this project. Serial holdings record of different libraries is being collected and entered in the electronic database for preparation of Union Catalogue.

9. INTERNATIONAL LIAISON

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

INFOTERRA

INFOTERRA is the United Nation Environment Programme's Global Information Network based at Nairobi, Kenya comprising of National Focal Points in about 200 Member States. INFOTERRA provides information on environmental issues by using the database on Environmental Information Sources which it has developed with the assistance of the NFPs. All Information services such as article service, bibliographic service, reference and referral service are supplied free of charge through INFOTERRA. During the period under review the following activities were undertaken.

Information on following topics were provided to 68 users. “Impact of water pollution on some wheat varieties of Punjab, Low cost household water, Effect of mercury on nervous systems of humans, Effect of lead on children, Oral contraceptive, Ovarian cancer, antibiotic toxicity, volatile organic compound effect on eyes, oesophageal varceal bleed and its outcome in 1st, 2nd, 3rd week with available treatment mobalities, Weather forecasting radars & satellites, Groundwater contamination, Waste

water treatment, Effects of water pollution on aquatic life, Cyclosporin, Fish toxicology, Polluted water, Food colours, Industrial pollution, Water sampling, Air pollution, Hospital wastes, Noise pollution, Pesticides, Benzene, Odor, Water quality, Industrial pollution monitoring, Monitoring of industrial air pollution, Land use planning, Flood impact, Water borne diseases, Solid waste management, Hospital waste, Radio isotopes in medicine, Low grade fuels, Drinking water, Suspended particulate matter, Sampling & monitoring of industrial effluents, Medicinal plants, Weather forecast, Water quality in Pakistan, Pesticide pollution, Gas heater, Food toxicology, Fish endosulfon, Indoor air pollution, Tobacco smoke, Metals in food, Deforestation, Global warming and Trace metals in human blood.

CEHANET

The World Health Organisation's Centre for Environmental Health Activities Information Network gathers information about published material on environmental health issues with the help of NFPs of CEHANET. These NFPs are 22 in number. PASTIC is one of the NFPs of CEHANET. The information is collected in this regard is incorporated in a database on environmental health documents. Information is then dissemination through this bibliographic database of environmental health documents which can be obtained from the member states. As PASTIC is the National Focal Point of CEHANET, therefore, during the report period 90 records from Pakistan were added to this Environmental Health Documents Database.

ASTINFO

It is a UNESCO supported Network for the Exchange of Experience and Information in Science and Technology in Asia and the Pacific. It aims is to build and strengthen the information infrastructure in the Member States. Under this network PASTIC is responsible for distribution of UNESCO developed software/packages such as CDS/ISIS and IDAMS and provision of training on CDS/ISIS package. In view of these objective following activities were undertaken during the period under report.

- WIN/ISIS Package was provided to 14 organizations, which are SME Bank Ltd, Islamabad; Health and Nutrition Development Society, Karachi; PNS RAHNUMA, Karachi; Liaquat University of Medical and Health Sciences, Jamshoro; Beaconhouse School, Wah; PASTIC Sub-Centre, Karachi; University of Peshawar; Nuclear Institute for Agriculture & Biology, Faisalabad; Beaconhouse School System, Lahore; National Institute of Oceanography, Karachi; Pakistan Council of Scientific and Industrial Research, Karachi; Government College, Rawalpindi; NGO Resource Centre, Karachi and Environmental Protection Agency, Islamabad.
- Procured CDS/ISIS Arabic Version Package under Windows from League of Arab States, Cairo, Egypt and supplied to International Islamic University, Islamabad.
- CDS/ISIS Package distribution list from 1998 to date was prepared and sent to UNESCO Office, Paris.

- ASTINFO Quarterly Newsletters received during the period under report were distributed to S&T organizations in Pakistan.
- Mrs. Kausar Sohail, Manager Technology Information, attended a Workshop on WINISIS at AIT, Bangkok, Thailand from November 19-23, 2001.
- Nomination processed for the post of Director (D-1) UNESCO Office, Cairo, Egypt.
- Two projects regarding UNESCO participation programme 2002-2003 from Pakistan were prepared.

10. BILATERAL COOPERATION

Under Bilateral Cooperation Programme project proposals for S&T cooperation agreement between Pakistan-Bangladesh, Pakistan-Sri Lanka, Pakistan-Thailand, Pakistan-Malaysia, Pakistan-Romania and Pakistan-Tajikistan were prepared.

SAARC DOCUMENTATION CENTRE

SAARC Documentation Centre (SDC) is a regional centre of SAARC. It was established in 1994 to act as an effective information system of Member States that enables exchange of information in various fields. Another objective of the SDC is to develop human resources in the Member States in the area of information science, technology, management systems and services. Under this objective nomination, cases of four officers of PASTIC were processed for two training courses.

11. Technological Information Promotion System (TIPS)

Technological Information Promotion System (TIPS) based at PASTIC has been regularly publishing weekly and fortnightly bulletins in Pakistan which provides up-to-the-minute detail information on technology and trade opportunities in developing countries. It covers fourteen different sectors and has the largest database 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) Bio-Technology (ix) Textiles (x) Fisheries (xi) Building Materials (xii) Chemicals (xiii) Mining (xiv) Packaging.

Under TIPS services information on 413 Technological offers from 42 countries were provided to its subscribers in Pakistan. Similarly, information from fifty-five Pakistani companies about their products and services was disseminated to 50 TIPS member countries.

PUBLICATIONS

- Pakistan Science Abstracts. (Quarterly)
- Directory of Scientific and Technological Periodicals of Pakistan.* (Bi Annual)
- Union Catalogue of Scientific periodicals in the Libraries of Pakistan. (Bi Annual)
- Directory of Trade & Technological Information.
- White Meat Journal.(Quarterly)

TRAINING/WORKSHOPS

One of the important activities of PASTIC is to impart training on computer applications for office & library automation using MICRO CDS/ISIS and other packages. Under this activity following workshops/training programmes were organized.

- PASTIC organized a workshop on “Information Handling for Promotion of E-Business” 2 Week workshop for Middle Management Women from 23 July-4 August, 2001 at Islamabad, under a development project entitled “Establishment of National Science and Technology Database/Information Network at PASTIC” Twenty women participated from major cities of Pakistan in this workshop.



- A series of training sessions on “Use of Patent Information System” were organized at Karachi, Lahore, Islamabad and Peshawar respectively. This activity was undertaken with the cooperation of World Intellectual Property Organization. Training was imparted to 138 individuals.

- PASTIC organized Training on WINISIS for PASTIC Officers from 06-12 November, 2001 at Islamabad, under its project entitled “Establishment of National Science and Technology Database/Information Network at PASTIC”. Five officers attended this training.
- PASTIC in collaboration with University of Karachi organized a Workshop on Information Handling in Biological Research from 04-06 March, 2002 at Karachi.



PASTIC Sub-Centre, Karachi, MELAP and Ziauddin Medical University organized a Seminar/Workshop on “Information Handling in Health Sciences and Networking of Medical Libraries” from 27-28 May, 2002 at Karachi.

CHAPTER-2

ORGANIZATION AND ADMINISTRATION

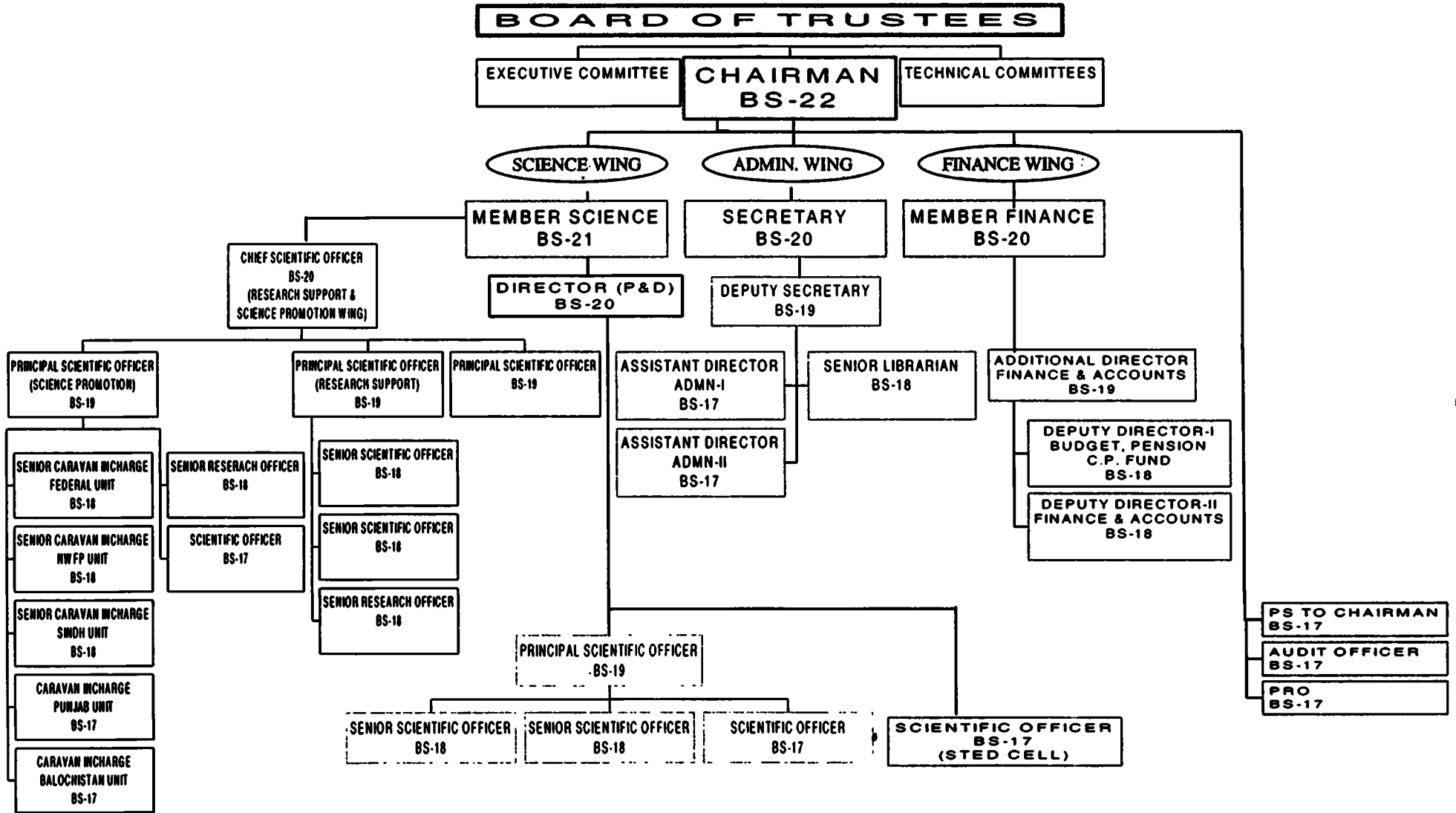
The organizational structure of the Pakistan Science Foundation, Pakistan Museum of Natural History & Pakistan Scientific & Technological Information are given on pages 73,76 and 78. The staff position in the Foundation, PMNH PASTIC during the report period is as under:

PAKISTAN SCIENCE FOUNDATION (PSF)

S.No	Designation	Number
1.	Chairman	1
2.	Member (Science)	1
3.	Member (Finance)	1
4.	Secretary	1
5.	Chief Scientific Officer	1
6.	Director (P&D)	1
7.	Additional Director (F&A)	1
8.	Deputy Secretary	1
9.	Principal Scientific Officer	4
10.	Sr. Scientific Officer	6
11.	Sr. Research Officer	2
12.	Sr. Librarian	1
13.	Dy. Director (F&A)	2
14.	Sr. Caravan Incharge	3
15.	Scientific Officer	2
16.	Public Relations Officer	1
17.	Assistant Director (Admn)	2
18.	Internal Audit Officer	1
19.	PS to Chairman	1
20.	Caravan Incharge	2
21.	Graphic Artist	2
22.	Mechanic for Instruments	1
23.	PA to Chairman	1
24.	Accountant Cum Cashier	1
25.	Accountant	1
26.	Asstt. Research Officer	1
	Total:	42
	Supporting staff	132
	G. Total:	174

In addition to the whole-time staff members of the Foundation there are about 200 scientists and technologists in various universities/research organizations who are acting in an honorary capacity as reviewers of the research proposals and members of the Technical Committees or Principal Investigators of Pakistan Science Foundation supported projects.

PAKISTAN SCIENCE FOUNDATION ORGANIZATIONAL CHART

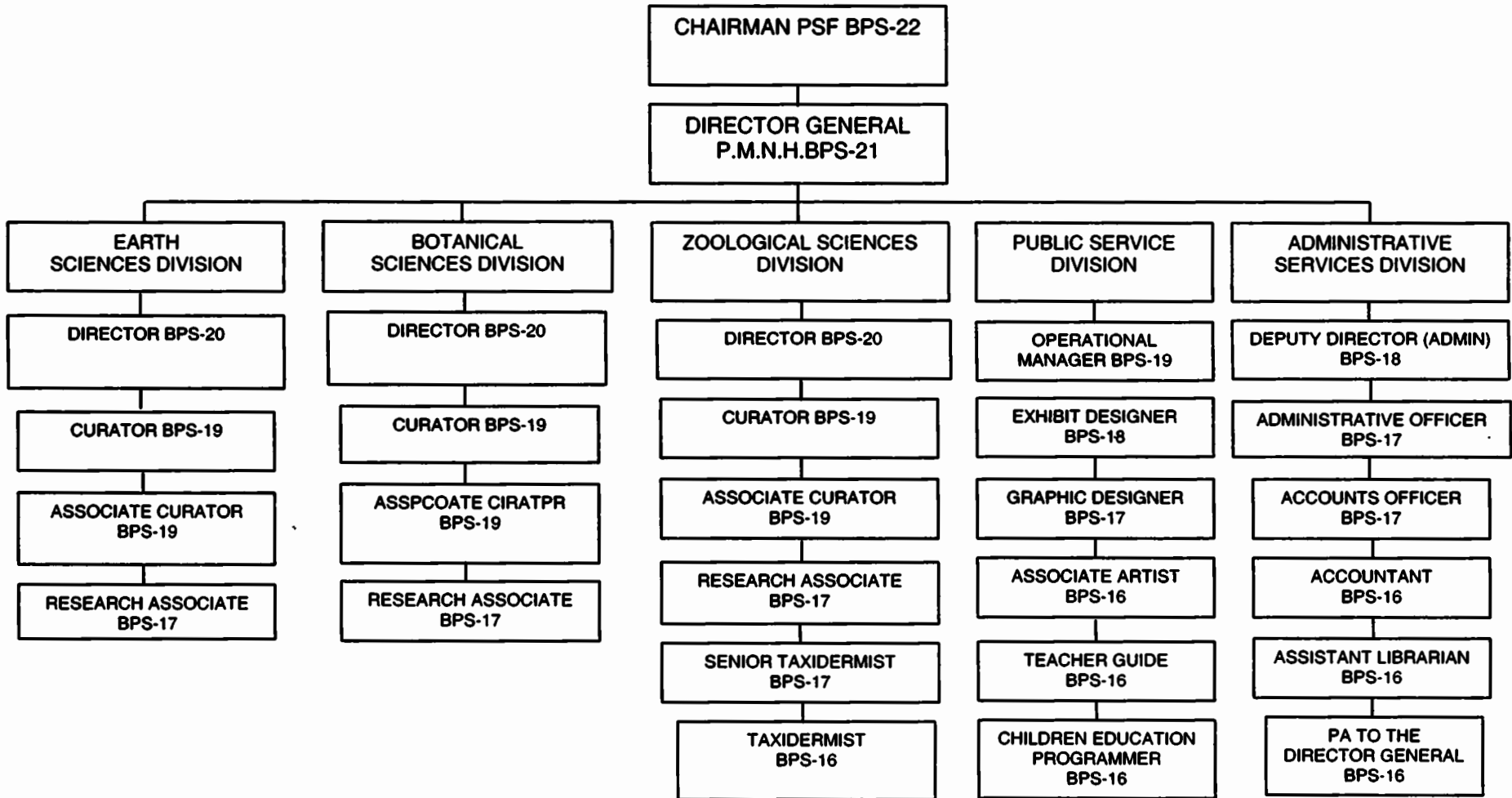


PAKISTAN MUSEUM OF NATURAL HISTORY (PMNH)

S. No	Designation	Number
1.	Director General	1
2.	Director	3
3.	Curator	3
4.	Operational Manager	1
5.	Associate Curator	11
6.	Exhibit Designer	1
7.	Dy. Director (Admn)	1
8.	Research Associate	21
9.	Administrative Officer	1
10.	Accounts Officer	1
11.	Graphic Designer	1
12.	Sr. Taxidermist	1
13.	Taxidermist	1
14.	Associate Artist	1
15.	Children Education Programmer	1
16.	Asstt. Librarian	1
17.	Teacher Guide	1
18.	Accountant	1
19.	PA to D.G	1
		<hr/>
		53
	Supporting Staff	83
	Total	<hr/>
		136

PAKISTAN MUSEUM OF NATURAL HISTORY

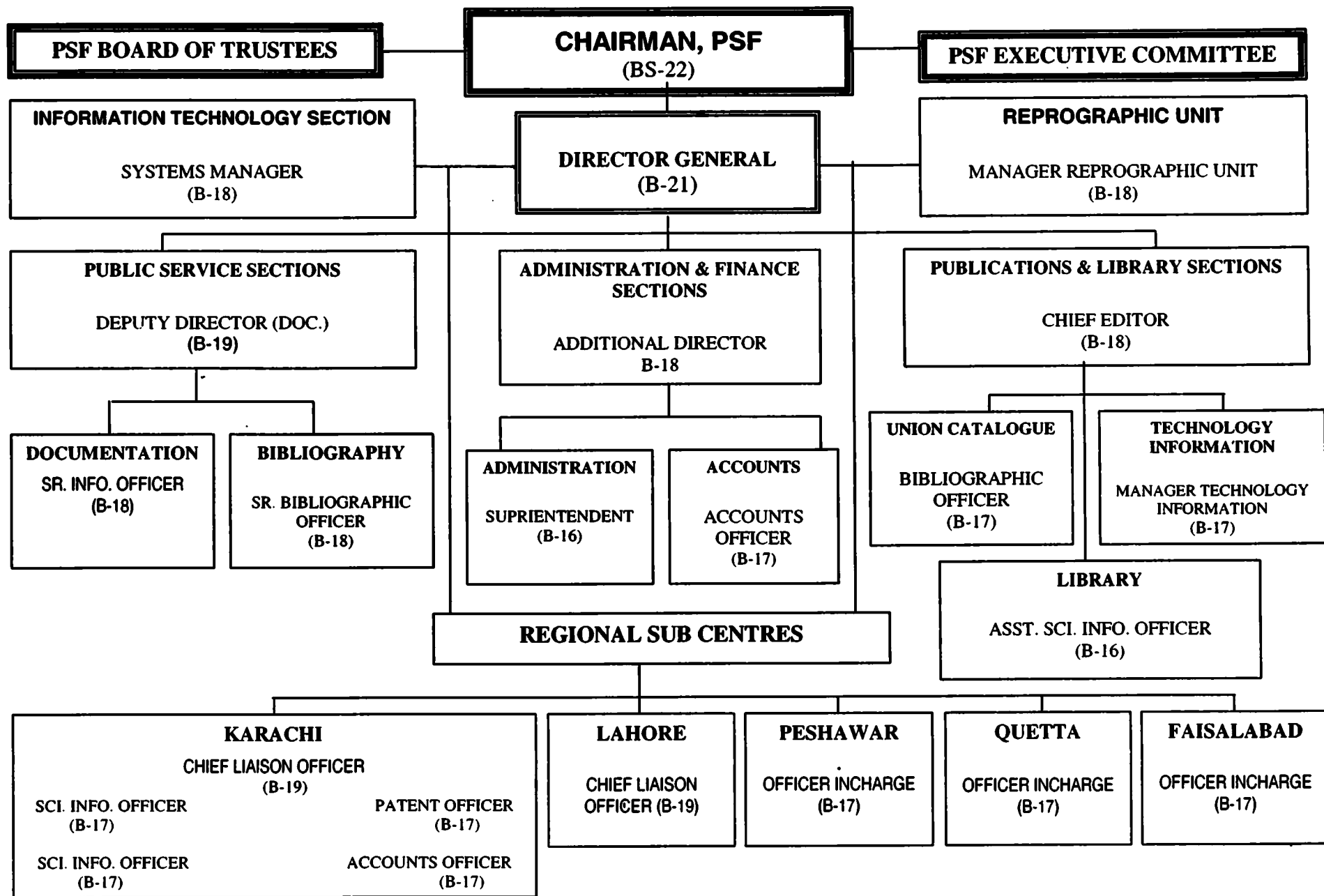
ADMINISTRATIVE ORGANIZATIONAL CHART



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

S. No	Designation	Number
1	Director General	1
2	Dy. Director	1
3	Additional Director (F&A)	1
4	Chief Liaison Officer	2
5	Sr. Translating Officer	1
6	Manager Repographic Unit	1
7	Sr. System Analyst	1
8	Sr. Documentation Officer	1
9	Chief Editor	1
10	Sr. Information Officer	1
11	Sr. Bibliographic Officer	1
12	Sr. Librarian	1
13	Deputy Director (Admn)	1
14	Scientific Information Officer	5
15	Bibliographic Officer	1
16	Patent officer	1
17	System Analyst	2
18	Manager Technology Information	1
19	Photographic Officer	1
20	Printing Officer	1
21.	Graphic Artist	1
22.	Assistant Director(Admn)	2
23	Liaison Officer/Officer Incharge	1
24	Accountant	1
25	Asstt: Accounts Officer	1
26	P.A to Director General	1
27	Superintendent (R.U)	1
28	Asstt: Scientific Information Officer	3
29	Asstt: Doc. Officer	2
30	Asstt: Programmer	3
31	Asstt: Manager (R. U)	1
32	Asstt: Printing Officer	3
33	Accountant- Cum Cashier	1
34	Superintendent-Cum- Asstt:	1
		<hr/> 48
	Supporting Staff	106
	Total	<hr/> 154

PAKISTAN SCIENTIFIC AND TECHNOLOGICAL INFORMATION CENTRE



CHAPTER-3

PAKISTAN SCIENCE FOUNDATION FINANCIAL STATEMENTS JUNE 30, 2002.

AUDITORS' REPORT TO THE BOARD OF TRUSTEES

We have audited the annexed balance sheet of the **PAKISTAN SCIENCE FOUNDATION** as at June 30, 2002 and the related receipts and expenditure account together with the notes forming part thereof for the year then ended.

These financial statements are the responsibility of the Management. Our responsibility is to express an opinion on these financial statements based on our audit.

We conducted our audit in accordance with generally accepted auditing standards. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting policies used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audit provides a reasonable basis for our opinion and, after due verification, we report that: -

The Foundation is not maintaining its books of accounts on the double entry book keeping as such the completeness of the receipts recorded and expenditure incurred cannot be ensured.

In our opinion: -

- a) The expenditure incurred during the year was for the purpose of the approved objects of the organization,
- b) Where funds were received for a specific stated purpose, these have been spent for that purpose only; and
- c) The financial statements give a true and fair view of the Foundation's affairs as at June 30, 2002 and of the results of its operations for the year then ended.


S.M.MASOOD & CO.,
Chartered Accountants


Date: August 26, 2003
Place: Islamabad

**PAKISTAN SCIENCE FOUNDATION
BALANCE SHEET
AS AT JUNE 30, 2002**

GRANT AND LIABILITIES	Note	<u>2002 Rupees</u>	<u>2001 Rupees</u>	PROPERTY AND ASSETS	Note	<u>2002 Rupees</u>	<u>2001 Rupees</u>
GENERAL FUND	3	22,987,855	24,296,026	TANGIBLE FIXED ASSETS			
RESEARCH SUPPORT GRANT	4	51,376,350	45,124,982	- at cost less accumulated depreciation	7	21,155,346	22,243,829
DEVELOPMENT FUND GRANTS	5	8,093,218	1,160,141	DEVELOPMENT PROJECTS			
				- at cost less accumulated depreciation	8	441,831	
CURRENT LIABILITIES				RESEARCH PROJECT IN PROGRESS			
Accrued and other liabilities	6	1,014,505	688,004			51,376,350	45,124,982
				LONG TERM DEPOSITS	9	1,617,195	1,617,195
				CURRENT ASSETS			
				Advances and prepayments	10	1,223,679	611,621
				Cash and bank	11	7,657,527	1,671,526
						8,881,206	2,283,147
		83,471,928	71,269,153			83,471,928	71,269,153

Auditors' report to the Board of Trustees is annexed.

These accounts should be read in conjunction with the annexed notes which form an integral part thereof.


TRUSTEE


CHAIRMAN

**PAKISTAN SCIENCE FOUNDATION
RECEIPTS AND EXPENDITURE ACCOUNT
FOR THE YEAR ENDED JUNE 30, 2002**

	Note	2002 Rupees	2001 Rupees
RECEIPTS			
Grant from Federal Government		33,800,000	27,370,000
Other income		<u>31,326</u>	<u>-</u>
		<u>33,831,326</u>	<u>27,370,000</u>
 EXPENDITURE			
Scientific functions	12	14,038,878	10,082,748
Administrative expenses	13	21,100,619	18,206,477
		35,139,497	28,289,225
 TRANSFERRED TO GENERAL FUND		<u>(1,308,171)</u>	<u>(919,225)</u>

Auditors' report to the Board of Trustees is annexed.

These accounts should be read in conjunction with the annexed notes which form an integral part thereof.

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TRUSTEE

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CHAIRMAN

**PAKISTAN SCIENCE FOUNDATION
CASH FLOW STATEMENT
FOR THE YEAR ENDED JUNE 30, 2002**

	2002 Rupees	2001 Rupees
CASH FLOWS FROM OPERATING ACTIVITIES		
Defecit in General Fund	(1,308,171)	(919,225)
Adjustment for:		
Depreciation	1,402,313	1,227,393
Surplus before working capital changes	94,142	308,168
Changes in working capital:		
(Increase)/decrease in advances and prepayments	(612,058)	(148,724)
Increase/(decrease) in creditors, accrued and other liabilities	326,501	5,970
	(285,557)	(142,754)
Net cash used in operating activities	(191,415)	165,414
 CASH FLOWS FROM INVESTING ACTIVITIES		
Purchases of fixed assets	(755,661)	(221,200)
Net cash used in investing activities	(755,661)	(221,200)
 CASH FLOWS FROM FINANCING ACTIVITIES		
Development Fund Grants - Net	6,933,077	1,160,141
Net cash generated from financing activities	6,933,077	1,160,141
 Net increase/(decrease) in cash and cash equivalents	5,986,001	1,104,355
Cash and cash equivalents at the beginning of the year	1,671,526	567,171
Cash and cash equivalents at the end of the year	7,657,527	1,671,526

Auditors' report to the Board of Trustees is annexed.

These accounts should be read in conjunction with the annexed notes which form an integral part thereof.


TRUSTEE


CHAIRMAN

**PAKISTAN SCIENCE FOUNDATION
NOTES TO THE ACCOUNTS
FOR THE YEAR ENDED JUNE 30, 2002**

1 BACKGROUND AND OBJECTIVES

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

2 ACCOUNTING POLICIES

2.1 Grants received

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

2.2 Research support grant

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

2.3 Fixed assets

Fixed assets have been valued at cost less accumulated depreciation except leasehold land which is stated at cost. Depreciation on fixed assets is charged on reducing balance method, at the rates specified in note 7. Full year's depreciation is charged on the assets acquired during the year and no depreciation is charged on the disposals.

	2002 Rupees	2001 Rupees
3 GENERAL FUND		
Balance as on July 01,	24,296,026	25,215,251
Deficit transferred from Receipts and Expenditure account	<u>(1,308,171)</u>	<u>(919,225)</u>
	<u><u>22,987,855</u></u>	<u><u>24,296,026</u></u>
4 RESEARCH SUPPORT GRANT		
Balance as at July 01	45,124,982	47,956,517
Add: Disbursements during the year	4.1 <u>10,629,634</u>	<u>6,167,066</u>
	55,754,616	54,123,583
Less: Projects completed during the year	4.2 <u>(4,378,266)</u>	<u>(8,998,601)</u>
	<u><u>51,376,350</u></u>	<u><u>45,124,982</u></u>

	2002 Rupees	2001 Rupees
4.1 DISBURSEMENTS DURING THE YEAR		
Bio tech Sciences	333,461	560,503
Mathematics and Computer Sciences	24,416	1,000
Physical Sciences	753,340	616,974
Chemical Sciences	1,808,486	1,140,535
Biological Sciences	1,837,381	685,123
Earth Sciences	932,431	409,988
Environmental Sciences	838,038	126,767
Engineering Sciences	434,855	229,841
Agricultural Sciences	2,207,669	2,036,653
Medical Sciences	683,241	69,134
Institutional support	656,669	113,332
Board/Committee meetings	119,647	177,216
	<u>10,629,634</u>	<u>6,167,066</u>

4.2 PROJECTS COMPLETED DURING THE YEAR

Physical Sciences	516,890	2,116,030
Environmental Sciences	471,221	746,630
Engineering Sciences	958,360	-
Chemical Sciences	668,965	1,040,882
Biological sciences	293,546	1,586,100
Agricultural Sciences	1,367,085	3,016,727
Medical Sciences	102,199	492,232
	<u>4,378,266</u>	<u>8,998,601</u>

DEVELOPMENT FUND GRANTS

Opening Balance		1,160,141	
Add: Development Project Grants	5.1	17,657,000	7,130,000
Computer equipment capitalized		320,950	-
		17,977,950	7,130,000
Less: Development Project Functions	5.2	(11,044,873)	(5,969,859)
Closing balance		<u>8,093,218</u>	<u>1,160,141</u>

Note: The difference with cash at bank relates to non-cash expenditure relating to depreciation and capital expenditure.

5.1 DEVELOPMENT PROJECT GRANTS

Financial Support To Scientific Societies	5,000,000	5,500,000
Popularization of sciences in rural areas	1,000,000	-
Participation of scientists and technologists In Conferences	2,160,000	300,000
Career Development of young Scientists and technologists	2,520,000	-
Funding of scientific research in universities and other organizations	4,500,000	-
NCST	2,477,000	-
TDPC	-	1,330,000
	<u>17,657,000</u>	<u>7,130,000</u>

5.2 DEVELOPMENT PROJECT FUNCTIONS

	2002 Rupees	2001 Rupees
TA/DA & Evaluation Fee	623,679	-
Financial Support To Societies	2,998,757	4,356,000
Grants For Research	4,246,663	-
Participation In Conferences	1,379,264	-
Career Development Grants	1,117,901	218,860
Postage	347	-
Stationary	69,262	121,139
Advertisement	217,135	100,018
Repair Of Office Equipment	7,500	-
Internet charges	3,000	-
Consultancy	47,000	746,117
Telephone	24,806	76,295
Depreciation	217,619	-
Honorarium	16,325	25,430
Entertainment	206	-
Vehicle running and maintenance	18,016	-
Bank Charges	57,393	5,050
Computers Equipment	-	320,950
	<u>11,044,873</u>	<u>5,969,859</u>

6 ACCRUED AND OTHER LIABILITIES

Accrued expenses	215,969	192,124
Security deposits	112,733	40,495
Other liabilities	685,803	455,385
	<u>1,014,505</u>	<u>688,004</u>

7 TANGIBLE FIXED ASSETS

PARTICULARS	C O S T			RATE	D E P R E C I A T I O N			BOOK VALUE AS AT JUNE 30,2002
	AS AT JULY 01,2001	ADDITIONS	AS AT JUNE 30,2002		AS AT JULY 01,2001	CHARGE FOR THE PERIOD	AS AT JUNE 30,2002	
Lease hold land	3,713,418	-	3,713,418	-	-	-	-	3,713,418
Building	19,484,540	-	19,484,540	5%	5,161,613	716,146	5,877,759	13,606,781
Motor vehicles	3,706,809	-	3,706,809	20%	3,219,012	97,559	3,316,571	390,238
Office equipment	3,135,361	89,700	3,225,061	15%	2,184,358	156,105	2,340,463	884,598
Science equipment	2,004,275	-	2,004,275	15%	1,364,176	96,015	1,460,191	544,084
Furniture and fixture	1,960,416	-	1,960,416	6%	886,805	64,417	951,222	1,009,194
Air conditioners	194,974	-	194,974	20%	185,796	1,836	187,632	7,342
Library books and films	1,455,004	6,511	1,461,515	5%	409,214	52,615	461,829	999,686
Bicycle	680	-	680	20%	674	1	675	5
2002	35,655,477	96,211	35,751,688		13,411,648	1,184,694	14,596,342	21,155,346
2001	35,434,277	221,200	35,655,477		12,184,255	1,227,393	13,411,648	22,243,829

8 DEVELOPMENT PROJECTS

PARTICULARS	C O S T			RATE	D E P R E C I A T I O N			BOOK VALUE AS AT JUNE 30,2002
	AS AT JULY 01,2001	ADDITIONS	AS AT JUNE 30,2002		AS AT JULY 01,2001	CHARGE FOR THE PERIOD	AS AT JUNE 30,2002	
Computer equipment	-	659,450	659,450	33%	-	217,619	217,619	441,831
2002	-	659,450	659,450		-	217,619	217,619	441,831
2001	-	-	-		-	-	-	-

Sum

	2002 Rupees	2001 Rupees
9 LONG TERM DEPOSITS		
Electricity (WAPDA)	1,472,195	1,472,195
Gas (SNGPL)	145,000	145,000
	<u>1,617,195</u>	<u>1,617,195</u>
10 ADVANCES AND PREPAYMENTS		
Advances to staff:		
- for vehicle / motorcycle	86,407	142,135
- for house rent	330,533	451,831
	416,940	593,966
Advance for motor vehicles	792,396	-
Prepaid insurance	-	17,655
Other receivable	14,343	-
	<u>1,223,679</u>	<u>611,621</u>
11 CASH AND BANK		
Cash at bank	798,536	495,880
PSF Development Fund bank accounts	6,858,991	1,160,141
UNESCO Coupons	-	15,505
	<u>7,657,527</u>	<u>1,671,526</u>
12 SCIENTIFIC FUNCTIONS		
Research and support grant	10,629,634	6,167,067
Scientific societies and professional bodies	293,000	345,000
Scientific conferences, meetings and seminars	222,920	395,000
Operation of science caravan	1,487,396	1,280,859
International liaison	289,613	-
Science promotion activities	1,116,315	1,394,822
Science centre, herbria clubs etc.	-	500,000
	<u>14,038,878</u>	<u>10,082,748</u>

	2002 Rupees	2001 Rupees
13 ADMINISTRATIVE EXPENSES		
Salaries and other benefits	13,699,650	11,133,309
Travelling	74,534	139,522
House rent facility	2,564,434	2,060,202
Ground rent to CDA	17,944	17,944
Electricity, gas and water	633,960	568,880
Postage, telephone and telegram	1,002,094	961,746
Printing and stationery	243,357	175,266
Vehicle running and maintenance	1,094,664	1,319,451
Newspaper and advertisement	177,303	304,295
Liveries and uniforms	16,100	13,708
Entertainment	69,715	56,751
Repair and maintenance of office equipment	143,908	109,297
Audit fee	20,000	12,500
Legal expenses	20,000	-
Depreciation	7 1,184,694	1,227,393
Maintenance of office building	64,826	68,723
Staff welfare fund	30,000	30,000
Miscellaneous	43,436	7,490
	<u>21,100,619</u>	<u>18,206,477</u>

14 FIGURES

- have been rounded off to the nearest Rupee.
- of the previous year have been regrouped and rearranged wherever deemed necessary for comparison.

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TRUSTEE

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CHAIRMAN

**PAKISTAN SCIENCE FOUNDATION
DEVELOPMENT PROJECT FUNCTIONS
PROJECT WISE BREAK-UP**

ANNEXURE-J

	NCST Rupees	PSTIC Rupees	CDYST Rupees	FOSTRUAAO Rupees	PSRA Rupees	FSSS Rupees	TDPC Rupees	TOTAL Rupees
TA/DA & Evaluation Fee	561,304	-	-	62,375	-	-	-	623,679
Financial Support To Societies	-	-	-	-	-	2,998,757	-	2,998,757
Grants For Research	-	-	-	4,246,663	-	-	-	4,246,663
Participation In Conferences	-	1,379,264	-	-	-	-	-	1,379,264
Career Development Grants	-	-	1,117,901	-	-	-	-	1,117,901
Postage	-	-	-	347	-	-	-	347
Stationary	17,000	16,950	-	21,897	-	13,415	-	69,262
Advertisement	-	-	135,096	29,564	-	-	-	164,660
Repair Of Office Equipment	2,500	-	-	5,000	-	-	-	7,500
Internet charges	-	-	-	1,000	-	1,000	-	2,000
Consultancy	-	-	-	-	-	-	47,000	47,000
Telephone	21,309	-	-	-	-	-	3,497	24,806
Depreciation	-	-	-	-	-	-	-	217,619
Honorarium	16,325	-	-	-	-	-	-	16,325
Entertainment	206	-	-	-	-	-	-	206
Vehicle running and maintenance	17,966	-	50	-	-	-	-	18,016
Bank Charges	250	-	-	44,654	200	50	12,239	57,393
Total	636,860	1,396,214	1,253,047	4,411,500	200	3,013,222	62,736	10,991,398

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 2001-2002

<u>S.No</u>	<u>Title and Number of Project</u>	<u>Name of PI and the Organization Supported</u>	<u>Project Cost (Rs.)</u>
a) Agricultural Sciences:			
1	Effect of soil salinity & nitrogen availability on photosynthate partitioning and growth of wheat. P-NIAB/Agr((288)	Dr. Asma Hassan Senior Scientific Officer NIBGE Faisalabad	3,56,413/-
2	Development of sustainable rice-wheat cropping system through management of legumes. F-AU/Agr(291)	Dr. Zahir Shah Associate Professor NWFP, Agriculture University Peshawar.	3,84,499/-
3	Ethnobotanical studies of economically important plants of northern areas of Pakistan and their taxonomy. C-QU/Agr(292)	Dr. Rizwana A. Qureshi Assistant Professor Department of Biological Sciences Quaid-I-Azam University Islamabad.	9,09,937/-
4	Studies on the field efficacy of the entomopathogenic nematodes as biopesticides. S-KU/Agr(285)	Dr. Shahina Fayyaz Scientific Officer National Nematological Research Centre University of Karachi	5,13,488/-
5	Epidemiological & pathological study of TB in food, animals and its association with human infection health, veterinary pathology & public health. P-AU/Agr(283)	Dr. Tariq Javed Assistant Professor Department of Veterinary Pathology University of Agriculture, Faisalabad.	6,33,461/-
6	Utilization of the genetic potential existing in sorghum bicolor (L) moench for the development of genotypes tolerant to soil salinity. P-AU/Agr(242)	Dr. Faqir Muhammad Azhar Associate Professor Department of Plant Breeding & Genetics , University of Agriculture, Faisalabad	4,49,667/-

b) Biological Sciences

- | | | | |
|----|---|--|------------|
| 7. | Evaluation of indigenous trivalent vaccines for the control of mastitis in buffaloes and cows.
P-AU/Bio(326) | Dr. Ghulam Muhammad
Assistant Professor
Department of Clinical Medicine & Surgery University of Agriculture, Faisalabad. | 3,59,387/- |
| 8. | Conservation biology of larks (alaudidae) in Pakistan.
P-BZU/Bio(340) | Dr. Aleem A. Khan
Assistant Professor
Institute of Pure and Applied Biology, Bahauddin Zakariya University, Multan. | 7,20,161/- |

Environmental Sciences

- | | | | |
|-----|--|---|------------|
| 9. | Studies on growth and bio-energetic of fish under heavy metal toxicity.
P-AU/Env(62) | Dr. M. Javed ,
Associate Professor,
Department of Zoology & Fisheries ,University of Agriculture, Faisalabad. | 2,68,000/- |
| 10. | Residual nitrate status of cultivated lands and water pollution in barani areas.
P-UAAR/Env(49) | Dr. M. Iqbal Lone,
Associate Professor,
University of Arid Agriculture Rawalpindi. | 2,36,722/- |
| 11. | Passerine birds in cotton based agro-system of the Punjab: a preliminary study to investigate the risks of pesticides.
C-NARC/Env(59) | Dr. Iftikhar Hussain,
Senior Scientific Officer,
NARC, Islamabad. | 5,47,307/- |

Engineering Sciences

- | | | | |
|---------------|--|--|--------------------|
| 12 | Controlled drainage for crop production and water quality enhancement.
P-AU/Engg.(54) | Dr. Niaz Ahmed,
Associate Professor,
Department of Irrigation and Management,
University of Agriculture, Faisalabad. | 6,51,780/- |
| 13 | Stochastic flood risk mapping (Zoning)
P-CEWRE/Engg.(77) | Engr. Dr. S. M. Saeed Shah,
Head of Hydrology Division,
Centre of Excellence in Water Resources Engg.
University of Engg. & Tech. Lahore. | 3,03,960/- |
| Total: | | | 63,34,782/- |

**DETAILS OF MONITORING AND EVALUATION OF ON-GOING PSF
PROJECTS DURING 2001-2002**

a) Semi-Annual Reports

S.No	Project No.	Project Title	Reports
1.	Biotech/P-GC/Bio(37)	Optimization of cultural conditions of the biosynthesis of xylanase by locally isolated <i>Aspergillus niger</i> .	1 st semi annual
2.	S-KU/Env(51)	Population dynamics and dispersal pattern of fiddler crabs in the mangrooves areas of Karachi coast.	2 nd semi annual
3.	S-AU/Env(45)	Floristic study of arid zone (desert-nara region), Sindh, Pakistan	3 rd semi annual
4.	S-SALU/Env(45)	Floristic study of arid zone (desert-nara region), Sindh, Pakistan	3 rd semi annual
5.	F-AU/Agr(268)	Evaluation of morphological and physiological plant traits adopting as forage under stresses.	1 st semi annual
6.	S-KU/Agr(269)	Use of rhizobia in the biological control of root knot disease of crop plants.	1 st semi annual
7.	B-ARIQ/Agr(247)	Determination of pesticides resistance in codling moth and two spotted spidermites, the sever pests of apple in Balochistan.	2 nd semi annual
8.	F-AU/Agr(258)	Identification and field evaluation of bio-control agents of the family braconidac against important crop pestis in the NWFP.	3 rd semi annual
9.	S-PARC/Agr(277)	Investigations of plant parasitic nematodes and pseudomonas associated with date palm in Balochistan and their management by organic amendments.	1 st semi annual
10.	S-KU/Bio(277)	Assessment of biological activity in the marine cynobacterial species from coastal and near shore environment.	3 rd semi annual
11.	F-PU/Earth(51)	Geological bibliography of the Himalayan Korakoram Hindukush region of Pakistan.	2 nd semi annual
12.	S-KU/Chem (348)	extrapyramidal and monoaminergic effects of neuroleptics: modulation by l-tryptophan and l-valine	2 nd semi annual

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|-----|-----------------|---|---|
| 13. | S-KU/Chem (363) | Purification characterization and applied studies of protein antibiotics from indigenous staphylococci. | 1 st semi Annual |
| 14. | C-QU/Chem (370) | Synthesis and characterization of some liquid crystalline molecules. | 1 st semi annual |
| 15. | C-QU/Phys (111) | Numerical study of pinch dynamic/stability and study of nonlinear wave propagation in magnetized plasmas. | 2 nd semi, & 3 rd Semi annual |
| 16. | C-QU/Phys (120) | Laser optical spectra of atoms | 1 st semi annual |

b) First Annual Reports

- | | | |
|-----|----------------------------|--|
| 1. | Biotech/P-CEMB/Ind(21) | Process development for the manufacture of <i>Bacillus thuringiensis</i> bio-insecticide. |
| 2. | Biotech/P-AU/NIBGE/Agr(27) | Isolation identification and molecular characterization of economically important potato virus of Pakistan and development of transgenic potato. |
| 3. | C-QU/Env(58) | Studies on the degradation of chlorinated phenolic compounds by <i>Pseudomonas</i> spp. |
| 4. | C-NARC/Agr(270) | Characterization and monitoring of banana bunchy top virus (BBTV). |
| 5. | S-KU/Agr(269) | Use of rhizobia in the biological control of root knot disease of crop plants. |
| 6. | B-ARIQ/Agr(247) | Determination of pesticides resistance in colling moth and two spotted spidermites, the sever pests of apple in Balochistan. |
| 7. | P-AU/Agr(236) | Identification of resistant sources against major potato viruses and their vectors and their diagnosis based on serological testes. |
| 8. | P-AU/Agr(244) | Screening of germplasm for genetic improvement of wheat in relation to salinity stress. |
| 9. | C-NARC/Agr(266) | Identification, characterization and distribution of phytoplasmal disease of potato in Pakistan. |
| 10. | S-KU/Bio(319) | Distribution and abundance of juvenile fish stocks in korangi creed. |
| 11. | P-PU/Bio(304) | Micropropagation of jojoba (<i>Simmondsia chinensis</i>) a high yielding plant of commercial value. |
| 12. | F-GU/Bio(296) | Propagation of plants floriculture / ornamental horticulture through in vitro culture. |
| 13. | C-QU/Bio(323) | Identification of loci in Pakistani kindred with ectodermal dysplasia. |
| 14. | C-NARC/Bio(321) | Pathobiology, molecular characterization and control of avian influenza viruses. |

15. P-AU/Chem (353) Pilot production of barium and strontium pigments from indigenous barite and celestite minerals.
16. S-KU/Chem (363) Purification characterization and applied studies of protein antibiotics from indigenous staphylococci.
17. P-PU/Phys (114) Pomeron (Odderon) in soft and hard processes.
18. P-PU/Phys (117) Investigation in CP violation.

b) Second Annual Reports

1. P-UAAR/Agr(230) Studies on the control of codling moth, *Cydia pomonella* in Murree hills of Punjab.
2. F-AU/Agr(258) Identification and field evaluation of bio-control agents of the family braconidac against important crop pestis in the NWFP.
3. P-PU/Agr(248) Fungi as biocontrol agents against weeds: biocontrol of weeds of rice crop.
4. S-PCCC/Agr(183/1) Breeding for glandless cotton.
5. F-PU/Earth(66) Structural and stratigraphic analysis of himalyan fold thrust belt in kohat karak and bunnu- transect northern, Pakistan.
6. P-PU/Chem (339) Preparation and applications of alkyl derivatives of aluminum gallium, silver, gold, tin, and titanium: spectroscopic and pyrolysis studies of metal/metal oxide deposition precursors.
7. C-QU/Phys (108) Study of x-rays/neutrons/ion beam emitted from mather type plasma focus.

**LIST OF PUBLICATIONS PRODUCED THROUGH PSF SUPPORTED
PROJECTS COMPLETED DURING 2001-2002**

- Soomro, A.R. (2000). Assessment of useful heterosis in glandless *Gossypium hirsutum* cotton strains through their performance in hybrid combination. Pak. J. of Botany. 32(1) : 65-68
- Soomro, A.R. and A.D. Kalhoro (2000). Hybrid Vigor (F1) and in breeding depression (F2) for some economic traits in crosses between glandless and glanded cotton. Pak. J. of Biological Science 3(12): 2013-2015.
- Kalhoro, A.D., A.R. Soomro, R. Anjum, and G.H. Kalwar, (2002). Seed cotton yield, lint percent and staple length of F3 glandless cotton as affected by cotton leaf curl virus. Indus J. of Plant Science 1(1): 73-75.
- Kalhoro, A.D., A.R. Soomro, R. Anjum, S. Bano, and G.N. Panhwar, (2002). Exploring combining ability in glandless and CLCV disease resistant genotypes. Indus J. of plant Sci. 1(2): 108-111.
- Kaliq, A. and F.S. Shaheen, (2001). Control of codling moth, *Cydia Pomonella* L. (Tortricidae: Lepidoptera) using non-insecticidal methods with particular emphasis on mating distribution technique. Pak. Entomol., 23(1-2): 12-19.
- Leghari, S.M. and M.K. Leghari, (2000). Limnological study of Tatta Pani Hot spring and river punch at tatta pani village, district Punch, Azad Kashmir, Pakistan. Scientific Khyber, 13(1): 73-85.
- Khuhawar, M.Y. and S. N. Lanjwani (2002) Solvent Extraction and HPLC Determination of Copper, Iron Nickel and Mercury in Water and Fishes as 2-Pyrrolaldehyde-4-Phenyl 1-3-Thiosemi-Carbazone as Derivating Reagent. J. Chem. Soc. Pak. 23(3).
- Khuhawar, M.Y. and D.J. Pritam (1997) Spectrophotometric Determination of Cobalt and Iron in Pharmaceutical Preparation Using 6-Methyl-2-Pyridinecarboxyaldehyde 4-Phenyl-3-Thiosemicarbazone as Chromogenic Reagent. Jour. Chem. Soc. Pak. 19(4).
- Khuhawar, M.Y. and D.J. Pritam (1997) Spectrophotometric Determination of Nickel in Nickel-Aluminum Alloy and Palladium in Palladium-Barium Sulphate using 6-Methyl -2-Pyridinecarboxaldehyde-4-Phenysemicarbazone as Derivating Reagent. Jour. Chem. Soc. Pak. 19(2).
- Khuhawar, M.Y and S.N. Lanjwani (2001) Determination of Mercury by Liquid Chromatography in Fresh Water Fishes using 2-Tinophenlaldehyde-4-Phenyl -3-Thiosemicarbazone Pak. J. Scientific Industrial Research. 44 (5), 253-256.
- Khuhawar, M.Y. and S.N. Lanjwani (1998) Liquid Chromatographic determination of Cobalt(II), Copper(II) and Iron(II) using 2-Thiophenlaldehyde-4-Phenyl-3-Thiosemicarbazone as derivatizing Reagent. Talanta 46, 485-490.

- Chandio, B A; M.B. Mirbahar and A.B. Chandio (1996). Injection Well Mechanism for disposal of drainage Effluent and their Modeling. Published in Proceedings of Regional workshop on "Artificial Groundwater Recharge" organized by PCRWR. 80-88.
- Chang, M. H., M. Shaikh and A.M. Leghari (1998). Conjunctive use of Canal Water and Saline Drainage Effluent for Crop Production. Journal of Drainage and Water Management. 2(2); 29-34.
- Qamar, S., S.Y. Zhu and M.S. Zubairy (2000). Atom localization via resonance fluorescence. Physics Review A. 61, 063806-1 to 063806-5.
- Ghafoor, F., S.Y. Zhu and M.S. Zubairy (2000) Amplitude and phase control of spontaneous emission. Physics Review A. 62, 013811-1 to 013811-7.
- Ikram, M., S.Y. Zhu and M.S. Zubairy (2000). Quantum teleportation of an entangled state. Physics Review A. 62, 022307-1 to 022307-9.
- Mashhood, A.S. Qamar and M.S. Zubairy. Quantum state tomography using phase-sensitive amplification. Physics Review A. 62, 043814-1 to 043814-6.
- Azim, T and M.S. Zubairy. Measurement of photon statistics via electromagnetically induced transparency J. Opt. B: Quantum & Semi class. Opt. B

**GRANTS SANCTIONED FOR CONFERENCES, SEMINARS AND SYMPOSIA
DURING 2001-2002**

S.No	Title of the Conference/Symposia/ Seminar etc	Name of the Organization/Institution	Released Amount.
1.	Pakistan Workshop on "Uniform Islamic Lunar Calander-201	Pakistan Association for History and Philosophy of Science.	Rs. 30,000/-
2.	3 rd National Conference of Plant Pathology Integrated Plant Health Management	Pakistan Phytopathological Society University of Agriculture, Faisalabad.	Rs. 30,000/-
3.	Pure Mathematics Conference	Department of Mathematics, Quaid-I-Azam University, Islamabad.	Rs. 25,000/-
4.	Seminar on "Corporate Agriculture; Issues and Options"	University of Arid Agriculture, Rawalpindi.	Rs.30,000/-
5.	National Workshop on Techniques for Sustainable Agriculture	Nuclear Institute for Agriculture and Biology (NIAB), Faisalabad.	Rs. 15,000/-
6.	Symposium on "Drought and Water Resources in Pakistan	Centre of Excellence in Water Resources Engineering, university of Engineering & Technology, Lahore.	Rs. 25,000/-
7.	Symposium "Marine Environment 2002-Food, Health and Habitat"	Centre of Excellence in Marine Biology University of Karachi, Karachi.	Rs. 25000/-
8.	National Conference on "Factors Limiting Dairy Production in Pakistan" April 8-9,2002.	Pakistan Society for Animal Reproduction, Lahore.	Rs. 18,000/-
	Total:-		Rs.198,000/-