EXECUTIVE SUMMARY

PAKISTAN SCIENCE FOUNDATION (PSF)

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

RESEARCH SUPPORT

Research Support is the principal programme of the Foundation, which provides funding for research projects in natural and physical sciences. Project proposals submitted to the Foundation are evaluated initially by subject experts in relevant fields and then by Technical Committees on the basis of technical merit and relevance to the socio-economic needs of the country. The progress of research is monitored through evaluation of semi-annual and annual progress reports. Multi-disciplinary research projects in areas of economic significance to Pakistan are accorded special priority for award of financial support.

During 2017-18, a total of 270 research projects/concept papers in 10 scientific fields namely Agricultural Sciences, Biological Sciences, Biotechnology & Genetic Engineering, Chemistry, Computer Sciences/Maths, Earth Sciences, Engineering Sciences, Health Sciences, Environmental Sciences and Physics remained under active consideration. Among these, 61 were under process, of which, 06 projects costing Rs.8.67 million were approved and an amount of Rs.8.97 million was released to 13 new projects on account of 1st installments including already approved projects. Total 62 projects were on-going and an amount of Rs.7.11 million was released on account of due installments and evaluation fee of these projects.

One of the main achievements and usefulness of any research is the publication of its results in scientific journals. Based upon the results of 21 completed projects, 36 research papers were published in national/international journals and 03 patents were registered. In addition, 04 Ph.D and 34 M.Phil/M.Sc (Hons) students secured their respective degrees while working as Research Associates in these completed projects.

Focusing on collaborative research and strong industrial linkages, R&D-Industry Programme (previously called Industrial Linkages Programme, ILP) aimed to bring researchers, end-users and the funding institutions together at one platform to create an environment of a unified approach to identify and solve industrial problems through applied research and technology transfer mechanism. During the report period, a total of 08 research proposals were received from various organizations, out of these, 06 proposals were presented in Technical Committees, wherein, 05 were approved at a total cost of Rs.13.4 million. Currently, 09 projects are on-going and an amount of Rs.6.8 million was released on account of due instalments for smooth running of these projects. In addition, under this programme, "Invention to Innovation Summit" was also organized at University of the Punjab, Lahore to establish linkages between Academia and Private Sector.

PAK-US NATURAL SCIENCES LINKAGE PROGRAMME (NSLP) ENDOWMENT FUND

PSF maintains an Endowment Fund under Pak-US Natural Sciences Linkage Programme (NSLP) to boost the research in agriculture sector in the country. During the report period, 118 proposals remained under consideration of the NSLP. Out of these concept papers, 46 projects were presented in 03 Technical Committee meetings held during the report period. Technical Committee recommended 14 new projects for funding at total cost of Rs.44.5 million. During the year, 60 ongoing research projects and the progress reports of projects (semiannual, 1st and 2nd annual & final reports) were received. An amount of Rs.23.5 million was released on account of due installments of on-going projects. During the report period, 17 projects were also completed. Further 16 projects being executed at different institution were monitored by M&E Wing and 21 projects were completed.

SCIENCE PROMOTION ACTIVITIES

During the report period, an amount of Rs.5.3 million was released to various institutions for organizing 32 conferences, seminars and workshops on important scientific topics and Rs.0.180 million were released to 02 scientific societies/journals for their regular activities. However, Institutional Support and PSF Fellowships programmes were not entertained due to paucity of funds.

SCIENCE POPULARIZATION

Popularization of science, increasing science awareness and development of scientific culture in the society are major functions entrusted to Pakistan Science Foundation. During the year 2017-18, a total 81,999 students from 371 schools visited Science Caravan Exhibitions. 27th

Annual Intra and Inter Board Science Essay and Poster Competitions were organized between the students of all Boards of Intermediate and Secondary Education (BISE) of the country. Students from all over the country took part in the competitions. Winners were awarded cash prizes. Essay Competition was on theme titled "Food Adulteration and Our Health Challenges" and for Science Poster Competition the theme was "Wealth form Waste". Donation of Popular Science Magazines and Scientific Books is one of the regular and important activities for science popularization. Quarterly "Urdu Science Magazine" was distributed to 2000 (i.e.) 8000 annually in Schools during the year. Popular Science magazine "Monthly Global Science" and Quarterly "Urdu Science Magazine" were distributed to 500 schools during the report period. Bimonthly Scientific Journal "The Fountain" published by The Light Publishing Turkey was also provided to Caravan offices, PASTIC offices and PMNH. A book titled; "Transgenic Plant" was also distributed among universities and colleges. During the report period, an amount of Rs.190,000/-was sanctioned to S&T organizations for strengthening of their labs and arranging their Science Popularization activities. During the report period, 25 Popular Science Lectures were arranged across the country in which large number of students, teachers and general public participated.

PSF in collaboration with other organizations like UNESCO, Intel, and Federal Directorate of Education organized various activities for students and scientists to commemorate the "World Science Day" like Convention of Scientists, Science Caravan Exhibitions, Panel Discussions on TV and Prize Distribution to the winners of PSF Annual Inter Board Science Essay and Poster Competitions etc. The theme selected by UNESCO for this year was "Science for Global Understanding". Federal Secretary for Science & Technology Ms. Yasmin Masood, Director General National Centre for Physics (NCP) and Chairman PSF Dr. Muhammad Ashraf highlighted the importance of science and its peaceful use for development and benefit of the mankind. Moreover cash prizes and certificates were also distributed among the winners of PSF's 26th Science Essay & Poster Competitions.

Pir Mehar Ali Shah Arid Agriculture University team won 1st position in Science Quiz Competition among students of Natural Sciences and Emerging Technologies on "Climate Change and Biodiversity" from Universities of Rawalpindi and Islamabad on 3rd January, 2018.

The 2nd and 3rd positions were won by National University of Science and Technology (NUST) and Fatima Jinnah Women University (FJWU) respectively.

INTERNATIONAL LIAISON

PSF has the mandate to liaise with similar international bodies across the globe and is in active collaboration with many similar International bodies. In the prevalent global scenario, the importance of international collaborations has become vital for the technological developments and advancement of knowledge. Therefore, PSF has re-vitalized its international collaborations and embarked upon new linkages to harness potential of technologically advanced nations like China, Turkey, Iran and Sri Lanka. In addition, PSF regularly plays role as a facilitator to link various international organizations/ universities with local universities and research institutions. Delegates from the reputed universities and similar collaborating bodies regularly hold meetings with PSF to discuss the areas of joint collaboration.

Over the years, PSF has established cordial bilateral relations with various international bodies to synergize efforts for achieving technological excellence and socioeconomic well-being of the people at large. Joint research projects are already ongoing with The National Natural Science Foundation of China (NSFC); Scientific and Technological Research Council of Turkey (TÜBITAK): Ministry of Science, Research and Technology (MSRT), Iran and National Science Foundation, Sri Lanka.

During the year 2017-18, second joint call for proposals was launched with NSFC, China, and TUBITAK-Turkey. The calls were highly appreciated by the scientific community. International Linkages activities of Pakistan Science Foundation were expanded to the greater extent. More effective linkages were developed with international counter parts to benefit the scientific community of Pakistan. During the report period, 24 projects remained ongoing under first call with NSFC, TUBITAK, and MSRT, while 06 projects were selected for funding received under “PSF-NSF, Sri Lanka first call. A total of 20 technical reports (semi-annual and annual) were received of ongoing projects and an amount of Rs. 43.5 million released on account of due installments and first installment of newly initiated projects with NSF-Sri Lanka and NSFC-China.

Chairman, PSF had various meetings with international counter parts to further expand the PSF activities at international scale. Delegates of TUBITAK and NSF-Sri Lanka visited PSF to chalk out the areas of further joint collaboration.

PLANNING AND DEVELOPMENT

The aim of this activity is to provide financial assistance to Pakistani Scientists, Technologists, Doctors and Engineers working in R&D organizations and educational institutions. Under this programme, a total of 167 requests were received from the scientists and technologists of the country. After comprehensive scrutiny as per eligibility criteria, 92 requests were presented in 10 meetings of PSF Travel Grant Award Committee (PSF TGAC). A total of 75 requests were dropped due to deficiencies in the eligibility criteria and requisite documents by the scientists. Out of the 92 requests presented to the PSF TGAC, 37 were recommended whereas 55 requests were not recommended, 22 scientists/technologists availed the grant and 17 could not proceed abroad due to visa problems and other reasons.

PAKISTAN SCIENTIFIC AND TECHNOLOGICAL INFORMATION CENTRE (PASTIC)

Pakistan Scientific and Technological Information Centre (PASTIC) is the premier organization in the field of S & T information dissemination that serves as a gateway for access to and delivery of S&T information catering to the needs of researchers. It is one of the few public sector organizations, which acquired ISO: 9001: 2000 Certification. PASTIC National Centre is housed in its own building at Quaid-e-Azam University Campus, Islamabad with comprehensive collection of information resources such as online databases and publications in various fields of Science and Technology. PASTIC has 06 Sub-Centres functioning at Karachi, Lahore, Peshawar, Quetta, Faisalabad and Muzaffarabad.

Main objective of PASTIC is to acquire, process and disseminate information in all disciplines of Science and Technology. To meet this objective, PASTIC has developed interlibrary cooperation for sharing of information resources to provide Document Supply Service, Bibliographic Information Service, Abstracting and Indexing Service etc. Besides, Technology Information Service, Patent Information Service, Reprographic Service are other regular services of PASTIC. It also conducts trainings for researchers and information professionals in modern information handling and management techniques.

Major achievements and initiatives taken during 2017-18 are summarized below:
Under the Bibliographic Information & Document Supply Service, 84,080 S&T documents in digital form and 7,213 bibliographies, were supplied to 6741 R&D workers, on their requests. PASTIC publishes an Abstracting Journal entitled “Pakistan Science Abstracts” (PSA) in 10 different scientific disciplines as secondary source of information. Based on this resource, an

online searchable database also exists for this purpose. During the period, 3,389 abstracts were converted to text format. PASTIC in collaboration with CyberVision is going to launch beta version of National Science Search Engine to optimize its online search facility. Initially application will cover research published in Pakistani Scientific Journals (Pakistan Science Abstracts), Later on other scientific repositories like database of scientists and engineers of Pakistan, database of R&D projects, database of Scientific periodicals of Pakistan, Union Catalogue of Pakistani Scientific libraries and other future databases developed by PASTIC will be linked.

Under Technology Information Service, 06 issues of bimonthly Trade and Technology news e-bulletin entitled "Technology Roundup" were published online. Three Exhibitions (Invention to Innovation Summit) and one Seminar were organized at Peshawar, Lahore, Quetta and Sukkur under the University Industry Partnership (UIP) Programme for building effective linkages between Universities/R&D Institutions and the Industrial Sector for enhancing innovations and competitiveness.

During the period 2017-18, a total 12,615 users visited library for reference purpose, reading, photocopying, internet browsing and web searching. Besides, the library received 197 issues of national and international journals in exchange of Pakistan Science Abstracts and on gratis basis. 12 issues of Fresh Arrivals of PASTIC library were compiled, published and distributed within and outside the organization to PASTIC members and also available on website. PASTIC Science Reference Library was renovated for improving ambience and enhancing the library services.

Under Reprographic Services of PASTIC, 169 printing jobs of 08 R&D organizations were carried out and completed.

In order to publicize PASTIC Services, PASTIC service stalls and awareness seminars about its activities were organized at various universities and other institutions so that S&T and R&D community of the country can be acquainted with its S&T information services. Through this activity, services are brought to the doorsteps of the researchers. As a result, a large number of new research scholars and faculty members have come to know about PASTIC information services. A total of 24 stalls and 30 awareness seminars at various departments of universities in several major cities were organized.

PASTIC liaise and collaborate with regional and international information networks agencies and also acts as the National Focal Point of those International/Regional Information Networks. PASTIC is also the national distributor of UNESCO developed library management software "WINISIS". Under international liaison, SAARC Development Fund (SDF) project "Networking of Women Entrepreneurs (SMEs) from SAARC Countries" was approved for funding. Financial agreement with Donor remained under progress. Four bilateral cooperation proposals prepared and forwarded to PSF.

PASTIC organized 48 workshops on various themes such as PASTIC Information Services, Searching Techniques, Library Management, Information Literacy Skills, Strengthening Innovative Library Leaders, Plagiarism, Easy Way of Library Automation & Digitalization, Intellectual Property Rights, Health Awareness, KOHA, Research Tools and Techniques / Citation Management (SPSS, Endnote, Mendeley, etc.).

The total number of users/researchers served during year under all categories was 19,356 and total number of persons trained was 1,588.

PAKISTAN MUSEUM OF NATURAL HISTORY (PMNH)

Pakistan Museum of Natural History the only natural history museum of Pakistan was established in 1979 under Pakistan Science Foundation, Ministry of Science & Technology, and Government of Pakistan. Pakistan Museum of Natural History (PMNH) has four principal divisions namely Earth Sciences Division, Botanical Sciences Division, Zoological Sciences Division and Public Services Division. First three scientific divisions are engaged in the collection, identification and research activities pertaining to plants, animals, fossils and mineral resources of Pakistan, while the fourth one is responsible for mass education and popularization of natural history through various displays, exhibits and dioramas. Researchers of PMNH carried out extensive field works from the Coast of Arabian Sea to the Alpine regions, roamed through barren areas for the collection of Flora & Fauna, Rocks, Fossils and Minerals not only for research work but also for the purpose of education because education is also one of the main objectives of PMNH. For this purpose, PMNH regularly organizes trainings, workshops, seminars, symposia and other educational interactive activities related to natural history, environment and biodiversity of Pakistan. International days are also observed by PMNH. PMNH has formed many national and international liaisons with the other research institutes in the country and from abroad. Due to these collective efforts of scientific and technical staff of PMNH and collaborations with other research institutions, PMNH has

1.5 million natural history specimens in its repositories. Research outcome of these field works and National and International projects are published in the form of research papers in reputed national and international journals. PMNH is not only conducting research on the natural resources of Pakistan which exists in the form of Flora & Fauna, Rocks, Fossils and Minerals but also educating the students of Pakistan along with the common people with the help of informative, interactive, educative 3-dimentional dioramas and exhibits. Students of schools, colleges and universities from all over the Pakistan visit PMNH as a part of their educational tours. Scientific and Technical staff of PMNH also facilitate the students and researchers from the other universities and institutes by providing help in the research in the form of information, technical assistance, specimens as a loan and guidance in their research work.

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 bearing on the socio-economic needs of the country. The tasks undertaken by the Foundation for the performance of its statutory functions are divided into following three broad categories:

i) Science Promotion supports basic and fundamental as well as applied research Involving researchers/academia at universities and R&D organizations focusing socio-economic needs/development of the country.

ii) Science Popularization endeavoring to image scientific ideas to grasp the concept of fundamental science.

iii) Science Centers to encourage all segments of society in thinking, understanding and exploring science.

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

i) Establishment of comprehensive scientific and technological information and dissemination centers.

ii) Promotion of basic and fundamental research in universities and other institutions on scientific problems relevant to the socio-economic development of the country.

iii) Utilization of the results of scientific and technological research including pilot plant studies to prove the technical and economic feasibility of processes found to be promising on a laboratory scale.

iv) Establishment of science centers, clubs, museums, herbaria and planetaria.

v) Promotion of scientific societies, associations and academies engaged in spreading the cause of scientific knowledge in general or in the pursuit of a specific scientific discipline or technology in particular.

vi) Organization of periodical science conferences, symposia and seminars.

vii) Exchange of visits of scientists and technologists with other countries.

viii) Grant of awards, prizes and fellowships to individuals engaged in developing processes, products and inventions of consequence to the national economy.

ix) Special scientific surveys not undertaken by any other organization and collection of scientific statistics related to the scientific efforts of the country.

The Foundation shall also:

i) Reviews the progress of scientific research sponsored by it and evaluates the results of such research.

ii) Maintain a National Register of highly qualified and talented scientists/engineers and doctors both in and outside Pakistan, and to assist them in collaboration with concerned agencies to seek appropriate employment.

iii) Establish liaison with similar bodies in other countries.

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

ACTIVITIES AND PROGRAMMES

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

i) Promotion and Financing of Scientific Research in the Country and the Utilization of the Research Results.

ii) Promotion and Popularization of Science in Society.

iii) International Liaison.

iv) Establishment of Comprehensive Scientific and Technological Information Dissemination Centers.

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

Research Support is performing the following activities:

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

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

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

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

I. PAKISTAN SCIENCE FOUNDATION (PSF)

I. PAKISTAN SCIENCE FOUNDATION (PSF)

1.1 RESEARCH SUPPORT:

1.1.1 Research Projects Funded

Research support is the principal programme of the Foundation, which provides funding for research projects in natural and physical sciences. Project proposals submitted to the Foundation are evaluated initially by subject experts in relevant fields and then by Technical Committees on the basis of technical merit and relevance to the socio-economic needs of the country. The progress of research is monitored through evaluation of semi-annual and annual progress reports. Multi-disciplinary research projects in areas of economic significance to Pakistan are accorded special priority for award of financial support.

a) Under Process Projects

During 2017-18, a total of 270 research projects/concept papers in 10 scientific fields namely Agricultural Sciences, Biological Sciences, Biotechnology & Genetic Engineering, Chemistry, Computer Sciences/Maths, Earth Sciences, Engineering Sciences, Health Sciences, Environmental Sciences and Physics remained under active consideration. Among these, 61 were under process, of which, 06 projects costing Rs.8.670 million were approved (*Annexure-II)* and an amount of Rs.8.97 million was released to 13 new projects on account of 1st installments including already approved projects.

b) On-going Projects

Total 62 projects were on-going and an amount of Rs.7.11 million was released on account of due installments and evaluation fee of these projects. A list of the semi-annual, annual and final reports is placed at *Annexure III.*

c) Completed Projects

During the year, 21 research projects were completed. The subject experts evaluated the final technical reports which were subsequently placed before the respective PSF Technical Committee for consideration. After adoption of these reports by the Committee, the accounts of these projects were settled and files were closed. A list of completed projects followed by their scientific output is given below:

Sr. No.	Project No.	Project Tittle
1.	PSF/Res/C-QU/Bio (419)	Functional Analysis of a Proteinase Inhibitor Gene Construct for Insect Resistance
2.	PSF/Res/P-PMAS-AAU/Bio (397)	Detection of Multiple Anthelmintic Resistances of Nematodes in Small Ruminants Grazing in Barani Region
3.	PSF/Res/KPK-AU/Bio (484)	Modification of Egg Cholesterol Content through Medicinal Plants
4.	PSF/Res/S-SALU/Bio (382)	Comparative Characterization and Recombinant Study of Indigenous Keratinase Enzymes
5.	PSF/Res/P-AU/Bio (356)	Pigeon Newcastle Disease Virus: Surveillance and pathogenicity for chickens and Development of Vaccine for Control
6.	PSF/Res/B-FGC/Bio (458)	Parasites of Boxes and Jackals in Easteren Balochistan, with Special Emphasis on Diseases of Veterinary and Zoonotic Importance
7.	PSF/Res/KPK-AU/Bio (403)	Effect of Sperm Concentration, Season and Extenders on Goats Semen Integrity and Fertility
8.	PSF/Res/P-UHS/ Biotech (107)	Molecular Genetic Studies in Pakistani Families with Autosomal Recessive Primary Microcephaly (MCPH)
9.	PSF/R&D/KPK-IBGE/ Biotech (209)	In Vitro Development of Salt Tolerance in Rice
10.	PSF/Res/P-PU/Earth (85)	Petrology, Mineralogy, Geochemistry and Economic Geology of the Hangu Formation of Salt Range, Pakistan
11.	PSF/Res/B-BU/Earth (86)	Basement Shear and Transpression near a Restraining Bend on the Chaman Fault an Investigation of the Structural Kinematics and Seismic Hazard in Northern Balochistan
12.	PSF/Res/P-HITECU/Engg (113)	Compressed Air Power Vehicle (Bike)
13.	PSF/Res/C-CIIT/Engg (148)	Machine Vision System for Visually Impaired People
14.	PSF/Res/F-GIK / Engg (107)	Battery based Micro hydropower plant on catamaran for free water flow operation
15.	PSF/Res/C-NUST/Engg (105)	Tribological Performance of Cam/Tappet Interaction in a Direct Acting Overhead Valve –Train Engine
16.	PSF/Res/C-NUST/Envr (112)	Chlorine Decay Modeling in a Prototype Distribution Network
17.	PSF/Res/ P-GCU/Envr (89)	Comparative Study of Genotoxic Effects of Heavy Metals on Indian Major Carps by Bioassays in the Indus River
18.	PSF/Res/ P-DGF/Envr (65)	Pollution in Hadiary Drain its Direct and Indirect Impact on Human Health through Food Chain
19.	PSF/Res/P-AU/Phys (151)	Synthesis of Soft and Hard Ferrites and their

		Characterization using Laser Induced Break-down Spectroscopy
20.	PSF/Res/P-GCU/Phys (246)	AC magnetic measurenments
21.	PSF/Res/C-PINSTECH//Phys (172)	Development of Graphene Based Highly Sensitive and Low Cost Glucose Biosensor

i) **Biological Sciences:**

Project No:	PSF/Res/C-QU/Bio (419)
Project Title:	Functional Analysis of a Proteinase Inhibitor Gene Construct for Insect Resistance
Duration:	03-Years
Date of Initiation:	16.11.2009
Date of Completion:	15.11.2012
Total Expenditure:	Rs.1,911,233/-
Principal Investigator:	Dr. Tariq Mehmood
Name of Institution:	Quaid-i-Azam University, Islamabad

SUMMARY:

Today, humans are facing a big challenge to provide sufficient and high quality food to the rapidly growing population. The situation is becoming more and more critical and one of the main reasons is the losses in agriculture sector due to insects and pathogens. Scientists are trying to improve the quantity and quality of all major food items. Use of the advanced biotechnological approaches is one of the promising solutions in achieving this high priority task. Transformation of a protease inhibitors (PIs) gene under the control of a wound inducible promoter is one of the important approaches for getting enhanced insect resistance. Basically proteases inhibitors are the products of PIs gene and they can inhibit/retard proteases secreted by insects to digest/cross the initial barrier of plant cell for invasion. Regulated transgene expression, whereby a wound inducible promoter is specifically activated in response to pathogen invasion or pest attack, has distinct advantages for genetically engineering disease/pest resistant traits in plants. It is an alternative to the continuous expression of insecticidal proteins at the whole plant or tissue level throughout the life cycle in case of promoters of viral origin. Therefore, this project was designed to transform a PI gene of plant origin under the control of a wound inducible promoter again of plant origin in potato. In order to pursue the main objective of the project, a PI gene was identified from tomato, amplified and cloned in a direct PCR

product cloning vector in the first year of the project. Further, the cloned gene was also sequenced. Then, the PI gene was ligated downstream to a wound inducible promoter (the promoter was already available and cloned in a vector). This modified expression construct was successfully cloned into an *Agrobacterium* strain. This genetically modified *Agrobacterium* was used for potato transformation. Transgenic plants with antibiotic resistance were shifted to rooting media. These plants were kept for a period of 4 months, with regular shifting on fresh rooting media after every 4 weeks. Microtubers developed from these transformed potato plants after 4 months. Then transformed potato plants were established under *in vitro* conditions and then shifted to soil in small pots and placed inside laboratory. DNA was extracted from transformed potato plant tissues. The extracted DNA was used for the amplification of wound inducible promoter available upstream to PI gene. In earlier experiments in our research group, the tissue specific expression analysis of this particular wound inducible promoter was done. In those experiments, it was confirmed that this promoter can express a gene ligated towards downstream to this promoter in tubers, leaves and stem.

Project No:	PSF/Res/P-PMAS-AAU/Bio (397)
Project Title:	Detection of Multiple Anthelmintic Resistances of Nematodes in Small Ruminants Grazing in Barani Region
Duration:	03-Years
Date of Initiation:	01.07.2009
Date of Completion:	30.06.2012
Total Expenditure:	Rs.628,130/-
Principal Investigator:	Prof. Dr. Mazhar Qayyum
Name of Institution:	PMAS Arid Agriculture University, Rawalpindi

SUMMARY:

The current study has been designed to detect multiple anthelmintic resistances against gastrointestinal nematodes in small ruminants reared at Barani region Punjab, Pakistan. The potential production of small ruminants is greatly affected by the development of anthelmintic resistance. The rates of appearance of anthelmintic resistance against gastrointestinal nematodes all over the world appear to differ geographically and in accord with the current climate, parasites type and treatment regime adopt in the region. Various *in vivo* and *in vitro* methods were used to detect multiple anthelmintic drugs resistance. First of all, to conduct a comprehensive studies on selected sheep and goat herds to evaluate the reliability of treat-

ment with wide spectrum anthelmintic drugs using faecal egg count reduction test (FECRT) and, concurrently, to undertake *in vitro* egg hatch assays (EHA) to evaluate the susceptibility of nematode to anthelmintic drugs. Mean faecal egg count, percentage reduction and 95 per cent confidence interval were calculated by using the formula recommended by the World Association for the Advancement of Veterinary Parasitology (WAAVP) for detecting multiple anthelmintic resistant gastrointestinal nematodes of ruminants. Multiple anthelmintic resistances were found in selected goats and sheep flocks. All flocks were found resistance against the albendazol; six were resistance against levamisole, two suspected for resistance. Seven flocks were susceptible against Ivermectin while one is suspected for resistance. The results revealed that a significant difference ($P<0.05$) of FECRT were found on pretreatment and after post-treatment with different anthelmintic drug as compared to control group in all the flocks. The results against albendazol were also confirmed by the Egg Hatch Assay (EHA). Results of EHT revealed that all the eight flocks found positive for resistance against albendazol. The LC_{50} values ranged 0.138 µg/mL to 0.141 µg/mL which confirmed the results of FECRT.

Project No:	PSF/Res/KPK-AU/Bio (484)
Project Title:	Modification of Egg Cholesterol Content through Medicinal Plants
Duration:	1.5-Year
Date of Initiation:	20.10.2015
Date of Completion:	20.06.2017 (extended)
Total Expenditure:	Rs. 1,301,313/-
Principal Investigator:	Dr. Naila Chand
Name of Institution:	University of Agriculture, Peshawar

SUMMARY:

Project was initiated with the view to study the egg yolk cholesterol lowering effect of plants in chicken. Three different plants i.e. *Berberislycium, Terminaliaarjuna,* and *Trigonellafoe-num-graecum* were fed at different concentration to cross (RIR X Fayumi) birds during first and second production cycle. Data was recorded on egg yolk cholesterol & serum lipid profile and production performance. Liver function tests were carried out in order to check the toxicity of the plants. A total ofsix experiments were conducted including three experiments during the first production cycle and three experiments in the second production cycle. One Msc (Hons) student has been produced under the project (attached as annexure-I). One PhD

student hascompleted his research work in the project and thesis writing is under process (attached as annexure-II). Application for one patent has been filed with Intellectual Property Organization (IPO) (attached as annexure-III). The data generated was presented in two international conference for having the expert opinion of industry personals and end users. High appreciation from end users was received. All objectives committed under the project were achieved. Two research papers have been submitted for publication in international journals. All the three plants were found to reduce egg cholesterol without affecting production performance and liver health. Among the three plants *Berberislycium* was found most effective for reducing egg yolk cholesterol level. *Berberislycium* was found to reduce egg yolk cholesterol by 12.23 and 12.53% during first and second production cycle, respectively.

High egg cholesterol content is the main threat to egg industry because eggs are high in cholesterol and saturated fatty acids and low in mono and poly unsaturated fatty acids which have triggered recommendation by the medical community to limit egg consumption. Improvement in the nutritional profile of egg may help to reverse the situation. As herbs are known to reduce cholesterol content in human and animals, the present project has explored the possibility of using herbs in poultry for lowering egg cholesterol content and thus both the industry and consumer will benefit from it. Different phase wise experiments have been conducted in the current project. Day old chicks were purchased from the local commercial market and were reared till egg production. In the first experiment cholesterol lowering effect of different levels of the root bark of *Berberislycium*was investigated against the standard cholesterol lowering drug (atrovastatein). After peak egg production eggs were analyzed for cholesterol contents on weekly basis. To study herb toxicity liver biochemistry was performed. In liver biochemistry liver function test i.e. ALT and AST test were performed. Root bark of barberry (*Berberislycium*) effectively reduced egg and serum cholesterol without affecting liver function and egg production. The second experiment was conducted on“Modification of egg cholesterol contents through *Terminaliaarjuna*during first production cycle”.The detail of this experiment is attached in the result section of the report.Third experiment was conducted to investigate the Effect of “Modification of egg cholesterol contents through *Trigonellafoenum-graecum*during first production cycle”.Details are attached. Fourth experiment was conducted on “Modification of egg cholesterol contents through *Berberislyicum* during second production cycle”. Details attached. The fifth experiment was conducted on“Modification of egg cholesterol contents through *Terminaliaarjuna*during second production cycle”. The detail of this experiment is attached. Sixth experiment was conducted to investigate the Effect

of “Modification of egg cholesterol contents through *Trigonellafoenum-graecum*during second production cycle”. Detail of this experiment is presented in the result section.

Findings of the present projectare useful to produce low cholesterol eggs for specific group of people and thus both the industry and consumer may benefit.

Project No:	PSF/Res/S-SALU/Bio (382)
Project Title:	Comparative Characterization and Recombinant Study of Indigenous Keratinase Enzymes
Duration:	03-Years
Date of Initiation:	01.09.2009
Date of Completion:	31.08.2012
Total Expenditure:	Rs. 1,797,519/-
Principal Investigator:	Prof. Dr. Yasmeen Faiz Kazi
Name of Institution:	Shah Abdul Latif University, Khairpur

SUMMARY:

Keratins are the widely distributed fibrous proteins of our environment. Vast quantity of chickens is being utilized every day in the society that produces a large amount of feathers waste in poultry industries. Keratin is a major constituent of feathers processing almost 90% of feather weight.

Keratin-consisting materials have always been plentiful in the nature but restricted in practical usages, mainly because of their insolubility and non-degradability by the ordinary proteolytic enzymes. However keratin can be degraded by a number of species of saprophytic and parasitic fungi, a few of actinomycetes and Bacillus species. Keratinase belongs to a group of proteinase enzymesthat have high level of actively on insoluble keratin, playing a crucial role in hydrolyzing feather, hair, wool, collagen and casein in removing barriers in waste water treatment systems. Not only have these enzymes been applied in sewage systems but have also recently emerged in many applications including food, textile, medicine and cosmetics industries and medical applications. More interestingly, keratinases are well identified in leather industry to have been employed in dehairing process of animal skins.

The aim of present study was to isolate and identify keratinolytic fungi and bacteria from soils of District Khairpur and prepare crude enzyme from these species to characterize the indigenous keratinase enzymes.

A total of 80 soil samples were collected from Ghari Mori District Khairpur and keratinolytic fungi and bacteria were isolated using Hair Bait Technique. A modification of original

method was done by sterilizing the hair to minimize the contaminants. The isolated species comprised: *Absidia sp*., *Chrysosporiumasperatum, Chrysosporiumkeratinophilum*and *Entomophthora coronate, Bacillus subtilis* and*Staphlococcusaureus*from 80 soil samples, collected from fertile land, animal manger, poultry farms and barber's shop.

Screening of the isolated keratinolytic fungi and bacteria was performed by hydrolysis of casein (a substrate of the enzyme) in skimmed milk agar. The fungal species were characterized for production of keratinase by measurement of zone of hydrolysis. *Chrysosporiumkeratinophilum* produced largest zone among all the tested species. The zone size increased when this species was grown for seven days. Among two bacterial species isolated during this study, *Bacillus subtilis* produced larger zone in three days. These two species therefore were selected as mega producer of keratinase enzyme. The keratinolytic property of these species was further confirmed by growing them on growth medium containing keratin (prepared in our laboratory from chicken feathers) as sole source of carbon and nitrogen and as substrate.

The production of Keratinase from these species was judged by the zone of hydrolysis on skimmed milk agar and the effect of different growth parameteres was tested. The Keratinase enzyme was produced by sub-merged fermentation process. The crude enzyme from both the species was characterized by determining and evaluating the optimum temperature, pH, incubation period and nitrogen and carbon source. For C. keratinophilum, optimum temperature was 30^0C, pH 10.0, incubation period 7 days, preferred N source gelatin and albumin and preferred C source maltose. For *Bacillus subtilis* PK-1, optimum temperature was 37^0C, pH 11.0, 24 hours, gelatin, keratin and glucose respectively. *Bacillus subtilis* PK-1 was selected as the Keratinase producing species for further studies because of its short incubation period for enzyme production. The crude Keratinase enzyme from *Bacillus subtilis* PK-1 was further purified by Gel chromatography. The purified enzyme was also characterized for the optimum parameteres of production and enzyme activity by keratin assay using azocasein and keratin azure as substrate. The purification factor was estimated by SDS-PAGE. The SDS-PAGE showed a single band at molecular weight of 30kDa, when compared to protein standard marker. From these findings we report the isolation of a bacterial species *Bacillus subtilis* PK-1 producing alkaline keratinase of molecular mass 30kDa, with optimal activity at 37^0C and pH 11.0, preferred substrates: gelatin and keratin, with de-hairing activity of goat skin and psoriasis scale hydrolysis capability.

The extraction of genomic DNA from *Bacillus subtilis* PK-1 was performed by boiling method. Genomic DNA extraction using boiling method showed recovery of genomic DNA as was evident from the bands at higher position. Polymerase Chain Reaction (PCR) was used

for producing enormous amplification of a short sequence from a single molecule of template DNA. The *ker* gene was amplified by using specific primers and standard PCR conditions. A 700 bpamplicon, using Agarose Gel Electrophoresis was amplified that correspond to the *ker* gene.

Basic Local Alignment Search Tool (BLAST) was used to detect the presence of keratinase gene in *B. subtilis.* The published codon sequences from NCBI were retrieved for *B. subtilis*PK-1 and keratinase gene (*ker A*) of *B. lichenoformis*. The total similarity index appeared as 75.6%. This shows that *B. subtilis*PK-1 possessed keratinase gene. The gene from B. subtilis PK-1 was cloned in *E. coli* to construct recombinant strain *E. coli* BL21(DE3)pPK-1. This strain exhibited keratinase activity by azocaseine assay.

Project No:	PSF/Res/P-AU/Bio (356)
Project Title:	Pigeon Newcastle Disease Virus: Surveillance and pathogenicity for chickens and Development of Vaccine for Control
Duration:	03-Years
Date of Initiation:	25.01.2007
Date of Completion:	30.09.2010 (extended)
Total Expenditure:	Rs.707,587/-
Principal Investigator:	Dr. Farzana Rizvi
Name of Institution:	University of Agriculture, Faisalabad

SUMMARY:

Clinical prevalence of PMV-I pigeons in Lahore, Rawalpindi, Peshawar and Karachi was found 32 %, 36 % 38 % and 44 %, respectively. Seroprevalence in the same cities was 59.50%, 55.79%, 62.69 and 58.97 % respectively. Antibody titer against PPMV-I was more than 256 in pigeons from Faisalabad, Lahore, Rawalpindi, Peshawar and Karachi was 69.15%, 65.55 %, 66.98 % 61.90% and 53.91% and it was more than 1:512 in 30.85%, 34.45%, 33.02%, 38.10% and 46.09 Frequency of emaciation was in Faisalabad, Lahore, Rawalpindi and Peshawar 30.34 %, 28.36 %, 23.72 % and 26.34 %, respectively. Viral samples obtained after egg inoculation were subjected to confirm the virus type i.e., APMV-1 or PPMV-1 through the use of monoclonal antibodies. Pigeon paramyxovirus -1 was 64.29%, 63.64%, 72.73%, 63.64%, 69.23% and avian paramyxivirus-1 was 35.71%, 36.36%, 27.27%, 36.36% and 30.77% were in pigeons of Faisalabad, Lahore, Rawalpindi, Peshawar and Karachi respectively

Clinical signs observed in pigeon lofts were torticulus, wing and leg paralysis, blindness shivering of head and neck and greenish mucoiddirrhoes in clinically infected pigeons. As far as gross lesions are concerned spleanomagly, pale kidneys and liver and haemorrhages in brain are the lesions which were observed during the report period. Histopathological changes include perivascular infiltration of inflammatory cells, proliferation of fibroblasts and hepatic cell swelling,, infiltration of inflammatory cells in interstial spaces, hypertrophy of proximal tubular cells in the kidney, misshapen villi and necrosis of columinar epithelium in the intestine, excessive fibrosis in proventriculus were the major histopathological findings during report period.

Different groups of pigeons were vaccinated with Hitchner B1, La-Sota and Muktaswar and oil based vaccine was prepared against the local strain of PPMV-1. Maximum GMT was attained upto 139.58 at 21 days post vaccination in single vaccination trial. During the second trial when the boaster dose was given to birds GMT was seen up to 215.27, 279.17 and 234.75 at 28, 35 and 42 DPV.

In trial of challenge protection single vaccination total mortality in pigeons was 15 % in vaccinated birds while it was 85 % in non vaccinated birds. In a second trial of challenge protection by vaccination plus booster total mortality was 12.50 % in vaccinated birds while it was 80 % in non vaccinated birds.

Project No:	PSF/Res/B-FGC/Bio (458)
Project Title:	Parasites of Boxes and Jackals in Easteren Balochistan, with Special Emphasis on Diseases of Veterinary and Zoonotic Importance
Duration:	02-Years
Date of Initiation:	01.12.2012
Date of Completion:	30.11.2015 (extended)
Total Expenditure:	Rs. 439,716/-
Principal Investigator:	Mr. Sher Ahmed
Name of Institution:	FG Degree College, Quetta

SUMMARY:

Canids or dogs, are beneficial animals, yet they may also cause parasitic diseases to man. In Pakistan, research on parasites of domestic dogs has been conducted, yet research on wild kin of these animals is still in dark. Foxes and jackals are two types of wild canids that prevail around human habitats. Yet, they go unnoticed because of their nocturnal behavior. In Pakistan, red fox and golden jackal are very prevalent. Near the peripheries of the cities, they often invade domestic garbage, sometimes also agricultural farms and poultry. This way they get into the crossroad of parasitic infection with domestic dogs, livestock and human. These wild animals can obtain parasites from domestic animals, and they may also transmit their parasites to domestic animals and human. The present project was designed to determine parasites of foxes and jackals in eight cities of eastern Balochistan, especially the ones that are important from veterinary and human point of view. So far, two cities, Sinjavi and Harnai have been visited. The animals were infected with 12 species of parasites. Ectoparasites were represented by three species of hard ticks (Hyalomma spp., Haemaphysalis spp. and Rhipicephalussanguineus), one species of soft tick (unidentified Argasidae spp.), and three species offleas (Ctenocephalidescanis, Pulex irritans and an unidentified species). Among helminths, no trematodeor nematode was observed, yet, infection with cestodes was common, with species being Mesocestoideslineatus, iplopylidiumnolleri and Taeniaspp. Animals were also heavily infected with two species of acanthocephala, i.e., Oncicola canis and the giant of the phylum, Macracanthorhynchus spp. No protozoan parasite was found in intestine. In previous report, PI had reported presence of Protozoa Balantidium coli, Giardia spp. And unidentified round bodies resembling yeast. Yet, after repeated observation and considerations, the PI has reverted. Despite having Babesia-related ticks on the body of foxes, no infection with blood parasites was observed. Periodic Acid Schiff's stain gave negative results for the presence of Toxoplasma gondii in brain. Except D. nolleri and O. canis, which could infect domestic canids but not human, all the other recovered are significant veterinary and zoonotic parasites.

Project No:	PSF/Res/KPK-AU/Bio (403)
Project Title:	Effect of Sperm Concentration, Season and Extenders on Goats Semen Integrity and Fertility
Duration:	03-Years
Date of Initiation:	03.06.2008
Date of Completion:	02.06.2011
Total Expenditure:	Rs. 851,321/-
Principal Investigator:	Prof. Dr. Subhan Qureshi
Name of Institution:	University of Agriculture, Peshawar

SUMMARY:

This project was launched with focus on studying the effect of sperm concentration, season and extenders on goats' semen integrity and fertility. The project was approved with a total cost of Rs.1.097 million; however, a fund of 688,975 was released in three installments.

Six dairy goats and 3 bucks were purchased and stationed at University Dairy Farm and another buck was added through exchange with a female. The animals were grazed in the nearby adjoining areas on daily basis. Green fodder was provided ad lib and concentrate feeds were fed to according to requirements. Free excess to drinking water were provided. Data were collected on periodical basis regarding reproductive history, health status, nutrition and suckling. The bucks were housed separately from the females and were provided training in semen collection through artificial vagina and isolated from the rest of the flock and visitors. Semen was collected in an artificial vagina and volume was read at the graduation of the semen collection tube, ignoring the frothy part of the ejaculate. A drop of semen was collected, placed on a slide and examined for mass motility (wave motion) of the whole semen under a microscope and graded as 0-5. Percentage of living spermatozoa, morphological abnormalities and individual motility of spermatozoa was recorded. Extenders were prepared for evaluation and long storage of semen under refrigeration. The pH was adjusted to 6.8. The flask was labeled and kept in refrigerator for semen dilution. General linear model procedure was used for analysis through SPSS (6) statistical package under guidelines of Steel and Torrie.

In the present study the extenders combination of high fructose with high glycerol or lower fructose with lower glycerol protected the spermatozoa motility up to 192 hours post-dilution as compared to others extenders at 4ºC. The libido showed a decline during June and mass motility during November to January. Individual motility remained higher during March and July to October. Volume showed the highest value during January (1.60 ml). Sperm concentrations were highest during November, followed by June. Liquid semen was used for insemination of goats coming to the University Clinics. Seventeen goats were inseminated out of which two exhibited estrous post-insemination. The farmers have developed confidence on the project for breeding of their goats.

Three studies leading to M ScHons and one leading to PhD were facilitated by the project. Three impact factor papers were published in Turkish Vet J, Reprod Dom Anim and J Anim-PhysiolAnim Nut. The studies came up with the following conclusions:

Vitamin E at the rate of 400 IU/buck/day supported higher semen volume, per cent motility, per cent live spermatozoa, antioxidants (SOD, GPx) and trace minerals (Zn, Cu, Mn) in the seminal plasma and lowered AST; however, the dose of 800 IU/buck/day did not improve the semen quality showing the adverse effect. Zinc sulphate supplemented at the rate of 100 mg/buck/day was an optimum dose to improve semen volume, motility and seminal plasma antioxidants (SOD, GPx) in Beetal bucks.

Semen Quality of Local and Exotic Roosters (Gallus gallusdomesticus) during extremes of summers supplemented with ascorbic acid and electrolytes (Ce-Col®) was studied by Mr Muhammad Inam. The paper will be presented by the PI in the 7th International Symposium of Integrative Zoology, 25-28 August 2015. Xi'an, Shaanxi, province, China. Vitamin C/electrolyte supplementation improved semen quality in poultry under thermal stress and semen quality was better in local than in exotic poultry breeds under these circumstances.

ii) **Biotechnology and Genetic Engineering**

Project No:	PSF/Res/P-UHS/ Biotech (107)
Project Title:	Molecular Genetic Studies in Pakistani Families with Autosomal Recessive Primary Microcephaly (MCPH)
Duration	02-Years
Date of Initiation:	01.06.2013
Date of Completion:	30.05.2016 (Extended)
Total Expenditure:	Rs.543,753/-
Principal Investigator	Dr. Saqib Mahmood
Name of Institution	University of Health Sciences, Lahore

SUMMARY:

In pursuance of the goals set for the successive completion of our project, we collected 05 families with Autosomal Recessive primary microcephaly (MCPH). By typing microsatellite markers located in the vicinity of known loci for MCPH, and by resolving the alleles on polyacrylamide gel electrophoresis (PAGE), we found linkage to the most prevalent MCPH1 locus in four families (A, B, C & E). This locus contains *ASPM* gene. We sequenced affected and unaffected individuals from each of these families and found previously reported mutation (c.3978G>A; p.W1326X) in all these linked families. The mutation is a homozygous premature

stop codon (c.3978G>A-p.W1326X) in exon 17 of *ASPM* gene. The mutation was present in heterozygous state in the obligate carriers in all the four linked families and was absent from a cohort of 100 ethnically matched control individuals. In family D, we performed SNP based homozygosity mapping of whole genome to elucidate novel locus in this family, as the family was not linked to any of the tested loci of MCPH. We found two significant regions on chromosome 4 and chromosome 20 in this family. One of the candidate genes at chromosome 20 (*ZNF335*, which was discovered after microsatellite genotyping method), was sequenced but no pathogenic mutation was found. Currently, this family has been sent on whole exome sequencing, with the help of our collaborators, to find out novel gene mutation in this family.

Project No:	PSF/R&D/KPK-IBGE/ Biotech (209)
Project Title:	In Vitro Development of Salt Tolerance in Rice
Duration	03-Years
Date of Initiation:	01.07.2007
Date of Completion:	30.06.2010
Total Expenditure:	Rs.802,595/-
Principal Investigator	Prof. Dr. Safdar Hussain Shah
Name of Institution	Institute of Biotechnology & Genetic Engineering The University of Agriculture, Peshawar

SUMMARY:

Development of the salt tole4rant crops is one of the strategies to partially utilize the saline soils, the single largest abiotic st4ess that limits the agricultural productivity over the one fourth area of the whole world. The biotechnology has enormous potential to complement and facilitate the crop improvement methodologies. The current project was aimed at the development of the salinity tolerance at cellular level utilizing the phenomena of cross/co-adaptation for acquisition of sequential tolerance followed by regeneration of plants from adapted cell lines. After preliminary study non-basmati rice cultivar Swat-1 was selected for the study. Polyethylene glycol (PEG) and Rubidium chloride (RbCl) was used to generate osmotic (drought) and ion specific components of the stress. For osmotic stress cells line was adapted to 20% PEG, a stress level that caused about 80% reduction in growth. On the other hand 50mM RbCl did not exhibit significant inhibition in growth of un-adapted cells line. The stress level above the 50mM generates both osmotic and toxic components of the stress, therefore research work was focused on studying the response of PEG adapted cell line toward NaClstress. The adapted cells lines were growing on the respective media (stress free

medium for un-adapted and medium containing 20% PEG for adapted lines) for about 25 generations i.e. 18 months. The tolerance of adapted lines was tested after 3rd and 6th passages on stress free medium. The adaptation of PEG caused substantial increase in proline and Ca2+ and significant reduction in Mg2+ and K+ contents. Adapted and un-adapted lines were subjected to 200 mM NaCl, a stress level having isosmotic effect equivalent to 20% PEG. The tolerance of adapted line was significantly greater than un-adapted lines. When cell lines grown on 200mM NaCl for the first time were subsequently subjected to second passage of NaCl stress, the un-adapted line failed to survive but tolerance of adapted line further increased. The Na content of the both lines increased at NaClstress but at different rate, the PEG adapted line accumulated higher level than un-adapted line. The K+ element of both the lines increased, this over all resulted in higher Na+/K+ ratios of PEG adapted line than un-adapted line. The Mg++ content of both the lines increased under NaClstress. PEG adapted line accumulates significantly higher amount of proline. On subjection to NaCl stress the proline content of adapted line increased while that of un-adapted line decreased. The protein profiling of adapted line showed size newly synthesized polypeptide bands (15, 17, 26, 32 and 68 kDa). The polypeptides remained stable under 200mM NaCl stress. The PCR primers using same set of SSR primers for saltol region of chromosome 1 of rice revealed 100% homozygosity in adapted and un-adapted cell lines. The data regarding the organic osmolytes (proline and sugar) of regenerants show that the proline content of adapted line was significantly higher than the level in un-adapted line, in contrast un-adapted line accumulated higher concentration of total sugars than adapted cells line. The protein banding pattern of regenerants was found to be similar to their respectice lines. While 60 kDa band found to be absent from the shoot of regenerated plantlets of adapted cells line but was present in roots. This reveals that adaptation at cellular level is transferable to complete plant level, roots in particular, may be due to resemblance in calli and roots being non-photosynthetic.

iii) **Earth Sciences:**

Project No:	PSF/Res/P-PU/Earth (85)
Project Title:	Petrology, Mineralogy, Geochemistry and Economic Geology of the Hangu Formation of Salt Range, Pakistan
Duration:	02-Years
Date of Initiation:	01.07.2011
Date of Completion:	31.12.2013 (extended)
Total Expenditure:	Rs. 549,327/-
Principal Investigator:	Mr. Syed Mahmood Ali Shah
Name of Institution:	University of the Punjab, (Quaid-i-azam Campus) Lahore.

SUMMARY:

The Lower Paleocene Hangu Formation forms the basal stratigraphic unit of the three fold Paleocene Formation of the Salt Range. The Hangu Formation is widely distributed in the entire Salt Range (Cis-Trans-Indus Ranges), Kohat, Kalachita and Abbottabad areas.

The name "Salt Range" was first used by Elphinston (1808-1815) who noted the extraction of salt from the salt deposit of the area, and his work was extended by Wynne (1878). Fleming (1853), a physician in the British Army, also wrote an extensive report and produced an initial geological map of the Salt Range and Hazara area. A systematic geological study of the area was initiated by the Geological Survey of India in 1931. Gee (1945, 1947, 1981, and 1989), however, prepared a detailed geological map of the Salt Range and Kohat area and reported the presence of "Siliceous laterite" deposits at the base of Eocene sequence. He also extended his work on the Paleocene coal in Dandot and Makerwal areas followed by detailed geological study of coal fields of the area by Danilchik and Shah (1967) and Iqbal and Shah (1980).

Several research workers (Waagen, 1879, 1895; Davies, 1930a and Sahni, 1945, 1947) reported the presence of Paleocene fossils in the Hangu Formation in the Salt Range and Kohat-Potwar Province. Many other research workers (Pinfold, 1918, Davies and Pinfold, 1937; Haque, 1956 and Iqbal, 1972) also reported fossils of early Paleocene age in this formation. Moreover, numerous other research workers (Teichert, 1966-67; Ashraf et al. 1972a, 1972b, 1976; Gardezi and Ashraf, 1974 and Iqbal and Shah, 1980) also briefly described the geology of the Hangu Formation. However, Shah (2001) studied in detail the Hangu Formation in terms of paleoenvironment, sedimentology and economic present in KohatPotwar and Hazara Area.The Salt Range stratigraphic units range in age from Palaeozoic to Tertiary with a markedabsence of Ordovician, Devonian and Carboniferous epoch throughout the region in addition to a major unconformity between the Cambrian and Permian periods. Presently, the Mesozoic sequence is well developed in the Western Salt Range and is partially developed in the Central Salt Range. However, the sequence is mostly weathered and / or eroded in the Eastern Salt Range. In contrary, the Cenozoic stratigraphic sequence is well developed in the entire Salt Range

Project No:	PSF/Res/B-BU/Earth (86)
Project Title:	Basement Shear and Transpression near a Restraining Bend on the Chaman Fault an Investigation of the Structural Kinemat-

	ics and Seismic Hazard in Northern Balochistan
Duration:	02-Years
Date of Initiation:	01.08.2010
Date of Completion:	31.07.2013 (Extended)
Total Expenditure:	Rs. 1,046,388/-
Principal Investigator:	Dr. Din Muhammad Kakar
Name of Institution:	University of Balochistan Quetta

SUMMARY:

The seismic hazard in northern Balochistan has a long history. Several active faults including the three major the Chaman, Ghazaband and Ornach-Nal faults left-lateral left-stepping faults account for most of the north-south length of the Chaman fault system. From 1892 -2013 three dozen damaging earthquakes that have occurred within ±100 km of transition zone exist between the Sulmain and Kirther Mountain Ranges. The cumulative death-toll from these earthquakes in this sparsely populated region exceeds 38,000-46000, most of whom were killed in the 1935 Mw=7.6 earthquake. The recent damaging earthquakes in the region occurred in 2008 and 2011, 2013 in the Pishin/Kach region NE of Quetta, Dalbandin, Mashkel and Awaran respectively. After every earthquake, next city became unsafe and need special attention to mitigate the effect of next damaging earthquake.

The Chaman fault is the longest of these, extending ≈800 km from 28^0N, near the northernmost fold belts of the Makran subduction zone, to 35^0N. Despite its considerable length, the only damaging earthquake of note to have occurred on the Chaman fault in the past 200 years (1892, M6.5) occurred near the town of Chaman, Pakistan, to which the fault owes its name.

Through this Pakistan Science Foundation sponsored Project we seek support both for geodesy /GPS studies and for expanding them to understanding the seismic hazards of northern Balochistan.

The GPS studies are designed to determine tectonic strain rates (movements of plate foundary/faults) in the region, and subsequently to estimate future seismic hazards. At its simplest the geodetic strain rate is a measure of seismic productivity. Note that strain does not basically provide a measure of risk, since a slow strain rate simply means that earthquakes occur at long intervals and faster movement causes frequent earthquake.

During the project life GPS field work carried out in different parts of Balochistan to measure and re-measures 23 GPS points in northern Kirthar and Suleiman Range. Due to security situation in south of Quetta, we were unable to re-measure GPS points in Kalat, Surab , Nushki

and Dalbandin due to political instability in the region. We re-measure all points in Quetta and in northern Balochistan, including Chaman, Qila-Abdulla, Saranan, Surkhab, Kach, Ziarat, Khost, Sharhrig, Harnai, Sanjavi, Loralai, Qila Siafullah, Muslimbagh and 6 points in Quetta. The one at Quetta is a permanent station and is part of International network and can be access through internet: http://121.52.157.106/perl-scripts/NetRS.cgi. The installed GPS point's data has been process and results has been analyzed and published.

i. Inter-seismic strain accumulation along the western boundary of the Indian sub-continent.
ii. "Bookshelf Faulting in the Ziarat Earthquake Sequence, Northern Baluchistan, October 2008"
iii. "Land Subsidence and Declining Water Resources in Quetta Valley, Pakistan"

The details of the above mentioned three papers are mentioned in the relevant section of this report. In addition to the publication of the above mentioned papers, some statements were also appeared in Daily Dawn newspaper:

Link: 1) http://dawn.com/2012/06/01/major-quake-may-hit-quetta-warns-expert/
Link: 2) http://www.dawn.com/news/722990/major-quake-may-hit-quetta-warns expert.

These statements motivated the Chairman National Disaster Management Authority (NDMA) and called Principal Investigator of this project to present recent research carried out through this project before the experts / scientist and disaster manager in NDMA office Prime Minister Secretariat Islamabad. A presentation was made and presented in NDMA office Islamabad on 15th August, 2012, before the Pakistani Scientist and Disaster managers. The meeting was chaired by the Chairman NDMA. Several meetings were scheduled for the purpose to get deliberation on future threat of earthquake to Quetta and surrounding regions. The minutes of the meeting are also attached here to show the progress and impact of this project. A committee was constituted to prepare recommendation to mitigate seismic threat to Quetta. Copy is attached here as (annex-1). The product of all the meetings in NDMA and PDMA resulted announcement of a project for the hazards assessment of Quetta valley, through PDMA Balochistan with financial assessment of the World Bank. This is a remarkable achievement of the Project.

Significance of the Findings: For the first time in the history of Balochistan, GPS data has been generated and analyzed and get published in international repute journals. The fundamental measurement through GPS described the 2008 twin Pishin/Ziarat earthquakes sequence that occurred near our GPS measured network enabling us to capture subsurface displacement causal to these earthquakes. The Chaman fault system have also been studied through this project. The GPS measurements in across the Chaman fault system provide new insight into the seismotectonics of the western and NW edge of the Indian Plate and its interaction with Eurasian Plate. The displacement on the Chaman fault system is approximately

3cm/year. The Mach Kach shear zone partitioning velocity is 8mm/year towards southeast. These rates are responsible for historical and future seismicity in this region. The research carried out through this project cannot be underestimated. These studies have changed the entire view of tectonic process operating in Pakistan. The GPS measurements are the foundations for the future studies and framing building codes. Another phenomena revealed through study is the land subsidence of Quetta valley through extraction of groundwater. The vertical subsidence in the city of Quetta at rates that point to irreversible groundwater surface tilts and fractures developed in land and building caused by aquifer compaction. Through print and electronic media the public and high-up have been made aware about the seriousness of seismic hazards and land subsidence of the region.

iv) **Engineering Sciences:**

Project No:	PSF/Res/P-HITECU/Engg (113)
Project Title:	Compressed Air Power Vehicle (Bike)
Duration:	02-Years
Date of Initiation:	02.03.2015
Date of Completion:	01.03.2017
Total Expenditure:	Rs.436,490/-
Principal Investigator:	Prof. Dr. S Kamran Ashfaq
Name of Institution:	HITEC University, Taxila

SUMMARY:

An air engine provides power to a Compressed-Air Vehicle (CAV), using compressed air, which is stored in a tank. Instead of mixing fuel with air and burning it in the engine to drive pistons with hot expanding gases; compressed-air vehicles use the expansion of compressed air to drive their pistons.

Previous work done (in first year of the project) on this project concluded that such engine can be run on compressed air successfully but it lacked the necessary torque to run a vehicle. The previous attempt was done using an electromechanical system.

In this report, brief summary is presented about the research conducted in multiple phasesin HITEC University.

The most recent work employed two different methods. In the first method a two stroke petrol engine was modified to run on compressed air and later, after gathering all necessary results of the first method, second method was carried out by modifying a four stroke petrol engine. Although the vehicle was run successfully in this project, but further research is pro-

posed on the compressed air technology owing to its economic advantages than alternative fuel sources.

Project No:	PSF/Res/C-CIIT/Engg (148)
Project Title:	Machine Vision System for Visually Impaired People
Duration:	01-Year
Date of Initiation:	21.12.2015
Date of Completion:	20.12.2016
Total Expenditure:	Rs.602,467/-
Principal Investigator:	Dr. M. Mohsin Riaz
Name of Institution:	COMSATS Institute of Information Technology, Islamabad

SUMMARY:

Blindness or poor visual perception usually limits the capabilities of people. Beside other senses (hearing, speaking and smelling), vision plays an important role in day-to-day activities. According to a survey, almost 285 million people globally are visually impaired out of which 39 million are blind and 246 have extremely low vision. Blindness can occur at any stage of life (even before birth i.e. in pregnancy) due to various reasons (like genetics, illness, poisoning, or willful action etc.). Generally, visually impaired people uses sticks and trained pets for navigation. However, these provide very limited information about the scene. For detail object/scene information (shape, size, texture, motion, color etc.) smart electronic systems are required.

The project deals with the development of a machine vision system to assist visually impaired people. The device will consist of a camera to acquire scene information in the form of images/video. The video is passed through different pre-processing steps like filtering, interpolation, fusion etc. The pre-processing step will remove any unwanted artifacts presented in the video due to system or environment noise. Various post processing steps will be performed for object detection, feature extraction and recognition. In addition, text recognition will be performed to extract associated information with the objects. A major feature of the project is health care system for visually impaired people. It is observed that blind people can-not use daily routine health sensors (temperature, blood pressure, pulse etc.) without the help of human assistance. To address this issue, the project will provide plug-and-play facility to connect different sensors with the processing unit without external help. The sensors will take the reading and processing unit will convert the readings into audio output.

In nut-shell the developed system/device with compact size, plug-and-play, audio output, real-time, accuracy and robustness will provide a wide range of visual assistance to blind people.

Project No:	PSF/Res/F-GIK / Engg (107)
Project Title:	Battery based Micro hydropower plant on catamaran for free water flow operation
Duration:	02-Years
Date of Initiation:	01.09.2011
Date of Completion:	28.02.2013 (extended)
Total Expenditure:	Rs.445,388/-
Principal Investigator:	Prof Dr. Muhammad Abid
Name of Institution:	GIK Institute of Engg. Sciences & Technology, Topi.

SUMMARY:

This report presents the site selection, preliminary design, fabrication, installation and testing of a micro-hydro power plant. The power plant was installed and tested in the irrigation canal near GhulamIshaq Khan Institute, Topi, Swabi. The first step of this project was to carry out a site analysis at the canal. The purpose of the site analysis was to identify a location of the canal which has suitable conditions for testing. Two of the most important conditions were the water velocity and water depth, as sufficient water velocity needs to be present to rotate the water wheel and sufficient depth need to be present so that the entire blades are immersed in water. The next step was to select a suitable generator; for this an alternator depending on market availability was selected. The power output and the required rotational speed of the generator were tested by setting up a test rig in Faculty of Mechanical Engineering, GIK Institute. Gear box was required to step up slow rotational speed of the water wheel to the required rotational speed of the generator, to determine the gear box ratio we required the rotational speed of the water wheel in the canal. Preliminary testing was done. Rotational speed of the water wheel was recorded and week points of the structure and performance were observed. Design of different parts of MHPP was improved to improve its strength, make it modular and improve performance and efficiency, Gear box of 1:160 was selected depending on the rotational speed of the water wheel and the generator. To connect the water wheel shaft with the gear box and the gear box shaft with the generator shaft, a suitable coupling was selected. The final installation was carried out in April 2912 and a power output of 1.14 KW was obtained from the Micro Hydro Power Plant. After this testing, design is further improved and its structure was made stronger for better performance. System is now ready for

installation and testing for power generation with batteries, DC-AC inverters, gear boxes in order to and benefit the community at some suitable and safe site. As design is made modular, so proper training of the personnel and awareness for its use be imparted for its sustainability and proper functioning. A power output up to 3 kW is expected, provided proper installation and operation is done.

Research results are presented in international conference by the CO-PI in Tajikistan and in the ***2nd annual All Pakistan Students Projects & Poster Competition, 2012 (SPPC 2012)"*** held on May 5, 2012 where it was awarded the First Best Project Prize.

Project No:	PSF/Res/C-NUST/Engg (105)
Project Title:	Tribological Performance of Cam/Tappet Interaction in a Direct Acting Overhead Valve –Train Engine
Duration:	02-Years
Date of Initiation:	01.06.2011
Date of Completion:	31.12.2013 (Extended)
Total Expenditure:	2,006,394/-
Principal Investigator:	Prof. Dr. Riaz Ahmed Mufti
Name of Institution:	National University of Sciences and Technology (NUST), Islamabad

SUMMARY:

A wide range of valve train configurations are used in internal combustion engines. The most widely used configuration is the direct acting overhead cam-tappet arrangement. In this type of configuration the cam is slightly conical and operates on a dome-shaped tappet to encourage rotation. Tappet rotation is an important parameter as it has a direct effect on the durability of the component and is the focus for this research. If for some reasons the tappet stops rotating, due to fatigue, catastrophic failure of component can take place. The tappet rotation mainly depends on the friction between the cam-tappet interface and the friction between the tappet-bore. The friction at the cam-tappet interface encourages the rotation whereas the tappet-bore friction resists rotation. A number of techniques have been developed to measure tappet rotation on test rigs using custom made valve train mechanisms. To understand the interaction at the cam-tappet interface it is important to carry out the experiments under its original environment, using real engine valve train systems. Initially it was suggested to use eddy current sensor for monitoring the tappet rotation. But due to the adverse effect of lubricant on the sensor, a new technique was developed based on a small GMR chip. The tappet rotation on the real engine head under motored conditions was measured under different op-

erating conditions. A special engine test rig was developed for the purpose of understating the tribological performance of cam/tappet interaction. The results clearly indicated that the tappets in an engine behave different from each other. Some rotate at minimal speed and some at high speeds. It was also revealed that a good number of tappets did not even rotate and this is a worrying factor. As an outcome of this work, two patents have been filed to convert the developed technique into a commercial product in the new future. In this final report the details of the test rig, the developed tappet performance monitoring system, camshaft drive torque measurement, component wear methodology and the test results have been reported.

v) **Environmental Sciences:**

Project No:	PSF/Res/C-NUST/Envr (112)
Project Title:	Chlorine Decay Modeling in a Prototype Distribution Network
Duration	01-Year
Date of Initiation:	01.07.2016
Date of Completion:	30.06.2017
Total Expenditure:	Rs.895,315/-
Principal Investigator	Prof. Dr. Imran Hashmi
Name of Institution	National University of Science & Technology, Islamabad

SUMMARY:

Provision of safe drinking water and adequate disinfection are vital for the sustainable environmental conditions and reducing the incidence of water borne diseases and morbidity levels. Upon disinfection, the presence of organic and inorganic precursors in raw water leads to the formation of disinfection by-products (DBPs), such as trihalomethanes (THMs), which are of prime health concern associated with disinfectionpractices. Owing to its cost-effectiveness, availability and broad spectrum method of disinfection, chlorine hasbeen a preference over other disinfectants since ages to treat drinking water, but chloramine is an emerging formof disinfection because it is stable than chlorine and doesn't react with organic matter readily to form THMs. Ithas been widely applied as a secondary disinfectant. Several failures in the distribution system, namely loss of adequate disinfectant residual, intermittent service, leakages and ageing of infrastructure can result in pathogen intrusion and ultimately declining quality of water supply. So, it is important to understand the response of specific water quality parameters like applied chlorine dose, pH, temperature, total dissolved solids (TDS), contact time to chlorination and pathogenic microorganisms. Another group of bacteria, Ammonia oxidizing bacteria (AOB) occur when chloramines are used as disinfectant and

thus they reduce the efficiency of disinfectant. It is, therefore, essential to achieve a good understanding of the behaviour of pathogenic microorganisms and chlorine with different water variables as they contribute towards chlorine decay in long distribution network. For this purpose, deterministic modeling is one of the best tools available to determine the microbial behaviour with different variables. Modeling may be used to predict residual concentrations in water distribution networks and optimize chlorine dosing. The present study compares the potential of chlorine and chloramine to inactivate gram negative microorganisms along with the formation of DBPs in treated water. In controlled batch experiments, bacterial inactivation varied as a function of dose and contact time. Batch experiments revealed greater log-inactivation of gram negative microorganisms with monochloramine as compared to chlorine. Chloroform was predominant in 97% of samples while Iodoform produced in small quantities. Whereas NDMA produced in highest concentrations in chloramination of water. Response surface methodology (RSM) was employed for optimization of variables to study bacterial inactivation and DBPs within a lab-scale distribution network to simulate real distribution network. After a series of experimental runs based upon design of experiments (DoE) by RSM, dose was found to be the most significant factor ($p<0.01$) in determining DBPs formation while contact time significantly ($p<0.01$) affected bacterial inactivation by both disinfectants. The quantification results for THMs revealed that Chloroform was the predominant specie detected in all post-chlorinated water samples; however, 88% samples exceeded the permissible limit set by USEPA (0.07 mg/l). Iodoform speciation was less favourable as compared to chloroform at higher chlorine dosages. NDMA was also predominant in chloramination of prototype watersamples. To simulate real contamination conditions for drinking water networks, sludge from membrane bioreactwas spiked with tap water. Presences of AOBs were detected by PCR analysis. AOBs are resistant to monochloramine and hence persist in treated drinking water networks. Study revealed that their presence in thewater network, reduce bacterial reduction by 2-log, thus reducing overall efficiency of treatment. Drinking water distribution systems need to be monitored periodically for microbial and chemical contaminants to ensure safe drinking water supply at consumer's end. Increased bacterial resistance to conventional treatment methods has provoked the need to reconsider chlorination. Study revealed a better overall disinfection with mono-chloramine owing to its stability in long-distant water networks. Various inter-related parameters effect adequate disinfection and safe water supply at consumer's end which needs to be monitored olistically. Furthermore, the study will provide an insight to the behavior of pathogenic microorganism and applied chlorine in a distribution network.

Project No:	PSF/Res/ P-GCU/Envr (89)
Project Title:	Comparative Study of Genotoxic Effects of Heavy Metals on Indian Major Carps by Bioassays in the Indus River
Duration	02-Years
Date of Initiation:	24.04.2009
Date of Completion:	23.04.2011
Total Expenditure:	Rs.783,250/-
Principal Investigator	Prof. Dr. Shahid Mahboob Rana
Name of Institution	Govt. College University, Faisalabad

SUMMARY:

The influence of the Indus River system on the marine and freshwater fisheries is substantial, as this river system has historically transported enormous quantities of nutrient and sediments to the continental shelf. With the construction of a number of barrages across the Indus, water has been diverted for power generation and irrigation purposes to the extent that the discharge into the ocean from the Indus has been reduced by almost 90%. The present Project was designed on Indus River at District Mianwali to assess the effect of pollution and heavy metals on fish health and composition as they have a tendency to accumulate heavy metals and other environmental toxicants in their body tissues. During the first year of this project following investigations were made.

Status of heavy metals Cadmium (Cd), Cobalt (Co) and Nickel (Ni) was determined in water and fish samples of Wallago *attu and Labeo rohita* along the stretch of Indus River. Seven fish of same weight categories of each fish species were collected from three different locations Kalabagh, Kundian and Chashma on monthly basis from September, 2010 to March, 2011 from Indus River Mianwali. Fishes were shifted into the Research Laboratory Department of Wildlife and Fisheries, G.C University Faisalabad. Estimation of heavy metals from water and fish (liver, Kidneys and muscles) sample was performed by using atomic absorption spectrometry (AAS). The physico-chemical parameters of water samples viz. temperature, pH, electrical conductivity, TDS were also studied.

In water samples from Kalabagh, Kundian and Chashma the maximum Cd concentration (0.003±0.00 mg/l) was observed from Kalabagh during dry season. Whereas, the Co-concentration (0.0006±0.000 mg/l) and Ni-concentrations (0.030±0.00 mg/l) were observed

During the year 2017-18 M&E Wing monitored sixteen (16) projects being executed at different institution from Chashma during dry season.

Project No:	PSF/Res/ P-DGF/Envr (65)
Project Title:	Pollution in Hadiary Drain its Direct and Indirect Impact on Human Health through Food Chain
Duration	1.5-Years
Date of Initiation:	01.07.2006
Date of Completion:	31.12.2007
Total Expenditure:	Rs. 521,380/-
Principal Investigator	Dr. Muhammad Ayub
Name of Institution	Department of Fisheries, Lahore

SUMMARY:

Hudiara Drain is an international drain that originates in District Amritsar, Punjab, India. It flows about 45km in India and then enters in Pakistan and finally joins River Ravi after flowing about 55km in Pakistan. On its way it receives Sewage disposal and various industrial effluents from both countries India as well as Pakistan. Most alarming scenario of the Drain is that thousands of acres of land on both sides of drain are permanently irrigated by its water through 55km stretch in Pakistan. A survey was conducted along the whole length of Hudiara drain to assess the heavy metals accumulation in producers and animal's liver, kidney, milk, meat and blood samples. Significantly high concentrations of heavy metals like Al, Cr, Ni, Zn, Cd , As and Cu was detected in samples of plants and animals. The liver, kidney and plants samples were analyzed by Proton Induced X-rays Emission (PIXE) technique and milk, meat, and blood samples of animals were analyzed by Atomic Absorption Spectrophotometer for heavy metals detection. Epidemiological studies indicated that local peoples are suffered in many diseases like urinogenital, cardiac, gastrovascular, respiratory and integumentary diseases that may be attributed due to Hudiara drain pollution in the food chain.

Al concentration ranged in *Trifolium alexandrinum* 630-98672ppm, 991-67378ppm in *Brassica compestris*, 564-17115ppm in *Psidium guajava*, 2308-4240mg/kg in wheat, 534-210mg/kg in rice and 166-687mg/kg in liver. Al was not detected in kidney, milk, meat and blood samples of animals. Cr ranged in *T. alexandrinum* 115-398ppm and 177-284ppm in *P. guajava*. Cr was not detected in rice, wheat, brassica and all animals samples. Ni concentra-

tions ranged in *T. alexandrinum* 95-472ppm, 68-106ppm in *P. guajava*, 18-41mg/kg in liver, 51mg/kg in wheat, 14mg/kg in rice, 1.4-2.7mg/L in milk samples from 4-11.00mg/kg in meat samples and from 0.7-2.4mg/L in blood sample during the study period. Zn concentration ranged in *T. alexandrinum*, 98-494ppm, 73-322ppm in *B. compestris*, 98-154ppm in *P. guajava*, 09-14mg/kg in liver, 65-118mg/kg in kidney, 29-53mg/kg in wheat, 1.9-4.2 mg/L in milk, 15-36 mg/kg in meat and 0.8-1.6 mg/L in blood. Zn was not detected in rice. Cd concentrations was found to be in range from 0.13 to 0.25 mg/L, 0.13 to 2.3 mg/kg and 0.1 to 0.7 mg/L in milk, meat and blood respectively. Cd was not detected in liver, kidney and plants samples. Cu concentrations in milk during study period varied from 0.5 to 1.1 mg/L in milk, ranged from 1.3 to 1.9 mg/kg in meat, 10 to 144mg/kg in liver, 145-180mg/kg in kidney, 0.35 to 0.7 mg/L in blood and 9-27mg/kg in wheat. It was not detected in plants samples except wheat. It is concluded that Hudiara drain is highly polluted due to addition of untreated city sewage and industrial effluents form both countries India and Pakistan. The use of agricultural food crops irrigated by Drain water, animals meat, milk and liver that feed on these crops can cause serious human health impacts and other organisms of the area.

vi) **Physics:**

Project No:	PSF/Res/P-AU/Phys (151)
Project Title:	Synthesis of Soft and Hard Ferrites and their Characterization using Laser Induced Breakdown Spectroscopy
Duration	03-Years
Date of Initiation:	18.06.2011
Date of Completion:	17.12.2014 (Extended)
Total Expenditure:	836,375/-
Principal Investigator	Prof. Dr. Yasir Jamil
Name of Institution	University of Agriculture, Faisalabad

SUMMARY:

Ferrites are magnetic materials of immense technological importance with diverse applications such as low and high frequency transformer cores, antenna rods, and microwave devices, high density recording media, ferrofluids, rare absorbent materials and biomedicine. Quantum size effect and large surface area of nano sized particles dramatically change some of magnetic properties and exhibit super paramagnet phenomena. Due to spin anisotropy and high coercively at room temperature, magnetic anisotropy and moderate saturation magnetization along with good chemical hardness and chemical stability, these magnetic nanoparti-

cles have various useful applications. During this research period, different ferrites were prepared and characterized using X-ray diffraction method. Furthermore some of them were also treated and analysed qualitatively and semi quantitatively by using laser induced breakdown spectroscopy. Whole research work is divided into five sections and experimental procedures and results are discussed in detail. In first section, samples of cobalt substituted nickel zinc ferrite with chemical formula Ni0.5-xCoxZn0.5Fe2O4 were prepared at constant sintering temperature via co-precipitation technique. The micro structural studies were carried out at Quaid-e-Azam University, Islamabad. All samples showed magnetization, magnetization of all samples were determined by using permanent magnet. The XRD patterns of all the samples were in close agreement with the standard patterns. Particle size for the cobalt substituted nickel zinc ferrite was determined by sherrer‟s formula. The size of nano particle were in the range of 20.4nm to 34.63nm , the minimum particle size 20.4 was obtained for the chemical concentration of formula Ni0.2 Co0.3 Zn0.5Fe2O4 for the M/OH ratio of 0.3. The lattice constant, particle size and the density of nanoparticle of ferrite is found to be affected by varying the cobalt concentration and metal to hydroxyl ion ratio although it is showed that variation in cobalt content has little influence on microstructure of Ni05-x Cox Zn0.5 Fe2O4, and do not induce change in microstructure. 3 In second section, Fine powders of cobalt zinc nanoferrites were prepared through co precipitation technique and effect of laser irradiation on the samples of ferrite for different time was checked. The X-ray diffraction analysis was performed to calculate the volume, lattice constant, X-ray density, particle size and the effect of laser irradiation on the samples from the data thus obtained. The XRD patterns of the samples were exactly related with the original patterns. The effect of laser irradiation on Cobalt Zinc ferrite nanoparticles were investigated by using X-ray diffraction technique, through which the structural and magnetic properties of these synthesized samples were also, examined. The Particle size of these synthesized samples was also calculated using Sherrer‟s formula from the XRD data. X-ray densities of these prepared samples were decreased gradually by increasing the magnesium contents while increased abruptly by removing the magnesium contents. The other parameters like lattice constant and volume for each synthesized samples were calculated before and after the laser treatment from the analysis of XRD spectrum. Volume particle size and the density of the sample increased after some minutes due to the laser treatment. Third section of the report deals with the preparation of NixZn1-xFe2O4 and MgxZn1- xFe2O4. The synthetic technique involved the co precipitation of Nickel, Magnesium, Iron and zinc ions from aqueous solutions using NaOH base to create fine NixZn1-xFe2O4 and MgxZn1- xFe2O4 particles. The structural studies were performed using XRD

technique at Quaid-eAzam University, Islamabad. Samples with different concentrations of both NixZn1-xFe2O4 and MgxZn1-xFe2O4 were prepared. Particle sizes for all prepared 10 samples were determined using Scherrer‟s formula. The XRD patterns of all powdered samples showed very close resemblance with the original patterns. Electrical properties of the samples have been studied with the help of LCR 6440B Wayne Kerr analyser at room temperature. The capacitance and dielectric loss were measured simultaneously in the frequency range from 1 KHz to 3 MHz. Dielectric constant and ac conductivity was calculated by using these parameters. The effect of frequency on the dielectric constant, loss tangent, and ac conductivity has been studied. The values of dielectric constant are high at low frequency and then decreases rapidly with the rise in frequency. Dielectric loss tangent of all the samples decreases with increasing frequency. Ac conductivity of both materials increases by increasing frequency. In fourth section, Mn-Zn ferrites which are synthesized by the co-precipitation techniques were analyzed using LIBS is. Data obtained from emission spectrum is compared with National Institute of Standard and Technology (NIST) data base. In order to conduct the quantitative analysis of the material one needs to calculate the plasma parameters like that of 4 electron number density (Ne) and plasma temperature (Te). Boltzmann method is used to find out Plasma temperature (Te) which is theoretical method. Number density (5.34× 1016 cm-3) and Plasma temperature (5463 K) confirms that our plasma is in LTE (Local Thermodynamic Equilibrium). Our experiment is conducted in open air at atmospheric pressure. Section five is concerned with spectroscopic analysis of five samples of nickel zinc ferrites. Plasma is produced by 1064 nm and 532 nm wavelengths of Nd:YAG laser. For fundamental (1064 nm) and second harmonics (532 nm), the pulse duration was 5 ns and 4 ns respectively. Boltzmann plot method was used for determination of plasma temperature and number density was calculated by Stark broadening. The plasma parameters were characterized by time resolved spectroscopy, using neutral and ionic emission lines, at time delays of 200 μs, 250 μs and 300 μs. The observed lines were compared with NIST data base. Ni, Zn and Fe were main elements of five samples. The plasma temperature was measured by Boltzmann plot method. At 1064 nm wavelength of laser, temperature was found to be 16537 K and at 532 nm wavelength of laser, the temperature was 13035 K. The number density was 3.66×1016cm-3 at 1064 nm and 2 × 1016 cm-3 at 532 nm.

Project No:	PSF/Res/P-GCU/Phys (246)
Project Title:	AC magnetic measurenments
Duration	02-Years

Date of Initiation:	04.04.2007
Date of Completion:	03.04.2009
Total Expenditure:	1,050,280/-
Principal Investigator	Prof. Dr. Salamat Ali
Name of Institution	Government College University, Faisalabad

SUMMARY:

AC magnetic measurenments in which an Ac field is applied to a sample and the resulting ac movements is measured, or an important tool for characterizing magnetic (whether it is para-ferro- or antiferro- for diamagnetic material) superconducting and spin-glass behaour od matrials.when a samall AC field is applied to the material induced magnetic moment is produced, which is time dependent and this induced moment is measured using AC magnetometer. These measurements yield information about magnetization dynamics which are not obtained in DC measurement. Where, the sample moment is constent during the measurement time. In this project a complte AC magnetic measurement Probe in the variable temeperature environment ranging from liquid nitrogen to room temeperature has been developed and now being used in the Deaprtment of Physics, GCU, Lahore.

Project No:	PSF/Res/C-PINSTECH//Phys (172)
Project Title:	Development of Graphene Based Highly Sensitive and Low Cost Glucose Biosensor
Duration	02-Years
Date of Initiation:	01.05.2015
Date of Completion:	30.04.2017
Total Expenditure:	1,466,483/-
Principal Investigator	Dr. Mashkoor Ahmad
Name of Institution	Pakistan Institute of Nuclear Science & Technology (PINSTECH), Islamabad

SUMMARY:

Nanostructures materials play an important role for the fabrication of nanoscale devices for future nanoscience and technology. The main aim of this project is the synthesis of large scale production of high quality and uniform graphene films and the development of graphen-based glucose biosensor for enhanced sensitivity and reusability to reduce the overall cast as compared to convention biosensors available in the market. The unique and outstanding properties of graphene make it promising nanomaterial for the applications in various fields such as energy, medical and optoelectronics. One of the most capable applications of graphene is electrochemical sensing. Graphene based hybrid nanostructures provides noticeably and highly desirable advantage due to unique functions in bioapplication and physicochemical properties as compared to individual material. In noble metal nanoparticles, AuNPs are the major studied nanomaterials, due to their remarkable catalytic activity, high chemical stability, excellent chemical properties and other distinguished properties. This report mainly

consists of three major parts, synthesis, characterization and applications of graphene based nanostructures. Firstly, we will briefly describe the most commonly applied methodologies such as chemical vapor deposition (CVD) along with wet-chemical approach for the synthesis of graphene (GN) and graphene based hybrid nanostructures. Via this method, various GN based advanced functional hybrid nanostructures, such as graphene/gold and GN/Co3O4 have been prepared. Large scale CVD grown graphene and integration into the fabrication of biosensor remain a great challenge. Also TiO2/rGO, Fe3O4/rGO, and Fe2O3/rGO composites have also been synthesized by employing modified hummer,s method along with chemical approach. In order to explore the structural and electronic investigation, X-ray diffraction (XRD), field emission scanning electron microscope (FESEM), high resolution transmission electron microscopy (HRTEM), energy dispersive X-ray spectroscopy (EDX), Raman spectroscopy, and FTIR have been used to characterize hybrids nanostructures. To fabricate the glucose biosensor, a conventional glassy carbon electrode (GCE) has been modified by hybrid structures for the determination of glucose. Detailed electrochemical measurements of the modified electrode towards glucose detection are investigated by cyclic voltammetry (CV) and amperometry. The modified electrode shows a very rapid and sensitive response towards the change in glucose concentration in the range from 0.0025 to 0.1mM within a response time less than 4s. Also the modified electrode exhibits a very high and reproducible sensitivity of 84.53mA M-1 cm-2 , which is much higher than that of a bare and graphene oxide based modified electrodes. The increase in sensitivity is considered due to the presence of AuNPs and the unique properties of GN. Furthermore, the biosensor exhibits a good anti-interference ability and thermal stability. All the results show that GN based hybrid nanostructures not only enhance the sensitivity towards glucose detection but also provide a novel platform for the design of other biosensors. Furthermore, glucose biosensor based on different GN based nanostructures has been fabricated. Although the biosensors based on these nanostructures have the required sensitivity, but the selectivity needs to be improved. Finally, it has been found that GN based hybrid nanostructures provide a new platform for the design of biosensor. Also it is expected that these hybrid structures may provide wide range of applications not only in biosensor but also for energy storage, environmental remediation and photocatalysis applications.

1.1.2 Scientific Publications Produced through PSF Supported Projects

One of the main achievements and usefulness of any research is the publication of its results in scientific journals. Based upon the results of completed projects, 36 research papers were

published in different national / international journals and 03 patents were registered under these completed projects. Details are given at *Annexure-IV*.

1.1.3 Higher Degrees Earned through PSF Supported Projects

One of the major goals of the Foundation is the development of scientific human resource in the country. This results in strengthening of R&D infrastructure of various scientific organizations. The Foundation has been developing scientific manpower through its research projects and the Research Associates employed in the PSF supported research projects to register for higher degrees. During the year, 04 Ph.D and 34 M.Phil/M.Sc (Hons) students secured their degrees while working as Research Associates in these completed projects. Following students working on PSF supported research project and were awarded Ph.D/M.Phil/M.Sc. (Hons) degrees: in Detail placed at (*Annexure-V)*

1.2 OTHER SCIENCE PROMOTION ACTIVITIES

a. Financial Assistance for Holding Science Conferences, Seminars, Symposia and Workshops

Another function of the Foundation is to provide funding for holding conferences/seminars/symposia/workshops etc. During the year 2017-2018, an amount of Rs.5.3 million was released to various institutions for organizing 32 conferences, seminars and workshops on important scientific topics. Details are given as *(Annexure-VI)*

b. Financial Support for Scientific Societies/Scientific Journals

The Foundation provides funds to Scientific Societies/for holding their regular conferences, meetings and publication of scientific journals in various disciplines. During the period, an amount of Rs.0.180 million was released to 02 societies/journals. *(Annexure-VII)*

1.2.1 a. R&D-Industry Programme:

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

a) **Under-Process Projects**

During 2017-18, the following project proposals were remained under-process;

1. **"Enhanced Productionof Protease by UsingAgro-IndustrialResidue and GeneExpression forIndustrial Demand"** from Department of Biotechnology & Genetic Engineering, Kohat University of Science & Technology, Kohat.

2. **"Production and Commercialization of DNA Purification Kit"** from COMSATS Institute of Information Technology, Islamabad.

3. "**Development of an Indigenous Gasifier for Lignite Coal**" from Mehran University of Engineering & Technology, Jarnshoro

4. "**Utilization of Mango Kernel Starch as Biodegradable Packaging Films**" from Pakistan Council of Scientific & Industrial Research (PCSIR) Laboratory Complex, Lahore

5. "**Commercialization of Lamp-Based Diagnostic Kits for Diagnosis of Banana Pathogens**" from COMSATS University, Islamabad

b) Projects Approved:

a) **"**Design Improvement of High Torque Low-Speed Diesel Engine: Phase-I**"** receive from Heavy Industries, Taxila.

c) On-Going Projects

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

1. "**Pilot Scale Studies and Commercialization of Indigenous Deflouridation Technology for Drinking Water"** received from PCSIR Labs. Complex, Karachi.

2. **"Development of Water-Proof Breathable Nanofibers Membranes for Raincoat Application"** received from Mehran University of Engineering & Technology, Jamshoro. The objective of this project is to develop a water-proof breathable nanofibre membrane for raincoat application. The textile industry would be its end-user once developed.

3. **"Development of Microbial based Feed Supplement and Evaluation of its Efficiency on Growth, Production and Health of Dairy Cattle"** received from Quaid-i-Azam University, Islamabad. The objective of this project is to introduce a feed supplement having positive impact on growth, production and health of Dairy Cattles. M/s Shafi Resochem (Pvt.) Ltd. have consented to be its end-user once developed.

4. **"Design, Manufacturing and Installation of Gravitational Water Vortex Turbine at Mardan, KPK"** from Ghulam Ishaq Khan Institute of Engineering Sciences & Technology, Topi, District Swabi. This turbine would be used for electricity production through gravitational water vortex.

5. **"Development of Indigenous Technology to Produce High Energy from RDF Gasifier for Zero Waste"**received from PCSIR Labs. Complex, Lahore.

6. Project Entitled, **"Development of Technology for the Synthesis of Pharmaceutical Raw Materials"** from PCSIR Labs. Complex, Lahore remained on-going during the report period. The First Annual Technical Report was received during the report period. The local pharmaceutical industry is the end-user of this technology.
7. Project Entitled, **"Easy Maintainable Leather with Upgraded Properties through Advanced Nanomaterials"**from Leather Research Center, PCSIR Labs. Complex, Karachi remained on-going during the report period. The use of nanomaterials in leather have showed improved properties of leather, such as tensile strength, elasticity, wear resitance, stain resistant and fire resistant antimicrobial hydro etc. Aururms Chemicals Ltd., Karachi has consented to be its end-user after its successful completion.
8. Project entitled, **"Indigenous Development of Alumina Ceramic Faucets"** from Metallurgy Division, Dr. A. Q. Khan Research Laboratory, Kahuta, Rawalpindi was approved by the Technical Committee on Engineering Sciences held on 14.09.2015.
9. Project entitled, **"Nickle Metal Hydride (NiMH) Batteries"** from Metallurgy Division, Dr. A. Q. Khan Research Laboratory, Kahuta, Rawalpindi was approved by the Technical Committee on Engineering Sciences held on 14.09.2015.
10. Project entitled, **"Low Cost Ni-Cr based Dental Alloy Development for Commercial Usage"** from Metallurgy Division, Dr. A. Q. Khan Research Laboratory, Kahuta, Rawalpindi was approved by the Technical Committee on Engineering Sciences held on 14.09.2015.
11. **"Development of Eco-Friendly Products as Larvicidal/Insecticidal against Dengue Vector"** received from PCSIR Labs. Complex, Lahore.
12. **Development of Eco-Friendly, Energy Efficient, Indigenous Sizing Machine**" received from National Textile University, Faisalabad
13. "**Pilot Scale Demonstration and Popularization of Dual Technology of Bio-Geyser with Agro Waste Composting**" received from Nuclear Institute of Food and Agriculture, Peshawar

1.2.1 b. Invention to Innovation Summits:

Four Inventions to Innovation Summits were organized during 2017-18 at all four provinces of Pakistan. The venues in Punjab, Balochistan, Sindh and KPK were University of the Punjab, Lahore, University of Balochistan, Quetta, University of Karachi, Karachi and the Universtiy of Engineering & Technology, Peshawar respectively. All these summits were organised with mutual collaboration of Pakistan Science Foundation (PSF), Pakistan Scientific and Technological Information Center (PASTIC), Institute of Research Promotion (IRP) and the Offices of Research, Innovation & Commercialiation (ORICs) of the respective universities.

The industries aiming innovations in business were invited to visit exhibition, perceive new technologies and to commercialize them. An exhibition was the crux of these activities where researchers, academia personals, R&D organisations and industrialists having technologies engrossed with local R&D physically displayed their products, processes and technologies. Along-side, this summit proceeded with Technical Sessions facilitated by the R&D experts from public & private sector entities relating to different fields viz. Food Safety and Standards for Hotels & Restaurant Industry, Technologies for Mineral Based Chemicals and Material, Live Stock & Dairy, Technologies for Electrical and Communication, Business Plan Competition, Food Processing Technologies, Technologies for Agriculture Engineering, Pre-Harvesting Technologies for Agriculture Sector, Social Sector Innovation-Processes, Models and Marketing Ideas and Technologies Dyes & Pigments etc. These Summits are the provincial level annual activity of the joint collaboration of R&D-Industry Programme of Pakistan Science Foundation (PSF) and Pakistan Scientific & Technological Information Center (PASTIC), respective Universitites and Institute of Research Promotion (IRP).

Till 2017-18, (07) summits were organized in Punjab, 03 in Balochistan, 03 in Karachi and 03 in KPK. Pakistan Science Foundation organizes an exclusive session on **"PSF Fund Winning Opportunities for Academia and Industry"** at these summits. This session was specially designed for the industrialists and researchers who have novel ideas but could not harness funds due to unawareness about research planning and development of project proposals.

1.2.1 c. Inventions and Innovations Programme:

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

During the report period, a financial grant of Rs. 0.15 million was provided to 02 proposals of inventions & innovations. The detail of the proposals is as under: -

i. Rs. 100,000/- to the team for Participation in International Genetically Engineered Machines Competition, 9-13 November, 2017
ii. Rs. 50,000/- for Design and Fabrication of Urban Concept Car for Participation in Shell Eco Marathon Asia, 2018.

1.3 SCIENCE POPULARIZATION

Introduction

Popularization of science, increasing science awareness and development of scientific culture in the society are major functions entrusted to Pakistan Science Foundation. Under the action plans of various S&T Policies, the task of science popularization at grass roots level in the country has also been assigned to PSF.

Objectives and Functions

Popularization of science plays a central role in the socioeconomic, cultural, and environmental development of any country. It is usually understood as the system of measures aimed at the dissemination, appropriation, and valuing of science and technology goods, which include critical thought, ideas and values, the history and sociology of scientific knowledge, how science is practiced, and the results of scientific research and technological development. Popularization of science makes it possible to spark vocations and encourage talent for scientific research, technological development, and intellectual endeavors in general. It fosters creativity and innovation, further contributes to producing better trained human resources, expands social opportunities, and strengthens the educational system. It also helps to enhance the critical sense of the population, by increasing its involvement in decision-making and contributing to sustainable development. In this regard, Pakistan Science Foundation undertakes a number of programs; a brief of the activities is given below;

Regular Activities

1.3.1 Science Caravan (Mobile Science Exhibitions) is a Mobile Science Exhibition that has been designed to increase public awareness about science and to motivate the younger generation of the country towards study of science. Science Caravan consists of three major components, firstly the Panel Exhibits & Display items, secondly film/multimedia projectors for screening of science films/documentaries and lastly the Starlab Planetarium System. Microscopes, computers, laser holograms and working models reflecting various phenomena of physics, chemistry, mathematics and biology are included in Caravan Exhibitions. At present, nine Science Caravan units are in operation, two for each of the four provinces and one for federal and adjoining areas. During the year 2017-18, a total 81,999 students from 371 schools visited Science Caravan Exhibitions as detailed below;

- Federal Unit:-12,745 students from 61 schools visited the exhibition
- Sindh Unit Sukkur:- 21,305 students from 91 schools visited the exhibition

- Sindh Unit Tandojam:- 6,265 students from 46 schools visited the exhibition
- Punjab Unit Faisalabad:- 20,151 students from 68 schools visited the exhibition.
- Punjab Unit Multan:- 3,480 students from 17 schools visited the exhibition.
- Khyber PakhtoonKhaw Unit, Peshawar:-14,003 students from 61 schools visited the exhibition.
- Baluchistan Unit:- 4,050 students from 27 schools visited the exhibition.

Detail list of Science Caravan Exhibitions are placed at Annexure-VIII.

1.3.2 27th Intra and Inter Board Science Essay and Poster Competitions were organized between the students of all Boards of Intermediate and Secondary Education (BISE) of the country. Students from all over the country took part in the competitions. Winners were awarded cash prizes. Essay Competition held on theme titled **"Food Adulteration and Our Health Challenges"** and for Science Poster Competition the theme was **"Wealth from Waste".** Thousands of students from all over the country participated in these competitions.

1.3.3 Donation of Popular Science Magazines and Scientific Books is one of the regular and important activities for science popularization. Quarterly "Urdu Science Magazine" was distributing to 2000 (i.e.) 8000 annually distributed in Schools during the 2017-18. Bimonthly Scientific Journal "The Fountain" published by The Light Publishing Turkey was also provided to Caravan offices, PASTIC offices and PMNH.

1.3.4 Financial Assistance to Schools and other Institutes for Science Popularization activities. PSF supports S&T organizations in organizing their science popularization activities. During the report period, an amount of Rs.190,000/-was provided to S&T organization for strengthening of its labs and arranging Science Popularization activities.

1.3.5 World Science Day for Peace and Development: This day is observed all over the world on November 10 and PSF observes it every year in a befitting manner. PSF in collaboration with other organizations like UNESCO, Intel, and Federal Directorate of Education organized various activities for students and scientists to commemorate the world science day like Convention of Scientists, Science Caravan Exhibitions, Panel Discussions on TV and Prize Distribution to the winners of PSF Annual Inter Board Science Essay and Poster Competitions etc. The theme selected by UNESCO for this year was "Science for Global Understanding" Federal Secretary for Science & Technology Ms. Yasmin Masood, National Centre for Physics Director General Dr. Hafeezur Rehman and Chairman PSF was highlighted the importance of science and its peaceful use for development and benefit of the mankind.

Moreover cash prizes and certificates were also distributed among the winners of PSF's 26th Science Essay & Poster Competitions.

World Science Day was also celebrated by Science Caravan units across the country. They arranged different activities on the occasion such as Quiz competition, Speech competition and Science Exhibition.

Sindh: Science Caravan Unit Sukkur arranged Science Caravan exhibition at Government High School, Qamber, Distt. Shahdadkot. During exhibition also celebrated World Science Day for Peace and Development on the theme "Science for Global Understanding". A speech competition was orgsanised. Above 150 students and teachers of 03 schools participated in this program. At the end, prizes were distributed among winner students and Urdu Science Encyclopedia, DVD, posters, brochures and book sets were presented to the Head of the School.

Science Caravan Tando Jam Unit also celebrated World Science Day at Govt. Boys High School Kunri, District Umerkot. During Science Exhibition, they organized science promotion activities, in which large number of students and teachers participated.

Balochistan: Science Caravan Balochistan Unit Quetta arranged Science awareness programme on "World Science Day for Peace and Development" on 10th November 2017, at Iqra Residential School & College, Quetta. Mr. Maqbool Ahmad (Assistant Director) highlighted the importance, history and purpose of celebrating World Science Day and that how we can use the knowledge and inventions of Science for Peace and Development of our country. He also delivered a detailed lecture on "Science for Global Understanding". More than 100 students and teachers participated in the event. At the end, Mr. Maqbool Ahmad presented Scientific literature i.e. Urdu Encyclopedia, scientific booklets on different topics, Disaster master kit with DVD and Scientific posters to the Vice Principal Iqra Residential School & College Quetta.

Science Caravan Jaffarabad Unit organized a lecture to highlight the importance of the theme for World Science at Govt. Middle School, Hub. Mr. Abdul Khalique, Unit Incharge delivered the lecture. 243 teachers and students attended the lecture.

KPK: Science Caravan KPK Unit arranged World Science Day for Peace & development at Chakdara Abasyn High School. About 515 Students participated in this event. The Head Master and teachers of the schools highly appreciated this event.

Punjab: Science Caravan Unit Multan arranged World Science Day for Peace & development in collaborating with UNESCO on theme "Science for Global Understanding" at Government Pilot High School Multan. About 130 Students and teachers participated in this program.

1.3.6 Popular Science Lectures:

Pakistan Science Foundation arranges series of lectures where eminent scientists and educationists express themselves for the benefit of the audience comprising scientists, scholars, students and the general public as one of its mandatory functions. 25 Popular Science Lecture were arranged across the country in which large number of students, teachers and general public attended the lectures.

DEVELOPMENT ACTIVITIES

1.3.7 New Initiatives/Activities and Future Plans

Old Science Caravan transformed into "Mobile Science Talent Farming Lab"

Under Science Talent Farming project, one important component is strengthening of existing science caravans. In this regard, Science Caravans were refabricated and transformed into "Mobile Science Talent Farming Labs". The new STFS lab is equipped with latest equipment, computers, LEDS with touch screen for interactive learning of students. For presentation and scientific videos, it can accommodate 15-20 students at a time. It is also equipped with solar power and fully air conditioned.

1.3.8 Participation of Pakistani Students in International Forums

A group of 04 students including group leader Dr. Saima, SSIO, PASTIC, participated in London International Youth Science Forum-2017 in London.

Under this Motivational programmes for students to create science awareness in them and to engage them in creative activities, PSF also selected 04 students for London International Youth Science Forum (LIYSF-2017-18).

1.3.9 Pakistani Students Shine in the Belt & Road Teenager Maker Camp Teachers Workshop at Beijing-China

PSF sponsor participation of Pakistani young scientists with the objective to give a greater insight into science and its application for the benefit of all mankind through participation in the said event. The students shared their ideas and projects with fellow students around the

world and eminent scientists. The programme open up opportunities for youth by combining hands-on enriching cultural activities and outdoor adventures with access to fascinating people, places and events which will reflect well for their future access to universities and employment opportunities. In the said camp, 120 students from 16 countries alongwith 30 teachers participated.

The following 04 students participated in the event:
1. Kaleem Ahmed Zafar S/o Zafar Iqbal
2. Ebad Faisal Qureshi S/o Faisal Mehmood Qureshi
3. Shadab Ahmed S/o Mahboob Khan
4. Maheen Mirza D/o Shujaat Mirza

Miss Zaiban Farooq, Assistant Director (Caravan) also participated as group leader to guide and assist students in preparation for camp activities including a teachers training session. The opening ceremony was held on 18th Dec, 2017 in the Auditorium of Beijing High School No.35, Beijing which was attended by senior official from Ministry of Science and Technology, China, Directors of Children & Youth Science Centre of CAST, Ambassadors of different countries and First Secretary for Culture and Education, Embassy of Pakistan, China. Prior to this, students performed cultural activities during welcome dinner.

The students worked in the mix groups of students from other countries where they were briefed about 05 different disciplines according to their interest. These students were part of the groups working on "Bridge Model Design and Making" and "Intelligent Robot Study and Application" All the students performed with their best abilities during the camp. They prepared models as per instruction.

1.3.10 Inter Universities Quiz Competition

Pir Mehar Ali Shah Arid Agriculture University (PMAS-AAU) team won 1st position in Science Quiz Competition among students of Natural Sciences and Emerging Technologies on "Climate Change and Biodiversity" from Universities of Rawalpindi and Islamabad on 3rd January, 2018.

The Competition was organized by Pakistan Science Foundation as a part of its Science Popularization Programme.

The 2nd and 3rd positions were won by National University of Science and Technology (NUST) and Fatima Jinnah Women University (FJWU) respectively.

Overall 05 universities participated in the competition held at COMSTECH Auditorium and each team comprised 3-student. COMSTECH Coordinator General Dr. Shaukat Hameed was the Chief Guest while PSF Chairman Prof. Dr. Muhammad Ashraf, and a large number of scientists and university students participated in the event. Pakistan Museum of Natural History (PMNH) DG, International Islamic University Botanist and Chief Editor Engineering were the judges of the competition.

The top 03 winner teams were awarded cash prizes amounting to Rs 20,000, Rs, 15,000 and Rs 10,000 respectively. Shields and certificates were also awarded to the winning teams.

PSF Chairman Prof. Dr. Muhammad Ashraf said that the Foundation, in order to pass on domino effect of Science to the society, is energetically drawn in to promote and popularize science in the country. The Foundation is undertaking a number of activities. Among these, capacity building of young students is one of the key activities of Foundation, he added.

1.3.11 Inquiry Based Science Education (IBSE) Programme in Pakistan

- PSF conducted Inquiry Based Science Education Program with collaboration of Federal Directorate of Education and Private School Network (PSN).
- 2 days training session / workshop on modern teaching skills Inquiry Based Science Educationwith internationally qualified trainers
- The training Session was based on biological Sciences, Physical Sciences and Chemical Science Modules
- The 33 male & female teachers from public and private Schools participated in two days training Session.
- 2-day capacity building workshop for master trainers (teachers) on Inquiry Based Science Education (IBSE) was organized on 2018 at PSF. The training programme, was attended by over 33 master trainers from Islamabad and Rawalpindi. 03 regional teachers training sessions on IBSE was arranged by Science Caravan, Federal Unit. Islamabad.

1.3.12 Media Workshop on "Understanding Science"

Pakistan Science Foundation is the first science organization in the country which in collaboration with Ministry of Science and Technology and National Press Club has instituted the Science Popularization and Science Journalist Awards. PSF had invited entries for Science Popularization Award 2017 and Science Journalist Award 2017 in October last year. In four categories of Science Journalist Award i.e. English Print Media, Urdu Print Media, TV and Radio, entries in the English and Urdu Print Media categories only fulfilled the required crite-

ria. The judges comprised three eminent scientists including Vice Chancellors and heads of S&T organizations as well as two senior journalists. The PSF Board of Trustees Member headed the Judges Committee to ensure transparency and merit.

Pakistan Science Foundation (PSF), being the apex body for science promotion and popularization in the country, is striving for promotion of science among the youth and motivating them towards Science Education. There are many non-governmental as well as governmental organizations and Individuals/engaged in various activities related to Science Popularization. Keeping in view, the extraordinary efforts/contributions of the individuals and organizations in the field of Science Popularization, PSF has initiated awards to recognize outstanding efforts aimed at popularizing science and technology and promoting scientific attitude among people.

There are many journalists also engaged in various activities related to Science Popularization and to recognize their outstanding efforts aimed at popularizing science and technology and promoting scientific attitude among people the Foundation has also initiated Science Journalist Award from the year 2017.

Mr. Syed Ali Mustafa Zaidi from Islamabad won Science Popularization Award 2017 amounting to Rs. 100,000, Mr. Jamil Ahmed Soomro from Sukkur Rs. 50,000 Journalist Award in Urdu Print Media Category while Mr. Ammer Malik Sheikh from Lahore Rs. 50,000 Journalist Award in English Print Media Category.

1.3.13 Future Plans/Targets

Development of Indigenous Expo on "Water and its Conservation".

- Publication of PSF Science Magazine
- Implementation of IBSE at Provincial level
- Foreign Trainings of PSF officers
- Strengthening of Science Centre, Faisalabad
- Establishment of Science Centers and Science Clubs
- Enhancement of all Science Popularization activities in collaboration with National and International S&T Organizations
- STEM Trainings for Young Students Organizing National Youth Science Forum
- Strengthening and up gradation of Science Caravans
- Media forums for Science Popularization in Collaboration with Press Clubs.
- Capacity building of Science Teachers by organizing Inquiry Based Science Education master trainers workshops on Provincial level.
- Awards for SSC and HSSC students for development of thematic working scientific models.

Development Project

1.4 Science Talent Farming Scheme (STFS) for Young Students Phase-I, Component-I (Revised)

Development project "Science Talent Farming Scheme (STFS) for Young Students, Phase-I, Component-I (Revised)" was conceived by the Pakistan Science Foundation (PSF). The original PC-I was approved by the CDWP in June 2015, however the PC-I was revised and approved by the CDWP on July 6, 2017 at a total cost of Rs.1,285.361 million for a period of 5 years.

Objectives

Primarily, the project is meant to achieve knowledge based economy through capacity building of the youth, having aptitude towards Science, Technology, Engineering and Mathematics (STEM) education. It is an endeavor to sow a crop of young talented students, who will be groomed to turn into a full lot of productive scientists through additional interventions likely to be carried out under STFS, in addition to their formal education.

Each year 300 students who passed their SSC/matriculation from pure Government Schools are selected to groom them to achieve the highest degrees (up to PhD level) in various scientific disciplines. PSF is undertaking STFS for F.Sc. studies, whereas Higher Education Commission (HEC) is responsible for university level/higher education under STFS, Phase-II.

Implementation Strategy

The project objectives will be achieved through the following processes and activities:

a) Selection of 300 students, each year, through evaluation by a specialized testing agency e.g. NTS etc. Scientific aptitude test to be conducted in three phases:

    1. Specialized written/screening test
    2. Paper Based IQ Test
    3. Presentation on innovative ideas/Interview

b) Scholarships @Rs.10,000/- per month, Tuition fee @Rs.10,000/- per year and hostel fee (where applicable) @Rs.10,000/- per year
c) Research projects to be undertaken by each student under supervision of university teacher/researcher.
d) Visits to universities and S&T organizations both at national and international levels
e) Science lectures, Presentations, Film/ Planetarium Shows and Hands on activities through Mobile Science Labs
f) Interaction with eminent scientists

g) Participation in Summer Colleges and National Youth Science Forums
h) Computer/android based learning through laptops/tablets
i) Online meetings and Interaction with eminent scientists through Mobile Science Labs

Achievements

1.4.1 Selection of STFS 3rd batch

For selection of 300 students for STFS 3rd batch, as per directives of Ministry of Science and Technology, the services of National Testing Service (NTS) were hired, which conducted the scientific aptitude test combined with IQ test in May, 2017. Afterwards interviews were conducted by PSF all over the country in July, 2017. The formula approved by MoST for final selection is described below;

Matric (9th& 10th combined)	Scientific Aptitude Test	IQ Test	Interview/Presentation on Scientific Ideas	Total
30%	40%	20%	10%	100%

Accordingly, a provisional merit list of 300 successful candidates was prepared and placed before a "Scrutiny Committee" for final selection. The "Scrutiny Committee" finalized a list of 298 students after verification of their educational certificates and other documents viz., SSC certificate, B-form, domicile etc. Two seats could not be filled due to non-submission of required documents by the selected students, in spite of repeated reminders and phone calls. Details regarding distribution of students are given below;

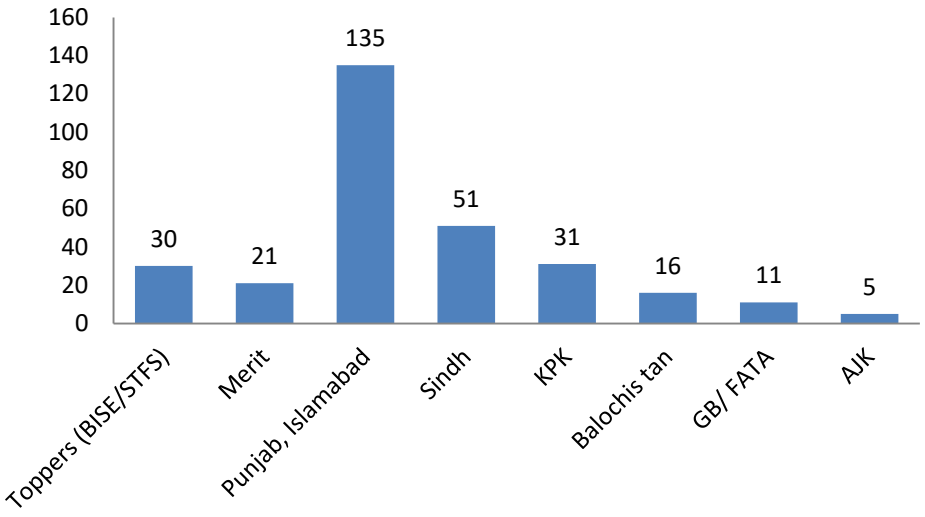
Total seats: 300 (as per decision of STFS Steering Committee on 4.1.2018)

- Pure Govt. Schools: 80% [217 seats]
- Other than Govt. Schools: 20% [53 seats]
- BISE position holders: 10% [30 seats]

Province-wise quota distribution of remaining seats (300-30 = 270)

No. of students	Open Merit		Punjab, Islamabad		Sindh		KPK		Balochistan		GB/ FATA		AJK		%age
% age	7.5%		50%		19%		11.5%		6%		4%		2%		100%
270	21		135		51		31		16		11		5		270
Govt v/s N-Govt 80% v/s 20%	17	4	108	27	41	10	25	6	13	3	9	2	4	1	270
Sindh (Rural v/s Urban) 11.4% v/s 7.6%					25	16	6	4							

(Distribution of seats in graph form)



1.4.2 Monetary Benefits for the students

Selection of 3 batches of STFS (900 total) has been completed. Monetary benefits i.e. scholarships and tuition fee for 2 years to 1st and 2nd batch completed. Monetary benefits for 08 months to students of 3rd batch completed.

1.4.3 Summer Camps for STFS Students

As per approved PC-I, arrangement of summer camp is an important additional intervention in which visits are arranged for S&T organizations along with interaction with eminent scientists, presentations and Inquiry Based Science Education (IBSE) sessions for STFS students each year.

Travel Agency was hired through tender process for making all necessary arrangements for the first 02 batches. For the 1st batch of 300 students, these activities were organized in July, 2016. For the 2nd batch, summer camp and other related activities were organized in July, 2017.

For arranging 3rd summer camp and international study visit, tendering process was initiated many times for hiring of travel agency but each time it was cancelled due to some technical reasons therefore, no summer camp or international visit could be arranged.

1.4.4 Distribution of Laptops among STFS Students

As per approved PC-I of the project, laptops were to be provided to each STFS student. Therefore, laptops were distributed to 1st& 2nd batch students, in 2017 and 2018 respectively in several small ceremonies. However, tendering process for procurement of 600 laptops for

upcoming batches was canceled in June, 2018.Therefore, laptops for 3rd and 4th batch could not materialized.

1.4.5 International visit to S&T Organizations and Universities /Labs

As per approved PC-I, arranging S&T/study visit of 30 top STFS students along with 2 chaperons is an important activity of the STFS project. So far, international visit for 02 groups of 25 top students each from 1st and 2nd batches were arranged to S&T facilities of Singapore/Malaysia and London, UK in August, 2016 and August, 2017 respectively.

For arranging 3rd summer camp and international study visit, tendering process was initiated many times for hiring of travel agency but each time it was cancelled due to some technical reasons therefore, no summer camp or international visit could be arranged.

1.4.6 Selection of Universities and Research Supervisors/Mentors for undertaking Research Projects of STFS Students

As per approved PC-I, the STFS students have to undertake research projects under the mentorship of universities teachers/professors. The STFS students will use the labs and other facilities of selected universities and S&T/academic institutions nearby their areas. In this regard, 36 mentors were to be selected for mentorship of students. Previously 8 universities and their 32 mentors were selected for undertaking research projects with STFS students. University of Balochistan (UoB) was selected and nominations were received from the same to achieve the target of selection of 09 universities along with 36 mentors (4 from each). Payment to 08 already approved universities @1.00 million was completed in 02 installments.

1.4.7 Research Projects of STFS Students

Undertaking research projects by STFS students, under university teachers' supervision is an important activity of the project. In this regard, 36 university teachers were approved as mentors from 09 universities from all over the Pakistan. Subsequently, students of 1st and 2nd batches completed their research projects and submitted their reports in the form of posters. The research projects by 3rd batch students remained in progress. So far, more than 140 research reports/posters were received from students of 1st, 2nd and 3rd batch.

1.4.8 Fabrication of Mobile Science Talent Farming Labs

In the approved PC-I, there is a provision of fabrication and strengthening of (9) Mobile Labs with addition of working models.

The assignment was completed by M/S Shahan Bus Body Works, Lahore. 09 Mobile Science Labs were fabricated on old caravans Buses. The new Mobile Science Talent Farming Labs were equipped with Solar Panels, Touch Screen computer systems, Learning Management System, Videos of practicals of Physics, Chemistry and Biology in Urdu and English for 9th,

10th, 11th and 12th grade students. Science kits were also available in these Labs for better understanding of processes and system in term of Applied Science.

1.4.9 Development of STFS Website, Learning Management System and Video Contents

As per provision in the approved PC-I, to supplement the teaching learning process, a number of additional interventions were to be undertaken including the software development, website, learning apps and teaching learning resources. The said assignment was also completed.

1.4.10 Meetings held

- 5th meetings of STFS Executive Committee held
- 3rd meeting of STFS Steering Committee held

1.4.11 Revision of PC-I for another 3 years (Total 5 years)

The PC-I of the STFS project was revised for another 3 years (total 5 years from December 2015 to December 2020). The same was approved by the CDWP in its meeting held on 6.7.2017 at a total cost of Rs. 1,285.361 million.

1.5 INTERNATIONAL LIAISON

1.5.1 Joint R&D Bilateral Projects and Calls by PSF-NSFC, China joint call for proposals

Pakistan Science Foundation (PSF) and National Natural Science Foundation of China (NNSFC) signed a MoU on 30th of October, 1992 for joint research activities. In order to further strengthen the ties between Pakistan and China, and to take maximum benefit from the experience of Chinese Scientists, Second call of proposals with NSFC was launched between 01.06.2017 to 28.07.2017, under the discipline of "Engineering and Materials Sciences"(Renewable energy resources included). A total of 178 projects were received and after the completion of review process, 12 projects were mutually agreed for funding. The list of projects approved for funding under this call is given at *Annexure-IX*. **A 14** projects awarded under first call are ongoing in different universities/S&T organizations across the country.

1.5.2 PSF-TUBITAK, joint call for proposals

Second call of proposals with TUBITAK was launched between 01.11.2017 and 15.01.2018. Proposals were invited in the field of, Renewable Energy, Earth Sciences, Aeronautics, Materials Science, Biotechnology and Environmental Science. A total of 109 projects were received which are currently under review process while on other side, **05** projects awarded under first call are ongoing in different universities/S&T organizations across the country.

1.5.3 PSF-MSRT joint call for proposals

Under Programme of Cooperation (PoC) signed between Pakistan and Ministry of Science, Research and Technology, (MSRT) Iran for joint research activities**.** Second call for joint proposals with MSRT was launched between 01.02.2018 to 15.03.2018. Proposals were invited in the fields of Material Sciences and Metallurgy, Climate Smart Agriculture and Biotechnology, Economic Utilization of Marine Resources, Textile Engineering and Value Addition, Earthquake forecasting services, Solar Energy and ways of its implementation, Wind Energy and ways of its implementation, Water scarcity in near future and its relation to food scarcity, Air Pollution, Saving Endangered Species of plants, animals and insects. A total 63 projects were received under these calls which were remained under under review. While on other side, 08 projects awarded under first call are on-going in different universities/S&T organizations across the country.

1.5.4 Call for Joint Proposals with Sri Lanka

The first call was launched on 15.02.2017 and concluded on 25.05.2017. Proposals were invited in 06 scientific disciplines namely, Biotechnology, Food and Agriculture, Marine Sciences, Material Sciences, Health and Natural Products. Six projects were selected for funding received under "PSF-NSF, Sri Lanka first call" after the visit 03 member Delegation from the National Science Foundation (NSF), Sri Lanka to Pakistan during September, 2017. The list of projects approved for funding under this call is given at *Annexure- X*.

1.5.5 Visit of International Delegations to Pakistan Science Foundation

TUBITAK and PSF Discuss Avenues of Joint Cooperation

A 06 member Delegation of the Scientific and Technological Research Council of Turkey (TUBITAK), on invitation of Chairman, PSF visited Pakistan from July 16-19, 2017. The TUBITAK team was headed by Dr. Orkun HASEKIOGLU, Vice President TUBITAK. The delegation held meetings with many organizations such as National Radio Telecommunication Cooperation, Haripur, Pakistan Aeronautical Complex, Kamra, Pakistan Atomic Energy Commission, COMSATS, COMSTECH, National Center of Physics and Ministry of Science and Technology, Islamabad.

The meeting of TUBITAK delegation with PSF was held on July 16, 2017. During the meeting, various aspects of future joint collaboration were discussed. PSF and TUBITAK agreed to launch 2nd call of joint proposals. The proposals were to be submitted jointly by Pakistani and Turkish Scientist in various scientific fields. Priority areas of joint proposal submission were also finalized during the meeting. PSF and TUBITAK also agreed to conduct joint workshop on key scientific areas. Possible future avenues of joint cooperation between PASTIC and PMNH with TUBITAK were also discussed during the meeting.

1.5.6 National Science Foundation, Sri Lanka and PSF Discuss Avenues of Joint Cooperation

A 03 member Delegation of the National Science Foundation, Sri Lanka on invitation of Chairman PSF, visited Pakistan Science Foundation on September 15, 2017. The NSF team was headed by Prof. Dr. Sirimali Fernando Chairperson, NSF.

During the meeting, the various aspects of future joint collaboration were discussed. PSF and NSF by joint discussion finalized the projects for funding. Both Foundations also agreed to launch 2nd call of joint proposals. The proposals were to be submitted jointly by Pakistani and Sri Lankan Scientists in various scientific fields. Priority areas of joint proposal submission were also finalized during the meeting. PSF and NSF also agreed to conduct joint workshop on key scientific areas.

1.5.7 International Participation and Visits:

International Symposium on Funding Science and People Cooperation for Prosperous Belt and Road

The Director Research Support/International Linkages attended International Symposium on Funding Science and People Cooperation for Prosperous Belt and Road on July 02-04, 2017 at Beijing, China. The symposium was organized by the National Natural Science Foundation of China (NSFC) and was attended by the policy makers and scientists from 50 countries around the world. The symposium was basically aimed to discuss the role of science for sustainable development along the Belt and Road region. A detailed presentation on the role and working of Pakistan Science Foundation was also delivered by Director, Research Support (RS). List of approved projects under PSF-NSFC China joint initiatives (2nd Call) placed at *Annexure-VIII*.

1.6 NATURAL SCIENCES LINKAGE PROGRAMME

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

1.6.1 Aims and Objectives:

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

Research Priority Areas:

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

Project proposals which highlight main problems of agricultural sector are invited from universities and R&D organizations across the country. Research work is emphasized on the food production & food security issues in Pakistani scenario. Currently 60 projects are being funded in different Universities and R&D organizations around the country under this programme.

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

ACTIVITIES AND PROGRAMMES

1.6.2 Research Funding

Research funding is the principal activity of Natural Sciences Linkage Programme (NSLP). Efforts are being made to establish linkages between end-users and scientists of different R&D Organizations and Universities throughout the country. Projects of applied nature are selected for funding and these research proposals undergo the strict process of scrutiny before the funding. The criteria include the competence of the scientific personnel to carry out the research, institutional capabilities i.e availability of the basic equipment and laboratory

facilities, scientific merit of the proposed research proposals and likelihood of completion of proposed research work within the stipulated time and funds. The proposals are reviewed by two Pakistani experts along with US experts. The proposals recommended by experts are placed in the relevant subject Technical Committee for technical evaluation and recommendations. Technical Committee on NSLP comprises of the renowned scientists from various fields of agriculture and natural sciences. The proposals recommended by the Technical Committee are then submitted to NSLP Fund Management Committee (FMC) for administrative and budgetary approval, before the release of funds.

a) Under process Projects:

During the report period, 118 concept papers remained under consideration of the NSLP. Out of these concept papers, 46 projects were presented in 03 Technical Committee meeting. Technical Committee recommended 14 new projects for funding at total cost of Rs.44.5 million. List of projects recommended for funding during the report period is given in *Annexure-XI***.**

b) On-going Projects

During the year, 60 ongoing research projects remained active and the progress reports of projects (semiannual, 1st and 2nd annual & final reports) were received. The NSLP staff scrutinized the semiannual reports before releasing of next due installment, whereas, annual and final reports after initial scrutiny by NSLP team were sent for evaluation to the subject experts to assess the interim progress of the projects before next due installment was released. It is worth mentioning that due installment of the on-going projects are released only if the interim progress of the projects at the end of each year is rated as satisfactory by the subject expert. An amount of Rs.23.50 million was released on account of due installments of on-going projects. A list of semiannual, annual and final reports is given in *Annexure XII***.**

c) On site Monitoring of NSLP Projects

Natural Sciences Linkage Programme supports the scientific research throughout the country by funding projects of applied nature in different universities and R&D organizations. Technical Progress of the projects is monitored through the Semi Annual and Annual reports. During the year 2017-18, M&E Wing monitored 16 projects being executed at different institutions of Rawalpindi, Lahore, Sargodha, Multan, Vehari and Bahawalpur.

The monitoring team discussed the technical and fiscal issues and progress of the projects with the Principal Investigators and observed that all the projects were running smoothly

without any major hurdle. Monitoring of the projects helped to improve the research quality for better results and in managing the issues related to management and execution of project. The list of projects monitored is placed at *Annexure-XIII*.

d) Completed Projects

e) During the year, 21 projects were completed. The subject experts evaluated the final technical reports of the projects which were subsequently placed before the Technical Committee for adoption. The accounts of these projects were settled. Details of the projects along with the scientific output are given below.

Project No	PSF/NSLP/KP-NIFA (253)
Project Title	Nutrient Management of Deciduous Orchards (Plum) Through Foliar Feeding
Duration	3-years
Date of initiation	15-09-2013
Date of completion	14-09-2016
Final report received	02-01-2017
Final technical report was adopted in the Technical Committee meeting held on	01-08-2017
Location of project	Nuclear Institute for Food & Agriculture, Peshawar
Principal Investigator	Dr. Syed Azam Shah Senior Scientist
Total Expenditure	2,756,174/-
Main objectives	• To eliminate the deficiency of essential macro and micro-nutrients in plum orchards through foliar feeding in order to enhance the fruit yield and quality. • To develop an economical consortium of foliar application of macro and micro-nutrients for plum to improve their use efficiency.

Project No	PSF/NSLP/KP-AU (271)
Project Title	Development of Abiotic Stress Tolerant Rice
Duration	3-years

Date of initiation	15-09-2013
Date of completion	14-09-2016
Final report received	06.04.2017
Final technical report adopted in the Technical Committee meeting was held on	01-08-2017
Location of project	Institute of Biotechnology and Genetic Engineering, The University of Agriculture, Peshawar
Principal Investigator	Dr. Asad Jan Associate Professor
Total Expenditure	1,433,681/-
Main objectives	• Transformation, Selection and Characterization of Stable Transgenic rice • Evaluation of Abiotic stress Tolerance/Adaptation in Transgenic rice • Restricted trials for Abiotic Stress Tolerance with Control Checks • Identification of the Stress Tolerant Lines to be incorporated in Breeding Program for Stress Tolerant Varieties

Project No	PSF/NSLP/KP-AU (293)
Project Title	Utilization of Maggots as an Alternative Animal Origin Protein on the Production Performance of Meat and Egg-Type Bird
Duration	3-Years
Date of initiation	01-05-2014
Date of completion	30-05-2017
Final report received	01-06-2017
Final technical report was adopted in the Technical Committee meeting held on	01-08-2017
Location of project	Department of Poultry Sciences The University of Agriculture, Peshawar
Principal Investigator	Dr. Sarzamin Khan

	Chairman
Total Expenditure	Rs.2,200,780/-
Main objectives	• To evaluate the nutritive value (amino acids, gross energy and minerals profile) of maggot meal as feed ingredient of poultry ration. • To study the effect of maize and maggot meal based ration on growth and immunity of broilers and egg production and quality of laying hens • Economic assessment of feeding maggot meal as alternative protein source in poultry ration

Project No	PSF/NSLP/KP-AU(421)
Project Title	Isolation and Structural Elucidation of the Antimicrobial Compounds Effective against the Wilt Pathogens from *Penicillum* sp. EU0013
Duration	2-years
Date of initiation	01-12-2014
Date of completion	30-11-2016
Final report received	08.03.2017
Final technical report was adopted in the Technical Committee meeting held on	01-08-2017
Location of project	Department of Agricultural Chemistry The University of Agriculture, Peshawar
Principal Investigator	Dr. Zafar Iqbal Assistant Professor
Total Expenditure	Rs.1,372,773/-
Main objectives	• To explore new antifungal agents from *Penicillium* sp EU0013 for control of the Wilt's pathogens; *F. oxysporumf.sp. ciceris* and *F. oxysporum sp. Lycopersici* of chick pea and tomato plants. • To establish bioassay-guided isolation of the targeted natural products from the mycellial extract of the fungus *Penicillium* sp EU0013. • Structural characterization of the targeted bioactive compounds from the *Penicillium* sp EU0013 for

	further development as local natural product based fungicide against the Wilt diseases of tomato and chick pea.

Project No	PSF/NSLP/KP-GU (424)
Project Title	Entomocidal Studies of Plant Materials against Maize Weevil (*Sitophilus oryza*) and Side Effect on Parasitoid *Anisoptromanlous Calandareae* (Howard)
Duration	2-years
Date of initiation	15-12-2014
Date of completion	14-12-2016
Final report received	24-01-2017
Final technical report was adopted in the Technical Committee meeting held on	01-08-2017
Location of project	Department of Entomology, Gomal University, D.I. Khan
Principal Investigator	Dr. Muhammad Mamoon-ul Rashid Assistant Professor
Total Expenditure	Rs.1,498,565
Main objectives	• To see the toxic, repellent, anti-feedant, growth inhibiting and anti-ovipositional effects of the plant derivatives against maize weevil. • To determine the most promising plant extract concentration against thementioned insect pest. • To investigate the potential of natural enemies against the test insect. • To investigate the effects of selected plant materials on the natural enemies of maize weevil.

Project No	PSF/NSLP/P-BZU (130)
Project Title	Breeding for impact of different temperatures on bt

	cruciferous crops and development of resistance to insecticides in *plutella xylostella*
Duration	3-Years
Date of initiation	01-03-2012
Date of completion	28-02-2015 (Extended till 30.06.2016)
Final report received	21-03-2017
Final technical report was adopted in the Technical Committee meeting held on	01-08-2017
Location of project	Department of Entomology, Bahauddin Zakariya Univ Multan
Principal Investigator	Dr. Syed Muhammad Zaka Assistant Professor
Total Expenditure	Rs.760,304/-
Main objectives	• To measure the effect of temperature on the production of toxin and glucosinolates by the genetically modified canola. The measurable outcomes will be a statistical analysis of the sets of assay data. • To investigate differences in the evolution of resistance of an unselected population of field population to a genetically modified canola plant expressing the Bt toxin Cry1Ac. The measurable objectives will be to produce resistant populations. Our preliminary data indicates that resistant populations will be obtained. • To measure the effect of temperature on known insecticide detoxification mechanisms. Enzymatic assays will be performed to measure esterase, cytochrome P450 and glutathione S-transferase activities from insects reared at the two different temperatures. The measurable outcomes will be the same as in 1) above. • To quantify and characterise the differences in the evolution of resistance of an unselected population to the Bt toxin Cry1Ac and to the pyrethroid deltamethrin at two different temperatures (20°C and 30°C). The measurable outcomes will be the same as 2) above. • To investigate the effect of temperature and of

	insecticide resistance on the fitness of the insect populations. Various fitness indicators will be quantified as described in detail below. • To analyse the genetic architecture and biochemical basis of resistance of the resistant populations derived from three insecticide treatments at the two temperatures. The measurable objectives will be to determine the number of resistance alleles involved, the dominance status, sex-linkage if present, the number of resistance alleles and the biochemical explanation for the resistance phenotype. • To analyse the immunocompetence of the resistant populations derived from three insecticide treatments at the two temperatures. The measurable objectives will be to quantify differences in the ability to encapsulate parasitoid eggs and in the two key aspects of the immune system involved in this process: haemocytes and the melanization pathway.

Project No	PSF/NSLP/P-AU (185)
Project Title	Evaluation of Some Cereal Derived Polysaccharides as Natural Biological Response Modifiers and Their Therapeutic Efficacy Against Coccidiosis in Chicken
Duration	3-year
Date of initiation	01-06-2012
Date of completion	31-05-2015 (Extended till 31.08.2016)
Final report received	02-01-2017
Final technical report was adopted in the Technical Committee meeting held on	01-08-2017
Location of project	University of Agriculture, Faisalabad.
Principal Investigator	Dr. Muhammad Kasib Khan Department of Parasitology
Total Expenditure	Rs.3,561,509/-
Main objectives	• Pharmacological screening of cereals bran viz., barley, oats and wheat to separate polysaccha-

	rides. • Optimization/Standardization of polysaccharides extraction and purification method(s) • Immunological evaluation of polysaccharides preparations in terms of cellular and humoral responses in chickens. • Protective effects of cereals bran polysaccharides on *Eimeria* infection (mixed species) in chickens. • Commercial feasibility of polysaccharides as natural biological response modifiers in poultry.

Project No	PSF/NSLP/S-SAU (236)
Project Title	Biological Control of Okra Mealy Bug by Fungal Bio-Control Agents
Duration	2-year
Date of initiation	01-06-2014
Date of completion	31-05-2016 (Extended till 31.05.2017)
Final report received	22-06-2017
Final technical report was adopted in the Technical Committee meeting held on	01-08-2017
Location of project	Department of Plant Protection, Sindh Agriculture Univ Tandojam
Principal Investigator	Dr. Muhammad Ali Khanzada Assistant Professor
Total Expenditure	Rs.2,388,408/-
Main objectives	• To identify the indigenous fungi that are pathogenic to mealy bug • To find out a cheap and effective method for mass multiplication of potential biocontrol agents. • To determine a simple method for field application of the selected biocontrol agents.

Project No	PSF/NSLP/S-SAU (242)

Project Title	Integrated Pest Management in Organic Cotton and its Impact on Yield and Lint Quality Characteristics
Duration	3-years
Date of initiation	01-06-2013
Date of completion	31-05-2016 (Extended till 31.03.2017)
Final report received	31-03.2017
Final technical report was adopted in the Technical Committee meeting held on	01-08-2017
Location of project	Department of Entomology, Sindh Agriculture Univers Tandojam
Principal Investigator	Prof. Dr. Ghulam Hussain Abro
Total Expenditure	Rs.2,496,288/-
Main objectives	• Development of organic cotton IPM package for the farming community of Pakistan, recommending them a frame • Work of operations to be carried out during different periods of time of cotton crop cultivation for sustainable cotton production system. • Farmer community awareness will result in reduction in use of pesticides and chemical fertilizers, thus saving of foreign exchange of country. • Reduction in environmental pollution and pesticide poisoning of farmers and cotton pickers • Organic cotton farming improves soil organic matter and soil fertility and reduces nitrite accumulation in soils. • Adaptation of organic cotton production technology will lower cost of inputs, lower financial risks and satisfying yields once soil fertility has improved. • Organic cotton will fetch premium prices in international market, thus increase in foreign exchange earnings.

Project No	PSF/NSLP/S-HEJ (290)
Project Title	Synthesis of Combinatorial Libraries of Cyclic Pep-

	tides in Search of Novel Medicinal Agents
Duration	3-years
Date of initiation	01-05-2014
Date of completion	30-04-2017
Final report received	09-05-2017
Final technical report was adopted in the Technical Committee meeting held on	01-08-2017
Location of project	H.E.J Research Institute of Chemistry International Centre of Chemical & Biological Science, HEJ Research Institute, Karachi
Principal Investigator	Dr. Farzana Shaheen Associate Professor
Total Expenditure	Rs.3,993,168/-
Main objectives	• To establish combinatorial chemistry method in Pakistan. • To design and synthesize OBOC from novel building blocks and parallel combinatorial libraries of cyclic peptides. • To establish screening protocol of libraries. • To elucidate the structure of "hit" compounds. • To confirm the structure of hit compound by re-synthesis and biological evaluation.

Project No	PSF/NSLP/P-UAAR (264)
Project Title	Improving Yield, Quality and Storage Life of Bell Pepper by use of Food Grade Chemicals
Duration	2-years
Date of initiation	22-07-2014
Date of completion	21-10-2016
Final report received	02-05-2017
Final technical report was adopted in the Technical Committee meeting held on	13.10.2017

Location of project	Department of Horticulture, PMAS Arid Agriculture University, Rawalpindi
Principal Investigator	Prof. Dr. Nadeem Akhtar Abbasi Chairman
Total Expenditure	Rs.2,547,445/-
Main objectives	• To enhance the yield and quality of bell pepper keeping in view food safety standards • To determine the relationship of GRAS chemicals with yield and quality attributes of bell pepper • To determine the effect of edible coatings on quality attributes of bell pepper during storage. • To improve the postharvest quality attributes of bell pepper fruit and low temperature • To publish research papers in reputed journals

Project No	PSF/NSLP/P- NIBGE (273)
Project Title	Investigation of the Mechanisms Responsible for Adherence in Bifidobacterial Species: its Relevance to the Development of effective Bifidobacterial Probiotic Products
Duration	2-years
Date of initiation	24.5.2014
Date of completion	23.5.2017 (Extended for one year)
Final report received	19.07.2017
Final technical report was adopted in the Technical Committee meeting held on	13.10.2017
Location of project	Health Biotechnology Division, National Institute for Biotechnology and Genetic Engineering Faisalabad
Principal Investigator	Dr. Arsalan Zaidi Senior Scientist,
Total Expenditure	Rs.3,154,131/-
Main objectives	• To determine the level of bifidobacteria in commercial products in Pakistan, identify the species

	and strain, and compare the resistance of common bifidobacterium spp. to acidity and oxidative stress. • To evaluate autoaggregation and co-aggregation with other probiotic and human pathogenic bacteria and develop methods for evaluating affinity of bifidobacterium with strong interactions with the human intestinal mucin (glycoprotein). • To develop a culture collection of novel bifidobacterium strains of human and animal origin for innovative probiotics development. • To build links with the food industry and research institutions and initiate collaborative research in the area of probiotics and intestinal microbiota. • To develop a microbiological laboratory that can certify and test the safety, efficacy and reliability of bifidobacterial probiotic products being sold in the national market.

Project No	PSF/NSLP/P- AU (285)
Project Title	Assessment of Genotoxic Effects of Metals in Fish using Comet and Micronucleus Assays
Duration	3-years
Date of initiation	01.08.2014
Date of completion	31.07.2017
Final report received	31.8.2017
Final technical report was adopted in the Technical Committee meeting held on	13.10.2017
Location of project	Department of Zoology & Fisheries, University of Agriculture, Faisalabad
Principal Investigator	Prof. Dr. Muhammad Javed Chairman
Total Expenditure	Rs.2,947,080/-
Main objectives	• Determination of acute toxicity of Cd, Cr, Co, Cu, Ni and their mixture for *Channa marulius, Mystus seenghala and Wallago attu* • Determination of fish growth and metals bio-accumulation patterns in the fish body organs during chronic exposure of individual metals and

	their mixture • Determination of metallic ions concentration based DNA damage in terms of proportions of damaged nuclei, damaged cells, genetic damage index (GDI), cumulative tail length (comet) and frequency of micronuclei, nuclear buds and bi-nucleated erythrocytes in fish blood • Determination of metals accumulation patterns in fish liver, kidney, gills, skin, muscle and blood in relation to genetic damage indices and induction of micronuclei frequency at various concentration of metals and metals mixture.

Project No	PSF/NSLP/P-UAAR (313)
Project Title	Ants – Aphid's Mutulistic Association, its Impact on Biological Parameters of Aphids and Predation of *Coccinelids*
Duration	3-year
Date of initiation	25-04-2014
Date of completion	24-04-2017
Final report received	20-07-2017
Final technical report was adopted in the Technical Committee meeting held on	13.10.2017
Location of project	Department of Entomology,PMAS Arid Agriculture University, Rawalpindi
Principal Investigator	Dr. Imran Bodhla Assistant Professor
Total Expenditure	Rs.1,203,808/-
Main Objectives	• Collection of aphids and their associated ants from Pothowar • Collection of various larval and pupal stages of beetles feeding on aphids • Study the biological parameters of *aphis gossypii or Myzus persicae* and its biocontrol agents (Coccinelids) in the presence of ants

Project No	PSF/NSLP/P-NIBGE (315)
Project Title	Diversity of Symbiotic and Free Living Plant Growth Promoting Rhizobacteria in the Root Nodules and Rhizosphere of Chickpea
Duration	3-years
Date of initiation	01-07-2009
Date of completion	30-06-2012
Final report received	19-12-2013
Final technical report was adopted in the Technical Committee meeting held on	13.10.2017
Location of project	National Institute of Biotechnology & Genetic Engineering (NIBGE), Faisalabad
Principal Investigator	Dr. Muhammad Sajjad Mirza Principal Scientist
Total Expenditure	Rs.2,985,462/-
Main Objectives	• To study bacterial diversity in the nodules and rhizosphere of chickpea varieties (both Desi & Kabuli) growing in different regions of Pakistan by bacterial isolations as well as by culture-independent DNA based metagenomic studies • To study the effect of bacterial inoculations on plant growth by using free-living PGPR (nitrogen-fixers, phytohormone producers and phosphate solubilizers) as co-inoculants with rhizobia. • To study nodule occupancy and survival of inoculated bacteria in the rhizosphere and selection of efficient combinations of rhizobial and PGPR strains for inoculum production.

Project No	PSF/NSLP/KP-NIFA (203)
Project Title	Development and Validation of Technologies for Pesticide Residue Management in fruit and Vegetable Produce
Duration	3-years

Date of initiation	15-12-2012
Date of completion	15-05-2016
Final report received	05-04-2017
Final technical report was adopted in the Technical Committee meeting held on	13.10.2017
Location of project	Nuclear Institute for Food & Agriculture, Peshawar
Principal Investigator	Dr. Azhar Rashid Principal Scientist
Total Expenditure	Rs.2.5 million
Main Objectives	• To investigate the pesticide residue status in locally consumed and exportable fruit and vegetable produce. • To identify potentially hazardous pesticides in temporal and special perspective. • To exploit and develop post-harvest fruit and vegetable processing technologies to minimize the residue carryover.

Project No	PSF/NSLP/P-UAAR (314)
Project Title	Nematodes Infecting Temperate Fruits in Pakistan and their Management
Duration	2-years
Date of initiation	25-04-2014
Date of completion	24-04-2016
Final report received	29-08-2017
Final technical report was adopted in the Technical Committee meeting held on	13.10.2017
Location of project	Department of plant Pathology, PMAS Arid Agriculture University, Rawalpindi.
Principal Investigator	Dr. Tariq Mukhtar Associate Professor
Total Expenditure	Rs.4,994,213/-
Main objectives	• To undertake proper surveys of nematode infestation of temperate fruits (apple, peach and plum) based on scientific, mathematical and statistical models, for ecological distribution of parasitic nematodes. • To collect representative/typical diseased sam-

	ples, collect data on symptomatology and identification of parasitic species based on standard keys and literature. • To determine population dynamics of important parasitic species to program control strategies. • Host range and symptom expression of important nematode species, and strain differentiation including reaction of different root stocks and scions. • To plan integrated management strategies in apple, pears, peaches, apricots, cherry, walnut and selected minor crops.

Project No	PSF/NSLP/P-PU (510)
Project Title	Employing Chitinolytic Bacteria for Biological Control of Termites
Duration	2-Years
Date of initiation	01.02.2015
Date of completion	31-01-2017
Final report received	09.05.2017
Final technical report was adopted in the Technical Committee meeting held on	13.10.2017
Location of project	Department of Zoology, University of the Punjab, Lahore
Principal Investigator	Prof. Dr. Javed Iqbal Qazi
Total Expenditure	Rs.844,305/-
Main objectives	• To isolate chitinolytic thermoduric/thermostable bacteria from local termites' influenced areas and to optimize their growth and efficiency conditions instandard as well as low-cost media. The latter will be constructed from local agro-industrial wastes. • Detailed characterization of the bacterial isolates with specific emphasis of identification of bacteria capable of withstanding chipboard preparational conditions and having termiticidal activities. • To control termites attack and damage of chipboard based buildings installments by employing thermo-

	tolerant bacterial chitinases.

Project No	PSF/NSLP/P-GCU (291)
Project Title	Survey and Detection of *Wolbachia* in Natural Insect Population of Pakistan
Duration	3-Years
Date of initiation	01-08-2014
Date of completion	31-07-2017
Final report received	20.10-2017
Final technical report was adopted in the Technical Committee meeting held on	29.03.2018
Location of project	Department of Wild life and Fisheries, G.C University, Faisalabad
Principal Investigator	Dr. Bilal Rasool Assistant Professor
Total Expenditure	Rs.3,153,472/-
Main objectives	• Identification of molecular markers for the analysis of new *Wolbachia* strains in pest populations for the risk assessment and Incompatible Insect Techniques. • To develop simple and feasible strategy to help reduce/suppress *Aedes* populations under lab conditions by integrating *Wolbachia* in the *Aedes* vector control programs • To devise new strategy using *Wolbachia* as a biocontrol agent against insect pests in an IPM approach • Capacity building of the Insect Pest Management lab • Training and dissemination of knowledge to the students, scientists/researchers and academia personnel along with the farmers and the common public.

Project No	PSF/NSLP/P-NIBGE (319)

Project Title	Developing a Sustainable Formulation for Biological Control of Rice Bacterial Blight and Yield Increase Using Native Growth Promoting Bioantagonists
Duration	2-Years
Date of initiation	01.01.2015
Date of completion	01-06-2017 (Extended for six months)
Final report received	01.05.2017
Final technical report was adopted in the Technical Committee meeting held on	29.03.2018
Location of project	National Institute of Biotechnology & Genetic Engineering (NIBGE) Faisalabad
Principal Investigator	Dr. Sumera Yasmin Senior Scientist
Total Expenditure	Rs.1,351,917/-
Main objectives	• To develop suitable microbial formulation for biocontrol of bacterial leaf blight of rice. • To optimize the formulation for yield increase of rice crop.

Project No	PSF/NSLP/P-UAAR (346)
Project Title	Evaluation of Intravenous Hyperosmotic Sodium Bicarbonate Solution as an Adjunct to Antibiotic Therapy on Acid-base Status and Cardiovascular Functions in Buffalo Calves with Induced and Spontaneous Neonatal Diarrhoea Associated with Escherichia Coli.
Duration	2-Years
Date of initiation	01-08-2016
Date of completion	31-07-2018
Final report received	16-03-2018
Final technical report was adopted in the Technical Committee meeting held on	29.03.2018
Location of project	Department of Clinical Sciences Faculty of Veterinary & Animal Sciences, PMAS Arid Agriculture University, Rawalpindi
Principal Investigator	Dr. Muhammad Arif Zafar Associate Professor,
Total Expenditure	Rs.1,320,411/-
Main objectives	• Establish the safety of IV administration of hyperos-

	motic sodium bicarbonate (HSB) solution in buffalo calves. • Evaluate the efficacy of rapid IV administration of small-volume HSB in inappetent buffalo calves suffering from strong ion acidosis in experimentally induced neonatal diarrhoea associated with *E. coli*. • Investigate the clinical efficacy of IV administered HSB in the treatment of field cases of dehydrated diarrhoeic buffalo calves associated with *E. coli*. • Determine the cardiovascular effects of HSB in severe acidotic calves suffering from neonatal diarrhoea.

1.6.3 Scientific Publications and Patents Produced through PSF Funded Projects

One of the main achievements and usefulness of any research is the publication or patents of its results in scientific journals. Based upon the results of research projects 17 research papers were published in peer review journals the details of which are given at *Annexure-XIV***.**

1.6.4 Project Formulation Workshops

A total 03 Project Formulation Workshops were organized to enhance the capacity of the researchers for writing project proposals. The workshops were organized at the following venues;

1. University of Engineering & Technology, Peshawar
2. Government Sadiq College for Women University, Bahawalpur
3. Pakistan Science Foundation all S&T Organizations of MoST;
4.

The workshop enabled and trained 141 researchers and Scientists in preparing fund wining project proposals.

1.6.5 Meetings of NSLP Board of Governors (BoG)

The 8th meeting of the NSLP Board of Governors (BoG) was held on 10.01.2018 and chaired by the Federal Minster for Science and Technology, Mr. Rana Tanveer Hussain and Co-Chaired by Ms. Yasmeen Masood, Federal Secretary, Ministry of Science and Technology and attended by esteemed members from different ministries.

Chairman, PSF/Secretary BoG, Prof. Dr. Muhammad Ashraf briefed about the significant achievements and working of NSLP Endowment fund. The Board confirmed minutes of the previous BoG meeting held on 22.06.2017 and expressed its satisfaction on the progress of the NSLP. The BoG also approved the actual expenditures for FY2016-17 and Budget Estimates of NSLP Accounts, for FY2017-18. Furthermore, the Board approved the investment

of profit earned on Principal Endowment Funds (PEF) of NSLP up to Rs.150 million. The meeting ended with the vote of thanks to and from the Chair.

1.6.6 Meetings of Fund Management Committee of NSLP

During the year, 02 meetings of the Fund Management Committee (FMC) were held on 15.11.2017 and 08.06.2018 to review the financial matters of NSLP. The meetings were chaired by the Chairman, PSF/Chief Executive NSLP and attended by members of the Fund Management Committee. The FMC approved budgets of 14 new projects of worth Rs.31.98 million, recommended by the NSLP Technical Committee.

1.6.7 Meetings of Technical Committee of NSLP

During the year 2017-18, 03 meetings of the Technical Committee (TC) were held on 01.08.2017, 13.10.2017 and 29.03.2018 to technically evaluate the projects to be funded. The meetings were chaired by the Chairman, PSF/Chief Executive NSLP and attended by the renowned scientists related to agriculture and natural sciences. A total 46 new projects were presented to the Technical Committees, out of which, 14 projects were recommended for funding.

1.7 Planning and Development

1.7.1 Travel Grant Actvity

The aim of this activity is to provide financial assistance to Pakistani Scientists, Technologists doctors and engineers working in R&D organizations and educational institutions. Under this programme, during the year 2017-18, a total 167 requests were received from the scientists and technologists of the country. After comprehensive scrutiny as per eligibility criteria, 92 requests were presented in 10 meetings of PSF Travel Grant Award Committee (PSF TGAC). A total 75 requests were dropped due to deficiencies in the eligibility criteria and requisite documents by the scientists. Out of the 92request presented to the PSF TGAC, 37 were recommended whereas 55 requests were not recommended. Twenty two scientists/technologists availed the grant and 17 could not proceed abroad due to visa problems and other reasons.

1.7.2 Ongoing projects:

1.7.3 Financial Support to Scientific Societies in Pakistan

The aim of the project is to strengthen the role of Scientific Societies in Pakistan by providing them financial assistance for:

- Holding National and International Conferences, Seminars and workshops on important scientific topics.
- Publication of Scientific Journals/periodicals
- Development of linkages with their counterpart societies in advanced countries and to remain updated in the contemporary Science and Technology.

The long-term objective of the project is to strengthen the scientific research base and develop a culture of science in society which would ultimately result in the development of science and technology in the country.

The project was approved in the DDWP meeting held on 26th March, 2015 with the total cost of Rs. 38.440 million for 36 months. During the financial year 2017-18, a total of Rs. 9.841 million was allocated out of which, Rs. 5.687 million was utilized. There are 32 societies registered with PSF. After approval of the project, all the registered scientific societies were to submit their activities for financial support. However, only 14 scientific societies contacted PSF and submitted their doings which were financially supported in order to enable them to perform their scientific activities regularly. During the period, one society (Pakistan Academy of Engineering) was registered with PSF and was also supported. Twenty three issues of the 08 scientific journals were published by these societies and 04 linkages were maintained with their international counterparts.

1.7.4 Competitive Research Programme

Under this project, financial assistance is provided to,

i. Provision of the research grants to address the mega national issues and promote world class research.
ii. Development of the new processes/products/applications/ technologies through native knowledge/skills of the researchers working in the universities and R&D institutions.
iii. Multi-disciplinary research on the mega issues of national importance through provision of Consortium Research Grants.
iv. Collaborative projects with the established International Partners for Indigenous Technology Development particularly by substitution of imports.
v. Public Private Collaborations by providing strong platform to R&D institutions to liaise with Industry and Academia for improvement and commercialization of their end products so as to enhance the exports.
vi. Technology Transformation in the specific thrust/priority areas to boost the economy that may result in the generation of S&T Human Resource as well as financial capital.
vii. Promotion of demand driven research by linking public sector capability and private sector marketability.

viii. Capacity building trainings for the project staff (National /International) and Project Formulation Workshops for the researchers.

The project was approved in CDWP with the total cost of Rs. 2000.00 million for 60 months. During the financial year 2017-18, a total of Rs. 500.00 million was allocated, out of which, no expenditure was done because Administrative Approval of the project was issued on 20th June, 2018 by MoST.

1.7.5 Modernization of PASTIC National Science Reference Library for Effective Resource Sharing among S&T Libraries in Pakistan

The core objectives of the project were:

i. Development of Information Communication Technologies (ICT)s infrastructure for PASTIC National Science Reference Library.
ii. Development of Consortium of S&T and R&D libraries of Pakistan (CSTRDLP);
    a. Creation of digital repository of indigenous literature.
    b. Creation of online Public Access Catalogue (union OPAC) for books and monographs of literature.
    c. Generation of union list of International Scientific Research database scribed by S&T and R&D organization of Pakistan.
iii. Capacity building of library information scientists (librarians) for Library Automation, Digital Library & Library Management.
iv. Revamping and strengthening of PNSR library.
v. Organizing awareness seminars for research scholars to promote/utilize the developed information resources.

The project was approved in the DDWP meeting held on 26th March, 2015 with the total cost of Rs. 51.13 million for 24 months. During the financial year 2017-18, a total of Rs. 25.00 million was allocated, out of which, Rs. 13.89 million were utilized.

1.7.6 "Feasibility Study for Completion of the Remaining Six Blocks and Strengthening of Research and Display Activities of the PMNH" PC-II

The main objective of the feasibility study was to select a new design of PMNH building compatible with the already constructed 02 blocks of PMNH. The consulting firm was hired for preparation of a comprehensive report on the cost estimates required for the construction of PMNH building of International Standards. The report for the design of technical and financial parameters of the new buildings is under way. On the factual position, the detailed PC-I with cost estimates was to prepared for onward submission to MoST/Planning Commission.

The PC-II was approved with the total cost of Rs.35.20 million. Out of the total allocation of Rs. 25.00 million for FY 2017-18, an expenditure of Rs. 6.036 million was made.

1.7.7 New development Projects submitted to MoST

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

S #	Project Title	Duration (months)	Amount (million)
1.	Popularization of Science through Mass Media: Strengthening of PSF Science Media Cell	24	57.621
2.	Identification and Strengthening of Key Scientific Laboratories in Government High Schools at Tehsil Level across the Country	24	2990.746
3.	Establishment of Five Science Centers in different Cities of Pakistan.	24	892.594
4.	Participation of Scientists & Technologists in International Science Conferences, Seminars, Workshops and Training abroad (Phase-III)	36	24.00

1.7.8 Other Activities:

- Fixing of Targets and submission of Regular Reports on Achievements of PSDP projects.
- One pager project briefs of PSDP Projects.
- Monthly Progress Report (Short term and Long Term Targets/Action Plan).

1.7.9 Replies to the National Assembly Questions

Different questions received from National Assembly Secretariat and Senate Secretariat and were replied about achievements of PSF for its regular activities.

II. PAKISTAN SCIENTIFIC AND TECHNOLOGICAL INFORMATION CENTRE (PASTIC)

II. PAKISTAN SCIENTIFIC AND TECHNOLOGICAL INFORMATION CENTRE (PASTIC)

Pakistan Scientific and Technological Information Centre (PASTIC) is the premier organization in the field of S & T information dissemination that serves as a gateway for access to and delivery of S&T information catering to the needs of researchers. It is one of the few public sector organizations, which acquired ISO: 9001: 2000 Certification. PASTIC National Centre is housed in its own building at Quaid-e-Azam University Campus, Islamabad with comprehensive collection of information resources such as online databases and publications in various fields of Science and Technology. PASTIC has six Sub-Centres functioning at Karachi, Lahore, Peshawar, Quetta, Faisalabad and Muzaffarabad.

Main objective of PASTIC is to acquire process and disseminate information in all disciplines of Science and Technology. To meet this objective, PASTIC develops inter-library cooperation for sharing of information resources to provide Document Supply Service, Bibliographic Information Service, Abstracting and Indexing service etc. Besides, Technology Information Service, Patent Information Service, Reprographic Service are other regular services of PASTIC. PASTIC also conducts trainings for researchers and information professionals in modern information handling and management techniques.

2.1 AIMS & OBJECTIVES

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

2.2 ACTIVITIES AND SERVICES

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

the Socio-economic development of the country. The Services provided and activities undertaken during the period, July 2017 to June 2018 are briefly described below:

2.3 BIBLIOGRAPHIC INFORMATION & DOCUMENT SUPPLY SERVICE

Under the Bibliographic Information & Document Supply Service, a total 84,080 S&T documents in digital form and 7,213 bibliographies were supplied to 6,741 R&D workers, on their request during the year 2017-18.

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

To expedite the procurement process, PASTIC uses e-mail contacts so that information delivery is quick and delays are minimized. PASTIC has access to international online bibliographic and full text databases through subscription and agreements with some organizations like HEJ and HEC. PASTIC has accessed to all countrywide digital resources of HEC such as;

a) HEC Digital Library Resources

1. Wiley-Blackwell Journals
2. Taylor & Francis Journals
3. Springerlinks
4. ASTM
5. Springer E-Books (2005-2007)
6. IMF Ebrary
7. E-brary
8. University of Chicago press
9. OVID
10. INFORMS

b) LEJ Resources, Karachi

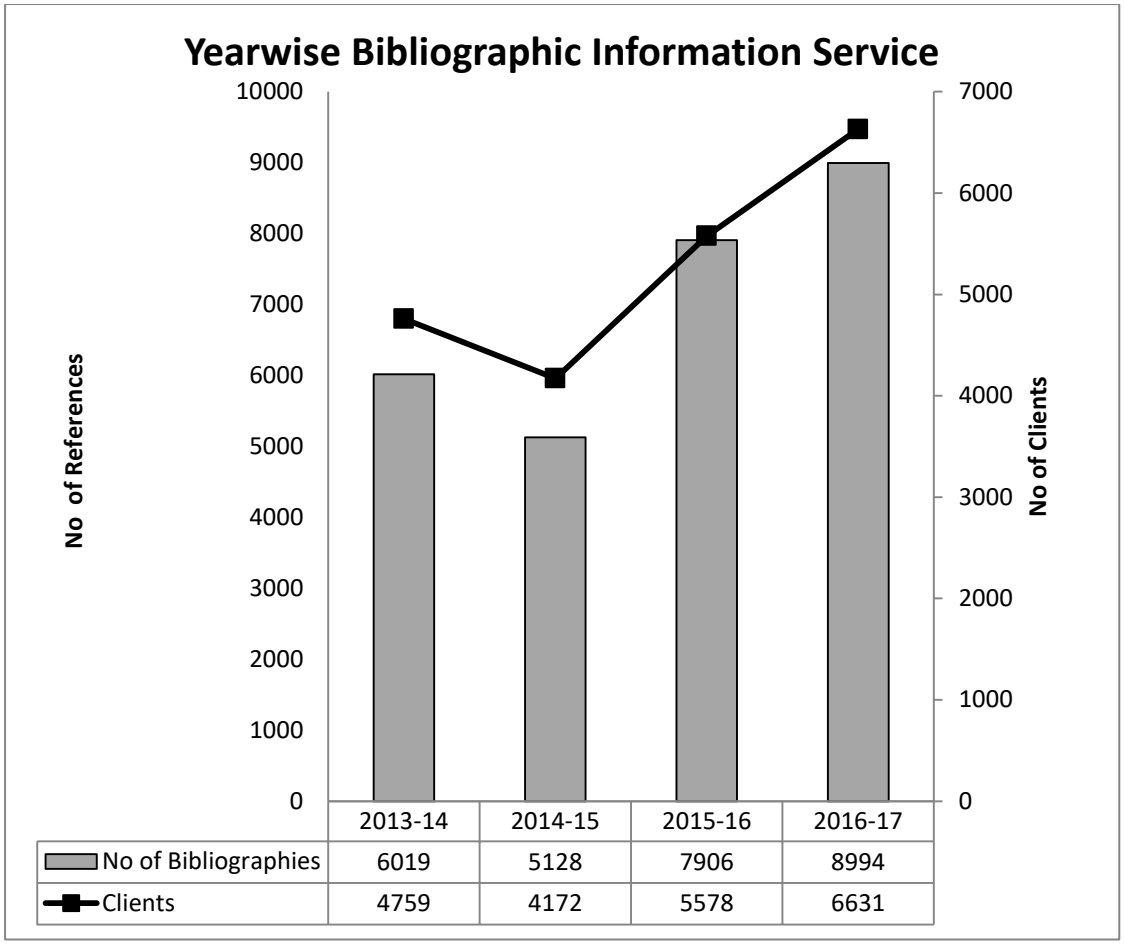
1. Science Direct
2. Science Finder

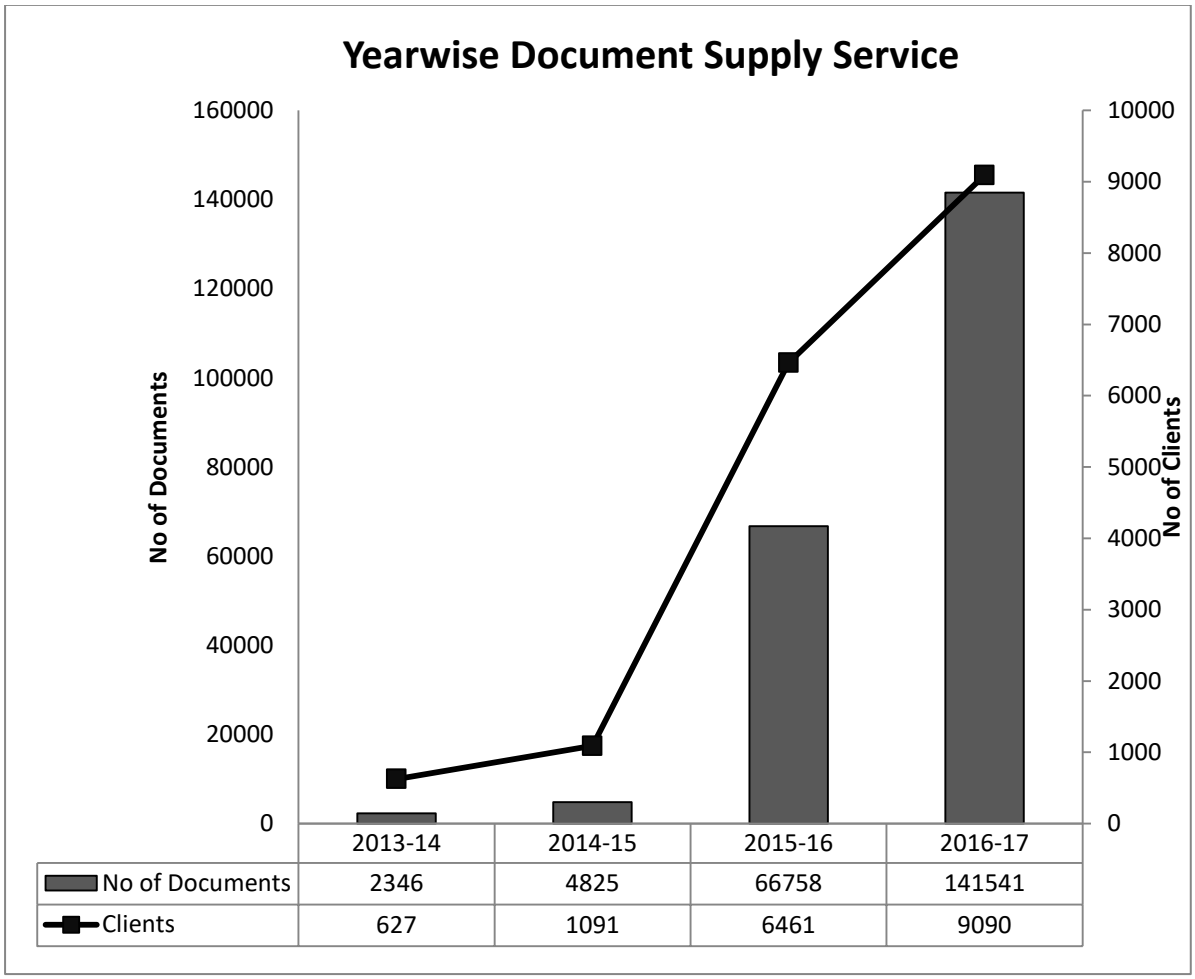
c) HEC licensed databases through VPN

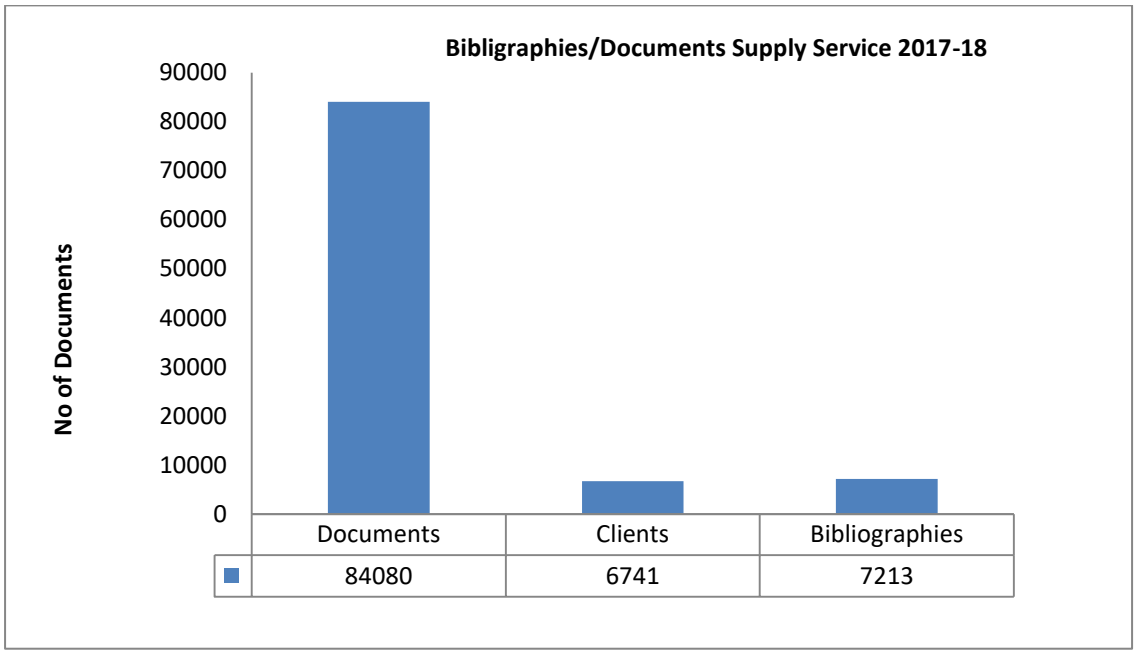
PASTIC has also accessed to HEC licensed databases through VPN which are as under:

1. All disciplines of Science Direct
2. Web of Knowledge
3. IEEE

The graphic representation of bibliographic information service showing the progress for the last 05 years is given below.


Yearwise Bibliographic Information Service
No of References
No of Clients
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
7000
6000
5000
4000
3000
2000
1000
0
2013-14
2014-15
2015-16
2016-17
No of Bibliographies
6019
5128
7906
8994
Clients
4759
4172
5578
6631


Yearwise Document Supply Service
No of Documents
No of Clients
160000
140000
120000
100000
80000
60000
40000
20000
0
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
2013-14
2014-15
2015-16
2016-17
No of Documents
2346
4825
66758
141541
Clients
627
1091
6461
9090



2.4 ABSTRACTING AND INDEXING SERVICE (PAKISTAN SCIENCE ABSTRACTS)

PASTIC provides abstracting and indexing service by publishing an abstracting journal entitled "Pakistan Science Abstracts" in 10 different scientific disciplines, which serves as a secondary information source to give support to research and development activities in the country. The scientific information generated in Pakistan or abroad and published in Pakistani S&T journals is documented in the form of abstracts along with detailed author index and keyword index in this secondary journal.

An online application for Pakistan Science Abstracts (PSA) database has been developed for provision of abstracting and indexing service and publishing the Pakistan Science Abstracts. During the period, 3,389 abstracts converted into text format. Downloading and processing of abstracts for the year 2017-18 remained in progress.

PASTIC in collaboration with Cyber Vision launched beta version of National Science Search Engine to optimize its online search facility. Initially, application covered research published in Pakistani Scientific Journals (Pakistan Science Abstracts). Later on, other scientific repositories like database of scientists and engineers of Pakistan, database of R & D projects, database of Scientific periodicals of Pakistan, Union Catalogue of Pakistani Scientific libraries and other future databases developed by PASTIC were linked.

2.5 Publications

2.5.1 Pakistan Science Abstracts (PSA)*:* PASTIC publishes an abstracting journal entitled "Pakistan Science Abstracts" in 10 different scientific disciplines as secondary source of information on regular basis. During this period, Up-gradation of PSA application by Cybervision was carried out. PDF extractor application is developed for optimization of the data processing. Total 14,091 records were entered into the database.

2.5.2 Pakistan Journal of Computer Sciences & Information System (PJCIS): Out of 11 articles received for publishing in the second volume, 5 articles were published in volume 2 Issue 1 (offline and online) respectively, 2 articles were rejected by the reviewers/editors while rest remained under process for reviewing and editing for publishing in upcoming issue.

The second issue of PASTIC primary journal namely "Pakistan Journal of Computer and Information Systems (PJCIS)" was published and the third issue is ready.

2.5.3 Abstract Book/Conference Proceeding: PASTIC collaborates with S&T/R&D institutions by publishing Abstract Book/Proceeding of Conferences organized. During current period, Abstract Book of Conference on *Computational Biology and Genomics* organized by Centre for Human Genetics Hazara University Mansehra (September 27 -29, 2017) was published.

2.6 Technology Information Service

This service is meant for dissemination of Technological Information Services to R&D Workers, Engineers, Entrepreneurs, SMEs and the Industrialists. The aim is to facilitate growth, potential and competitiveness among SMEs at national and international level, build effective coordination between R&D Sector and Industry for enhancing innovations, competitiveness and development & promotion of indigenous technologies. During 2017-18, the following activities were carried out.

- PASTIC Peshawar organized 3rd Invention to Innovation Summit at UET-Peshawar onNovember 29-30, 2017.
- PASTIC Peshawar organized ORIC Session: IP Policy for Research Commercialization during 03rd Invention to Innovation Summit on November 30, 2017
- PASTIC Lahore with the collaboration of Sheikhupura Chamber of Commerce & Industry (SCCI) & IPO-Pakistan organized a seminar under the title "Importance of intellectually Property Rights in SMEs" at (SCCI) Sheikhupura.
- PASTIC Lahore arranged one day seminar on 16-04-2018 at Sheikhupura Chamber of Commerce & Industry (SCCI), with the collaboration of IPO-Pakistan and SCCI on the title of "Importance of intellectually Property Rights in SMEs"

- A bimonthly Trade and Technology news bulletin entitled “Technology Roundup” was regularly published and six issues of this news bulletin were brought out online.

  A Technology Portal was developed under which following new databases developed under TIS Service

  i. Database of Chambers of Commerce of Pakistan
  ii. Database of Industrial Associations of Pakistan
  iii. Database of Offices of Research, Innovation and Commercialization (ORIC) of Pakistani Universities
  iv. Database of Overseas Investors of Industry and Commerce in Pakistan
  v. Database of University-Industry Linkages
  vi. Database of Industrial issues
  vii. Database of Industry in Pakistan

- Following databases were strengthened:
  i. Data Collection & Data entry of R&D Projects = 5054
  ii. Data Collection & Data entry of Scientists = 12236

2.7 PASTIC National Science Reference Library

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

During 2017-18, 12,615 users/researchers visited PASTIC library for reference purpose, reading, photocopying and internet browsing. Besides, the library received 197 issues of different national and international journals, 28 miscellaneous documents, reports, etc. All this library material was processed and shelved for use.12 issues of the library bulletin “Fresh Arrivals” of PASTIC library were regularly published on monthly basis during the period under review and distributed among relevant circles. The same was regularly uploaded on PASTIC website.

A new database of scientific books authored by Pakistani Scientists is being developed in collaboration with National Library of Pakistan. 1500 Pakistan Scientific books record was entered. PASTIC National Science Reference Library was renovated in the third quarter of current financial year for providing a better environment to the library users for study, consultation and internet facility for web surfing. This library renovation would be helpful in improving and enhancing the library services.

2.8 Reprographic Service

The Reprographic Section of PASTIC has facilities ranging from photocopying to offset printing for its own printing requirements and for providing printing services to other S&T organizations. During the year 2017-18, a total 169 printing jobs were carried out for 30 R&D organizations.

2.9 I.T Activities

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

1. Developed Technology Information Services (TIS) Web Portal along with following databases:
    a. Pakistan Science Abstract.
    b. Union Catalogue.
    c. PASTIC Periodicals Directory
    d. R&D Projects
    e. Scientists Directory of Pakistan
    f. S & T Libraries of Pakistan
    g. S & T Societies of Pakistan
    h. S & T Organizations of Pakistan
    i. Union OPAC (Books of 11 libraries)
    j. Database of Energy Articles published in Pakistan
    k. Database of Climate Change Articles published in Pakistan
    l. Scientific Books Published by Pakistani Authors
2. Organized 8 Training on the topic of SPSS
3. Performed data Import activity of 12 Libraries with PASTIC online OPAC.
4. Launched PASTIC Search Engine Project for online search of indigenous research content
5. Revamped PASTIC website with new features and look
6. Launched PASTIC VDS Server and shifted PASTIC Website along with all databases to new server.
7. Developed Web Application for PSF Research Support Section for Digitization of PSF Funded Projects.
8. Developed online application for PASTIC/PSF KPIs data entry/monitoring
9. Supervised following activities of PSF Science Talent Forming Scheme Project:
    a. Laptops Tender Specifications preparation, Comparative Statement, Verification of Laptops)
    b. Internet Devices Specifications, Comparative Statements
    c. Learning Management (LMS) Website Tender Specification, Comparative Statement and Verification of LMS/Website
    d. Performed installation of LMS Setup in 10 PSF Busses
    e. Launched STFS Website at STFS.GOV.PK
    f. Performed verification of all video contents (120 videos) of STFS project
10. Supervised PASTIC and PSF web designing and updating activities

11. Launched MoU with Lahore Garrison University to enhance PASTIC training services
12. Supervise ICT EXPO activities.
13. Initiated proposal for shifting of PASTIC LAN to Wireless- LAN with advance features
14. Supervised equipment purchase activity under Modernization of PASTIC NSRL project
15. Coordinated in SDC Capacity Building of Women Entrepreneurs (SMEs) project
16. Supervised data entry activities of Data Entry Pool, PSA project and TIS databases
17. Submitted concept proposal for Ministry of Science and Technology(MoST)
18. Supervised application development of MoST and its organization equipment listing
19. Submitted "Technical Cooperation", "Development Study" & "Grant Aid" proposal for Japan
20. Submitted "Marketable Demand Driven Courses For PM's Youth Skill Development Program
21. Delivered talks on web Searching Techniques at different universities and Institutes
22. Principal System Analyst, PASTIC participated as member of purchase committee, Technical Committee& Hiring Committee
23. Supervised IT training activities and launched annual training calendar
24. Principal System Analyst, PASTIC Conducted different inquires to document real fact
25. Supervised data entry pool activities for data entry of all PASTIC S&T databases

2.10 INTERNATIONAL LIAISON ACTIVITIES

PASTIC is the National Focal Point of some Regional/International Information Centers and Networks viz. WHO/CEHANET and National distributor for UNESCO developed library management software WINISIS and IDAMS.

Under international liaison activities, a project namely "Networking of Women Entrepreneurs (SMEs) from SAARC Countries" was approved for funding by SAARC Development Fund (SDF). Financial agreement with Donor remained under progress. In addition, 04 bilateral cooperation proposals were prepared and forwarded to PSF.

A Proposal was prepared for cooperation in information science strategies in a digital environment between Pakistan and Thailand and is under consideration by the both the governments.

2.11 PASTIC Information Service Stalls

PASTIC arranged 24 Service Stalls at Faisalabad, Peshawar, Karachi, Quetta, Muzaffarabad (AJK), Islamabad and Lahore at various departments of different Universities and R&D Institutions on different occasions. The aim of organizing the service stalls was to provide S&T information services at the doorstep of the Universities and other institutions to facilitate faculty members, researchers and R&D workers. Detail of these Stalls is as follows:

MUZAFFARABAD

Sr.#	Date	Venue
1.	17-07-2017 to 18-07-2017	Women University of AJ&K, Bagh.
2.	10-08-2017	Department of Zoology, University of AJ&K, Muzaffarabad.
3.	19-09-2017	Department of Chemistry, University of AJ&K, Muzaffarabad.
4.	22-02-2018	University of AJ&K City Campus, Muzaffarabad.
5.	09-04-2018	Mirpur University of Science & Technology, Mirpur

LAHORE

Sr.#	Date	Venue
1.	21-11-2017	Mechanical Engineering Department, University of Engineering and Technology, (UET) Lahore.
2.	05-12-2017	Pakistan Institute of Fashion and Design (PIFD), Lahore.
3.	10-02-2018	Department of Computer Science, University of Engineering and Technology, (UET) Lahore.
4.	21-02-2018	FAST-NU. National University of Emerging Sciences, Lahore.
5.	07-03-2018	Botany Department, The University of the Punjab, Lahore.
6.	08-03-2018	Geology Department, The University of the Punjab, Lahore.
7.	14-03-2018	COMSATS Institute of Information Technology (CIIT) Lahore Campus.
8.	27-04-2018	Pharrmacy Department, Lahore Medical and Dental College, (LMDC) Lahore.
9.	15-05-2018	Postgraduate Block, Government College University, (GCU) Lahore.

KARACHI

Sr.#	Date	Venue
1.	1-07-17	PASTIC S &T Stall during Symposium on Hydrogen Carbon-Free-Fuel Democratizing the Energy at Movenpic Hotel, Karachi
2.	7-09-17	PASTIC S &T Stall at Karachi Medical & Dental College
3.	20-09-17	PASTIC S &T Stall at Faculty of Engineering, Hamdard University, Karachi
4.	20-21/12/17	PASTIC S &T stall during 2nd Invention to Innovation Summit Sindh 2017 collaboration with Pakistan science Foundation , IRP & ORIC University of Karachi
5.	16-01-18	PASTIC S &T Stall, during Conference on "Probe" Biology: Down the Road organized by Department of Physiology, University of Karachi

6.	18-01-18	PASTIC S &T Stall during All Karachi Project Exhibition &Competition at Sir Syed University of Engineering & Technology, Karachi
7.	22-01-18	PASTIC S &T Stall during “Research Expo” 2018 at Liaquat National Hospital & Medical College, Karachi
8.	3-02-18	PASTIC S &T Stall, during “Research forum” 2018 at Jinnah Sindh Medical University
9.	9-02-18	PASTIC S &TStall at University of Sindh, Mirpurkhas Campus, at Mirpurkhas
10.	5-04-18	PASTIC S &T Stall during "Autism Awareness Seminar" at Dr. A.Q. Khan Institute of Behavior Science Dow University of Health Science
11.	14-05-18	PASTIC S &T Stall during “Workshop on Laboratory Animal Handling and ethics” at Federal Urdu University of Arts, Science and Technology

2.12 Human Resource Development

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

2.13 Trainings/ Workshops /Seminars/Symposia Organized

- PASTIC-Karachi organized a one day seminar on PASTIC activities during Symposium on “Hydrogen: Carbon-Free-Fuel, Democratizing the Energy” at Möven pic Hotel, Karachi, on July 01, 2017.
- PASTIC-Quetta organized a one day seminar on PASTIC activities at Sardar Bahadur Khan Women University, Quetta on July 11, 2017.
- PASTIC-Karachi organized a one day seminar on PASTIC activities at Center of Excellence in Marine Biology (CEMB), University of Karachi, Karachi on July 19, 2017.
- PASTIC, Islamabad organized a two days training workshop on “Make your research life easier with Mendeley Tool” at PASTIC National Centre, Quaid-e-Azam University Campus, Islamabad on July 19-20, 2017.
- PASTIC, Islamabad organized a three days training workshop on “Research Tools & Techniques (SPSS)” at PASTIC National Centre, Quaid-e-Azam University Campus, Islamabad on July 26-28, 2017.
- PASTIC-Faisalabad organized a one day training workshop on “Managing Citation in Research”at NTU Library, Faiasalabd on July 28, 2017.
- PASTIC- Quetta organized a one day seminar on PASTIC activities at the Department of Zoology, University of Balochistan, Quetta on August 04, 2017.

- PASTIC-Muzaffarabad organized a two days training workshop on "Strengthening Innovative Library Leaders (SILL)" with the collaboration of the University of Azad Jammu & Kashmir, Muzaffarabad, August 10-11, 2017.
- PASTIC, Islamabad organized a training workshop on "Make your research life easier with Mendeley Tool" at PASTIC National Centre, Quaid-e-Azam University Campus, Islamabad on August 16-17, 2017.
- PASTIC-Karachi organized a one day seminar on PASTIC services at Jinnah University for women, Karchi on August 21, 2017.
- PASTIC- Quetta arranged a one day seminar on PASTIC activities at Department of Biochemistry, University of Balochistan, Quetta on August 24, 2017.
- "Make your research life easier with Mendeley Tool" from 20-21ST September, 2017 at PASTIC National Centre, Quaid-e-Azam University Campus, Islamabad.
- PASTIC Sub-centre, Karachi organized a three-day training workshop on "SPSS Research Methodology", from September 19-21, 2017, with collaboration of Quality Enhancement Cell, Hamdard University Karachi.
- PASTIC Sub Center, Quetta arranged a one day seminar on PASTIC activities at Biochemistry department, University of Balochistan, Quetta on September 14th, 2017.
- PASTIC Sub Center, Quetta arranged a one day seminar on PASTIC activities at Botany department, Sardar Bahadur Khan Women's University, Quetta on September 26th, 2017.
- The PASTIC Sub Center, Quetta arranged a one day seminar on PASTIC activities at Biotechnology department, Sardar Bahadur Khan Women's University, Quetta on September 15th, 2017.
- PASTIC- Quetta organized a one day seminar on PASTIC activities at the Sardar Bahadur Khan Women's University, Quetta on October 12, 2017.
- PASTIC- Quetta organized a one day seminar on PASTIC activities at the Department of Microbiology, University of Balochistan, Quetta on October 25, 2017.
- PASTIC- Peshawar organized a one day seminar on PASTIC activities at the Institute of Biotechnology & Genetic Engineering (IBGE) on October 24, 2017.
- PASTIC- Peshawar organized a two days training workshop on "How to write a worth publishing research paper" at Agriculture University Peshawar on October 18-19, 2017.
- PASTIC, Islamabad organized a training workshop on "Make your research life easier with Mendeley Tool" at PASTIC National Centre, Quaid-e-Azam University Campus, Islamabad on November 22-23, 2017.
- PASTIC, Islamabad organized "KOHA National Training Workshop for Master Trainers" at PASTIC National Centre, Quaid-e-Azam University Campus, Islamabad on December 04-08, 2017.
- PASTIC IT section organized three days training workshop on the topic of 'Research Tools & Techniques' from 20-22 December 2017 at PASTIC National Centre Islamabad.
- One day training workshop on "Managing Citation In Research By Using Mendeley" was held at the Islamia University of Bahawalpur on 14th December 2017 by PASTIC sub-centre Faisalabad in collaboration with ORIC IUB.
- PASTIC center Lahore, Pakistan Librarian Welfare Organization (PLWO) and Pakistan Institute of Fashion & Design (PIFD) jointly organized a hands-on training workshop on

Citation Management using Mendeley Software on December 5, 2017 at Pakistan Institute of Fashion and Design (PIFD), Lahore.

- PASTIC-Peshawar organized a Training Workshop on Endnote on December 06, 2016 at Agriculture University Peshawar.
- PASTIC Center Quetta arranged a PASTIC Awareness seminar at the Zoology Department, University of Baluchistan, Quetta on PASTIC activities on December 8th, 2017.
- PASTIC organized a training workshop on "*Make your research life easier with Mendeley Tool*" during 17-18 January, 2018 at PASTIC National Centre, Quaid-e-Azam University Campus, Islamabad.
- PASTIC IT section organized three days training workshop on the topic of 'Research Tools & Techniques: SPSS' from 24-26 January 2018 at PASTIC National Centre Islamabad.
- Dr. Shahid Qamar, Research Scientist from University of Louisville, USA delivered motivational talk to students and PASTIC officials on 25th January 2018 at PASTIC national Centre Islamabad.
- PASTIC Sub Centre, Karachi arranged PASTIC Awareness Seminar during "Research Expo" 2018 at Liaquat National Hospital & Medical College on 22-01-18.
- PASTIC Sub Centre, Karachi arranged PASTIC Awareness Seminar, during All Karachi Project Exhibition & Competition at Sir Syed University of engineering & Technology, Karachi on 18th January 2018.
- Training workshop on "SPSS Research Tools & Techniques" was conducted at PASTIC National Centre Islamabad from 26th to 28th February 2018.
- PASTIC Sub Center Lahore organized one day workshop with collaboration of FAST-NU Lahore on "Google Apps for Writing Research paper and Thesis", on 21th February 2018, at FAST-NU Lahore.
- A Two-day Workshop on "SPSS: Concepts & Practical" was held on Feb 01-02, 2018 at Qurtuba University DI Khan, PASTIC Sub-centre Peshawar.
- PASTIC Quetta organized one day training workshop on "EndNote" in collaboration with Geological Survey of Pakistan Quetta on 15th February 2018 at G.S.P Quetta.
- Training workshop on "Learning Data Analysis through SPSS" from 07-02-2018 to 08-02-18 with collaboration of Peoples University of Medical & Health Sciences for Women, Nawabshah, and Jinnah Sindh Medical University Karachi.
- Training workshop on "Learning Data Analysis through SPSS" from 12-02-2018 to 13-02-2018, with collaboration of ORIC, University of Karachi and Jinnah Sindh Medical University Karachi, at PASTIC Sub Centre Karachi.
- A one-day Awareness Seminar on "Intellectual Property Rights" was held at Peshawar on February 27th, 2018. The event was organized in collaboration with Qurtuba University of Science & Technology (QUSIT) Peshawar Campus.
- The PASTIC Sub-center Karachi, organized a one-day Awareness Seminar on "Intellectual Property Rights" (IPRs) on 26th February, 2018 with the collaboration of ORIC, University of Karachi and Intellectual Property Organization of Pakistan (IPO).
- The PASTIC Sub-center Karachi, organized a one-day PASTIC Services Awareness Seminar at University of Sindh, Mirpurkhas Campus, at Mirpurkhas on 9th February, 2018.

- PASTIC IT Section organize one day Training Seminar on March 14, 2018 on the topic of "Keyword planning and searching in digital era: Key Challenges" at PirMehr Ali Shah Arid Agriculture University, Rawalpindi in collaboration with facility of social Science.
- PASTIC organized a training workshop on "*Make your research life easier with Mendeley Tool*" during 28-29th March 2018 at PASTIC National Centre, Quaid-e-Azam University Campus, Islamabad.
- PASTIC Sub-centre Karachi arranged a one day Training workshop on "How to Write a Good Synopsis "on March 8, 2018 at PASTIC Sub-Centre Karachi.
- PASTIC Sub-centre Karachi arranged one day Training workshop on "Endnote" on March 22, 2018 at PASTIC Sub-Centre Karachi.
- PASTIC Sub-centre Karachi arranged one day Training workshop on "Data Analysis using SPSS" on March 28, 2018 at PASTIC Sub Centre, Karachi.
- A three-day hand on training workshop on "Library Automation by using Koha ILS package" was organized by PASTIC Sub-centre Faisalabad from 6th to 8th March at Ayub Agriculture Research Institute- Faisalabad.
- PASTIC Sub-centre Quetta organized two days training workshop on "SPSS" in collaboration with Center for Advanced Studies in Vaccinology & Biotechnology (CASVAB), University of Balochistan Quetta, from March 15-16, 2018 at CASVAB (UoB), Quetta.
- PASTIC Sub-centre Lahore, Pakistan Librarians Welfare Organization (PLWO), and COMSATS Institute of Information Technology (CIIT), Lahore jointly organized a seminar on "Effective Use of Information Resources" on March 14, 2018 at COMSATS Institute of Information Technology (CIIT) Lahore.
- A One-day Seminar on "Thesis Writing Skills" was held on March 14th, 2018 at Govt. Superior Science College (GSSC) Peshawar, jointly organized by Zoology Department GSSC-Peshawar & PASTIC Peshawar.
- One-DAY *Seminar On*Role of Research & Innovation for Shifting to TECHNICAL TEXTILE was organized by PASTIC Faisalabad and FCCI onMarch 15, 2018at Faisalabad Chamber of Commerce Faisalabad.
- PASTIC Sub Centre. Peshawar arranged PASTIC Services Awareness seminar at Zoology Department, University of Peshawar on March 6, 2018.
- PASTIC Sub-center Lahore organized a seminar on "Importance of Intellectual Property Rights in SMEs" on April 16th, 2018 at Sheikhupura Chamber of Commerce & Industry (SCCI).
- PASTIC Sub Centre Lahore, organized a one-day workshop with collaboration of Lahore Medical and Dental College Lahore, on "Use of Emerging Technologies in Research: Google Apps", on Friday 27th April 2018, at Lahore.
- PASTIC Sub Centre Karachi arranged a 5-day training workshop on "Librarians Personal Branding through Soft Skills Development" from 9-13 April 2018, at L.E.J, International Centre for Chemical & Biological Sciences (ICCBS), University of Karachi, in collaboration with Pakistan Library Club (PLC).
- PASTIC Sub Centre Karachi arranged a two-day Seminar on "How to Write Research Proposal for Getting Funds" on April 4-5, 2018 at PASTIC Sub Centre Karachi.

- PASTIC organized a three-day training workshop from April 2-4, 2018 in collaboration with Faculty of Social and Educational Sciences at PirMehr Ali Shah Arid Agriculture University Rawalpindi, on “Research tools and techniques to enhance quality of research”.
- PASTIC organized a training workshop on “*Make your research life easier with Mendeley Tool*” during April 11-12, 2018 at PASTIC National Centre, Quaid-e-Azam University Campus, Islamabad.
- PASTIC organized a Sindh Consortium meeting at PASTIC Sub Centre Karachi on April 13, 2018, which was attended by Senior Library professionals.
- PASTIC arranged a one-day training workshop on “Data Collection & Sample Size” on 18 April 2018, at PASTIC Sub Centre Karachi.
- PASTIC, Kohat University of Science & Technology (KUST)-ORIC, Kohat and Technology Times, Islamabad jointly organized One Day Workshop for Capacity Building of Young Scientists on “Communicating Science to Society,” on April 27, 2018 at KUST, Kohat.
- PASTIC organizes a one day training, titled "Smart Literature Search, Thesis and Internship Report Writing Skills” was held at SBBWU-Larama Campus, Peshawar on April 26, 2018.
- Two Days Training, titled "Research Tools and Techniques (SPSS)" was held at Pakistan Forest Institute from 12-13 April 2018 for capacity building of the faculty staff of PFI.
- PASTIC Sub Centre, Faisalabad in collaboration with Sargodha Chamber of Commerce and Industry (SCCI) organized one day seminar on CPEC opportunities and challenges on 10th April, 2018 at Sargodha.
- Two Days hands on training workshop on “SPSS” was organized by PASTIC Sub-Centre Faisalabad, from April 27-28, 2018, at the Women University Multan.
- One-day workshop for capacity building of young scientists on “Communicating Science to Society” was organized by PASTIC Sub-Centre Faisalabad on April 30, 2018 at BZU Multan.
- A three-week “Short term & Attachment training course for LIS Professionals” was organized by PASTIC National Centre, QAU Campus, Islamabad, from May 2-18, 2018.
- A one-day Workshop for Capacity Building of Young Scientists on “Communicating Science to Society”at University of Agriculture Faisalabad was jointly organized by PASTIC Faisalabad and UAF on May 10, 2018.
- A three-Day Workshop on ‘‘Emerging Technologies in Research; Google Apps & SPSS’’ was organized at Ayub Agricultural Research Institute Faisalabad on May 14-16, 2018.
- PASTIC organized three days training workshop on the topic of “Research Tools and Techniques (SPSS)” at I.T Lab of PASTIC to enhance the quality of research from May 2-4, 2018.
- PASTIC Sub Centre Karachi organized a one day training workshop on "Plagiarism" on April 30, 2018 at PASTIC Sub Centre Karachi.
- PASTIC Sub Centre Karachi organized a one-day Seminar on "How to write Research Paper" on May 9, 2018 at PASTIC Sub Centre Karachi.

- PASTIC Sub Centre Karachi organized a one-day Seminar on "Technology Development Fund" on May 8, 2018 at PASTIC Sub Centre Karachi.
- PASTIC Sub Centre Karachi organized a one-day "Workshop on Laboratory Animal Handling and ethics" with collaboration of Federal Urdu University of Arts, Science and Technology on May 14, 2018 at of Federal Urdu University of Arts, Science and Technology.
- PASTIC Sub-centre Lahore, Pakistan Librarian Welfare Organization (PLWO) and Government College University (GCU), jointly organized a hands-on training workshop on "Citation Management by using Mendeley Software", on May 15, 2018 at Government College University (GCU), Lahore.
- A one day seminar entitled "Resource Sharing, Networking and Consortium: Challenges, Prospects and way forward", was organized by PASTIC National Center at Lahore on June 28, 2018, in collaboration with COMSATS University Islamabad, Lahore Campus.

2.14 Meetings /Trainings/Seminars/Workshops Attended

- **Dr. Syed Aftab Hussain Shah, Sr. SIO, PASTIC,** Attended 12th ORIC meeting held at NUML, H-9, Islamabad on 27th July, 2017.
- **Dr. Syed Aftab Hussain Shah, Sr. SIO, PASTIC,** Participated in a two days workshop on "Growing Significance of IP," from 19th-20th December, 2017 held at Professional Development Centre (PDC), NUST, Islamabad.
- **Dr. Syed Aftab Hussain Shah, Sr. SIO, PASTIC,** Participated in Training Workshop on Patent Database Searches and Development of Technology and Innovation Support Centers (TISCs) in Pakistan held at NUST, Islamabad on March 13-15, 2018.
- **Dr. Syed Aftab Hussain Shah, Sr. SIO, PASTIC,** participated in a seminar on World IP Day 2018, theme entitled "Powering change: Women in Innovation and Creativity," organized by IPO Pakistan at Shadman Hall, Serena Hotel, Islamabad on April 24th, 2018.
- **Dr. Syed Aftab Hussain Shah, Sr. SIO, PASTIC,** participated as an organizing member of One-Day Workshop for Capacity Building of Young Scientists titled "Communicating Science to Society," on April 27, 2018, organized by PASTIC, Kohat University of Science & Technology (KUST), Kohat & Technology Times, Islamabad.
- Ms. Ghazala Ali Khan, Deputy Director (STI), PSC Peshawar, attended two days National workshop on implementation modalities of national biodiversity strategy & action plane at PFI Peshawaron August 2-3, 2017
- Ms. Ghazala Ali Khan, Deputy Director (STI), PSC Peshawar, attended three Weeks short Term Training Course for Library Professionals at PASTIC National Centre Islamabad on May 02-18, 2018.
- Ms. Ghazala Ali Khan, Deputy Director (STI), PSC Peshawar, attended Pre-summit meeting to plan 4thKP summit 2018 at Univ. of S&T, Bannu on 27th March, 2018.
- Ms. Ghazala Ali Khan, Deputy Director (STI), PSC Peshawar, attended 16th Conference of The Islamic Society of Statistical Sciences Islamia College Peshawar on March 5-8, 2018.

- Mr. Ali Raza Khan, Deputy Director (STI), PSC Lahore, attended the 42nd Board of Governor Meeting on 24th July, 2017 of Centre of Excellence in Molecular Biology, at University of the Punjab, Lahore.
- Mr. Ali Raza Khan, Deputy Director (STI), PSC Lahore, attended 64th meeting of the Board of Governors of the Centre of Excellence in Water Resources Engineering on 12-10-2017 at University of Engineering and Technology, Lahore.
- Dr. Maryum Ibrar Shinwari, Sr. Scientific Information Officer attended Review meeting of PSF on July 7, 2017.
- Dr. Maryum Ibrar Shinwari, Sr. Scientific Information Officer attended Meeting with Cyber Vision on July 26, 2017 regarding Pakistan Science Abstracts development.
- Dr. Maryum Ibrar Shinwari, Sr. Scientific Information Officer attended Meeting at HEC in November, 2017
- Mr. Muhamad Altaf, Deputy Director (STI) PASTIC Sub Centre Muzaffarabad attended Three Weeks Short Term Training Course for LIS Professionals at PASTIC National Centre Islamabad from 02-05-2018 to 18-05-2018.
- Mr. Muhamad Altaf Deputy Director (STI) PASTIC Sub Centre Muzaffarabad Attended one day Seminar Department of Botany, University of AJ&K Muzaffarabad, on"Emerging Trends in Plant Sciences" on 19-02-2018.
- Mr. Muhammad Hassnain, Deputy Director (STI) PASTIC Sub Centre Faisalabad, attended oath taking ceremony of Loyal pur Library Association (LLA) as a Chief Guest on 17.03.18.
- Mr. Saifullah Azim, Principal System Analyst, participated in National Police Summit and Innovation Expo on March 14, 2018 at Convention Centre Islamabad.

- Dr. Saima Huma Tanveer, Additional Director (STI) and Dr. Syed Aftab Hussain Shah, Senior Scientific Information Officer participated in Training Workshop on Patent Database Searches and Development of Technology and Innovation Support Centers (TISCs) in Pakistan, held at NUST, Islamabad on March 13-15, 2018.
- Ms. Ghazala Ali Khan, Deputy Director (STI) participated as Guest of Honor, in seminar on "Energy Awareness & Expansion Drive" at UET, Peshawar, on March 28, 2018.

2.15 DEVELOPMENT PROJECTS

PASTIC is also executing PASTIC Development Project entitled, "Modernization of PASTIC National Science Reference Library for effective Resource Sharing among S&T Libraries in Pakistan". Main objectives of the project are:

1. Development of Information Communication Technologies (ICT's) infrastructure for PASTIC National Science Reference Library.
2. Consortium of library & information scientists (librarians) of R&D organizations (CRDLP).
3. Capacity building of library information scientists (librarians) for Library Automation, Digital Library & Library Management, etc.

4. Revamping and strengthening of PNSR library.
5. Organizing awareness seminars for research scholars to promote / utilize the developed information resources.

2.16 MISCELLANEOUS ACTIVITIES

- PASTIC coordinated in bringing out PSF monthly Newsletter.
- PASTIC Sub-centre Faisalabad arranged Inaugural Ceremony of PSF-Planetarium on August 7, 2017. Mr. Fazal Abbas Maken, Federal Secretary MoST, was the Chief Guest. Dignitaries from all other organizations of Faisalabad participated.
- Independence Day August 14, 2017 was celebrated.The Science Centre/PASTIC Sub Centre Faisalabad were decorated with lighting, bunting and flags.
- STFS Interviews of remaining Students were conducted at Science Centre Faisalabad on August 24, 2017.
- A study tour from A.I.O.U. Faisalabad Campus visited the Science Centre Faisalabad on 24-08-2017.
- CEO Education Authority Faisalabad along with their team all DEOs, Deputy DEOs and AEO visited the Science Centre, Planetarium and STFS on 25.08.2017.
- A meeting was held on 25.08.2017 in the office of Deputy Director (STI), PASTIC Sub-Centre/Officer Incharge Science Centre Faisalabad. The meeting was chaired by Chairman PSF. Problems and issues of science education from primary to secondary education were discussed in details. CEO Education and Chairman PSF were on one page for future cooperation and coordination for popularization of Science through PSF activities throughout the Faisalabad region.
- Celebrations of World Science Day were held on November 10, 2017.Visit of Additional Commissioner General along with Chief Executive Officer Education with seniors from Education Department Faisalabad to Science Centre Faisalabad on April 18, 2018. Briefing/Meeting with faculty members and students of NTU Faisalabad, at NTU Library on October 3, 2017.
- PASTIC Sub-Centre Faisalabad is also making efforts to promote and publicize its activities and services through print media i.e. newspapers, and some time through electronic media
- PASTIC responded to various queries of MoST and Assembly / Senate questions, and prepared briefs on various topics.
- Organized meeting of senior professionals of LIS regarding development project “Modernization of PASTIC National Science Reference Library for effective resource sharing among S&T libraries in Pakistan” on March 7, 2018 at PASTIC Sub-Centre, Science Centre, Jail Road, Faisalabad
- Training session for New STFS buses for Caravan Teams from Sakhar, Tandojam, Jafarabad and Quetta was arranged at Science Centre Faisalabad on 25-08-2017.

2.17 PASTIC Membership

A total of 1,620 new members joined PASTIC and were added to PASTIC Services Users Membership Database.

III. PAKISTAN MUSEUM OF NATURAL HISTORY (PMNH)

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Pakistan Museum of Natural History (PMNH), the only natural history museum of Pakistan was established in 1979 under Pakistan Science Foundation, Ministry of Science & Technology, and Government of Pakistan. Pakistan Museum of Natural History (PMNH) has four principal divisions namely Earth Sciences Division, Botanical Sciences Division, Zoological Sciences Division and Public Services Division. First three scientific divisions are engaged in the collection, identification and research activities pertaining to plants, animals, fossils and mineral resources of Pakistan, while the fourth one is responsible for mass education and popularization of natural history through various displays, exhibits and dioramas. Researchers of PMNH carried out extensive field works from the Coast of Arabian Sea to the Alpine regions, roamed through barren areas for the collection of Flora & Fauna, Rocks, Fossils and minerals not only for research work but also for the purpose of education because education is also one of the main objectives of PMNH. For this purpose, PMNH regularly organized trainings, workshops, seminars, symposia and other educational interactive activities related to natural history, environment and biodiversity of Pakistan. International days are also observed at museum. PMNH has formed many national and international liaisons with the other research institutes in the country and from abroad. Due to these collective efforts of scientific and technical staff of PMNH and relations with other research institutions, PMNH has 1.5 million natural history specimens in its repositories. Research outcome of these field works and National and International projects are published in the form research papers in reputed national and international journals. PMNH is not only conducting research on the natural resources of Pakistan which exists in the form of Flora & Fauna, Rocks, Fossils and Minerals but also educating the students of Pakistan along with the common people with the help of informative, interactive, educative 3-dimentional dioramas and exhibits. Students of schools, colleges and universities from all over the Pakistan visit PMNH as a part of their educational tours. Scientific and Technical staff of PMNH also facilitate the students and researchers from the other universities and institutes by providing help in the research in the form of information, technical assistance, specimens as a loan and guidance in their research work. During 2017-18, PMNH performed the following activities;

3.1 BOTANICAL SCIENCES DIVISION

3.1.1 Field Work:

- Conducted 25 days field visit to Baluchistan and Karachi area and collected more than 200 higher plants from the study area from 19-01-2017 to 12-02-2017.

- Conducted 04 days visit at Shahran and Manchi area (Kaghan) District Mansehra KPK and collected 114 specimens of higher plants.
- Conduceted 03 days' field work in Sargodha and adjacent areas and collected 90 plant specimens.
- Collected 118 higher plants specimens from the Chakwal area comprising the following forests (namely Parera Forest 2. Dil-Jaba Forest 3. Ara Forest).
- Collected 35 higher plants from the DG. Khan and Sukkur area with reference to the IBDBR Project 2017 (Indus Blind Dolphin Biosphere Reserve).

3.1.2 Laboratory Work:

- Identification curation and photography of 282 higher plants sample collected from different parts of the country along with 06 plants from Chitral of family *Brassicaceae, Papilionaceae.*
- Curation of 150 higher plants, 36 plant samples of *Berberis sp* collected from AJK including new records from AJK including *Berberis kashmiriana, B. Ulicina, B. parkeriana.*
- Curated 475 and arranged 350 samples and entered data of 330 higher plants samples collected from various parts of the country for the higher plants herbarium.
- Identification and photography of 56 higher plants samples collected from Gilgit area and 14 plants samples from Jhelum area and 81 specimens from various other parts of the country for the higher plants herbarium.
- Arrangement of 400 and labeling of 320 higher plants samples from various areas of Pakistan for the higher plants herbarium.
- Curation (poisoning and mounting) of 400 and data entry of 879 higher plants samples (from Almirah No 30 to 34 in the higher plants herbarium).
- Photography of 65 higher plants from the higher plants herbarium and DG. Khan and Sukkur area.
- Photography of 289 higher plants from GB area for the higher plants herbarium.
- Data digitization and cataloguing of 2579 higher plant samples.
- Mounting and poisoning of 393 higher plant samples along with labeling of 150 plant samples
- Curation and arrangement of 1568 plants at the higher plants herbarium along with accessioning of 135 higher plant samples.
- Cataloguing of the plant samples in the Almirah number 28 of the higher plants herbarium
- Preparation of spawns (Button mushroom, Oyster mushroom and milky mushroom)

Summary

Activities	**No. of Plant Species Preserved**
Identified	706
Catalogued	27,609
Curated	8,639
Preserved	1,967
Digitized	3,788

Photographed	354
Biodiversity Global Network (BGN) Data Entry	5,601

ii. Total Collection during 2017-18

Higher Plants	1550
Mycology	1150
Phycology	200

3.1.3 Publications:

a. National:

- A Hussain, M Q. Hayat, **Sumaira Sahreen**, Qurrat ul Ain, S A I Bokhari. 2017. Pharmacological Promises of Genus Artemisia (Asteraceae): a Review. Proceedings of the Pakistan Academy of Sciences: B. Life and Environmental Sciences 54 (4): 265–287.
- Hussain,A.,M .Q. Hayat, Sumaira Sahreen, S A.I. Bokhari. 2018. Unveiling the Foliar Epidermal Anatomical Characteristics of Artemisia L. (Asteraceae) from Northeast (Gilgit-Baltistan), Pakistan. International Journal of Agriculture and Biology 21:630-638. (impact factor= 0.869)

b. International:

- **Sumaira Sahreen**, Khan MR, Khan RA. 2017. Evaluation of *Rumex hastatus* leaves against hepatic fibrosis: a rat model. BMC Complementary and Alternative Medicine 17:435 (**Impact Factor = 2.288)**
- **Sumaira Sahreen**, Khan MR, Khan RA. 2017. Evaluation of antioxidant profile of various solvent extracts of *Carissa opaca* leaves: an edible plant. Chemistry Central Journal, 11: 83. **(Impact factor 2.442).**
- Khan K. S., Ahmad M., **Gilani S.A**., Zafar M., Sultana S., Ashfaq S. 2017. "Himalaya's herbal medicine for the treatment of tuberculosis" Submitted in the Journal of Ethnopharmacology

- Reviewed the article for international peer reviewed journal" Pharmaceutical Biology".

3.1.4 Seminars/Trainings/Workshops/Organized:

- Dr. Syed Aneel Ahmad Gilani (Associate Curator BSD), Mr. Rafaqat Masroor (Associate Curator ZSD) and Mr. Khalil ur Rehman (Associate Curator ESD) facilitated the media persons in the field visit to Islamabad as resource persons at the Media workshop held at PMNH.
- Imparted the 02 days training to the forestry and wildlife officials of Punjab area at Parera (Distt. Chakwal) for the baseline and ecological studies of the vegeta-

tion/floral diversity of the Chakwal area under the SFM (Sustainable Forest Management) project.

- Trained the DFOs, RFOs and staff from the forest and wild life department of KPK (including Abbottabad, Mansehra, Balakot, Kohistan and Haripur) in the field at Saharan and Manchi forest (Kaghan, Distt. Mansehra) on the learning of the floral diversity and vegetation analysis of the said area from 21-24, Sept. 2017 under the SFM (Sustainable Forest Management) project.

3.1.5 Seminars/Trainings/Workshops/Attended:

- Dr. Syed Aneel Ahmad Gilani (Associate Curator, Botanical Sciences Division) and Mr. Rafaqat Masroor (Associate Curator, ZSD) participated in The ICOM-ITC International Training Workshop as Museum expert from November 07-15, 2016 and April, 3-11, 2017 at Palace Museum Beijing China.
- Dr. Aneel Gilani and Dr. Sumaira Sahreen participated in CABI workshop on knowledge and data sharing on *Parthenium* weed held on 16-17 May 2017.
- Attended the inaugural session of the two days training program on the formulation of the dossier for the Biosphere Reserves in Pakistan with collaboration with the Ministry of Climate Change, Pakistan on 09-10-2017 at PMNH.
- Attended one day validation workshop entitled "Development of Pakistan Snow leopard Ecosystem Protection Program" at hill view hotel, Islamabad on July 13th 2017 organized by SLF Pakistan.
- Attended two days project formulation workshop for R& D organizations of MOST at PSF Auditorium during 26th and 27th June 2018.
- Attended the Horizon2020 Awareness Seminar at PSF.

3.1.6 National/International Collaboration /Liaison

- Mutual research project with the Natural History Museum London, Department of Botany for the collaborative research work in Pakistan and UK, in progress.
- Submitted as **HEC-NRPU Project** entitled "Ethnobotany and Molecular Characterization of the selected Mangrove Species in Pakistan" as Co-PI with collaboration of Department of Plant Sciences, Quaid-I-Azam University, Islamabad.

3.1.7 Services Rendered to Other Organizations:

- Conducted the M.Phil viva of M.Phil student Ms. Maria Ameen on 17-02-2017 at the Department of Plant Sciences, Quaid-i-Azam University, Islamabad.
- Identification of plant species of *Pilea umbrosa* (family Urticaceae) collected from Dunga gali (KPK) of one of the Ph.D student from Department of Plant Sciences Quaid-i-Azam University Islamabad.
- Identification of 15 plant species of family Asteraceae and Acanthaceae for the M. Phil. students from Department of Botany, Quaid-i-Azam University Islamabad.
- Identification of 60 higher plants samples of the B.Sc. students from Punjab College Rawalpindi.

- Curation and arrangement of 110 Berberis species from Azad Kashmir area from the Ph.D. student from the University of Azad Kashmir Muzaffarabad.
- A group of 45 students led by Dr. Zafar (Assistant Professor) from the Department of Plant Sciences Quaid-i-Azam University Islamabad visited the Botanical Sciences Division.
- A group of 40 students of BS. Biology from COMSATS University Islamabad led by Dr. Kamran visited PMNH Display galleries along with the visit to the Zoological Sciences Division.
- Guided A levels and O levels students from different schools and colleges for the training and education about the herbarium techniques and plant collection in 2017 and 2018.
- Conducted 03 month internship Programme Biosciences student about herbarium techniques, research planning and report writing w.e.f. 03th july to 18th sept , 2018.
- Conducted a Five days internship Programme to O Levels students about plant collection techniques w.e.f. 9th Sep, 2018 to 13th July 2018.
- Guided the group of delegates from the three days International conference on Proteomics conducted at Department of Plant Sciences Quaid-i-Azam University Islamabad, including two delegates from China and one delegate from Brazil at the PMNH display galleries. The delegates were facilitated by the officials of WWF. Pakistan including the officer Mr. Amjad from WWF Khanewal office.
- Guided one M.Phil. Student from Hazara University and one Ph.D. student from Quaid-i-Azam University for the facilitation in their research work.
- Guided 2 groups of students (comprising 35 students) of the department of forestry and wildlife from University of Haripur at the higher and lower plants herbarium.
- Delivered a lecture at the higher plants herbarium to the students of the department of forestry and wildlife from University of Haripur on the flora of Pakistan and the herbarium techniques.
- Guided two Ph.D. students from University of Agriculture Rawlakot AJK and PMAS Arid University Rawalpindi for the identification and research guidance towards the completion of their Ph.D. research.
- Discussion with the faculty of University of Haripur for their official visit of the students to visit the herbaria at BSD in July and August-2017.

3.1.8 Education programs

➢ **Formal education to:**

✓ B.Sc students

300 (helped in the research work)

✓ M.Sc. students

200 (helped in the research work)

✓ M. Phill students

150 (helped in the research work)

✓ Ph.D students

50 (helped in the research work)

(Students from QAU, NUST, University of Peshawar, University of AJK, Fatima Jinnah Womens Unievrsity Rawalpindi (FJWU), PMAS Arid Agriculture University Rawalpindi and Islamic International University Islamabad etc.)

3.2 EARTH SCIENCES DIVISION

3.2.1 Field Work:

- Carried out one month geological field work from 30th June to 30thJuly 2017 in Gilgit Baltistan and its adjoining areas for the purchase of variety of gemstone specimens from different mines for the up gradation and beautification of Gemstone Gallery at PMNH, and for further study of mineral /rock samples. A total 235 samples of different rocks/ minerals and gemstones were collected for ESD repository.
- As a part of International Joint Programme entitled "**Zhob Dinosaur Track Way Reconstruction",** the Scientists of Pakistan Museum of Natural History (PMNH), Islamabad, with the team of Factum Foundation (Madrid/London), Palaeostreet (Warsaw), carried out fieldwork from 14th Dec to 21st Dec 2017 in Zhob, Balochistan. The team carried out the high-resolution recording of a fossilized dinosaur footprint in motion. The imprints were captured using a combination of systems, including photogrammetry and drone recording. The high-resolution information obtained was used to make an exact facsimile for the Pakistan Museum of Natural History in Islamabad. Further during on other fieldwork from 12th May to 19st May 2018 was to uncover some part of the strata above the adjacent stratum with expected imprints of sauropods that were examined in December 2017 which currently covers anticipated further markings that would indicate sauropod moving on that location approximately 70 million years ago. During the excavation, almost 4.5 meters horizontal and 4 to 5 meters vertically a stratum was uncovered to discover the foot prints of expected Sauropod. One small foot impression on very top was revealed. Also collected 108 Shale rock samples from Khewra, Salt Range.
- Another 10 days geological field work was carried out from 27th April, 2018 to 06th May 2018 in Gilgit Baltistan and its adjacent areas for the purchase of variety gemstone specimens from different mines for the up gradation and beautification of Gemstone Gallery at PMN and for study of mineral /rock samples.
- Another 15-days field work was carriedout for Lithofacies characteristic of Paleocene rocks in North West of Laki Range (near Hyderabad) and collection of the petrified wood for the paleo-environment of the Baluchitherium w.e.f. 21st May to 04 June 2018.

3.2.2 Laboratory Work:

- Cataloguing of 1165 vertebrate & invertebrate fossils was done for the Proper preservation of scientific materials/specimens in ESD reference collection.
- Digitization of 810 vertebrate & invertebrate fossils was done for the Proper preservation of scientific materials/specimens in ESD reference collection.
- Study of almost 140 thin sections for micropaleontological fossils research.
- Maintained the fossils record and curated the paleontology laboratory, ESD.
- Proper numbered given to the specimens collected from the field work.
- Identification, preservation, cataloguing and digitations of 250 rocks/wood fossils in reference collection of the PMNH.
- 375 hard rock Natural History specimens were identified, labeled, catalogued, digitized and curated in PMNH reference repository.

3.2.3 Publications:

a) National:

- Aamir Yaseen**,** Khalil-ur-Rehman, Muhammad Ahmad Farooqui and Mujeeb Ur Rehman Khaskheli **(2018).** First record of Pelecypod Fossils from Dhok Pathan Formation, Hassnot Area, District Jhelum, Pakistan. *University of Sindh Journal of Animal Sciences. Vol. 2, Issue 1, pp. 53-57.*
- K. A. Mirani, M. H. Agheem, S. H. Solangi, H. Dars and A. G. Sahito, 2017. Petrographic Studies of the Vihowa Formation, Sulaiman Range, Pakistan: Implications for Provenance. Sindh Univ. Res. Jour. (Sci. Ser.) Vol.49 (004) 835-842.

b) International:

- Ghazala Roohi1, S. Mahmood Raza, Elke Schneebeli-Hermann, Hugo Bucher, Aamir Yaseen, Khalil-ur-Rehman and Muhammad Imran. "Permo-Triassic climate change and faunal turnover in the Salt and Surghar ranges, Northern Pakistan". Journal of Himalayan Earth Sciences Volume 50, No. 1A, **2017** pp. 1-12
- Alexander Nutzel, David Ware, Hugo Bucher, Michael Hautmann, Ghazala Roohi, Khalil ur Rehman and Aamir Yaseen **(2018).** An early Triassic (Dienerian) microgastropod assemblage from the Salt Range, Pakistan and its implication for gastropod recovery from the end- Permian mass extinction. *Bulletin of Geosciences, Vol 93, Issue 1.*
- Ware, D., Bucher, H., Brühwiler, T., Schneebeli-Hermann, E., Hochuli, P.A., Roohi, G., UR-Rehman, K. & Yaseen, A**. (2018).** Dienerian (Early Triassic) ammonoids from the Northern Indian Margin. *Fossils and Strata*. An international monograph series of palaeontology and stratigraphy. Number 63.

c) Popular article:

- Article entitled "Reservoir rocks play an important role to economy" published in Technology Times Weekly newspaper.

- One research Article entitled 'Is it possible to have life on Mars?" has been published in Weekly Technology Times English newspaper.

3.2.4 Seminars/Symposia/Training/Workshop Organized:

- Organized 3 days training workshop on Gem & Gemology (Gemstone Identification/ Cutting, Polishing, Grading, Value Assessment and Evaluation) at PMNH from 24th to 26th September, 2013in collaboration with PSF GGIP, PAPG, IGL, PGJDC, IWCCI & ICCI Secretary MoST Mr. Kamran Ahmed Qureshi was the chief guest of the occasion.
- Arranged one day training for students on Relief Map Study in connection with Celebration of Biodiversity Day on 22ndMay, 2014. 120 students from eleven Schools of Islamabad and Rawalpindi participated in this event.

3.2.5 Seminars/Symposia/Training/Workshop Attended:

- Attended one day course on "Environmental Impact Assessment" organized by Pakistan Engineering council.
- Participated in an international seminar on "French Contributions to Pakistan Studies" held at Quaid-i-Azam University.
- Attended two days Media Workshop on "Understanding Science" at PMNH.
- Attended seminar on "Threatened wildlife species" at PMNH in collaboration with Ministry of Planning Development & Reform.
- Attended inaugural ceremony of capacity building workshop to "Preparation of Nomination dossiers of biosphere reserves in Pakistan".
- Attended seminar regarding celebration of World Science Day, 2017 at PSF.
- Attended workshops on "International day for Museum" and "International Day for Biological Diversity 2017" at PMNH.
- Attended celebration event on International Snow Leopard Day, 2018.
- Attended Inception Workshop arranged by Snow Leopard Foundation and Ministry of Climate Change, 2018.
- Attended workshop on "International Museum Day, 2018" in Lok Virsa, Pakistan".
- Attended workshop on "National Workshop on Exchange of Information on Snow Leopard Population in Pakistan".
- Attended seminar on "Threatened wildlife species" at PMNH in collaboration with Ministry of Planning Development & Reform.
- Attended inaugural ceremony of capacity building workshop to "Preparation of nomination dossiers of biosphere reserves in Pakistan".

3.2.6 Education Programme:

- Thin sections prepared for university students to study the microfossils and Petrographic studies.
- Internship and Supervision of 50 BS Geology students of University of Haripur.

- Prepared rocks/minerals Mobile Expo for display in different scientific events and in PMNH Display Gallery.
- Three days training related to geology to 15 students of University of Haripur.
- One month supervision and training to students from Bahria University Islamabad on depositional environment and sedimentary petrography.

3.2.7 National/international collaboration /Liaison

- Pakistan Museum of Natural History and Centre for Pure and Applied Geology, University of Sindh, Jamshoro signed a Memorandum of Understanding for cooperation in the field of Geology/Paleontology for mutual collaboration on research and education, training of scientists, information sharing, holding of exhibition/ workshop/ conferences/ symposia/ seminars and joint research projects.

3.2.8 Display Work:

- Prepared the poster on "Earthquake Causes and Safety Measures" and incorporated the amendments suggested by Prof. Dr. Muhammad Asif Khan, Vice Chancellor, Karakoram International University (KIU), Gilgit-Baltistan. Later on transformed the poster into brochure according to the Secretary, Ministry of Science & Technology's advice.
- Prepared Mobile Expo on Minerals & Rocks of Pakistan along with other officers and staff of Earth Sciences Division.
- Delivered lecture and guided group of 50 boys' students and 04 teachers during their visit to PMNH display galleries and ESD repositories.
- One Brusher entitled "Rock Garden" reviewed and ready to printing for public information.

3.3 ZOOLOGICAL SCIENCES DIVISION

3.3.1 Field Work:

- Dr. Khalid Mahmood Curator, Mr. Muhammad Asif Khan and Mr. Rafaqat Masroor Associate Curators and Mr. Mishkat Ullah, Research Associate, ZSD and Mr. Muhammad Kabir, Lecturer, University of Haripur carried out fieldwork for the collection of animals fauna (amphibians, reptiles, mammals, birds, butterflies and ground beetles) of Kaghan areas Moist Temperate Forests (Sharan Reserve Forest), Mansehra-KPK from 20-24th September 2017 in connection with Sustainable Forest Management Project. These officers also carriedout another field work for the collection of animals fauna (amphibians, reptiles, mammals, birds, butterflies and ground beetles) of 03 Chakwal Division "A" category Scrub Forests including Pararah Reserve Forest, Diljabba Game Reserve and Arra Range from 17-24th October 2017 in connection with Sustainable Forest Management Project.
- Dr. Khalid Mahmood, Curator, ZSD, Dr. Syed Aneel Gilani, Associate Curator, Mr. Rafaqat Masroor, Associate Curator, Mr. Mishkat Ullah, Associate Curator and Mr. Muazzam Khan conducted fieldwork in connection of UNESCO's project "Dossier

preparation for Establishment of Indus Blind Dolphin Biosphere Reserve in Pakistan" to Chashma, Taunsa, Guddu and Sukkur Barrage areas from 20th-25th November 2017.

- Dr. Khalid Mahmood, Curator, ZSD, Dr. Syed Aneel Ahmad Gilani, Associate Curator, BSD, Mr. Muhammad Kabir, Lecturer, University of Haripur, Muhammad Shakil, Lecturer, University of Kotli, conducted fieldwork for the collection of animals fauna (amphibians, reptiles, mammals, birds and butterflies) of Lakhat Dingano Reserve Forest, Nawabshah and Ketishahu Reserve Forests, Sukkur from 10-25th March 2018 in connection with Sustainable Forest Management Project.
- Dr. Ahsan Feroze, Associate Curator, Dr. Shabir Ali Amir and Dr. Muhammad Abbas, Associate Curator, carried out fieldwork for the collection of taxonomically important animals fauna of Coastal Waters of Karachi, Gawader and adjoining areas from 30th-23rd March 2018
- Dr. Khalid Mahmood Curator ZSD, Dr. Aneel Gilani, Associate Curator, BSD and Mr. Rahat Saeed, Operational Manager, PSD carried out fieldwork for collection of insect fauna and higher plant flora of Khunjrab National Park near Gilgit and adjacent areas from 26th June-14th July 2018.

3.3.2 Laboratory Work:

- During this period, 2,894 specimens of animals, birds, insects, and other zoological specimens were collected, catalogued, identified, digitized and preserved in the Zoological Sciences Division repositories as reference collection for future research.

3.3.3 National Research Project:

- Carabidae of Northern Pakistan (continued).

3.3.4 Collaborative Research Project:

a. National project

Project Title: Fauna and flora baseline establishment and capacity building of forest department in Sustainable Forest Management".

Objectives:

- Baseline surveys to prepare checklists of fauna and flora in, i). Khyber Pakhtunkhwa (Temperate forest), ii. Sind (Riverine forest), iii. Punjab (Scrub forest and Riverine forest)
- Capacity building of Provincial Forest and Wildlife Department staff with respect surveying and monitoring of animal and plant biodiversity.

b. International Project

Project Title: UNESCO's Project "Dossier Preparation for Establishment of Indus Blind Dolphin Biosphere Reserve in Pakistan"

Objectives

- To educate and involve stakeholders and local communities in conservation of Indus Blind Dolphin and reduction of mortalities due to its stranding in canals.
- To enhance awareness of local communities and to build their capacity for improved resource management and exploring alternative livelihoods and income generation.
- Promotion of Dolphin based ecotourism and other income generation activities for local communities.
- To enhance awareness about conservation of Indus Blind Dolphin through electronic media, print media, documentaries and popular literature.

3.3.5 Publications:

a) National:

- Ahmad, N., Siddiqui, P. J. A., Khan, K., Akbar, M. N. U., Rashid, M. and Masroor, R. 2018. The growth performance of juvenile yellow fin seabream (*Acanthopagrus arabicus*) fed at different feeding rates while reared in floating net cages. The Journal of Animal and Plant Sciences, 28 (4): 1014-1020.
- Naveed, A., Siddiqui, P.J.A., Ali, A., Khan, M.K., Masroor, R., Noor ul Akbar, Amin, M., and Attaullah, M. 2018. Dietary Protein Level in the Practical Diet of Yellow fin Seabream, *Acanthopagrus arabicus*, Juveniles for Optimum Growth Performance, Survival and Carcass Composition. Pakistan Journal of Zoology.

b) International:

- Amir, S.A., Siddiqui, P.J.A. and Masroor, R. 2018. Finfish diversity and seasonal abundance in the largest arid mangrove forest of the Indus Delta, Northern Arabian Sea. Marine Biodiversity, 48 (3): 1369-1380. DOI: 10.1007/s12526-016-0613-z
- Shabir Ali Amir, Sher Khan Panhwar, Pirzada J. A. Siddiqui, Fozia Khan, Shehnaz Rashid and Ye Zhenjiang. 2018. Age, growth and reproductive biology of Goldlined seabream Rhabdosargus sarba (Pisces: Sparidae) in coastal waters of Pakistan. Indian Journal of Geo-Marine Sciences, 47(7):1478-1485.

3.3.6 TECHNICAL REPORTS (13 reports)

a) Baseline Reports, in connection with Sustainable Forest Management Programme, Project.

- Baseline studies of Kaghan Temperate Coniferous Forest with reference to Small Mammals Fauna
- Baseline studies of Kaghan Temperate Coniferous Forest with reference to Ground Beetles Fauna
- Baseline studies of Kaghan Temperate Coniferous Forest with reference to Butterflies Fauna
- Baseline studies of Kaghan Temperate Coniferous Forest with reference to Amphibians and Reptiles Fauna

- Baseline studies of Kaghan Temperate Coniferous Forest with reference to Large Mammals Fauna
- Baseline studies of Kaghan Temperate Coniferous Forest with reference to Avi fauna
- Baseline studies of Perera, DilJaba and Ara Scrub Forest with reference to Large Mammals Fauna
- Baseline studies of Perera, DilJaba and Ara Scrub Forest with reference to Ground Beetles Fauna
- Baseline studies of Perera, DilJaba and Ara Scrub Forest with reference to Butterflies Fauna
- Baseline studies of Perera, DilJaba and Ara Scrub Forest with reference to Amphibians and Reptiles Fauna
- Baseline studies of Perera, DilJaba and Ara Scrub Forest with reference to Avi Fauna

b) Submitted reports of UNESCO project entitled "Dossier preparation of Indus Blind Dolphin Biosphere Reserve in Pakistan" at Pakistan National Commission for UNESCO Islamabad

c) Submitted evaluation and complete financial report of Indus Blind Dolphin Biosphere Reserve Project at Pakistan National Commission for UNESCO, Islamabad.

3.3.7 Seminars/Symposia/ Training/Workshop Organized:

- PMNH organized World Pangolin Day on 17th February 2018 in joint collaboration of PMAS-Arid Agriculture University, Rawalpindi and AJK Wildlife & Fisheries Department.
- PMNH and Snow Leopard Foundation jointly organized "National workshop for exchange of information on Snow leopard population in Pakistan" on April 24, 2018.
- PMNH and University of Haripur jointly organized 03 days training on the Taxidermy in Department of Forestry and Wildlife, University of Haripur on 14-16 May 2018.
- PMNH jointly organized a seminar and exhibition on Threatened Wildlife Species with Ministry of Planning, Development and Reforms with Collaborations of PMNH and UNDP on 27 December 2017 at PMNH Audio-Video Hall.

3.3.8 Seminars/Symposia/ Training/Workshop Attended:

International

- Mr. Mishkat Ullah, Associate Curator, ZSD attended training workshop on "Managing a Museum Today" held at ICOM's International Training Centre, Beijing-China from 08th-17th April 2018. He also got hands on training from Olympus-Pakistan regarding efficient operation Olympus Stereo zoom Microscope and its photographic software at Insect repository, ZSD, PMNH on 31st July 2017.

- All officers delivered lecture on "Taxonomy, field collection techniques and ecological importance of Animals (mammals, small mammals, fishes, amphibians, reptiles and insects)" to the students of BS (Hons) Forestry and Wildlife Management Department, University of Haripur at Insect Repository PMNH on 28th July 2017.
- Mr. Mishkat Ullah All ZSD officers attended a lecture entitled "Health Challenges of Modern Life and Treating with functional Foods and Lifestyle" by Dr. Anwar-ul-Haq Chairman PCST on 27th September 2017 at PSF Auditorium
- All ZSD officers delivered lectures on importance of Animals biodiversity and monitoring in Scrub forest environment during training session organized for the staff of Punjab Forest and Punjab Wildlife Protection Force at Lari Shah Nawaz, Chakwal on 17th-18th October 2017 in connection of Sustainable Forest Management Project.

3.3.9 National/International collaboration /Liaison

- MoU signed between Pakistan Museum of Natural History and HaglerBailly Pakistan to extend collaboration on biodiversity and environmental research.

3.3.10 Services Rendered to Other Organizations:

- Provided on loan 43 Reduviidae specimens for a PhD Scholar of China Agriculture University, West Campus, Beijing-China.
- Dr. Shabir Ali Amir, Associate Curator, ZSD collaborated with Dr. Bruce Thompson, Senior Scientist, Australian Museum Sydney for his ichthyology collection from Karachi coast area.
- Mr. Muhammad Asif Khan, Associate Curator, ZSD facilitated Islamabad Wildlife Management Board in preservation of common leopard specimen found dead in Margalla Hill National Park. He also contacted with Wildlife Department, KPK regarding donation of dead specimens of Snow Leopard and Tiger from Peshawar and Lahore Zoo respectively.
- Dr. Shabir Ali Amir, Associate Curator, ZSD gave a presentation on "Fish and fisheries in Pakistan" for BS student COMSAT university, Islamabad.
- 02 officers participated in the consultative meeting for Advancement of Mathematics & Science Education in Pakistan, held in PSF on 10th May 2018.
- Compiled and gave material for Technology Times Supplement on PMNH
- Conducted meeting with representative of SLF, Technology Times and ICIMOD for the celebration of Biodiversity Day
- Dr. Khalid Mahmood, Curator, ZSD gave a presentation on importance, diversity and classification of insect to M.Phil students at University of Haripur on 16.05.2018
- All ZSD officers attended the celebration of International Museum's Day held on 18th May 2018 in Lok Virsa Museum
- Dispatched letters to different tourism stakeholder in Public and Private sector to foster museum popularization and liaison.
- Sent 450 emails to schools of Federal Directorate of Education (FDE), Federal Govt. Educational Institutions Cantts/Garrisons (FGEICG) and Army Public School and Colleges (APS&C) to foster museum popularization and liaison

- Dr. Shabir Ali Amir, Associate Curator, ZSD worked/facilitated Assistant Director, Punjab Fisheries for their research on fish chromosomes. He also prepared project proposal entitled "DNA barcoding of commercially important marine fishes of Pakistan" under HEC/NRPU (National Research Program for Universities) as Co-PI with collaboration from Bahria University, Karachi. He also participated in a Medical Camp organized by Baharia University, Karachi for Fishermen at Bhit Island, Karachi on the occasion of celebrating World Fishermen Day". He
- Researchers of ZSD supervised 05 students of M. Phil. And Ph.D. belonging to different universities by providing assistance in their research work and thesis writing.
- Prepared diagnosis, remarks and distribution data of 153 species from 72 subgenera, 61 genera and 17 subfamilies. Morphometric data of all above mentioned species were also taken.
- Prepared 17 diagnostic keys (genera and species level) of different Carabid subfamilies.
- Sorted, pinned and Identified 290 Carabidae specimens collected during Sharan Reserve Forest, Kaghan and Parerah, Diljabba and Arra Reserve Forest, Chakwal fieldwork in connection with Sustainable Forest Management Project.
- Took morphometric data of 276 specimens belonging to 14 species of sub-family Carabinae deposited in Insect Repository of ZSD, PMNH.
- Identified 33 species of Carabidae collected through SFM Project.
- Identified insect specimens for Dr. Sameera Arshad, Assistant Professor, Qauid-e-Azam University on 22nd February 2018.
- Identified and catalogued 1430 specimens of marine fishes collected during different fields works along coastal belt of Sindh and Baluchistan during 2017-18
- Received 44 mammal specimens as donation from CDA Marghuzar Zoo Islamabad and Loi Bhair Wildlife Park Rawalpindi that inculde Indian Hog Deer (8 specimens), Barking Deer (07 specimens), Black Buck (07 specimens), Nilgai or Blue Bull (07 specimens), Lion (02 specimens), Wolf (02 specimens), Mouflon Sheep (02 specimens), Cevit (02 specimens), Spotted Deer (01 specimen), Black Bear (01 specimen), Brown Bear (01 specimen), Fellow Deer (01 specimen), Uriyal (01 specimen). All received specimens study skins were prepared after tanning.
- Received 3 bird specimens (House crow, Black kite and *Rufous* tree pie) from the vicinity of PMNH
- Acquired an Eagle owl specimen from University of Haripur
- Conducted field work for baseline studies of Raverine forests of Sukkur and Sakrand w.e.f 10-25 March 2018 and collected 900 insect, 4 Reptiles, 21 Amphibian and 10 Rodents specimens
- Identified 45 butterfly specimens
- Catalogued 02 snakes and 10 lizards in herpetology lab
- Cataloged and identified 135 specimens of birds

3.3.11 Education Display Activities:

- **Bird Diorama:** A new state of the art Diorama was added to PMNH gallery "World of Birds". It was joint project of ZSD (Dr. Muhammad Rafique, Dr. Khalid Mahmood, Mr. Muhammad Asif Khan and Mishkat Ullah) and PSD (Dr. Syed Lal

Shah and Mr. Rahat Saeed). This diorama was comprised of four sections i). Birds evolution along with *Archaeopteryx* of cast fossil specimen ii). Different birds' species mounted on wall and ground iii). Tree along with birds and their nests depicting natural environment in background iv). Different birds eggs from largest (Ostrich) to smallest arranged on wavy terraces.

- Dr. Shabir Ali Amir, Associate Curator, ZSD mounted PMNH stalls for participation in "An event for awareness of wildlife at Marghaza Zoo. Islamabad" from 20-21 January, 2018.
- Mr. Mishkat Ullah facilitated delegation DFOs from Gilgit Baltistan and CDA Environment wing during their visit to museum.
- Mr. Mishkat Ullah, Associate Curator, ZSD supervised a student Mr. Abdur Rehman M.Phil Parasitology, Quaid-i-Azam University regarding identification, morphometry and stereoscopic digital photography of fish ectoparasitoid *Lernaea* sp.
- Dr. Khalid Mahmood, Curator, ZSD guided a PhD student of University of Gujrat on the collection and identification of butterfly specimens. He also conducted museum visit with Prof. Don Driscoll, Deakin University, Australia.
- Mr. Muhammad Asif Khan, Associate Curator, ZSD facilitated a PhD research scholar, Mr. Muhammad Asad from Lincoin University, New Zealand University working on distribution and taxonomy of Common Leopard in Pakistan.
- Mr. Mishkat Ullah, Associate Curator, ZSD contacted an American Paleontologist for *Archaeopteryx* fossil cast for display in Bird diorama. This meeting actualized and received *Archaeoptyrex* fossil cast on 28th September 2017.
- Bird Diorama committee acquired donation of rock plate for *Archaeopteryx* display from M/s "New Muhammadi Marble & Chakwal Stone, Rawalpindi.
- Officers of ZSD guided goups of students from Abdul Hassan Scouts and Girl Guide, Karachi on 27th December 2017 during their visit to the display galleries. .
- Dr. Khalid Mahmood and Mr. Mishkat Ullah guided Mr. Akram Awan an amateur entomologist regarding Skipper (a kind of butterfly) identification and dissection. Moreover helped him preparing some digital photograph for a possible new species identification on 21-22 December 2017.

3.4 PUBLIC EDUCATION AND DISPLAY

3.4.1 Exhibits Developed

Design and Display Activities	Progress
• New Diorama/Exhibit Developed	02+1 in progress
• Maintenance of current displays/Exhibits	08
• Installed signage of PMNH at building and road side	05
• Information panels/boards	03
• Designed facade, background and murals of exhibits	12

• Write-up changed (display galleries)	04
• New garden lights in front of new and old gates	24
• Brouchers/Booklet/Posters prepared	03
• Newsletter for PSF	12
• Event Backdrops, banners, steamers, invitation cards, souvenirs, shields, yearbook title, certificates.	16
• 3-D model of Men for Cave Life Display	01
• Up-graded showcases in paleo-gallery	24
• Prepared Rockery	01
• Purchased & Installed Part-II of Interactive Floor System in display gallery.	01

I.T

• Software developed	01
• Software development in progress	02

3.4.2 Important Visits to PMNH

- Secretary MoST visited PMNH display galleries on 23-11-2017.
- Guided 02 high officials of Chinese delegation and German Ambassador and German official during their visit to the PMNH display galleries.
- Guided 15 students from the University of Punjab 161 students belonging to the various colleges and universities during their visit to the PMNH display galleries.
- Guided 04 member's Sri Lankan delegation during their visit to the PMNH display galleries on September 10, 2017.
- VC, GCU Lahore visited PMNH Display galleries on 28.12.2017.
- Ambassador of Egypt Mr. Ahmad Fadel Yacoub visited display galleries on 15-02-2018.
- Joint Secretary MoST Mr. Hassan Baig visited display galleries on 24-02-2018.
- Member Finance, PSF Mr. Tafakhar Ali Asdi visited PMNH display galleries on 27-03-2018.
- A delegation ECO Science Foundation visited PMNH display galleries on 12-04-2018.
- A group of delegates from the three days International conference on Proteomics conducted at Department of Plant Sciences Quaid-i-Azam University Islamabad, including two delegates from China and one delegate from Brazil visited PMNH display galleries. The delegates were facilitated by the officials of WWF. Pakistan.
- Mr. Ahmad Fadel Yacoub, Ambassador of Egypt in Pakistan visited Pakistan Museum of Natural History, Islamabad on 15th February 2018. The honorable guest visited different galleries and repositories of the Museum.
- Mr. Gary Elliot, Director, Global Human Resources, British Council and James Hampson, British Council Deputy Director, visited PMNH Display galleries on May 08, 2018. They expressed great interest in the displayed natural history specimens,

exhibits and dioramas. Senior officials and officers of PMNH provide assistance during their visit.

- Major (Retd) Qaiser Majeed Malik Chairman, PSF visited PMNH display galleries on April 09, 2018. He visited the display galleries and expressed keen interest in the exhibits.
- A delegation of 70 participants of 7th South Asian Conference on Sanitation (SACOSAN-II) along-with officials of Ministry of Climate Change visited PMNH display galleries on 14-04-2018. Delegation comprised on the representatives from Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal and Sri Lanka.
- Group of teachers participating in national workshop at PASTIC visited PMNH display galleries on May 14, 2018.
- Prof. Maria Eugenia D'Amato from Cape Town South Africa visited PMNH display galleries on 25-06-2018. Senior scientists of PMNH received the honorable guest. Prof. Maria visited different galleries and repositories of PMNH and took keen interest in various displays.

3.4.3 Educational Services

- Facilitated the visit of staff/students of Punjab University Lahore.
- Guided teachers/ Educators of Rawalpindi Division, Punjab Education Department through display galleries of PMNH.
- Facilitated PhD student from Quaid-e-Azam University, Islamabad.
- Briefed about the PMNH galleries to groups of students from Fatima Jinnah Women University, Rawalpindi and University of Gujarat students/staff.
- During the year, Students from various schools, colleges and universities of many parts of the country visited PMNH. Some of these were Institute of Geology Kashmir University Muzffarabad, Fauji Foundation Model School Abbottabad, Imperial International School & College, Islamabad, Fauji Foundation Model School Kohat, Faran Academy Mardan, New Age Scholars Science College Kotly AJK, Tamir-e-Millat School Peshawar, Balochistan Residential College Khuzdar, Balochistan, Punjab Group of college Haripur, Punjab Group of Colleges Gujar khan, NFC IEFR Faisalabad, AmnaBint-ul-Huda Educational Institute Murree, Govt. Girls High School SainthaKallarSyedan, The Citizen Foundation School DhokChoudrian Rawalpindi, Holy Family School of Nursing, Rawalpindi, The Lasanians School Rawalpindi, Fauji foundation Model School Kahuta, Fauji Foundation Model School Mang (AJK), Iqra Education Academy Peshawar, Peshawar, Dar-e-Arqam High School Samundri, Faisalabad, PMAS-Arid Agriculture University, Rawalpindi, University of Hiripur, University of Wah, WahCantt., Quaid-i-Azam Public Sec. School Hazro, Attock, Govt. Vocational Training Institute for Women, Daska, Dawah Academy, Unique Educational Academy Rawalakot AJK, Women branch International Islamic University, Islamabad Startwell Education Rawalpindi, GDGC No1 Abbottabad. These students were facilitated with the guided tour and video documentaries shown on a large screen.

3.4.4 Number of Visitors to Display Galleries

- **Providing Informal Education through PMNH displays:**
  PMNH has more than 130 state of art displays, exhibits, dioramas for public awareness about the biodiversity and natural resources of Pakistan. In 2017-18, new diorama "Bird of Pakistan" was inaugurated and opened for the general public. Another diorama "Botanical Forests Diorama of Pakistan" was under preparation. In 2017-18, two animated Dinosaurs added to the display galleries. These animated models of T-Rex remained center of attraction for the visitors of all ages. PMNH also facilitated visitors, National and International delegations and groups of students of schools, colleges and universities during their visit to the PMNH display galleries by providing guided tours. Large number of people, students of schools, colleges and universities belonging to the various regions of Pakistan visited PMNH displays galleries.

In 2017-18, a total 2,16,781 people visited museum including 48225 students, 99109 general public, 486 foreigners, and 68961children below 5 years of age.

IV. PHOTO GALLERY AND PRESS CLIPPING

4.1 PSF PHOTO GALLERY

Federal Secretary for Science and Technology Ms. Yasmin Masood addressing the participants on World Science Day

Student receiving a Shield from the Federal Secretary, Ministry of Science and Technology

Chairman, PSF addressing during Inter Universities Quiz Competition at COMSTECH Auditorium

Students with Chairman, PSF Prof. Dr. M. Ashraf

Students participating in Inter Universities Quiz Competition at COMSTECH Auditorium

Chairman, PSF and Senior Officials of PSF, PMNH and PASTIC attending the Inter Universities Quiz Competition at COMSTECH Auditorium

Federal Secretary for Science and Technology Mr. Fazal Abbas Mekan addressing the participants on Popular Science Lecture in PSF Auditorium

Federal Secretary S&T with Chairman, PSF

Group photo of participants of Pakistani Young Scientists at Belt & Road Teenager Maker Camp Teachers Workshop at Beijing-China

Outside view of STFS mobile Lab

Inside view of STFS mobile Lab

Group photo of STFS students during Summer Camp (July, 2017)

Distribution of Laptops among STFS Students

STFS Students with Project Director during International Study Visit in London

Group photo of STFS Students during International Study visit

Chairman PSF Prof. Dr. Muhammad Ashraf with the Delegation from Scientific & Technological Research Council of Turkey (TUBITAK) at PSF

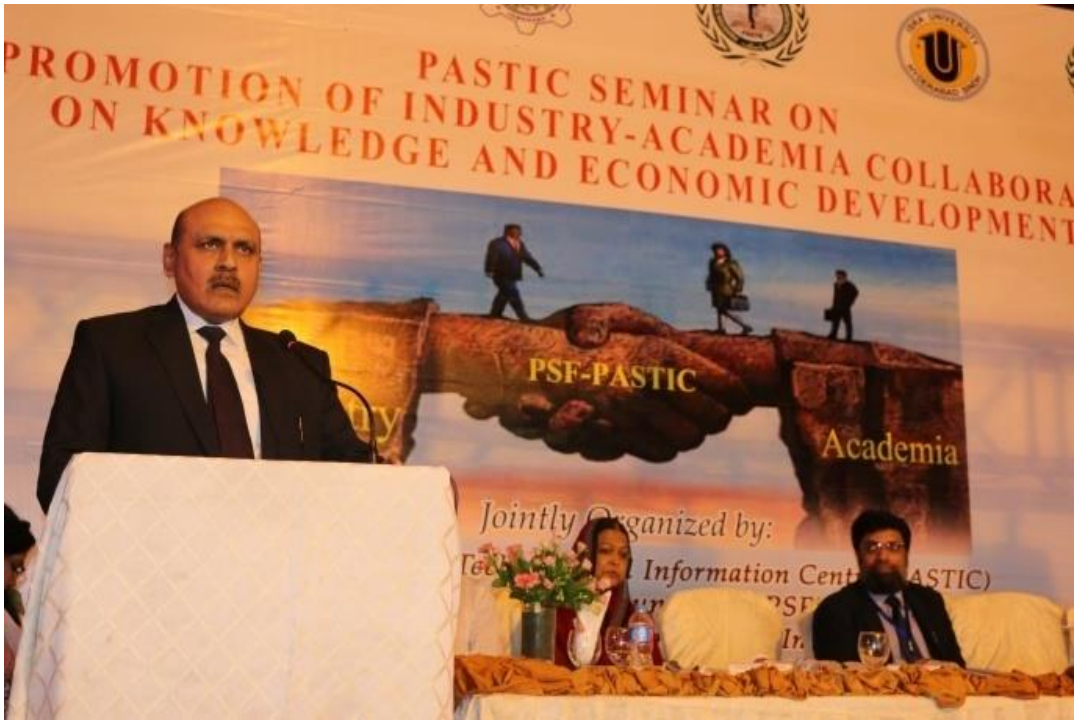
Dr. Orkun Hasekioglu, Vice President of the Scientific and Technological Research Council of Turkey (TUBITAK) Presenting Souvenir to Prof .Dr. Muhammad Ashraf, Chairman, PSF during the Visit of TUBITAK Delegation to Pakistan Science Foundation

Director (Res), PSF presenting PSF at International Symposium on Funding Science and People Cooperation for prosperous Belt and Road, at Beijing, China.

A Group photo of the Participants at International Symposium on Funding Science and People Cooperation for prosperous Belt and Road, at Beijing, China.

4.2 PASTIC PHOTOGALLERY & PRESS CLIPPING

Group photo of the Participants of the Training Workshop on Mendeley held at PASTIC Islamabad on 20-21ST September, 2017



PSF Chairman Prof. Dr. Muhammad Ashraf addressing the participants of the seminar on "Promotion of Industry-Academia Collaboration for Knowledge and Economic Development" at Hyderabad

Director General PASTIC, Ms. NageenAinuddin addressing the participants at Launching Ceremony of "National Exhibition on IT & Computer Tools for Science & Education at Pakistan Science Foundation on 10 October, 2017.

Deputy Director PASTIC presenting shield to Chief Guest Pro. Dr. Khalid Nawab at Closing Ceremony at training workshop on "How to Write a Worth Publishing Research Paper" at Agriculture University Peshawar.

Participants receiving certificates after completion of Medelay tools training at PASTIC from 22-23rd November, 2017

Ms. Nageen Ainnuddin, Director General PASTIC, signing MoU with Lahore Garrison University, on Cyber Security at PSF Auditorium Islamabad on November 22, 2017

Librarians participating in group discussion during consortium on November 01, 2017 at PASTIC, Islamabad

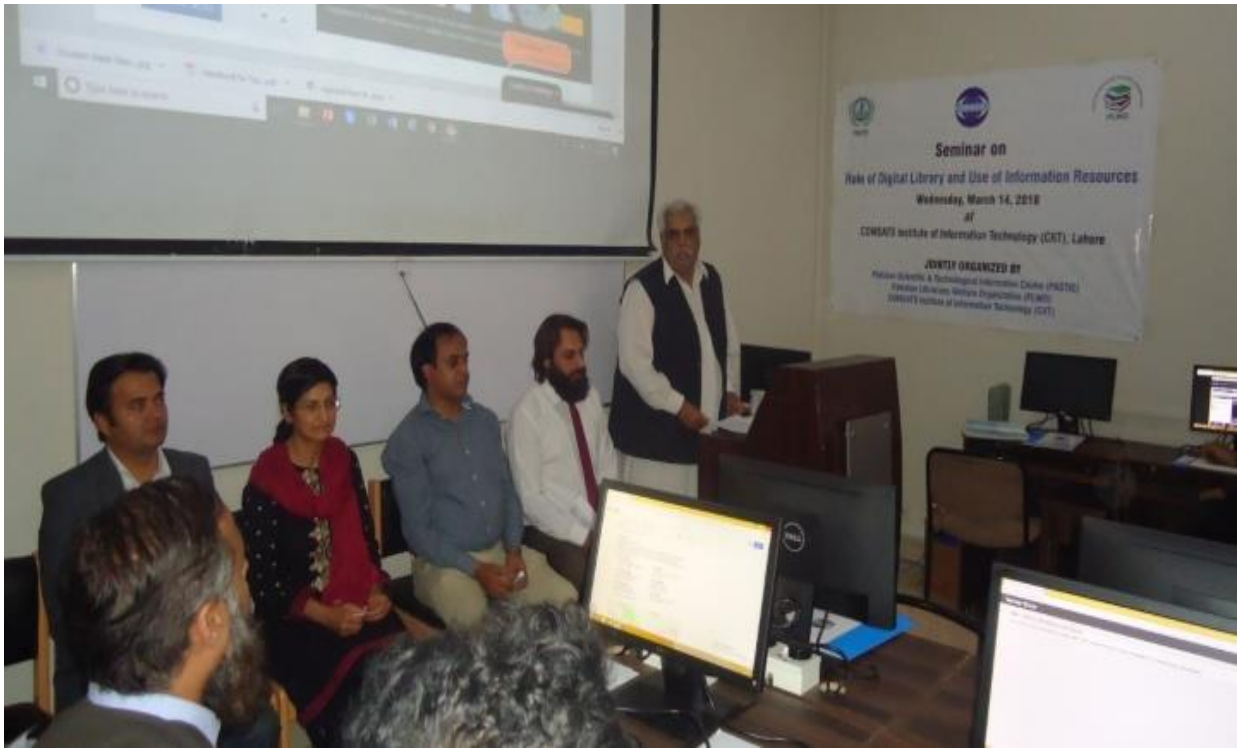
The Chief Guest Prof Dr. Muhammad Ashraf, Chairman, PSF with senior Management of PASTIC & Resource Person of Koha Workshop held on December 04-08, 2017 at PASTIC National Centre, Islamabad.

Ms. NageenAinuddin, DG PASTIC presenting certificate to a participant of the workshop.

Dr. Umbreen Shaheen delivering a presentation on "ENDNOTE" on 15th February 2018 at G.S.P Quetta.

Mr. Abdul Fatah Shaikh D.D STI, PASTIC Sub Centre, Karachi delivering a presentation at PSC Karachi on 26th Feb 2018

Mr. Muhammad Hassnain, DD PASTIC, Faisalabad delivering presentation during the seminar



Mr. Ali Raza Khan, Deputy Director (STI), PASTIC conducting a seminar on "Effective Use of Information Resources" on March 14, 2018 at COMSATS Institute of Information Technology (CIIT), Lahore.

DD PASTIC delivering presentation at Govt. Superior Science College (GSSC), Peshawar

Mr. Manzoor Ul Haq Malik, Chief Guest, presenting shield by DD (STI), PSC, Lahore

Mr. Tariq Najmi, Resource Person, receiving shield from Director ICCBS

Prof. Dr. M. Akram Shaikh, DG PASTIC, presided over the Sindh Consortium Meeting at PASTIC Sub-centre, Karachi

Prof. Dr. Jamil Ahmed, Vice Chancellor KUST, Kohat receiving PASTIC Crest from Prof. Dr. Muhammad Akram Shaikh, DG PASTIC at the end of the workshop held at KUST, Kohat on April 27th, 2018.

Mr. Muhammad Aqil Khan, Additional Director (STI), PASTIC Islamabad, highlighting the importance of the seminar, and the role of PASTIC regarding its information services at Seminar on CPEC Opportunities and Challenges at Sargodha.

Mr. Muhammad Altaf, Deputy Director (STI), PASTIC Sub-centre Muzaffarabad, giving briefing to students at the stall at University of Science & Technology Mirpur AJK.

Ms. Afsheen Tariq Raja, Assistant Scientific Information Officer, PASTIC sub-centre, Karachi briefing the students at the PASTIC Services Stall.

Dignitaries with the Chief Guest, Prof. Dr. Muhammad Akram Shaikh, DG PASTIC, at the Inauguration Session of Training Course

Prof. Dr. Muhammad Akram Shaikh, Director General PASTIC, delivering his speech at the inauguration ceremony of Short term & Attachment training courses

Dr. Muhammad Akram Shaikh, DG PASTIC, presenting shield to Prof. Dr. Zafar Iqbal, Vice Chancellor, University of Agriculture Faisalabad.

Mr. Ali Raza Khan, Deputy Director (STI), PASTIC highlighting the objective of the PASTIC and its achievements at Government College University (GCU), Lahore.

Group Photo of the participants of workshop at Government College University (GCU), Lahore.

Mr. Abdul Khalique Sial, In-Charge PASTIC Sub-Centre, Quetta, providing information to the researchers at the stall at University of Balochistan.

Prof. Dr. Muhammad Akram Shaikh, DG PASTIC presenting souvenir to Mr. Fahad Obaid, Data Control Assistant.

A view of the officers and staff during the ceremony

Prof. Dr. Muhammad Akram Shaikh, DG PASTIC, presents shield to speaker of the seminar Mr. Salman Bin Naeem, A.P. IUB., at COMSATS, Lahore.

Participants of one day seminar on “Resource sharing, networking and consortium challenges, prospects and way forward, at COMSATS, Lahore.

Faculty members visited PASTIC Service Stall during conference Probe Biology down the Road organized by Department of Physiology, University of Karachi

Reserachers visited PASTIC Service Stall during All Karachi Project Exhibition & Competition at Sir Syed University of Engineering & Technology, Karachi on 18th Januray 2018**.**

روزنامہ میرا علم 8 اگست 2017 فیصل آباد۔

کھویا ہوا مقام علم و ریسرچ سے ہی حاصل کر سکتے ہیں، فضل عباس میکن

جن معاشروں نے سائنس و ٹیکنالوجی کے علم پر عمل کیا وہ ترقی یافتہ معاشرے کہلاتے ہیں، نبی کریم ﷺ نے چودہ سو سال قبل کہہ دیا تھا علم حاصل کرو

ہمارا دین بھی اس بات پر زور دیتا ہے کہ ہم محنت لگن و سچے دل کے ساتھ اپنا ہر کام سرانجام دیں، وفاقی سیکرٹری سائنس اینڈ ٹیکنالوجی کا تقریب سے خطاب

فیصل آباد (سٹاف رپورٹر) وفاقی سیکرٹری سائنس اینڈ ٹیکنالوجی فضل عباس میکن نے آج سائنس سنٹر پاکستان سائنس فاؤنڈیشن فیصل روڈ پر واقع پی ایس ایف سیارہ گاہ کے افتتاح کے موقع پر منعقدہ تقریب سے خطاب کرتے ہوئے کہا کہ جن معاشروں نے سائنس و ٹیکنالوجی کے علم پر عمل کیا وہ ترقی یافتہ معاشرے کہلاتے ہیں آج سے چودہ سو سال پہلے ہمارے پیارے نبی نے علم حاصل کرنا مرد و عورت پر فرض قرار دیا (باقی اندرونی صفحہ نمبر 66)

اور اس کی اہمیت اس طرح بھی واضح ہے کہ علم کے حصول کے لئے اگر چین بھی جانا پڑے تو جاؤ اگر ہم اپنی تاریخ اٹھا کر دیکھیں تو معلوم ہوگا کہ مسلمانوں نے ہر علم پر دسترس حاصل کی چاہے اجرام فلکی ہو قانون ہو، معاشرہ ہو ہر ایک میں انہوں نے معراج حاصل کیا جیسے ہی ہم اپنی تاریخ سے دور ہوتے چلے گئے ہم پستی میں گرتے چلے گئے جن قوموں نے ان پر عمل کیا وہ ترقی میں ہم سے آگے نکل گئے اس لیے ہمیں چاہیے کہ ہم اپنی تاریخ سے سبق سیکھتے ہوئے علم و ریسرچ پر اپنی توجہ مرکوز کریں تاکہ ہم بھی اپنا کھویا ہوا مقام دوبارہ حاصل کر سکیں ہمارا دین بھی اس بات پر زور دیتا ہے کہ ہم محنت لگن و سچے دل کے ساتھ اپنا ہر کام سرانجام دیں تقریب میں فیصل آباد کے مختلف سکولوں، کالجوں کے طلباء طالبات نے بھی شرکت کی اور انہوں نے اس موقع پر اس بات پر بھی زور دیا کہ ہم اپنے بچوں کو یہاں لائیں تاکہ وہ قدرت کو زیادہ قریب سے دیکھ سکیں اس سے پہلے ڈائریکٹر جنرل پاکستان سائنس فاؤنڈیشن اسلام آباد ڈاکٹر ایم اشرف نے سپاسنامہ پیش کیا اس موقع پر سابقہ صدر فیصل آباد چیمبر آف کامرس محمد نواز نے بھی خطاب کیا بعد میں پی ایس ایف سیارہ گاہ اور جدید موبائل لیب کا افتتاح کیا۔ 66

روزنامہ جنگ 29 جولائی 2017

نیشنل ٹیکسٹائل یونیورسٹی میں ٹریننگ ورکشاپ

فیصل آباد (نامہ نگار خصوصی) نیشنل ٹیکسٹائل یونیورسٹی میں شعبہ لائبریری اور پاکستان سائنٹیفک اینڈ ٹیکنالوجیکل انفارمیشن سینٹر کے باہمی اشتراک سے ایک روزہ ٹریننگ ورکشاپ منعقد کی گئی۔ ورکشاپ کا موضوع "مینیجنگ سائٹیشن ان ریسرچ بائے یوزنگ مینڈلے" تھا۔ پروفیسر ڈاکٹر تنویر حسین ریکٹر نیشنل ٹیکسٹائل یونیورسٹی نے ورکشاپ کا افتتاح کیا اور اساتذہ اور طلباء کو ورکشاپ سے مستفید ہونے کے ساتھ ساتھ اسکو عملی طور پر اپنانے پر زور دیا۔

روزنامہ دنیا 29 جولائی 2017

نیشنل ٹیکسٹائل یونیورسٹی میں اساتذہ وطلبہ کیلئے ورکشاپ

ریسرچ کے حوالے سے چیلنجز کا سامنا کرنے کے بارے میں آگاہی فراہم کی گئی

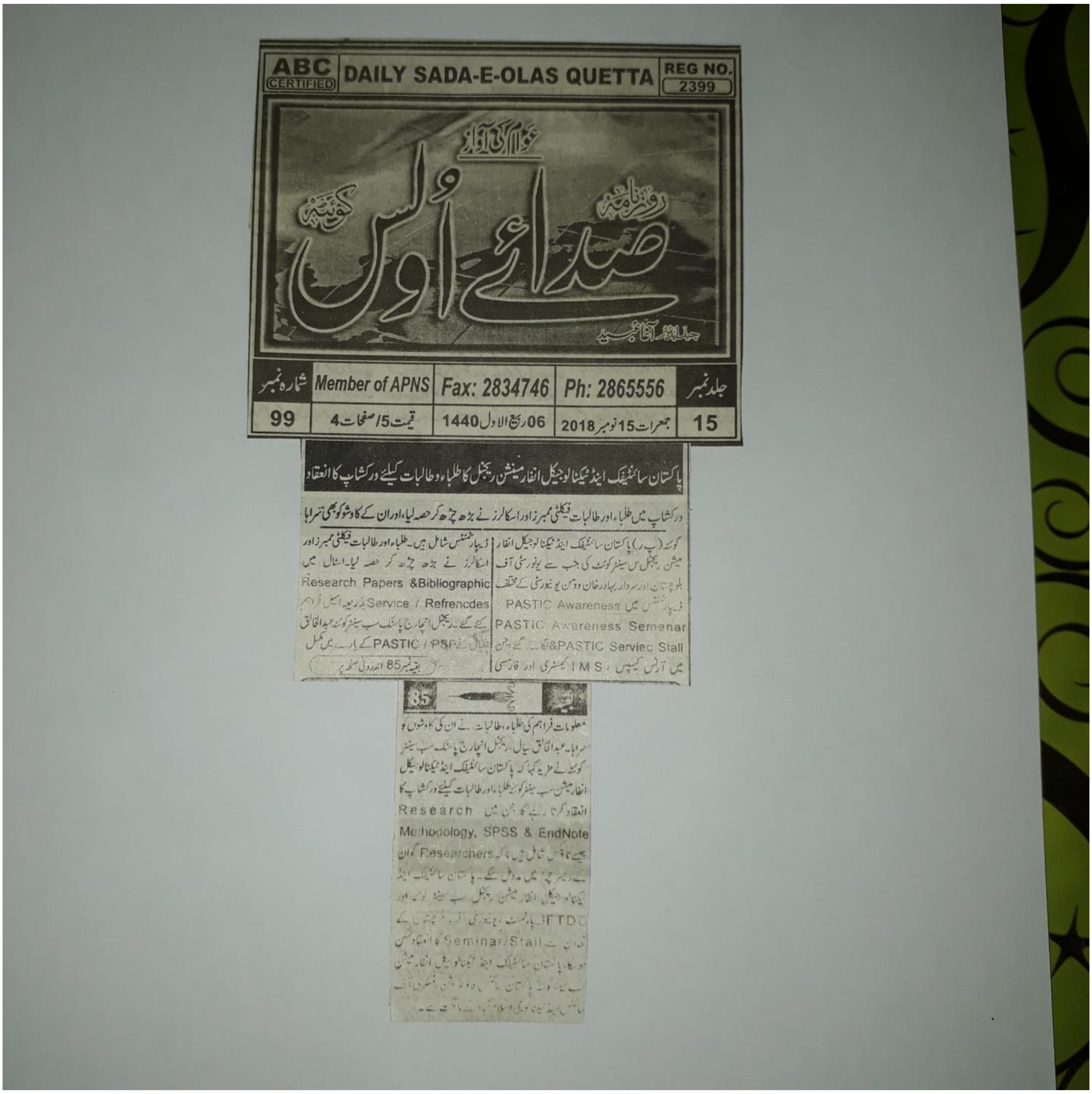
فیصل آباد (سٹی رپورٹر) نیشنل ٹیکسٹائل یونیورسٹی فیصل آباد میں شعبہ لائبریری اور پاکستان سائنٹیفک اینڈ ٹیکنالوجیکل انفارمیشن سنٹر (پاسٹیک) کے باہمی اشتراک سے ایک روزہ ٹریننگ ورکشاپ منعقد کروائی گئی۔ ورکشاپ کا بنیادی مقصد اساتذہ اور طلبہ کو جدید علوم سے آگاہی فراہم کرنا تھا تاکہ وہ ریسرچ کے حوالے سے گلوبل چیلنجز کا سامنا کر سکیں۔ ورکشاپ سے مہمان خصوصی پروفیسر ڈاکٹر تنویر حسین ریکٹر نیشنل ٹیکسٹائل یونیورسٹی نے اپنے خطاب میں اساتذہ اور طلبہ کو ورکشاپ سے مستفید ہونے کے ساتھ ساتھ اس کو عملی طور پر اپنانے پر زور دیا۔ اس موقع پر محمد حسنین، مشتاق احمد، آصف منیر، لیاقت علی، وقار احمد، ڈاکٹر محمد طاہر و دیگر بھی موجود تھے۔

The News 29.7.2017

NTU holds workshop

From Our Correspondent

FAISALABAD: National Textile University library organised a one-day workshop on managing citation in research by using mendeley with the collaboration of PASTIC sub-centre Faisalabad at IT Centre on Friday. A large number of faculty members, staff, research assistants and students of BS, MS and PhD scholars from all disciplines attended the workshop. Muhammad Asif Munir, Director IRM, Punjab Higher Education Commission, Lahore was the resource person and he told the participants about mendeley particularly the following steps of database; basic concepts & overview, installation & introduction, adding references to library editing, organizing references, using citation plugin and flattening of the documents, etc. Addressing the opening ceremony, guest of honour Professor Dr Tanvir Hussain said the NTU is one of the leading institutes which impart training to researchers. He said the workshop is an opportunity for faculty members and young scholars to enhance their skills in learning and technologies for research. He said such workshop should be conducted on regular basis to promote usage of digital libraries among PhD scholars. Dr Tanvir emphasized on the importance of the learning of information skills for the advancement of the library sciences to embrace knowledge in the era of technology. Liaqat Ali, Chairman Department of Management Sciences distributed certificates and shields among the participants and organisers.



ABC CERTIFIED | DAILY SADA-E-OLAS QUETTA | REG NO. 2399

عوام کی آواز

روزنامہ صدائے اولس کوئٹہ

شمارہ نمبر	Member of APNS	Fax: 2834746	Ph: 2865556	جلد نمبر
99	قیمت 5/ صفحات 4	06 ربیع الاول 1440	جمعرات 15 نومبر 2018	15

پاکستان سائنٹیفک اینڈ ٹیکنالوجیکل انفارمیشن ریجنل کا طلباء و طالبات کیلئے ورکشاپ کا انعقاد

ورکشاپ میں طلباء اور طالبات فیکلٹی ممبرز اور اسکالرز نے بڑھ چڑھ کر حصہ لیا، اوران کے کاوشوں کو بھی سراہا

کوئٹہ (پ ر) پاکستان سائنٹیفک اینڈ ٹیکنالوجیکل انفارمیشن ریجنل س سینٹر کوئٹہ کی جب سے یونورسٹی آف بلوچستان اور سردار بہادر خان وومن یونیورسٹی کے مختلف ڈیپارٹمنٹس میں PASTIC Awareness PASTIC Awareness Semenar &PASTIC Serviec Stall لگائے گئے جن میں آرٹس کیمپس، IMS، کیمسٹری اور فارمیسی ڈیپارٹمنٹس شامل ہیں۔ طلباء اور طالبات فیکلٹی ممبرز اور اسکالرز نے بڑھ چڑھ کر حصہ لیا۔ اسٹال میں Research Papers &Bibliographic Service / Refrencdes بذریعہ ایمیل فراہم کیے گئے۔ ریجنل انچارج پاسٹک سب سینٹر کوئٹہ عبدالخالق PASTIC / PSF کے بارے میں مکمل

بقیہ نمبر 85 اندرونی صفحہ پر

85

معلومات فراہم کی طلباء، طالبات نے ان کی کاوشوں کو سراہا۔ عبدالخالق سیال، ریجنل انچارج پاسٹک سب سینٹر کوئٹہ نے مزید کہا کہ پاکستان سائنٹیفک اینڈ ٹیکنالوجیکل انفارمیشن سب سینٹر کوئٹہ طلباء اور طالبات کیلئے ورکشاپ کا انعقاد کرتا رہے گا جن میں Research Methodology, SPSS & EndNote جیسے کورسز شامل ہیں تاکہ Researchers کو ان کے ریسرچ میں مدد مل سکے۔ پاکستان سائنٹیفک اینڈ ٹیکنالوجیکل انفارمیشن ریجنل سب سینٹر کوئٹہ اور FTDC ڈیپارٹمنٹ یونیورسٹی آف بلوچستان کے تعاون سے Seminar/Stall کا انعقاد ممکن ہو سکا۔ پاکستان سائنٹیفک اینڈ ٹیکنالوجیکل انفارمیشن سب سینٹر کوئٹہ پاکستان سائنس فاؤنڈیشن منسٹری آف سائنس اینڈ ٹیکنالوجی اسلام آباد کے ماتحت ہے۔

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THE DAILY JANG QUETTA
روزنامہ جنگ کوئٹہ
TUESDAY 13, NOVEMBER 2018
بانی میر خلیل الرحمن
قیمت 20 روپے
جلد 47 | منگل / 04 ربیع الاول 1440ھ / 13 نومبر 2018ء | نمبر 312

وائس چانسلر بیوٹمر فاروق بازئی پروفیسر ڈاکٹر شعیب خان کو شیلڈ دے رہے ہیں

پاکستان سائنٹیفک اینڈ ٹیکنالوجی انفارمیشن ریجنل سب سینٹر نے کوئٹہ کی جامعات میں اسٹالز لگائے

کوئٹہ (پ ر) پاکستان سائنٹیفک اینڈ ٹیکنالوجیکل انفارمیشن ریجنل سب سینٹر کوئٹہ کی جانب سے یونیورسٹی آف بلوچستان اور سردار بہادر خان وومن یونیورسٹی کے مختلف ڈیپارٹمنٹس میں اسٹالز لگائے گئے طلباء و طالبات فیکلٹی ممبرز اور سکالرز نے بڑھ چڑھ کر حصہ لیا ریجنل انچارج پاسٹک سب سینٹر کوئٹہ عبدالخالق سیال نے معلومات فراہم کیں اور کہا کہ پاکستان سائنٹیفک اینڈ ٹیکنالوجیکل انفارمیشن سب سینٹر کوئٹہ طلباء و طالبات کیلئے ورکشاپ کا انعقاد کرتا رہے گا۔

4.3 PMNH Photo Gallery

Visit of M.Sc and BS students from Quaid-i-Azam University, Islamabad and COMSATS University, Islamabad to Botanical and Zoological Sciences Division, PMNH

Scientist of BSD briefing the M.Sc. and B.Sc. students of Quaid-i-Azam University and COMSATS University, Islamabad during their visit to the Botanical Sciences Division herbarium of PMNH

Researchers of Earth Sciences Division conducting field with their foreign collaborators under the project of "Zhob Dinosaurs Track Way Reconstruction"

Chairman, PSF is conducting meeting with Mr. Nicholas Allan, Researcher from Factum Foundation for Zhob Dinosaurs Track Way reconstruction project.

Mr. Ahmad Fadel Yacoub, Ambassador of Egypt in Pakistan visiting Pakistan Museum of Natural History, Islamabad on 15th February 2018. D.G. PMNH is briefing the honorable guest about the exhibits

PMNH celebrated International Museum Day on 18th of May, 2018 in collaboration with Lok Virsa. Director General, PMNH and Executuve Director, Lok Virsa is at stage

Scientists of ZSD, PMNH delivering lectures during capacity building of Forest and Wildlife staff at Srcub Forest Chakwal

Demonstration of traps operation during field work at Phareera Reserve Forests to Forest Department staff during Sustainable Forest Management Project

Consultative meeting at Lahore, chaired by Mr. Waheed-ud-Din, Secretary Forest Wildlife and Fisheries Punjab on 14th November 2017. D.G. PMNH/Secretary National MAB Committee briefing the participants about Establishment of Indus Blind Dolphin Biospshere Reserve in Pakistan

Two animated T-Rex Dinosaurs Models added to the PMNH Display Galleries

A delegation of 70 participants of 7th South Asian Conference on Sanitation (SACOSAN-II) along-with officials of Ministry of Climate Change visited PMNH display galleries on 14-04-2018.

Latest interactive Computer Systems (Kiosiks) installed in the VOG Gallery

New Birds Diorama opened at PMNH for the general public


New Botanical Forest Diorama being developed

V. AUDITOR`S REPORTS

5.1 PAKISTAN SCIENCE FOUNDATION

SUMMARY

SUMMARIZED BUDGET / REVISED ALLOCATION, ACTUAL EXPENDITURE OF 2017-18 (NON-DEVELOPMENT) UNDER BUDGET ID-1700 PAKISTAN SCIENCE FOUNDATION (PSF).

		Budget Position & Actual Expenditure 2017-18				
Object Code.	Heads/Classification	Budget Allocation 2017-18	Revised Budget Allocation After Re-appropriation 2017-18	% age of Allocation	Actual Expenditure 2017-18	% age of Expenditure
1	2	3	4	5	6	7
	TOTAL BUDGET ALLOCATION	**258.240 (M)**	**282.547 (M)**		**282.407 (M)**	
A01	**EMPLOYEE RELATED EXPENSES (A + B)**	**90,523,000**	**100,448,000**	**35.6%**	**100,447,980**	**35.6%**
A011-1	**A). Pay (a + b)**	**53,397,000**	**62,667,000**	**22.2%**	**62,667,000**	**22.2%**

A01101	a). Pay of Officers	37,397,000	42,699,000	15.1%	42,699,000	15.1%
A01151	b). Pay of other Staff	16,000,000	19,968,000	7.07%	19,968,000	7.07%
A012	**B). Allowances (c + d)**	**37,126,000**	**37,781,000**	**13.4%**	**37,780,980**	**13.4%**
A012-1	c). Regular Allowances	31,126,000	30,281,000	10.7%	30,281,000	10.7%
A012-2	d). Other Allowances	6,000,000	7,500,000	2.65%	7,499,980	2.66%
A02	**PROJECT PRE-INVESTMENT ANALYSIS (STATUTORY FUNC-TIONS) (a + b)**	**117,000,000**	**107,221,000**	**37.9%**	**107,221,000**	**38.0%**
A02201	**a).** Grant for Research & Insti-tution Support	97,200,000	84,961,102	30.1%	84,357,329	29.9%
A02201	**b).** Science Promotion Activi-ties	19,800,000	22,259,898	7.88%	22,863,671	8.10%
A03	**OPERATING EXPENSES**	**28,135,000**	**27,835,000**	**9.9%**	**27,811,906**	**9.8%**

A04		**EMPLOYEES RETIRE-MENT BENEFITS**		**20,000,000**		**37,662,000**		**13.3%**		**37,662,000**		**13.3%**
A05		**GRANTS SUBSIDIZE & LOAN ADVANC-ES/OTHERS**		**1,000**		**6,500,000**		**2.30%**		**6,500,000**		**2.30%**
A06		**TRANSFERS**		**900,000**		**800,000**		**0.28%**		**800,000**		**0.28%**
A09		**EXPENDITURE ON AC-QUIRING OF PHYSICAL ASSETS**		**506,000**		**506,000**		**0.18%**		**388,940**		**0.14%**
A13		**REPAIR & MAINTE-NANCE**		**1,175,000**		**1,575,000**		**0.56%**		**1,575,000**		**0.56%**
-	**-**	**Grand Total :-**		**258,240,000**		**282,547,000**		**100%**		**282,406,826**		**100%**

→ During the year 2017-18 additional funds amounting to **Rs.34.0860 million** have been allocated under the Budgetary head "A-01-Employees Related Expenditure, A-04 Employees Retirment Benifits and A-05-Grants Subsidieze & wite off Loan for Payment of Financial Assistance to the family of an employees of PSF who was death during service (**orders enclosed).**

→ During the year 2017-18 funds of **Rs.9.779 million** have been Surrender under Budgetary head "A-02-Project Pre-Investment Analysis.**(Orders enclosed).**

5.2 PAKISTAN SCIETIFIC AND TECHNOLOGICAL INFORMATION CENTER (PASTIC)
SUMMARIZED POSITION OF BUDGET ALLOCATION / REVISED ALLOCATION, ACTUAL EXPENDITURE 2017-18 & BUDGET ALLOCTION AS PER NIS / BUDGET ESTIMATES 2018-19 AS PER NIS (PROPOSED) IN RESPECT OF PASTIC CURRENT EXPENDITURE (NON-DEVELOPMENT)

		Budget Position & Actual Expenditure 2017-18					Budget Estimates Proposed 2018-19		
Code No.	Heads/Classification	Budget Allocation As Per NIS 2017-18	Revised Budget Allocation 2017-18 after Additional Grant	% age of Allocation	Actual Expenditure 2017-18	% age of Expenditure	Budget Allocation 2018-19 (As Per NIS)	% age of Allocation	Budget Estimates 2018-19 (Proposed)
1	2	3	4	5	7	8	9	10	11
	TOTAL BUDGET ALLOCATION	135.450(M)	148.521 (M)	-	138.521 (M)	-	192.801(M)	-	192.801(M)
A01	Employee Related Expenses	76,696,000	89,767,000	60.44 %	89,767,000	64.80 %	96,000,000	49.79 %	96,000,000
A011-1	Pay	46,000,000	59,071,000	39.77 %	58,681,629	42.36 %	63,200,000	32.78 %	63,200,000

A011 01		Pay of Officers		30,000,000		39,770,000		**26.78 %**		39,481,528		**28.50 %**		44,000,000		**22.82 %**		44,000,000
A011 51		Pay of other Staff		16,000,000		19,301,000		**13.00 %**		19,200,101		**13.86 %**		19,200,000		**9.96 %**		19,200,000
A012		**Allowances**		**30,696,000**		**30,696,000**		**20.67 %**		**31,085,371**		**22.44 %**		**32,800,000**		**17.01 %**		**32,800,000**
A012-1		Regular Allow-ances		26,346,000		26,346,000		**17.74 %**		26,735,340		**19.30 %**		26,950,000		**13.98 %**		26,950,000
A012-2		Other Allowanc-es		4,350,000		4,350,000		**2.93%**		4,350,031		**3.14%**		5,850,000		**3.03 %**		5,850,000
A02		**Project Pre-investment Ana-lystis/ PASTIC Functions**		**12,000,000**		**12,000,000**		**8.08%**		**1,981,748**		**1.43%**		**12,000,000**		**6.22 %**		**12,000,000**
A03		**Operating Ex-penses**		**20,902,000**		**20,902,000**		**14.07 %**		**20,935,880**		**15.11 %**		**31,092,000**		**16.13 %**		**31,092,000**
A04		**Employees Re-tirement Bene-fits**		**23,000,000**		**23,000,000**		**15.49 %**		**23,000,000**		**16.60 %**		**48,000,000**		**24.90 %**		**48,000,000**

A05		**Grants Subsi-dies and Write off Loans/ Ad-vances/Others**		**1,000**		**1,000**		**0.00%**		**-**		**0.00%**		**1,000**		**0.00 %**		**1,000**
A06		**Transfers**		**1,300,000**		**1,300,000**		**0.88%**		**1,285,304**		**0.93%**		**1,300,000**		**0.67 %**		**1,300,000**
A09		**Expenditure on Acquring of Phyiscal Assets**		**501,000**		**501,000**		**0.34%**		**501,000**		**0.36%**		**2,000,000**		**1.04 %**		**2,000,000**
A13		**Repair & Maintenance**		**1,050,000**		**1,050,000**		**0.71%**		**1,050,068**		**0.76%**		**2,408,000**		**1.25 %**		**2,408,000**
-	**-**	**Grand Total**		**135,450,000**		**148,521,000**				**138,521,000**				**192,801,000**				**192,801,000**

5.3 PAKISTAN MUSEUM OF NATURAL HISTORY

S U M M A R Y

SUMMARIZED POSITION OF BUDGET ALLOCATION / REVISED ALLOCATION, SURRENDER AND ACTUAL EXPENDITURE 2017-18 AND BUDGET ALLOCATION AS PER NIS/BUDGET ESTIMATES 2018-19 AND PROPOSED AS PER NIS IN RESPECT OF PMNH CURRENT EXPENDITURE (NON-DEVELOPMENT)

		Budget Position & Actual Expenditure 2017-18							Budget Estimates Proposed 2018-19		
Code No.	Heads/ Classification	Budget Allocation 2017-18	Revised Budget Allocation 2017-18	% age of Allocation	SURRENDER AMOUNT	Actual Expenditure 2017-18	% age of Expenditure		Budget Allocation 2018-19 (As Per NIS)	% age of Allocation	Budget Estimates 2018-19 (Proposed)
1	2	3	4	5		6	7		8	9	10
	TOTAL BUDGET ALLOCATION	129.990 (M)	138.951 (M)		0.143 (M)	138.808 (M)			167.196 (M)		167.196 (M)
A01	Employee Related Expenses	65,000,000	73,961,000	53.23%	125,205	73,835,795	53.19 %		90,500,000	54.13%	90,500,000

A011-1		**Pay**		**39,850,000**		**47,177,000**		**33.95%**	**123,315**		**47,053,685**		**33.90%**		**61,520,000**		**36.80%**		**61,520,000**
A01101		Pay of Officers		29,550,000		34,157,000		24.58%	-		34,157,000		24.61%		45,550,000		27.24%		45,550,000
A01151		Pay of other Staff		10,300,000		13,020,000		9.37%	**123,315**		12,896,685		9.29%		15,970,000		9.55%		15,970,000
A012		**Allowances**		**25,150,000**		**26,784,000**		**19.28%**	**1,890**		**26,782,110**		**19.29%**		**28,980,000**		**17.33%**		**28,980,000**
A012-1		Regular Allowances		20,500,000		22,134,000		15.93%	**1,890**		22,132,110		15.94%		23,256,000		13.91%		23,256,000
A012-2		Other Allowances		4,650,000		4,650,000		3.35%	-		4,650,000		3.35%		5,724,000		3.42%		5,724,000
A02		**Project Pre-investment Analysis**		**22,000,000**		**22,000,000**		**15.83%**	-		**22,000,000**		**15.85%**		**22,000,000**		**13.16%**		**22,000,000**
A03		**Operating Expenses**		**17,574,000**		**17,574,000**		**12.65%**	**14,794**		**17,559,206**		**12.65%**		**24,834,000**		**14.85%**		**24,834,000**
A04		**Employees Retirement Benefits**		**21,990,000**		**21,990,000**		**15.83%**	-		**21,990,000**		**15.84%**		**26,000,000**		**15.55%**		**26,000,000**
A05		**Grants Subsidieze & Loan Advances/Others**		**1,000**		**1,000**		**0%**	**1,000**		-		**0%**		**1,000**		**0%**		**1,000**
A06		**Transfers**		**800,000**		**800,000**		**0.58%**	-		**800,000**		**0.58%**		**850,000**		**0.51%**		**850,000**
A09		**Expenditure on Acquring of Phyiscal Assets**		**750,000**		**750,000**		**0.54%**	**1,500**		**748,500**		**0.54%**		**750,000**		**0.45%**		**750,000**

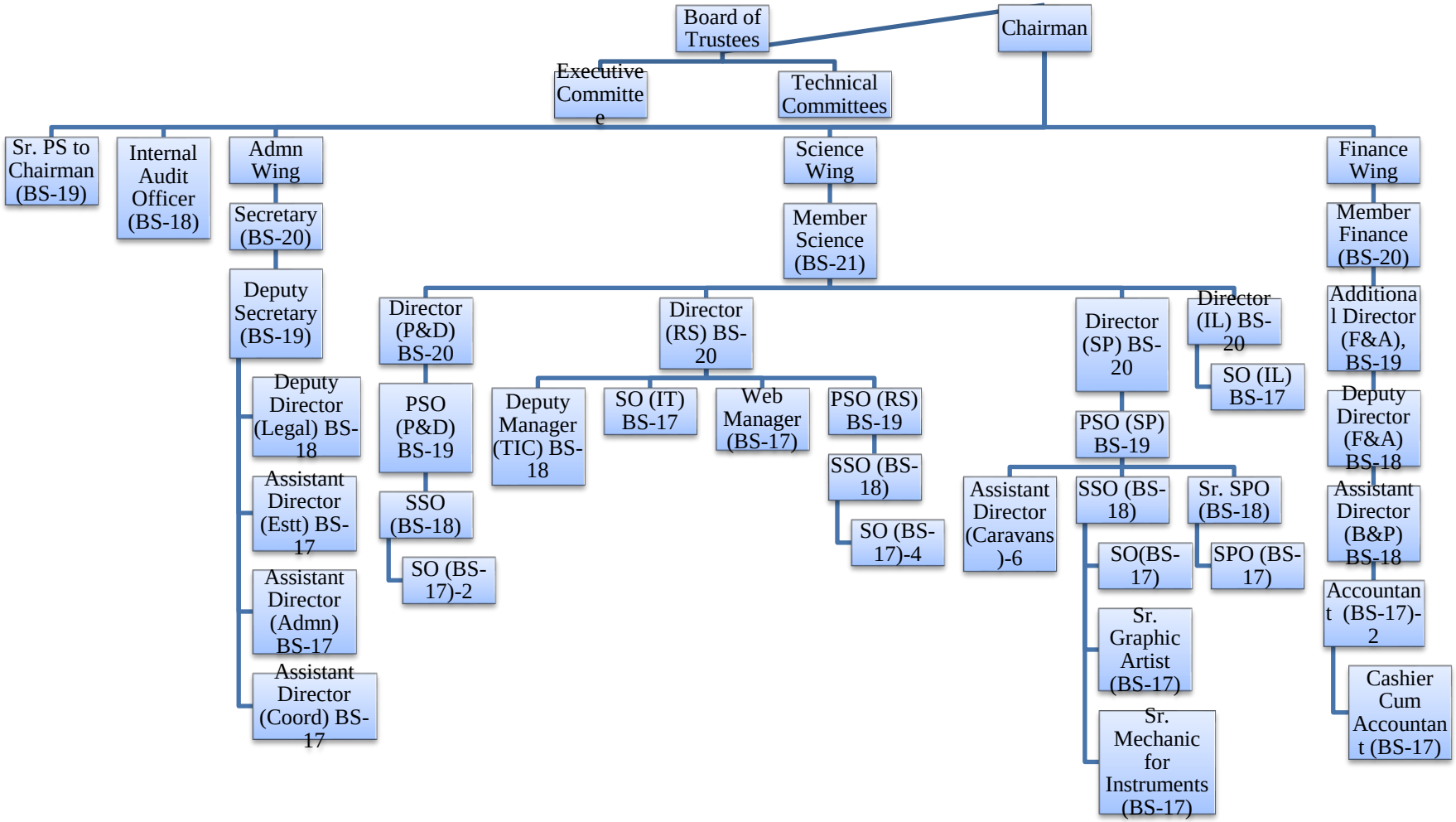
A13		**Repair & Maintenance**		**1,875,000**		**1,875,000**		**1.35%**	**456**		**1,874,544**		**1.35 %**		**2,261,000**		**1.35%**		**2,261,000**
-	**-**	**Grand Total :-**		**129,990,000**		**138,951,000**		**100%**	**142,955**		**138,808,045**		**100 %**		**167,196,000**		**100%**		**167,196,000**

An amount of Rs.8.961 million was provided as Technical Supplementary grant under the head of Accounts 01-Employees Related Funds during the financial year 2017-18

An amount of Rs.138.808 million was incurred against Revised Budget Allocation Rs.138.951 million during the financial year 2017-18 and Rs.0.143 million surrendered.

VI. ORGANIZATION AND ADMINISTRATION

Organizational Chart of Pakistan Science Foundation



6.1 PSF SANTIONED POSTS AND ORGANIZATINAL CHART

PSF SANCTIONED STRENGTH 2017-2018
TOTAL STRENGTH: 210

Sr. No	Name of Post	BPS	Total
1.	Chairman	22	1
2.	Member Science	21	1
3.	Member Finance	20	1
4.	Secretary	20	1
5.	Director (P&D)	20	1
6.	Director (SP)	20	1
7.	Director (RS)	20	1
8.	Director (IL)	20	1
9.	Additional Director (F&A)	19	1
10.	Principal Scientific Officer	19	3
11.	Deputy Secretary	19	1
12.	Sr. PS to Chairman	19	2
13.	Sr. Scientific Officer	18	3
14.	Deputy Manager (TIC)	18	1
15.	Sr. Science Promotion Officer	18	1
16.	Dy. Director (F&A)	18	1
17.	Dy. Director (Admn)	18	1
18.	Dy. Director (Legal)	18	1
19.	Internal Audit Officer	18	1
20.	Asstt. Director (Budget & Pension)	18	1
21.	Scientific Officer	17	8
22.	Scientific Officer (IT)	17	1
23.	Web Manager	17	1
24.	Asstt. Director (Coord/Estt)	17	1+1
25.	Asstt. Director (Caravan)	17	6
26.	Accountant	17	3
27.	Science Promotion Officer	17	1
28.	Sr. Mechanic for Instruments	17	1
29.	Sr. Graphic Artist	17	1
30.	Cashier-cum-Accountant	17	1
31.	Asstt. Scientific Officer	16	11
32.	Audit & Accounts Assistant	16	2
33.	Superintendent	16	1
34.	Graphic Artist	16	1
35.	Asst. Private Secretary	16	10
	S. Total (I)		75

36.	Photographer	16	1
37.	Planetarium Assistant	16	5
38.	Assistant	16	5
39.	Driver-Cum-Mechanic	16	6
40.	Science Assistant (Caravan)	14	13
41.	Science Assistant	14	5
42.	Technical Assistant (IT)	14	1
43.	Assistant	14	2
44.	Storekeeper	14	1
45.	Stenotypist	14	2
46.	Planetarium Assistant	11	4
47.	Driver-Cum-Mechanic	11	3
48.	Calligrapher	11	1
49.	UDC	11	6
50.	Carpenter	11	1
51.	LDC/Typist	9	8
52.	Electrician	11	1
53.	Driver/D.R	4/5/7/6/11	18
54.	DMO	6	1
55.	Naib Qasid	1/2/3/4	19
56.	Mali	4	1
57.	Mali	1/3	2
58.	Caravan Attendant	1/2/3	9
59.	Security Guard	1/2/3	16
60.	Sanitary Worker	1/2/3	4
	S. Total (II):	-	135
	G. Total (I) & (II):-	-	210

PAKISTAN SCIENCE FOUNDATION
ISLAMABAD

TECHNICAL (ORIGINAL STRENGTH)

Sr. No	Name of Post	BPS	Total
1.	Chairman (Statutory)	22	1
2.	Member Science (Statutory)	21	1
3.	Director (P&D)	20	1
4.	Director (SP)	20	1
5.	Director (RS)	20	1
6	Director (IL)	20	1
7.	Principal Scientific Officer	19	3
8.	Sr. Scientific Officer	18	3
9.	Deputy Manager (TIC)	18	1
10.	Sr. Science Promotion Officer	18	1
11.	Scientific Officer	17	8
12.	Scientific Officer (IT)	17	1
13.	Web Manager	17	1
14.	Asstt. Director (Caravan)	17	6
15.	Science Promotion Officer	17	1
16	Mechanic for Instruments	16	1
17.	Graphic Artist	16	2
18.	Asst. Scientific Officer	16	3
19.	Photographer	14	1
20.	Science Assistant	14	7
21.	Science Assistant (Caravan)	14	19
22.	Technical Assistant (IT)	14	1
23.	Planetarium Assistant	11	9
24.	Driver-Cum-Mechanic	11	9
25.	Calligrapher	11	1
26.	Carpenter	9	1
27	Electrician	7	1
	Total		86

PAKISTAN SCIENCE FOUNDATION
ISLAMABAD
NON-TECHNICAL (ORIGINAL STRENGTH)

Sr. No	Name of Post	BPS	Total
1.	Member Finance (Statutory)	20	1
2.	Secretary	20	1
3.	Additional Director (F&A)	19	1
4.	Deputy Secretary	19	1
5.	Dy. Director (F&A)	18	1
6	Dy. Director (Legal)	18	1
7.	Internal Audit Officer	18	1
8.	Asstt. Director (Budget & Pension)	18	1
9.	PS to Chairman	17	1
10.	Asstt. Director (Admn/Coord/Estt.)	17	3
11.	Accountant	17	2
12.	PA to Chairman	16	1
13.	Audit & Accounts Assistant and Cashier	16	4
14.	Superintendent	16	1
15.	Asstt. Private Secretary	16	6
16	Assistant	15	3
17.	Storekeeper	14	1
18.	Stenotypist	14	6
19.	UDC	11	5
20.	LDC/Typist	9	13
21.	Driver/D.R	4	18
22.	DMO	4	1
23.	Naib Qasid	1	19
24.	Mali	2	1
25.	Mali	1	2
26.	Caravan Attendant	1	9
27.	Security Guard	1	16
28.	Sanitary Worker	1	4
	Total:		124

PAKISTAN SCIENCE FOUNDATION
ISLAMABAD

DETAILS OF PSF VACANT POSTS AS ON 20.09.2017

	Name of Post	BPS	Vacant	Promotion Quota	Direct Quota
1.	Member Science	21	1	-	1
2.	Member Finance	20	1	-	1
3.	Secretary	20	1	1	-
4.	Director (SP)	20	1	1	-
5.	Director (IL)	20	1	-	1
6	Additional Director (F&A)	19	1	-	1
7.	Principal Scientific Officer	19	1	-	1
8.	Deputy Secretary	19	1	1	-
9.	Sr. Scientific Officer	18	1	-	1
10.	Deputy Manager (TIC)	18	1	1	-
11.	Dy. Director (Legal)	18	1	-	1
12.	Internal Audit Officer	18	1	-	1
13.	Assistant Director (Admn)	17	1	-	1
14.	Scientific Officer	17	2	2	-
15.	Web Manager	17	1	-	1
16	Asstt. Director (Coord/Estt.)	17	1	1	-
17.	Asstt. Director (Caravan)	17	1	1	-
18.	Accountant	17	1	-	1
19.	Science Promotion Officer	17	1	-	1
20.	Asstt. Scientific Officer	16	1	-	1
21.	Audit & Accounts Assistant	16	2	-	2
22.	Superintendent	16	1	1	-
23.	Graphic Artist	16	1	-	1
24.	Asstt. Private Secretary	16	1	-	1
	S. Total (I)		26	9	17
25.	Science Assistant	14	1	-	1

26.	Science Assistant (Caravan)	14	3	-	3
27.	Storekeeper	14	1	-	1
28.	Stenotypist	14	2	-	2
29	Calligrapher	11	1	-	1
30.	Driver	4	1	-	1
31.	Naib Qasid	1	2	-	2
32.	Caravan Attendant	1	1	-	1
33.	Security Guard	1	1	-	1
	S. Total (II):		13	-	13
	G. Total (I) & (II):-		39	9	30

PAKISTAN SCIENCE FOUNDATION
ISLAMABAD

PSF SANCTIONED STRENGTH (NON-DEVELOPMENT) AS ON 20.10.2017

TOTAL STRENGTH:- 210 Filled: 171 Vacant: 39

Sr. No	Name of Post	BPS	Sanctioned	Filled	Vacant	By Direct	By Promotion
1.	Chairman	22	1	1	-	1	-
2.	Member Science	21	1	-	1	1	-
3.	Member Finance	20	1	-	1	1	-
4.	Secretary	20	1	-	1	-	1
5.	Director (P&D)	20	1	1	-	-	-
6	Director (SP)	20	1	-	1	-	1
7.	Director (RS)	20	1	1	-	-	-
8.	Director (IL)	20	1	-	1	1	-
9.	Additional Director (F&A)	19	1	-	1	1	-
10.	Principal Scientific Officer	19	3	2	1	1	-
11.	Deputy Secretary	19	1	-	1	-	1
12.	Sr. Scientific Officer	18	3	2	1	1	-
13.	Deputy Manager (TIC)	18	1	-	1	-	1
14.	Sr. Science Promotion Officer	18	1	1	-	-	-
15.	Dy. Director (F&A)	18	1	1	-	-	-
16	Dy. Director (Legal)	18	1	-	1	1	-
17.	Internal Audit Officer	18	1	-	1	1	-
18.	Sr. PS to Chairman	19	2	2	-	-	-
19.	Asstt. Director (Budget & Pension)	18	1	1	-	-	-
20.	Assistant Director (Admn)	17	1	-	1	1	-
21.	Scientific Officer	17	8	6	2	-	2
22.	Scientific Officer (IT)	17	1	1	-	-	-
23.	Web Manager	17	1	-	1	1	-
24.	Asstt. Director (Coord/Estt.)	17	1+1	1	1	-	1
25.	Asstt. Director (Caravan)	17	6	5	1	-	1
26.	Accountant	17	3	2	1	1	-
27.	Science Promotion Officer	17	1	-	1	-	1
28.	Sr. Mechanic for Instruments	17	1	1	-	-	-
29	Sr. Graphic Artist	17	1	1	-	-	-
30.	Cashier-cum-Accountant	17	1	1	-	-	-
31.	Asstt. Scientific Officer	16	11	10	1	1	-
32.	Audit & Accounts Assistant	16	2	-	2	2	-
33.	Superintendent	16	1	-	1	-	1
34.	Graphic Artist	16	1	-	1	1	-
35.	Asstt. Private Secretary	16	10	9	1	1	-
	S. Total (I)		75	49	26	16	10
36.	Photographer	16	1	1	-	-	-

37.	Planetarium Assistant	16	5	5	-	-	-
38.	Assistant	16	5	5	-	-	-
39.	Driver-Cum-Mechanic	16	6	6	-	-	-
40.	Science Assistant	14	5	4	1	1	-
41.	Science Assistant (Caravan)	14	13	10	3	3	-
42.	Technical Assistant (IT)	14	1	1	-	-	-
43.	Assistant	15	2	2	-	-	-
44	Storekeeper	14	1	-	1	1	-
45.	Stenotypist	14	2	-	2	2	-
46.	Planetarium Assistant	11	4	4	-	-	-
47.	Driver-Cum-Mechanic	11	3	3	-	-	-
48	Calligrapher	11	1	-	1	1	-
49.	UDC	11	6	6	-	-	-
50.	Carpenter	11	1	1	-	-	-
51.	LDC/Typist	9	8	8	-	-	-
52.	Electrician	11	1	1	-	-	-
53.	Driver/D.R	4/5/7/6/11	18	17	1	1	-
54.	DMO	6	1	1	-	-	-
55	Naib Qasid	1/2/3/4	19	17	2	2	-
56.	Mali	4	1	1	-	-	-
57.	Mali	1/3	2	2	-	-	-
58	Caravan Attendant	1/2/3	9	8	1	1	-
59	Security Guard	1/2/3	16	15	1	1	-
60	Sanitary Worker	1/2/3	4	4	-	-	-
	S. Total (II):		135	122	13	29	-
	G. Total (I) & (II):-		210	171	39	39	10

PAKISTAN SCIENCE FOUNDATION
ISLAMABAD

PSF SANCTIONED STRENGTH (DEVELOPMENT SIDE) AS ON 20.10.2017

STUDENT TALENT FARMING SCHEME (STFS)

Sr. No	Name of Post	BPS	Original No. of Posts	Revised No. of Posts	Filled	Vacant
1.	Project Director (MP-II)	-	1	1	-	1
2.	Adviser Civil Works (MP-III)	-	1	1	1	-
3.	Adviser Student Affairs (MP-III)	-	1	1	-	1
4.	Account Officer	18	1	1	1	-
5.	Scientific Officer	17	1	1	1	-
6.	I.T. Manager	17	-	1	-	1
7.	Assistant Scientific Officer	16	-	1	-	1
8.	Computer Operator /Technical Assistant	16	1	1	-	1
9.	Sub-Engineer (Civil)	16	-	1	-	1
10.	Driver	05	2	14	-	14
11.	Naib Qasid	01	2	2	-	2
Total			10	25	03	22

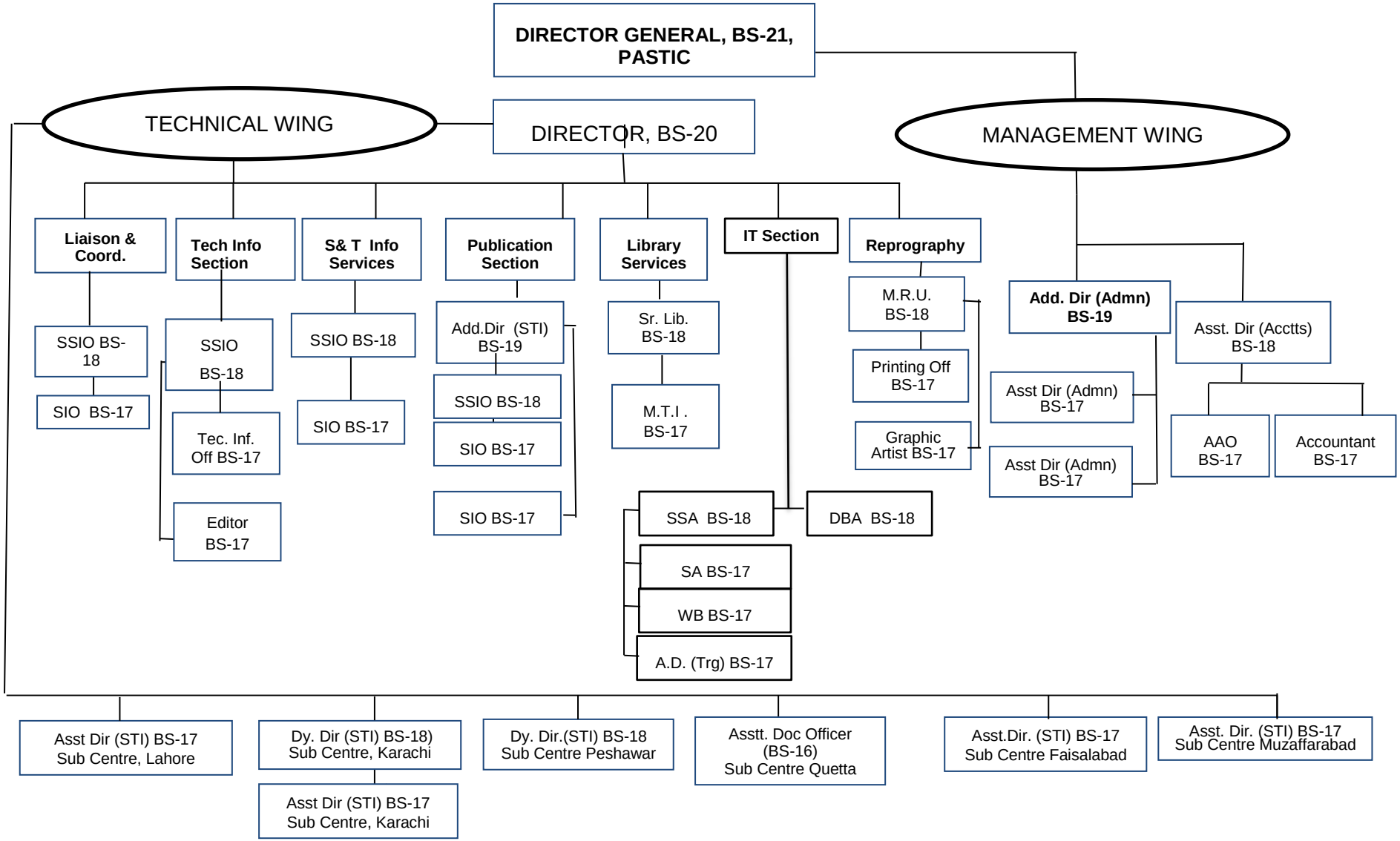
FINANCIAL SUPPORT TO SCIENTIFIC SOCIETIES IN PAKISTAN (PHASE-II)

Sr. No	Name of Post	BPS (Fixed pay)	Sanctioned	Filled	Vacant
1.	Project Manager	-	1	1	
2.	Senior Scientific Officer	-	1	1	
3.	Scientific Officer	-	1	-	1
4.	Naib Qasid	-	1	-	1

PAKISTAN SCIENCE FOUNDATION
ISLAMABAD
PSF SANCTIONED STRENGTH (DEVELOPMENT SIDE) AS ON 20.10.2017
NATURAL SCIENCES LINKAGES PROGRAMME (NSLP)

Sr. No	Name of Post	BPS	Sanctioned	Filled	Vacant
1.	Principal Scientific Officer	19	1	-	1
2.	Senior Scientific Officer	18	1	1	-
3.	Audit Officer	18	1	1	-
4.	Accounts Officer	18	1	1	-
5.	Scientific Officer	17	2	2	-
6	Account Assistant	16	1	1	-
7.	PA to PSO	16	1	1	-
8.	Science Assistant	14	1	1	-
9.	Driver-I	04	2	2	-
10.	Naib Qasid	01	2	2	-

Organizational Chart of Pakistan Scietific and Technological Information Center (PASTIC)



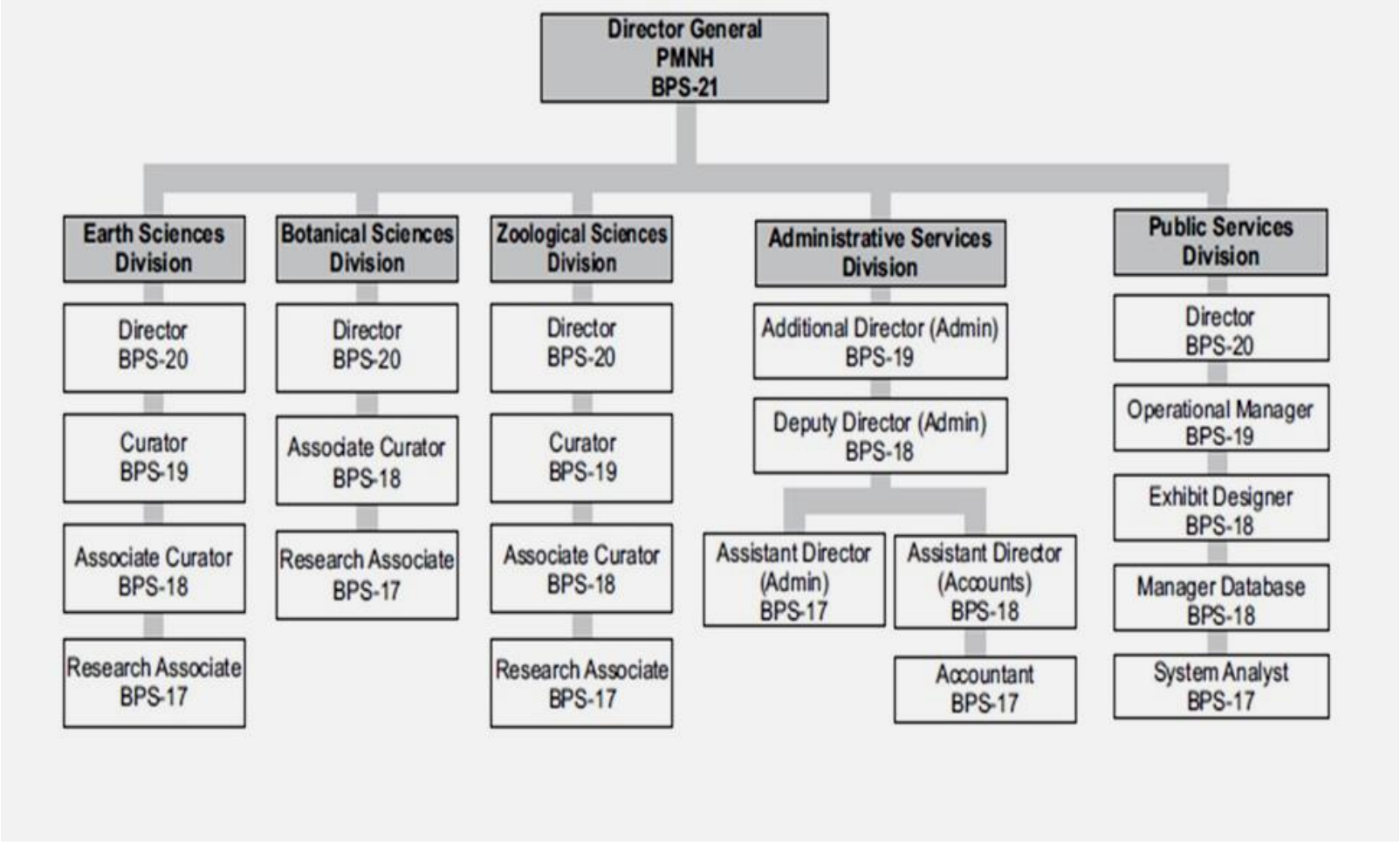
6.2 PASTIC SANTIONED POSTS AND ORGANIZATIONAL CHART

	Post	BPS	Sanctioned	Filled	Vacant	By Direct	By Promotion
1	Director General	21	1	1	0	1	-
2	Director	20	1	1	0	-	-
3	Additional Director (A&F)	19	1	1	0	-	-
4	Additional Director (STI)	19	1	1	0	-	-
5	Principal System Analyst	19	1	1	0	-	-
6	Principal Librarian	19	1	1	0	-	-
7	Deputy Director (STI)	18	5	5	0	-	-
8	Manager Reprographic Unit	18	1	1	0	-	-
9	Database Administrator	18	1	0	1	-	1
10	Senior Scientific Information Officer	18	8	7	1	1	-
11	Deputy Director (Admin)	18	1	1	0	-	-
12	Assistant Director (Accounts)	18	1	1	0	-	-
13	PS to D.G	18	1	1	0	-	-
14	Senior Manager Technology Information	18	1	1	0	-	-
15	Assistant Director (Training)	17	1	0	1	1	-
16	Scientific Information Officer	17	2	2	0	-	-
17	System Analyst	17	1	1	0	-	-
18	Web Manager	17	1	1	0	-	-
19	Printing Officer	17	1	0	1	-	1
20	Graphic Designer	17	1	0	1	1	-
21	Assistant Director (Admn)	17	2	2	0	-	-
22	Technology Information Officer (Marketing)	17	1	0	1	1	-
23	Editor	17	1	1	0	-	-
24	Assistant Accounts Officer	17	1	1	0	-	-
25	Accountant	17	1	1	0	-	-
26	Superintendent (Admin)	17	2	2	0	-	-
27	Assistant Scientific Information Officer	16	3	1	2	1	1
28	Assistant Documentation	16	1	1	0	-	-

	Officer						
29	Assistant Programmer	16	2	1	1	-	1
30	Assistant Web Manager	16	1	1	0	-	-
31	Assistant Manager Reprographic Unit	16	1	0	1	1	-
32	Assistant Printing Officer	16	4	3	1	1	-
33	Assistant Private Secretary	16	2	2	0	-	-
34	Assistant (Admn)	16	7	7	0	-	-
35	Assistant Accounts	16	1	1	0	-	-
36	Senior Data Control Assistant	15	2	2	0	-	-
37	Assistant (Admn)	15	1	1	0	-	-
38	Data Control Assistant	14	7	7	0	-	-
39	Layout Artist	14	1	1	0	-	-
40	Marketing/Field Assistant	14	1	0	1	1	-
41	Graphic Assistant	14	1	1	0	-	-
42	Mechanical Supervisor	14	1	0	1	1	-
43	Senior Offset Printer	14	2	1	1	1	-
44	Stenotypist	14	2	2	0	-	-
45	Library Assistant	12	1	1	0	-	-
46	Data Entry Operator	12	2	2	0	-	-
47	Technician	11	1	1	0	-	-
48	Offset Printer	11	1	1	0	-	-
49	Technical Assistant	11	1	1	0	-	-
50	Senior Carpenter	11	1	1	0	-	-
51	Upper Division Clerk	11	9	9	0	-	-
52	Lower Division Clerk	7	10	9	1	-	1
53	Electrician	7	1	1	0	-	-
54	Assistant Offset Printer	7	3	2	1	-	1
55	Driver	7	2	2	0	-	-
56	Bindery Assistant	5	2	2	0	-	-
57	Driver	5	2	2	0	-	-
58	Offset Machine Assistant	5	2	2	0	-	-
59	Drivers	4	4	4	0	-	-

60	Duplicating Machine Operator	4	1	0	1	1	-
61	Dispatch Rider	4	1	1	0	-	-
62	Head Mali	3	1	1	0	-	-
63	Record Sorter	3	1	1	0	-	-
64	Photo Attendant	4	1	1	0	-	-
65	Patent Attendant	4	1	1	0	-	-
66	Security Guard	3	5	5	0	-	-
67	Qasid	3	8	8	0	-	-
68	Qasid	2	1	1	0	-	-
69	Photo Attendant	2	1	1	0	-	-
70	Patent Attendant	2	1	1	0	-	-
71	Library Attendant	2	2	1	1	-	1
72	Bindery Helper	1	1	1	0	-	-
73	Sanitary Workers	1	3	3	0	-	-
74	Mali	1	2	2	0	-	-
75	Security Guard	1	3	3	0	-	-
76	Naib Qasid	1	9	9	0	-	-
GRAND TOTAL			**164**	**145**	**19**	**12**	**7**

Organizational Chart Of Pakistan Museum of Natural History (PMNH)



6.3 PMNH SANTIONED POSTS AND ORGANIZATIONAL CHART

GRADE WISE ACTUAL SANCTIONED STRENGTH 2017-18

Sr. No.	BPS	Designation	Number of Posts		
			No. of Posts	Filled	Vacant
1.	21	Director General	1	-	1
2.	20	Director	4	3	1
3.	19	Curator	2	1	1
4.	19	Operational Manager	1	1	-
5.	19	Additional Director (Admin)	1	-	1
6.	18	Associate Curator	10	6	4
7.	18	Exhibit Designer	1	-	1
8.	18	Deputy Director (Admin)	1	1	-
9.	18	Assistant Director (Accounts)	1	-	1
10.	18	Manager Data Base	1	-	1
11.	17	Assistant Director (Admin)	1	1	-
12.	17	Accountant	2	1	1
13.	17	Research Associate	18	10	8
14.	17	System Analyst	1	1	-
	Sub Total		**45**	**25**	**20**
15.	16	Assistant Librarian	1	1	-
16.	16	PA to D.G	1	1	-
17.	16	Sr. Modeler	1	1	-
18.	16	Superintendent	1	1	-
19.	16	Assistant Research Associate	2	1	1
20.	16	Casting Staff	1	1	-
21.	16	Teacher Guide	1	1	-
22.	16	Associate Artist	2	-	2

23.	16	Taxidermist	2	-	2
24.	16	Fossil Technician	1	1	-
25.	16	Assistant Private Secretary	3	3	-
26.	16	Accounts Assistant	1	1	-
27.	16	Computer Operator	1	1	-
28.	15	Children Education Programmer	1	1	-
29.	15	Office Assistant	1	1	-
30.	15	Purchase Assistant	1	1	-
31.	15	Data Control Assistant	1	1	-
32.	14	Sr. Skeleton Preparator	1	-	1
33.	14	Sr. Drying & Fumigating Assistant	1	-	1
34.	14	Repository Assistant	2	1	1
35.	14	Sr. Collection Incharge	2	2	-
36.	14	Photographer	1	1	-
37.	14	Store Keeper	1	1	-
38.	12	Calligrapher	1	1	-
39.	12	Sr. Incharge Embalming	1	1	-
40.	12	Drying & Fumigating Assistant	1	1	-
41.	12	Collection Incharge	2	2	-
42.	12	Skelton Preparator	1	1	-
43.	11	U.D.C	2	2	-
44.	9	Carpenter	1	1	-
45.	9	Museum Guide	2	1	1
46.	9	L.D.C	2	2	-
47.	7	Electrician	1	-	1
48.	7	Painter	1	-	1
49.	7	Tracer	1	1	-

50.	7	L.M.O	1	1	-
51.	5	Field Assistant	12	11	1
52.	4	Dispatch Rider	1	1	-
53.	4	D.M.O	1	1	-
54.	4	Driver	5	4	1
55.	1	Security Guard	14	12	2
56.	1	Naib Qasid	7	7	-
57.	1	Sanitary Worker	5	5	-
58.	1	Gardener	1	1	-
59.	1	Helper	5	4	1
	Total Staff (BS-1 to 16)		**98**	**82**	**16**
	Total Officers (BS-17 to 21)		**45**	**25**	**20**
	Total Officers & Staff (BS-1 to 21)		**143**	**107**	**36**

VII. ANNEXURES

ANNEXURE-I

Pakistan Science Foundation Act 1973

National Assembly of Pakistan

Islamabad, the 2nd February, 1973

The following Acts of the National Assembly received the assent of the President on the 31st January, 1973, and are hereby published for general information:-

ACT NO. III OF 1973

An Act to provide for the establishment of the Pakistan Science Foundation

WHEREAS it is expedient to provide for the establishment of the Pakistan Science Foundation and for matters ancillary thereto;

It is hereby enacted as follows:-

1. Short title, extent and commencement.-(1) This Act may be called the Pakistan Science Foundation Act, 1973.

(2) It extends to the whole of Pakistan.
(3) It shall come into force at once.

2. **Definitions** – In this Act, unless there is anything repugnant in the subject or context,-

a). "Board" means the Board of Trustees of the Foundation;
(b). "Chairman" means the Chairman of the Foundation; and
(c) "Foundation" means the Pakistan Science Foundation established under this Act.

3. **Establishment of the Foundation**.-- (1) As soon as may be after the commencement of this Act, the Federal Government may, by notification in the official Gazette, establish a Pakistan Science Foundation to promote and finance scientific activities having a bearing on the socio-economic needs of the country.

(2) The Foundation shall be a body corporate by the name of the Pakis-tan Science Foundation, having perpetual succession and a common seal, with power, subject to the provisions of this Act, to acquire, hold and dispose of pro-perty, both movable and immovable, and shall by the said name sue and be sued.

(3) The head office of the Foundation shall be at Islamabad.

4. Functions of the Foundation.-(1) The Foundation shall function as a financing agency for –

(i) the establishment of comprehensive scientific and technological information and dissemination centres;

(ii) the promotion of basic and fundamental research in the universities and other institutions on scientific problems relevant to the socio-economic development of the country;

(iii) the utilization of the results of scientific and technological research including pilot plant studies to prove the technical and economic feasibility of processes found to be promising on a laboratory scale;

(iv) the establishment of science centres, clubs, museums, herbaria and planetaria;

(v) the promotion of scientific societies, associations and academies engaged in spreading the cause of scientific knowledge in general or in the pursuit of a specific scientific discipline or technology in particular;

(vi) the organization of periodical science conferences, symposia and seminars;

(vii) the exchange of visits of scientists and technologists with other countries;

(viii) the grant of awards, prizes and fellowships to individuals engaged in developing processes, products and inventions of consequence to the economy of the country ; and

(ix) special scientific surveys not undertaken by any other organization and collection of scientific statistics related to the scientific effort of the country.

(2) The Foundation shall also—

(i) review the progress of scientific research sponsored by it and evaluate the results of such research;

(ii) maintain a National Register of highly qualified and talented scientists of Pakistan, including engineers and doctors, in or outside the country and to assist them, in collaboration with the concerned agencies in finding appropriate employment; and

(iii) establish liaison with similar bodies in other countries.

(3) In the performance of its functions, the Foundation shall be guided on questions of policy by the instructions, if any, given to it by the Federal Government which shall be the sole judge as to whether a question is a question of policy.

5. Board of Trustees.- (1) The general direction, conduct and management of the affairs of the Foundation, including administration of its funds, shall vest in a Board of Trustees consisting of the following members, namely:-

Whole-time members

(i) the Chairman;
(ii) one eminent scientist;
(iii) the Director of Finance;

to be appointed by the President;

Part-time members

(iv) the Chairman of the National Science Council;
(v) four scientists to be nominated by the National Science Council; and
(vi) eleven eminent scientists to be nominated by the President.

(2) The remuneration and other terms and conditions of service of Chairman and the two other whole-time members of the Board shall be such as may be determined by the President.

6. Chairman of the Foundation.- (1) The Chairman of the Board shall be the Chairman of the Foundation and shall be appointed from amongst eminent scientists of the country having experience of research and scientific administration

(2) The Chairman shall, subject to sub-section (3), hold office for a term not exceeding three years and shall be eligible for re-appointment.

(3) The President may at any time terminate the appointment of the Chairman without notice and without assigning any reason.

7. Members of the Board.- (1) The members of the Board, other than the ex-officio member shall, subject to sub-section (3), hold office for a term not exceeding three years and shall be eligible for re-appointment or re-nomination, as the case may be.

(2) A member, other than an ex-officio member, may at any time resign his office by writing under his hand addressed to the President but shall continue to perform his functions until his resignation has been accepted.

(3) The President may at any time terminate the appointment or, as the case may be, nomination of any member of the Board without notice and with out assigning any reason

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(As amended vide Ordinance No XIII of 1979, published in the Gazette of Pakistan, Extra, Feb, 24, 1979) Part I,

8. Meetings of the Board.---(1) The meetings of the Board shall be held at least twice a year and shall be presided over by the Chairman or, in his absence by its whole-time scientist member.

(2) All decisions at a meeting of the Board shall be taken by a majority of the votes of the members present and voting.

9. Quorum at the meeting of the Board.—To constitute a quorum at a meeting of the Board not less than nine members shall be present.

10. Executive Committee.- There shall be an Executive Committee consisting of the Chairman and the two other whole-time members of the Board.

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

12. Adhoc Committees.—The Foundation may set up ad hoc committees consisting of university professors and other leading scientists and experts to scrutinize applications for financial assistance for carrying out scientific research submitted to the Foundation by the universities or other institutions or by individual scientific workers or groups of scientific workers and to review ;and evaluate the results of research sponsored by the Foundation.

13. Funds.—The funds of the Foundation shall consist of—

(a) grants made by the Federal Government and the Provincial Government
donations and endowments ; and income from other sources.

14. Budget.—The Foundation shall cause to be prepared and approve a statement of its receipt and expenditure for each financial year.

15. Accounts and audit.—(1) The funds of the Foundation shall be kept in a personal ledger account of the Foundation with the State Bank of Pakistan or with any Branch of the National Bank of Pakistan acting as an agent of the State Bank.

(2). The accounts of the Foundation shall be maintained in such form and manner as the Auditor-General of Pakistan may determine in consultation with the Federal Government.

(3) The accounts of the Foundation shall be audited by one or more auditors who are chartered accountants within the meaning of the Chartered Accountants Ordinance, 1961 (X of 1961), and are appointed by the Foundation in consultation with the Auditor-General of Pakistan.

16. Appointment of officers and servants.—(1) The Foundation may appoint such officers and servants, and engage such consultants or experts, as it may consider necessary for the efficient performance of its functions, on such terms and conditions as it may deem fit.

(2) In fixing the terms and conditions of service of its officers and servants, the Foundation shall as nearly as may be conform to the scales of pay, allowances and conditions of service applicable to the corresponding class of employees of the Federal Government.

17. Annual report.—(1) The annual repot of the Foundation, which shall, among other things, clearly bring out the benefits accruing to the nation as a result of the activities sponsored by the Foundation, shall be prepared by the Chairman and submitted, through the Board, to the Federal Government alongwith the audited accounts of the Foundation.

(2) The annual report alongwith the audited accounts of the Foundation shall be laid before the National Assembly.

18. Regulations.—The Foundation may make Regulations for the efficient conduct of its affairs.

19. Repeal.—The Pakistan Science Foundation Ordinance, 1972 (LII of 1972), is hereby repealed.

ANNEUXRE-II

LIST OF PROJECTS APPROVED BY EXECUTIVE COMMITTEE DURING 2017-18

S. #	Project Title & No.	P.I. Name, Designation & Address	Total Cost in Pak. Rs.
1.	PSF/Res/P-UHS/Med (478) Comparison of Salivary and Lacrimal Aquaporin-5 Levels in Patients with Type-I and Type-II *Diabetes mellitus* and Healthy Individuals	Dr. Sarah Ghafoor Assistant Professor Department of Oral Biology University of Health Sciences Lahore	1,233,588
2.	PSF/Res/KPK-AWKU/Med (459) Synthesis of Coumarin Based Compounds for U2OS Bone Cancerous Cells Treatment	Dr. Muhammad Ikram Assistant Professor Department of Chemistry Abdul Wali Khan University Mardan	1,922,700
3.	PSF/Res/S-AKU/Med (488) Analysis of Population-Specific Epitope and Drug-resistance Mutations in HIV-1 in Pakistan	Dr. Syed Hani Abidi Assistant Professor Department of Biological and Biomedical Sciences The Aga Khan University Karachi	2,153,145
4.	PSF/Res/C-PINSTECH/Med (497) Prediction of Gastric Cancer in *Helicobacter pyroli* Infected Gastric Mucosa	Dr. Faisal Rasheed Senior Scientist Pakistan Institute of Nuclear Science and Technology Islamabad	591,600
5.	PSF/Res/P-UHS/Med (492) Biochemical and Molecular Analysis of Oculocutaneous Albinism in Families from Pakistan	Dr. Saqib Mahmood Assistant Professor Department of Human Genetics University of Health Sciences Lahore	586,500

ANNEXURE-III

TECHNICAL REPORTS RECEIVED DURING 2017-18

A. Non Development Budget

a. Semi Annual Technical Reports

S #	**Project No.**	**Project title**	**Report**
1.	PSF/Res/C-NILOP/Med (330)	Development of Optical Control Switch Gene Interference Technique as a New Therapeutic Approach for Lung Cancer	2nd Semi Annual
2.	PSF/Res/C-NUST/Med (374)	Development and Commercialization of Intelligent Functional Stent for the Treatment of Lung Cancer	2nd Semi Annual
3.	PSF/Res/KPK-KUST/Med (283)	Identification of Risk Factors for Hepatitis C Virus Infection and HCV Genotyping in Hemophiliac Patients of KPK	2nd Semi Annual
4.	PSF/Res/S-ICCBS/Med (431)	A Data Base Development of the Unique Metabolic Pathways of the Infectious Pathogens	1st Semi Annual
5.	PSF/Res/S-AKU/Med (479)	Understanding the Association of SIRT1 Genetic Variants with Microenvironment of the Oocyte in Infertile Female	1st Semi Annual
6.	P-AU/Agr (467)	Bio management of Alligator weed through its utilization as compost and organic mulch	1st Semi Annual
7.	C-NESCOM/Agr (497)	Wild Olive (OleaCuspedata) utilization as Root Stock for Oil Plants through Different Topworking Techniques	1st Semi Annual
8.	PSF/Res/S-SU/Chem (465)	Metal Ion Imprinted Polymers (MIIPs): Novel Material for Pre-Concentration and Separation of Total Arsenic in Aqueous Systems	2ndSemi annual
9.	PSF/Res/S-PCSIR/Chem (478)	Synthesis of Heterocyclic Organic Compounds for Drug Development	2nd Semi annual
10.	PSF/Res/S-ICCBS/Chem (516)	Identification of Small Molecular Agonists against G-Protein Coupled Receptors (GPCRs): Opportunities for Cancer Prevention	2nd Semi annual

		and Treatment	
11.	PSF/Res/P-CIIT/Chem (570)	Development of Mechanically Reinforced Silica Based Bioactive Glass (SiO2 CaO-P2O5) Polymer Composites for Potential Application in Osteochondral Defect Site	1st Semi annual
12.	PSF/Res/P-CIIT/Engg (159)	Evaluating the performance and Power Effectiveness of Asynchronous Processors Customized for many Core Systems	1st semi annual
13.	PSF/Res/C-SEECS/Engg (164)	iDOC: A Portable, Cost Effective Diagnostic Screening Device for Early Dengue Fever Detection	1st semi annual
14.	PSF/Res/C-NUST/Engg (136)	Plasmons Effects in Nano-Structures of Inoganic Polycrystalline Materials (ZnS, CdTe, CdS) by Embedding Different Metallic NanoParticles (Ag, Au,Cu) for Improving Photovioltaic Efficiency in Photovoltic Industry	1st semi annual

b. First Annual Technical Reports

S.#	**Project No.**	**Project title**
1	PSF/Res/C-PIMS/Med (450)	Identification of Molecular Determinants of Hereditary Deafness
2	PSF/Res/C-CIIT/Med (297)	Next Generation Granular Biomedical Ceramics for Rapid Bone Defect Repair
3	PSF/Res/KPK-KUST/Med (283)	Identification of Risk Factors for Hepatitis C Virus Infection and HCV Genotyping in Hemophiliac Patients of KPK
4	PSF/Res/S-KU/Bio (456)	Genetic Diversity of Some Ocypodoid Crabs with Special Reference to GneraUca and Macrophthalmus along the Coast of Pakistan
5	PSF/Res/S-SU/Chem (465)	Metal Ion Imprinted Polymers (MIIPs): Novel Material for Pre-Concentration and Separation of Total Arsenic in

		Aqueous Systems
6	PSF/Res/S-PCSIR/Chem (478)	Synthesis of Heterocyclic Organic Compounds for Drug Development
7	PSF/Res/S-ICCBS/Chem (516)	Identification of Small Molecular Agonists against G-Protein Coupled Receptors (GPCRs): Opportunities for Cancer Prevention and Treatment
8	PSF/Res/C-NUST/Engg (136)	Plasmons Effects in Nano-Structures of Inoganic Polycrystalline Materials (ZnS, CdTe, CdS) by Embedding Different Metallic NanoParticles (Ag, Au,Cu) for Improving Photovioltaic Efficiency in Photovoltic Industry
9	PSF/Res/C-NILOP/Phys (183)	Development of Fluorosensor for In vivo Tissue Charac-terization
10	PSF/Res/P-LUMS/ Phys (159)	Development of Low Field, Low Cost, Reconfigurable NMR and MRI

c. Final Technical Reports

S.#	**Project No.**	**Project Title**
1.	PSF/Res/C-NILOP/Med (330)	Development of Optical Control Switch Gene Interference Technique as a New Therapeutic Approach for Lung Cancer
2.	PSF/Res/C-NUST/Med (374)	Development and Commercialization of Intelligent Functional Stent for the Treatment of Lung Cancer
3.	B-BACP/Agr (379)	Population Dynamics and Life Table of Dubas Bug (Ommatis-susLybicus) on Date Palm In District Punjgur Balochistan
4.	PSF/Res/P-UVAS/Bio (544)	The Development and Evaluation of Thermostable Vaccine against Peste des Petits Ruminants

e. Technical Reports Adopted by Technical Committee

S. #	Project No.	Project title	Reports
1.	PSF/Res/P-AU/Bio (356)	Newcastle Disease Virus: Surveillance, Pathogenicity for Chickens and Development of Vaccine for Control	Final
2.	PSF/Res/KPK-AU/Bio (484)	Modification of Egg Cholesterol Content through Medicinal Plants	Final
3.	PSF/ResP-PMAS.AAU/Bio (418)	Ethnobotanical Survey of Thal Desert, Punjab, Pakistan	Final
4.	PSF/Res/S-SALU/Bio (382)	Comparative Characterization and Recombinant Study of Indigenous Keratinase Enzymes	Final
5.	PSF/Res/P-UHS/ Biotech (107)	Molecular Genetic Studies in Pakistani Families with Autosomal Recessive Primary Microcephaly (MCPH) Grade Graphite Schist Ores	Final
6.	PSF/Res/B-BU/Earth (86)	Basement Shear and Transpression near a Restraining Bend on the Chaman Fault an Investigation of the Structural Kinematics and Seismic Hazard in Northern Balochistan	Final
7.	PSF/Res/C-NUST/Envr (112)	Chlorine Decay Modeling in a Prototype Distribution Network	Final
8.	PSF/Res/C-PINSTECH/ Phys (172)	Development of Graphene Based High Sensitive and Low Cost Glucose Biosensor	Final
9.	PSF/Res/C-QU/Phys (136)	Investigation of the Scope of Plasma Focus as Radiation Sources for Material processing/ Surface Treatment	Final

f. Completed Projects

1.	PSF/Res/C-QU/Bio (419)	Functional Analysis of a Proteinase Inhibitor Gene Construct for Insect Resistance
2.	PSF/Res/P-PMAS-AAU/Bio (397)	Detection of Multiple Anthelmintic Resistances of Ne in Small Ruminants Grazing in Barani Region
3.	PSF/Res/KPK-AU/Bio (484)	Modification of Egg Cholesterol Content through Medicinal Plants
4.	PSF/Res/S-SALU/Bio (382)	Comparative Characterization and Recombinant Study of Indigenous Keratinase Enzymes
5.	PSF/Res/P-AU/Bio (356)	Pigeon Newcastle Disease Virus: Surveillance and pathogenicity for chickens and Development of Vaccine for Control
6.	PSF/Res/B-FGC/Bio (458)	Parasites of Boxes and Jackals in EasterenBalochi-stan, with Special Emphasis on Diseases of Veteri-nary and Zoonotic Importance
7.	PSF/Res/KPK-AU/Bio (403)	Effect of Sperm Concentration, Season and Extend-ers on Goats Semen Integrity and Fertility
8.	PSF/Res/P-UHS/ Biotech (107)	Molecular Genetic Studies in Pakistani Families with Autosomal Recessive Primary Microcephaly (MCPH) Grade Graphite Schist Ores
9.	PSF/R&D/KPK-IBGE/ Biotech (209)	In Vitro Development of Salt Tolerance in Rice
10.	PSF/Res/P-PU/Earth (85)	Petrology, Mineralogy, Geochemistry and Economic Geology of the Hangu Formation of Salt Range, Pa-kistan
11.	PSF/Res/B-BU/Earth (86)	Basement Shear and Transpression near a Restrain-ing Bend on the Chaman Fault an Investigation of the Structural Kinematics and Seismic Hazard in Northern Balochistan
12.	PSF/Res/P-HITECU/Engg (113)	Compressed Air Power Vehicle (Bike)
13.	PSF/Res/C-CIIT/Engg (148)	Machine Vision System for Visually Impaired People

14.	PSF/Res/C-NUST/Engg (105)	Tribological Performance of Cam/Tappet Interaction in a Direct Acting Overhead Valve –Train Engine
15.	PSF/Res/F-GIK / Engg (107)	Battery based Micro hydropower plant on catamaran for free water flow operation
16.	PSF/Res/C-NUST/Envr (112)	Chlorine Decay Modeling in a Prototype Distribution Network
17.	PSF/Res/P-DGFARC/Envr (65)	Pollution in Hadiary Drain its direct and indirect impact on human health through Food Chain
18.	PSF/Res/P-GCU /Envr (89)	Comparative Study of Genotoxic effects of heavy metals on Indian major carps by Bioassays in the river Indus
19.	PSF/Res/P-AU/ Phys (151)	Synthesis of Soft and Hard Ferrites and Their Characterization Using Laser Induced Breakdown Spectroscopy
20.	PSF/R&D/P-GCU /Phys (246)	AC Magnetic Measurement
21.	PSF/Res/C-PINSTECH/ Phys (172)	Development of Graphene Based High Sensitive and Low Cost Glucose Biosensor

ANNEXURE-IV

LIST OF SCIENTIFIC PUBLICATIONS UNDER PSF FUNDED PROJECTS FOR THE YEAR 2017-18

S.No.	Project No.	Publication
1.	PSF/Res/C-QU/Bio (419)	• F. Munir, S. M. S. Naqvi, and T. Mahmood (**2011**). *In vitro* culturing and assessment of somaclonal variation of *Solanumtuberosum*var. desiree. Turkish Journal of Biochemistry 36 (4): 296-302.
2.	PSF/Res/P-PMAS-AAU/Bio (397)	• Ali Muhammad, Haroon Ahmed, Muhammad Naeem Iqbal, MazharQayyum, (**2015**) Detection of Multiple Anthelmintic Resistance of *Haemonchuscontortus*and *Teladorsagiacircumcincta*in Sheep and Goats of Northern Punjab, Pakistan DOI: 10.9775/kvfd.2014.12581; 21 (3): 389-395
3.	PSF/Res/KPK-AU/Bio (484)	• Filed application for patent registration with IPO. Patent application No.188/2017
4.	PSF/Res/S-SALU/Bio (382)	• Pardeep Kumar, Yasmeen F. Kazi, Irshad H. Soomro (**2012**) A comparative characterization of indigenous Keratinase enzymes from District Khairpur, Sindh, Pakistan. *Pakistan Journal of Pharmaceutical Sciences*, 25(1), 73-79. • Yasmeen FaizKazi, Pardeep Kumar, IrshadHussainSoomro (**2014**) Characterization of the keratinolytic activity of indigenous *Bacillus subtilis*KeratinaseJournal of Chemical and Pharmaceutical Research (accepted).
5.	PSF/Res/P-AU/Bio (356)	• Pansota FM, F Rizvi, A Sharif, MT Javed, G Muhammad, A Khan and MZ Khan, (**2013**). Use of hyperimmune serum for passive immunization of chicks experimentally infected with Newcastle disease virus. Pakistan Journal of Agricultural Scienc-

		es, 50 (2): 279-288. • Shahzad M, F Rizvi, A Khan, M Siddique, MZ Khan and SM Bukhari, 2011. Diagnosis of Avain-Paramyxovirus Type-1 Infection in Chicken by Immunoflourescence Technique. International Journal of Agriculture & Biology, 13(2): 266-270.
6.	PSF/Res/KPK-AU/Bio (403)	• Qureshi MS, D Khan, A Mushtaq, SS Afridi, **2013**. Effect of extenders, post-dilution intervals and seasons on semen quality in dairy goats. Turkish Jounal of Veterinary and Animal Sciences, 37: 147-152, DOI: 10.3906/vet-1110-24. • Rahman HU, MS Qureshi, R Khan, 2014. Influence of dietary zinc on semen traits and seminal plasma antioxidant enzymes and trace minerals of Beetal bucks. Reproduction in Domestic Animals, 49 (6), 1004–1007; doi: 10.1111/rda.12422. • Majid A, MS Qureshi and R Khan. "In vivo adverse effects of high dose of alpha-tocopherol on the semen quality of male bucks". Journal of Animal Physiology and Animal Nutrition. In press. DOI: 10.1111/jpn.12284.
7.	PSF/R&D/KPK-IBGE/ Biotech (209)	a. Azhar H. Shah, Safdar H. Shah, H. Ahmad, Z.A.Swati. 2015. Cross Tolerance Mechanism of Osmotic and Ionic Stress Adapted Cell Lines of Rice Towards Salinity. IJAB b. Azhar H. Shah, S.H. Shah, H. Ahmad, Z.A.Swati l, A. H. Shah, M. Afzal, U. Aiman and Q. Khalid. 2012. The phenomenon of cross tolerance in osmotically and ionically adapted rice (*Oryza satica L.*) c. Azhar H. Shah, S.H. Shah, H. Ahmad, Z. A. Swati, F.M. Abbasi, Farhatullah and A.H.Shah. 2011. Adaptation to polyethylene stress maintains totipotency of cells lines of Oryza sativa L. cv. Swat-1 for a longer period. Pak J. Bot. 44 (1) 313:316.

		d. Azhar et al. 2015. Comparative tolerance of osmotically and ionically adapted cell lines of rice and their response to regeneration. (Accepted) Plant Omics. Ref no. PO JP6162
8.	PSF/Res/P-PU/Earth (85)	*S. M. A. Shah, N. Ahmad, M. A., N. Ahmad and N. Ahsan,* ***(2013).*** The Mineralogical and Petrographical Studies of the Lithofacies of the Hangu Formation in the Salt Range, Punjab, **Pakistan Journal of Science** ***(Vol. 65 No. 1 March,*** 142
9.	PSF/Res/B-BU/Earth (86)	• Abdul S. Khan, Shuhab D. Khan and Din M. Kakar **(2013)**. Land subsidence and declining water resources in Quetta Valley, Pakistan, Environmental Earth Sciences, Doi. 10.1007/s2665-013-2328-9. • Walter Szeliga, Roger Bilham, Din M. Kakar and Sarosh H. Lodi ***(2012) "Interseismic strain accumulation along the western boundary of the Indian subcontinent,*** Journal of Geophysical Research, , 117, 1-14. • Din M. Kakar, Walter Szeliga and Roger Bilham (2012). Bookshelf faulting in the Ziarat earthquake sequence Northern Baluchistan, October 2008" Geological Bullettin, 45 (02) • Stacey S. Martin and Din M. Kakar (2012). The 19 January 2011 M_w 7.2 Dalbandin Earthquake Balochistan" Bulletin of Seismological Society of America, 102 (4), 1810-1819.
10.	PSF/Res/C-NUST/Engg (105)	1. Technique and apparatus for engine tappet speed monitoring system, Patent Application No: 189/2013. 2. Cam lobe wear measurement apparatus and technique, Patent Application No: 175/2016
11.	PSF/Res/C-NUST/Envr (112)	• "Investigating the effect of disinfection practises on microbial inactivation using Response Surface Methodology (RSM)" is under submission process

		in Environmental Technology journal (Impact factor = 1.75)
12.	PSF/Res/ P-GCU/Envr (89)	• Monitoring of Trace Metals in Tissues of *Wallago attu* (Lanchi) from the Indus River as an Indicator of Environmental Pollution. • K.A. Al Ghanim, Shahid Mahboob, Sadia Seemab, S. Sultana, T. sultana, Fahad Al-Misned, Z. Ahmad. King Saud University, Saudi Journal of Biological Sciences (2016) 23, 72-78. • Shahid Mahboob, Shazia Kausar, Farhat Jabeen, S. Sultana, T. Sultana, K.A. Al-Ghanim, Bilal Hussain, Fahad Al-Misned1 and Z. Ahmed (2016). Effect of Heavy Metals on Liver, Kidney, Gills and Muscles of *Cyprinus carpio* and *Wallago attu* inhabited in the Indus. BRAZILIAN ARCHIVES OF BIOLOGY AND TECHNOLOGY http://dx.doi.org/10.1590/1678-4324-2016150275.
13.	PSF/Res/ P-DGF/Envr (65)	1. Muhammad, H. Iqbal, Z, Ayub. M., and Malik, M.A., 2013. Uptake of heavy metals by *Brasica cmpetris,* irrigated by Hudiara Drain in Lahore Pakistan. Canadian Journal of pure and applied sciences. 7(3): 2599-2604. 2. Muhammad, H. Ayub. M., Iqbal, Z., and Malik, M.A., 2013.Heavy Metals toxicity in *Psidium guajava* fruit irrigate by polluted water of Hudiara Drain In District Lahore, Punjab Pakistan. Biologia Pakistan. 59(2): 241-246.
14.	PSF/Res/ P-AU/Phys (151)	1. M. Raza Ahmad, Yasir Jamil, Faiza Jabeen and Tousif Hussain. 2014. A novel laser assisted structure refinement of Co0.5Zn0.5Fe2O4. Laser

		Physics Letters vol. 11 (046002) (Impact factor: 7.71) 2. Yasir Jamil, Humaima Saeed, M. Raza Ahmad, Shakeel Ahmad Khan, Hashim Farooq, Muhammad Shahid, K. M. Zia and Nasir Amin. 2013. Measurment of ablative laser propulsion parameters for aluminum, Co-Ni ferrite and polyurethane polymer. Applied Physics A, 110(1): 207-210 (Impact Factor: 1.63) 3. Hashim Farooq, M. Raza Ahmad, Yasir Jamil, Abdul Hafeez and Muhammad Anwar. Structural, Dielectric and magnetic properties of superparamagnetic zinc ferrite nanoparticles synthesized through coprecipitatyion technique. 56(5): online published Metallic Materials (Impact Factor: 0.74) 4. Hashim Farooq, M. Raza Ahmad, Yasir Jamil, Abdul Hafeez, Zeeshan Mahmood and Tahir Mahmood. 2012. Structural and dielectric properties of manganese ferrite nanoparticles. Journal of Basic and Applied Sciences. 8: 597-601 5. Ghulam Mustafa, M.U. Islam, Wenli Zhang, Yasir Jamil, Abdul Waheed Anwar, Mudassar Hussain, Mukhtar Ahmad. 2015. Investigation of structural and magnetic properties of Ce3+- substituted nanosized Co–Cr ferrites for a variety of applications. Journal of Alloys and Compounds.[Impact factor: 2.72] (Annex-20) 6. Ghulam Mustafa, M.U. Islam, Wenli Zhang, Yasir Jamil, M. Asif Iqbal, Mudassar Hussain, Mukhtar Ahmad. 2015. Temperature dependent structural and magnetic properties of Cerium substituted Co–Cr ferrite prepared by autocombustion method. Journal of Magnetism and

		Magnetic Materials. 378:409-416. (Note: The article was submitted and accepted in 2014, it is online published in the March issue of the journal) [Impact factor: 2.002] (Annex-21)
15.	PSF/Res/ P-GCU/Phys (246)	01
16.	PSF/Res/ C-PINSTECH/Phys (172)	1. Muhammad Hussain, Hongyu Sun, Shafqat Karim, Amjad Nisar, Maaz Khan, Anwar ul Haq, Munawar Iqbal, Mashkoor Ahmad*J. Nanoparticle Research. 18:95, 2016. DOI 10.1007/s11051-016-3397-y. 2. Mashkoor Ahmad*, Irum Khalid, Ayousha Ayaz, Muhammad Hussain , a book chapter on "Graphene network" in Carbon Nanomaterials Sourcebook: Graphene, Fullerenes, Nanotubes, and Nanodiamonds, Vol. 1, 2016, pp.67-88, ISBN 9781482252682 - CAT# K23883, CRS Press, Taylor & Francis group. 3. Sadia Tabassum, Mashkoor Ahmad, Shafqat karim, Amjad Nisar, Maaz Khan, Ghafar Ali and Shaista Shazada "Highly Sensitive Graphene/Au Hybrid Nanostructure as an Ultra Sensitive Sensing Probe for the Determination of Glucose" RSC Advances (under review) 2017. 4. Muhammad Hussain, Saima Tariq, Mashkoor Ahmad, Hongyu Sun, Maaz Khan, Ghafar Ali, Syed Zahid Hussain, Shafqat Karim, Amjad Nisar, Materials Chem. Phys. 181, 194-203,2016. 5. Mashkoor ahmad,Hongyu Sun, Shafqat Karim, Amjad Nisar, Ghafar Ali "Investigation of catalytic activity of graphene plasmonic hybrid nanostructures for the detection of

		glucose molecules" J. Mater. Chem. A. (2017) submitted. 6. Muhammad Tahir Zahoor,Mashkoor ahmad,Khan Maaz, Shafqat Karim, Khalid Waheed, Ghafar Ali and Amjad Nisar "Tungsten Oxide multifunctional nanostructures: enhanced environmental and sensing applications" New J. Chem. (2017) submitted. 7. Muhammad Hussain, Sidra Ibadat, Amjad Nisar, Mashkoor Ahmad, Shafqat Karim, Maaz Khan, Aqsa Arshad, Ghafar Ali and Sung Oh Cho “Electrochemical determination of L-Cysteine by selforganized hybrid TiO2 nanostructure” To be submitted (2017).

ANNEXURE-V

HIGHER DEGREES EARNED THROUGH PSF SUPPORTED PROJECTS DURING 2017-18

S. No.	Project No.	Name of the Researcher	Degree awarded
1.	PSF/Res/C-QU/Bio (419)	Ms. Faiza Munir	M.Phil
2.	PSF/Res/KPK-AU/Bio (484)	Mr. Fazal Wahab	M.Phil
		Muhammad Mushtaq	PhD
3.	PSF/Res/S-SALU/Bio (382)	Pardeep Kumar	M.Phil
4.	PSF/Res/P-AU/Bio (356)	Irfan Mushtaq	M.Phil
		Muhammad Shazad	M.Phil
		Faisal Muhammad Pansota	M.Phil
		Muhammad Mohsin	M.Phil
		Syed Mudassar Bukhari	M.Phil
5.	PSF/Res/KPK-AU/Bio (403)	Doulat Khan	M.Phil
		Hafiz Abdul Majeed	M.Phil
		Hafiz ur Rahman	M.Phil
		Muhammad Inam	M.Phil
		Shoaib Sultan Afridee	M.Phil
6.	PSF/Res/C-NUST/Envr (112)	Ms. Amrah Qureshi	M.Phil
7.	PSF/Res/ P-GCU/Envr (89)	Ms. Sadia Seemab	M.Phil
		Ms. Shazia Kausar	M.Phil
8.	PSF/Res/ P-DGF/Envr (65)	Syed Muhamamd Aun Naqvi	M-Phil
		Mr. Haji Muhammad	M-Phil
9.	PSF/Res/ P-AU/Phys (151)	Qurat ul ain Asif	M.Phil
		Shahbaz Ahmad	M.Phil
		Usman Arshad	M.Phil
		Kamran Akhtar Ch.	M.Phil
		Ayesha Tubassum	M.Phil
		Iffat Orangzeb	M.Phil
10	PSF/Res/ P-GCU/Phys (246)	Marryum Rehman	Ph.D
		Qasim Ali	M.Phil
		Muhammad Zahir Iqbal	M.Phil

11	PSF/Res/ C-PINSTECH/Phys (172)	Mr. Muhammad Hussain Sadia Tabassum	Ph.D MS
12	PSF/R&D/KPK-IBGE/ Biotech (209)	Mr. Azhar Hussain Shah Mr. Sulhah Syed Mr. Farhanullah Ms. Sidra Sardar Mr. Syed Aqeel Shah Mr. Muhammad Ibrar Mr. Syed Muhammad Us-man Shah	Ph.D M.Phil M.Phil M.Phil M.Phil M.Phil M.Phil
13	PSF/Res/P-UHS/ Biotech (107)	Mr. Tahir Qureshi	M.Phil

ANNXURE-VI

LIST OF CONFERENCES/WORKSHOPS/SEMINARS HELD DURING THE YEAR 2017-18

Sr.#	Title	Name & Address Principal Organizer	Amount Sanctioned (Rs.)
1.	International Conference on "Nano-Composites and Multi-Functional Materials 2017" on 3rd June, 2017 at National University of Sciences and Technology Islamabad	Dr. Quratul Ain Javed Assistant Professor (Physics) School of Natural Science, NUST, Islamabad	200,000/-
2.	7th International Conference on 'Biotechnology and Bioengineering and International Conference on Agricultural and Food Science (ICBB&ICAFS-2017) on 6th June, 2017at Virtual University, Lahore	Prof. Dr. MasroorEllahi Babar Dean Faculty of Science & Technology Virtual University, Lahore	200,000/-
3.	International Conference on "Mining and Fuel Industries (CMFI-2017)" on 3rdJuly, 2017 at Federal Urdu University, Karachi	Mr. SuhailAnjum Associate Professor Department of Geology Federal Urdu University Karachi Karachi	200,000/-
4.	1st International Conference on "Emerging Trends in Zoology (1st ICETZ 2017) on 7th July, 2017 at University of Sargodha, Sargodha	Dr. Muhammad Khalid Mukhtar Associate Professor Department of Zoology University of Sargodha Sargodha	100,000/-
5.	DICE Energy and Water 2017 (DEW 17) on 10th July, 2017 at Mehran University of Engineering and Technology, Jamshro, Sindh	Prof. Dr. Inamullah Director ORIC Mehran University of Engineering and Technology Jamshro, Sindh	200,000/-
6.	International Conference on Hydropower on 15th July, 2017 at University of Engineering & Technology, Lahore	Dr. Habib urRehman Director CEWRE University of Engineering & Technology, Lahore	200,000/-

		Lahore	
7.	Climate Change Threats to Agriculture and Food Security on 8th August, 2017 at University of Agriculture, Peshawar	Prof. Dr. Mohammad Akmal Department of Agriculture University of Agriculture Peshawar	100,000/-
8.	3rd International Nanomedicines Symposium "Nanotheranostics. The Power of Nanomedicine& 2nd International Workshop on Experimental Biology-IWEB-2017 Nanotheranostics: From Bench to Beside and Beyond on 12th September, 2017at NILOP, Islamabad	Dr. Abida Raza Principal Scientist National Institute for Laser and Optronics (NILOP), Islamabad	200,000/-
9.	International Conference on "Emerging Trends in Plant Proteomics" on 7th October, 2017 at Qauid-e-Azam University Islamabad	Dr. Ghazala Mustafa Assistant Professor Department of Plant Sciences Qauid-e-Azam University Islamabad	100,000/-
10.	3rd National Conference on "Intelligent Manufacturing & Sustainable Energy System 2017 (IMSES 2017) on 6th December, 2017 at SALU Auditorium at Mehran University of Engineering and Technology CampusKhairpur	Dr. Sadiq Ali Shah Assistant Professor Mechanical Department Mehran University of Engineering and Technology CampusKhairpur	100,000/-
11.	10th International Scientific School- 2018 (ISS-2018) on 12-16 March, 2018 at National Center for Physics, Islamabad	Dr. Hafeez R. Harooni Director General National Center for Physics Islamabad	200,000/-
12.	The 1st International Conference on "Conventional and Modern Approaches in Plant Sciences (CMAPS-2017) on28-29 November, 2017 at Department of Botany, University of the Punjab, Lahore	Prof. Dr. Firdaus e- Bareen Chairperson Department of Botany University of the Punjab Lahore	200,000/-
13.	4th International Conference on "Frontiers of Advance Engineering Materials" (FAEM-	Eng. Muhammad Irfan Head PITMAEM	200,000/-

	18) on 19-20 February, 2018 at PCSIR Auditorium, Lahore	Pakistan Council of Scientific and Industrial Research (PCSIR) Lahore	
14.	Emerging Trends in Knitting-2018 on 7-8 February, 2018 at National Textile University, Faisalabad	Dr. HafsaJamshaid Conference Chair National Textile University Faisalabad	100,000/-
15.	Strategies for Therapeuties Control and Prevention of Dengue and Other Emerging Viral Diseases in Pakistan on 01-02 March, 2018 at University of Sawabi, KPK	Prof. Dr. Imtiaz Ali Khan Vice Chancellor University of Sawabi, KPK	Rs. 100,000/-
16.	2nd International Conference on Environment and Sustainable Development on 13-14 March, 2018 atGovernment College University, Lahore	Dr. Engr. Abdullah Yasar Associate Professor & Director Sustainable Development Study Center GC University, Lahore	Rs. 200,000/-
17.	1st InternationalConference on "Power Energy and Smart Grid (ICPESG-2018) on 12-13 April, 2018 at Mirpur University of Science and Technology, (MUST)Mirpu	Prof. Dr. Habib-ur- Rehman Vice Chancellor Mirpur University of Science and Technology, (MUST) Mirpur	Rs. 200,000/-
18.	6th International Conference on Education (ICE- 2018) on 15-17 March 2018 at University of Education, College Road, Township, Lahore	Prof. Dr. Mohammad Alam Saeed Director Division of Science & Technology University of Education, Lahore	Rs. 200,000/-
19.	International Horticulture Conference Pakistan 2018 on 25-27 April, 2018 at PMAS-Arid Agriculture University, Rawalpindi	Prof. Dr. Nadeem Akhtar Abbasi Dean Faculty of Crop and Food Sciences PMAS-Arid Agriculture Rawalpindi	Rs. 200,000/-
20.	2018 International Conference on "Computing Mathematics and Engineering Technologies (iCoMET-2018) 3-4 March, 2018 at Sukkur IBA University	Dr. Ahmed Waqas Associate Professor Department of Computer Science Sukkur IBA University Sukkur	Rs. 200,000/-

21.	Pak China Symposium on Quantum Optics on April 09-11, 2018 at PIEAS/NILOP, Islamabad	Dr. ManzoorIkram Deputy Director National Institute of Laser and Optronics (NILOP) Islamabad	Rs. 200,000/-
22.	International Conference on Innovation and Commercialization in Biotechnology on 25-26 April, 2018 at PCSIR, Auditorium, Lahore	Dr. Naaz Abbas Principle Scientific Officer FBRC, PCSIR, Lahore	Rs. 200,000/-
23.	2nd International Symposium on Natural Products for the Future (ISNPF-2) on 4-6 Nov, 2018 at International Center for Chemical and Biological Sciences (ICCBS), HEJ Research Institute of Chemistry, University of Karachi, Karachi	Prof. Dr. M. Iqbal Choudhry Director ICCBS HEJ Research Institute of Chemistry, University of Karachi Karachi	Rs.200,000/-
24.	National Symposium on Soil Plant Water Interaction for Orchards Management under Changing Climate on 9-11 May, 2018 at University of Haripur, KP	Dr. Ali Raza Gurmani University of Haripur Haripur	Rs.200,000/-
25.	Training Course on Classical and Molecular Approaches in Wheat Breeding on 16-18 April, 2018 at IBGE, University of Agriculture, Peshawar	Dr. QuahirSohail Assitt. Professor IBGE University of Agriculture Peshawar	Rs. 100,000/-
26.	Workshop on "Algebric Geometry and its Applications" on 27-30 August, 2018 at Abdus Salam School of Mathematical Sciences, GC University, Lahore	Ms. AfshanSadiq Assistant Professor GC University, Lahore	Rs. 100,000/-
27.	Conference on "Land Degradation in Balochistan: A Serious Threat to Environment and Food Security" on 8-9 August, 2018 at Balochistan Agriculture College, Quetta	Dr. Muhammad Sharif Assistant Professor Department of Soil Sciences Balochistan Agriculture College Quetta	Rs. 100,000/-

28.	International Conference on "Earth Sciences Pakistan-2018" On 11-13 August, 2018 at Baragali Campus University of Peshawar	Dr. Shah Faisal Assistant Professor National Center of Excellence in Geology, University of Peshawar	Rs. 200,000/-
29.	29th National and 17th International Chemistry Conference on 6-8 September, 2018 at Baragali Campus, University of Peshawar	Dr. Jasmin Shah Professor/ Director Institute of Chemical Sciences University of Peshawar	Rs. 200,000/-
30.	Tackling Climate Change Through Plant Breeding on 11th September, 2018 at PMAS-Arid Agriculture University, Rawalpindi	Dr. Mahmood ul Hassan Assistant Professor Department of Plant Breeding and Genetics, PMAS-Arid Agriculture University, Rawalpindi	Rs. 100,000/-
31.	1st National Conference on "Advances in Physics" on 13th September, 2018 at University of Malakand, KPK	Dr. Arifullah Assistant Professor Department of Physics University of Malakand KPK	Rs. 100,000/-
32.	6thInternational Symposium–cum-Training Course on "Molecular Medicine and Drug Research" on 18th October, 2018 at ICCBS, University of Karachi Karachi	Prof. Dr. M. Iqbal Choudhary Director ICCBS University of Karachi Karachi	Rs. 200,000/-
		Total:	5,300,000/-

ANNEXURE-VII

LIST OF JOURNALS FUNDED BY PSF FOR THE YEAR 2017-18

S.No.	Title of Journal	Amount Funded (In million)
1.	Pakistan Journal of Pharmaceutical Sciences	0.0807
2.	Farming Outlook	0.1
	Total:	0.1807

ANNEXURE-VIII

LIST OF EXHIBITIONS 2017-18

Science Caravan, Federal Unit 2017-18

Sr. #	Exhibition Place	Date	No. of Days	No. of Students
1.	Science Caravan Exhibition at Institute of space Technology (IST), Islamabad	18-19 July, 2017	03	950
2.	Planetarium Show at Pak-Turk School G-10, Islamabad	23.Sep.2017	1	250
3.	Planetarium Show at Development in Literacy Schools Mandra	13.10.2017	1	250
4.	Science Caravan Exhibition at the Educators Capital Campus G-11/1, Islamabad	14-16, Oct. 2017	3	700
5.	Science Caravan Exhibition at Pakistan Museum of Natural History (PMNH)	10.11.2017	1	250
6.	Science Caravan Exhibition at Academy of Higher Secondary Education Thoba	20-25 Nov. 2017	6	1350
7.	Science Caravan Exhibition at Mirpur Public High School, Mirpur, AJK	27 Nov.-01 Dec. 2017	5	1700
8.	Science Caravan Exhibition at Malala Yousafzai Danish School Jand, Attok	04-08 Dec. 2017	5	1575
9.	Science Caravan Exhibition at PMNH, Islamabad	26-27 Dec. 2017	2	320
10.	Planetarium Show in 9th Annual Book Festival at Pak-China Centre, Islamabad	6-9 April 2018	4	5200
11.	Planetarium Show at Lahore Grammar School, H-8, Islamabad	12 April 2018	1	200

Science Caravan Multan Unit 2017-18

S. No.	**Activity and Venue**	**Date**	**Days**	**Students**
1	Exhibition at BZU, Multan			
2	GHS-Canal Colony Bahawalpur and celebration of WSDPD,2017	06-11 Nov,2017	6	1210
3	GHS- Shujaabad	20-25 Nov,2017	6	1570
4	GHS- Model Canal Colony, Bahawalnagar	04-09 Dec,2017	6	
5	Govt.boys model high School Choubara Distt.Layyah	25-29 Nov,2019	5	1210
6	Govt.MC.H.S and Govt.Girls H. School tehsil&Distt.Layyah	10-15 Feb,2020	5	1380

Science Caravan Sukkur Unit 2017-18

S. No.	Activity and Venue	Date	Days	Students
1.	GHSS- Bugul Dero Distt. Larkana	11-16 Sep,2017	6	1950
2.	GHSS- Thari Mirwah Distt. Khairpur Mirs'	09-14 Oct,2017	6	1980
3.	GHSS-Tehsil Mehar Distt.Dadu	30.10.17 to 4.11.17	6	1710
4.	GHS- Tehsil & Distt. Qamber (WSDPD,2017)	06-11 Nov,2017	6	1120 +150 WSDPD2017
5.	GHS-Talpur Wada Distt. Khairpur Mir's	20-29 Nov,2017	10	1785
6.	GHSS- Tehsil Moro, Distt. Naushehro feroze	11-16 Dec,2017	6	650
7.	Participatin in Festival at Larkana	19-22 Dec,2017	4	550
8.	G.Degree College Kandhkot (Participation in Event)	15-21 January, 2018	7	2800
9.	Participation in Thar Festival 2018	12-16 Feb,2018	5	2000
10.	Participation in fun fair at FFC- Mirpur Mathelo Distt. Ghotki	17-18 Feb,2018	2	1200
11.	GHSS- Kashmore	19-28 Feb,2018	10	3200
12.	GHS- Tehsil Rato dero Distt. Larkana	05.03.18 to 10.03.18	6	2170

Science Caravan Jaffarabad Unit 2017-18

S. No.	Activity and Venue	Date	Days	Students
1	GHss- Dera Allahyar	02-07 Oct,2017	6	2427
2	Celebration of WSDPD,10,Nov, 2017 at Usta Muhammad	10,Nov,2017	1	460
3	GHS- Dera Murad Jamali	11-17 Dec,2017	7	students+ public 2452
4	Science exhibition arrange during historical Sibbi Mela	24.02.18 to03.03.18	8	

Science Caravan Peshawar Unit 2017-18

S. No.	Activity and Venue	Date	Days	Students
1	GHSS- Ghari Habibullah Distt. Mansehra	21-26 August,2017	6	1447/62
2	GHS- Barikot Distt. Swat	11-16 Sep,2017	6	1752/112
3	GHS- Havelian Distt. Abbottabad	18-23, Sep,2017	6	1894/115
4	GHS-Shahbaz Shaheed Ouch Dir (Lower)	09-14 Oct,2017	6	1619/107
5	GHSS- Kahal Distt. Haripur	16-21 Oct,2017	8	1134/45
6	GHSS-1 Thana Distt.Malakand & Abasyn School Chakdara (Dir L) 06-14	06-14 Nov,2017	9	2417/60

	Nov,2017			
7	GGHSS- Charssada Khas Distt. Charassada	11-16 Dec,2017	6	
8	GHSS-Ikrampur Distt. Mardan	08-13, Jan,2018	6	1676/96
9	GGHSS-Nowshera Kalan Distt.Nowshera	22-27 Jan,2018	6	1763
10	GHSS- Khyber agency Bara	19.02.18 to 24.02.2018	6	1103

Science Caravan TandoJam Unit 2017-18

S. No.	Activity and Venue	Date	Days	Students
1	GHS- Pangrio Distt. Badin	25-30 Sep,2017	6	1148/62
2	GHS- Umerkot	23-28 Oct,17	6	1789/105
3	GHS- Daulatpur Distt. Shaheed Benazirabad (WSDPD,2017)	06-11 Nov,2017	6	1445/41
4	GBHS- Jati Distt. Thatta	20-25 Nov,2017	6	1123/50
5	Bukhari Model School Hyderabad	04.01.2018	1	350
6	GHS- Chukhi Tehsil & Distt.Hyderabad	11.01.2018	1	410
7	IBSE- training at Sindh Community Foundation at Hyderabad	14-17 Feb,2018	4	22 teachers Participated
8	Community Based School Tandojam	23.02.2018	1	445
9	GHS-Tando Kolachi Distt. Mirpur Khas	26.02.18 to 02.03.18	5	1048/32

Science Caravan Faisalabad Unit 2017-18

S. No.	Activity and Venue	Date	Days	Students
1	Tehsil Nushehra Distt.Khushab	11-22 Sep,2017	12	4770
2	GHS- Kalyar tehsil 18 Hazari Distt. Jhang	09-13 Oct,2017	5	
3	GHS (B/G) Distt. & Tehsil Gujrat	16.10.17 to 27.10.17	12	4616
4	Govt B/G School of Tehsil Dillewali Distt.Mianwali	13-24 Nov,2017	12	5000
5	Young Scholar School System Gujranwala	01-05 January,2018	5	1560
6	GHS- Tehsil & Distt. Kasur	11-22 Dec,2017	12	4255
7	GHS- Sarghoda	15-19 Jan,2018	5	1523
8	Khawarzimi/ Ali institute of Education at Lahore	26-28 Jan,2018	3	475
9	GHS-No.1 Tehsil Sanghal hill Distt.Nankana Sahab	29.01.18 to 03.02.18	6	2172
10	Askari Campus Narang Mandi Distt. Sheikhupura	06.02.18 to 08.02.18	3	550

Science Caravan Quetta Unit 2017-18

S. No.	Activity and Venue	Date	Days	Students
1.	Interview conducted of STFS at Quetta.	20.07.2017		
2.	Popular Science Lecture arranged at Iqra Residential School & College Quetta.	29.08.2017		130
3.	Popular Science Lecture arranged at Iqra Residential School & College at Quetta.	30.08.2017		
4.	Science Caravan Exhibition arranged GBHS-Tehsi & Distt. Ziarat	09-14 Oct,2017	6	240
5.	Quiz Competition arranged at Killi Shekhan at Quetta.	30.10.2017		
6.	Celebration of WSDPD at Killi Sheikhan Quetta	10.11.2017		115
7.	Visited the Muslim Hands School students in Science Caravan office at GSP-Quetta	14.11.2017		70
8.	GHS- Tehsil Dukki Distt. Loralai	27.11.17 to 01.12.2017	5	265
09.	Science Caravan Exhibition arranged GBHS-Dukki	26-30 March,2018		315
10.	Popular Science Lecture arranged at GGHS-Railway Colony Quetta.	09.04.2018		55

ANNEXURE-IX

LIST OF APPROVED PROJECTS UNDER PSF-NSF, SRI LANKA JOINT INITIATIVE (2ND CALL)

Sr. No	Project Title	Name, Designation, Department and Organisation of Pakistani PI	Chinese PI name and Address	Cost (in Rs.) and Duration
1.	Key Technologies and Application Foundation for Ultrasonic Processing of Soft and Brittle Composites Structure with Large-Scale Complex Profile	Prof. Dr.Fazal Ahmad Khalid Professor University of Engineering and Technology Lahore	Dr.Jianfu Zhang Lee ShauKee Building , Department of Mechanical Engineering Tsinghua University Beijing	4,173,840/- 3 Years
2.	Ultra High Molecular Weight Polyethylene with Rigid Reinforced Structures for Use in Artificial Joint Application	Dr.Rizwan Mahmood Gul Professor Dept. of Mechanical Engineering, University of Engineering and Technology, Peshawar	Dr.Zhong-Ming Li, Sichuan University, No. 24 South Section 1, Yihuan Road, Chengdu, China	3,728,100/- 3 Years
3.	Fabrication, Characterization and Magneto Transport Study of Ferromagnetic Hybrid Nanostructures	Dr.Rehana Sharif Professor Nanotechnologies Research Center, Physics Department, University of Engineering andTechnlogy, Lahore	Dr.JiafengFeng Institute of Physics Chinese Academy of Sciences	4,175,880/- 3 Years
4.	Two Dimension Transition Metal Dichalcoginide Based Photodectors and Quantum Effect Devices	Dr. Muhammad AftabRafiq Professor Department of Metallurgy and Materials Engineering, Pakistan Institute of Engineering and Applied Sciences ,Islamabad	Prof. Dr.XiulaiXu Institute of physics Chinese academy of Sciences, Beijing china	3,610,800/- 3 Years

5.	Design and Development of Innovative Impact Resistant Hybrid Structures Based on Super Elastic Shape Memory Alloys and Light Weight Lattice	Dr. Muhammad Abid Director Chairman and Professor of Mechanical Engineering COMSATS Institute of Information Technology Wah, Cantt	Prof. Dr.Zhu Jihong North western Poly technical University Xian Shanni China	3,809,700/- 3 Years
6.	Development of Stretchable Polymer Based Super capacitors for Energy Storage Systems	Prof. Dr. Ahmed Shuja Syed Professor Ibn-Khaldoon Block, International Islamic University, H-10, Islamabad, Pakistan.	Prof. Dr. Hong Meng School of Advanced Materials (SAM), Peking University Shenzhen Graduate School (PKUSZ), University Town, Nanshan District, Shenzhen P.R. China	1,567,740/- 3 Years
7.	Design and Fabrication of Highly Efficient Photocatalytic Materials for the Applications of Hydrogen Evolution from Water Splitting	Dr. Muhammad Nasir Assistant Professor IRCBM, COMSATS Institute of Information Technology , Defence Road, Raiwand road Lahore	Dr.ZinlongZhnang East China University of Science and Technology 130 meilong road, xuchui district shanghai, p.r. china	3,840,300/- 3 Years
8.	Implementation and Testing of Microgrid in Rural Communities with Maximum Penetration of Renewable Energy Resources in Pakistan	Dr.SobiaBaig Associate Professor COMSATS Institute of Information Technology Defence Road off. Raiwind Road Lahore	Dr. Lin Guan School of Electric Power South China University of China China	5,471,753/- 3 Years
9.	Design and Structure Modulation of Nano-Composite Membrane with Bi-interception for Juice Concentration	Dr.SaeedGul Associate Professor Department of Chemical Engineering University of Engineering and Technology, Peshawar	Dr.Qing He Jiang Qingdao Institute of Bioenergy and Bioprocess Technology, Chinese Academy of Sciences No.189 Songling Road 266101, China	3,736,784/- 3 Years

10.	Fabrication of High Corrosion Resistant Aluminium Alloy Coatings For Magnesium Alloys Through Cold Spraying Process and detailed Investigation Of Corrosion Resistance Mechanism	Dr. Muhammad Yasir Assistant Professor Institute of space and technology Islamabad highway Islamabad	Prof. Dr. Cheng-Xin Li Xian Jiaotong University 28-Xian-Ning, Eest Road Xian-Jiaotong University , Shaanxi,China	8,226,300/- 3 Years
11.	A Novel Solar Powered CCHP System Based On Evacuated Flat Plate Pv/T Collectors And Organic Rankine Cycle	Dr. Mohammad Bilal Khan Principal/Dean Center for Advanced Studies in Energy (USPCAS-E). National University of Sciences and Technology. NUST Campus, H-12, Islamabad, Pakistan.	Professor Dr.Pei Gang Department of Thermal Science and Energy Engineering, USTC, 96 Jinzhai Road, Hefei, Anhui, China	3,870,900 3 Years
12.	Development of Next-Generation Explosives Sensing Technology and Key Products Based on UniqueFluorescent Materials	Dr.SohailAnjumShahzad Assistant Professor HEC Approved Supervisor Department of Chemistry, CIIT Abbottabad-22060, Pakistan	Dr. Cong Yu State Key Laboratory of Electro analytical Chemistry, Changchun Instituteof Applied Chemistry, Chinese Academy of Sciences, Changchun, P. R. China	4,958,118/- 3 Years

ANNEXURE-X

LIST OF APPROVED PROJECTS UNDER PSF-NSF, SRI LANKA JOINT INITIATIVE (1ST CALL)

Sr.	Project Title	Name, designation, department and organisation of Pakistani PI	Name, designation, department and organisation of Sri Lankan PI	Cost (in Rs.) and Duration
1.	Preparation of Cost Effective Synthetic Skin Grafts for the Treatment of Burns and Chronic Ulcer Wounds: Bioactivity Directed Investigation of Angiogenic and Cell-Migration Potentials of Plant Extracts	Dr. Muhammad Yar Assistant Professor COMSATS Institute of Information technology 1.5 KM Defence Road Off Raiwind Road Lahore	Prof. G. M. Kamal B. Gunaherath Senior Professor of Chemistry and Deputy Vice Chancellor The Open University of Sri Lanka	Rs.2,064,480/- 03-years
2.	Genetic Characterization of Drug Resistant *Mycobacterium tuberculosis* Isolates from Sri Lankan and Pakistani TB Patients and Identification of Associated biomarkers	Dr. Sidra Younis Assistant Professor National University of Medical Sciences AbidMajeed Road, Rawalpindi	Dr.Dhammika N. Magana-Arachchi Senior Research Fellow National Institute of Fundamental Studies National Institute of Fundamental Studies, Hantana Road, Kandy, Sri Lanka	Rs.2,070,600/- 03-years
3.	Optimization of Donor and Acceptors Materials for Fabrication of Efficient Organic Solar Cell	Muhammad Imran Malik Assistant Professor H.E.J. Research Institute of Chemistry , International Center for Chemical and Biological Sciences (ICCBS), University of Karachi	Prof. L.B.D.R.P. Wijesundera Professor, University of Kelaniya, Sri lanka Department of Physics , University of Kelaniya , Sri Lanka	Rs.2,123,160/- 02-years
4.	Novel Materials for Secondary Sodium-ion Batteries and Proton Exchange Membrane Fuel Cells	Dr.NaseemIqbal Associate Professor U.S.-Pakistan Center for Advanced Studies	Dr. Kandasamy Vignarooban Head & Senior Lecturer in Physics	Rs.2,002,056/- 03-years

		in Energy (USPCAS-E) USAID Grantee National University of Science and Technology (NUST)	University of Jaffna Faculty of Science, University of Jaffna, Jaffna, Sri Lanka	
5.	Development of Carbon Based Nanomaterials for Counter Electrodes in dye Sensitized Solar cells	Dr.Hafeez Anwar Assistant Professor Department of Physics, University of Agriculture Faisalabad Pakistan University main road, Faisalabad, Pakistan	Prof. M.A.K.L. Dissanayake Research Professor National Institute of Fundamental Studies Hanthana Road, Kandy, Sri Lanka	Rs.2,055,963/- 03-years
6.	Novel Electrode material Based on Layer by Layer Assembly of Metal Oxide Nanoparticle/Graphene Composite for Lithium Ion Batteries and Solar Cells.	Prof. Dr. Muhammad MakshoofAthar Director Institute of Chemistry University of the Punjab, Lahore Pakistan.	Dr. Nanda Gunawardhana Director/International Research Centre International Research Centre Senate Building, University of Peradeniya. Sri Lanka	Rs.1,746,537/- 02-years

ANNEXURE XI

RESEARCH PROJECTS RECOMMENDED BY THE PSF-NSLP TECHNICAL COMMITTEE

Sr. #.	Project No. and Title	Name, Designation & Address of PI
1.	Molecular Cloning and Heterologous Expression of Endopolygalacturonas gene in *E. coli* as a Promising Application for Food Industry PSF/NSLP/P-UAAR (695)	Dr. Muhammad Javaid Asad Associate Professor Department of Biochemistry, Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi.
2.	Improvement of Carotenoid Contents and Herbicide Tolerance in Transgenic Potato for Commercial Cultivation PSF/NSLP/KP-CIIT(666)	Dr. Raza Ahmed Associate Professor Department of Environmental Sciences COMSATS Institute of Information Technology (CIIT), Abbottabad.
3.	Formulation, Fabrication and Characterization of Self Assembling Bioreducible Chitosan Based Nanoparticles for Biomedical Applications PSF/NSLP/P-BZU(713)	Dr. Furqan Muhammad Iqbal Assistant Professor Department of Pharmacy Bahauddin Zakria University, Multan
4.	Develop Web-accessible Documented and Illustrated Information on Plants of Balochistan PSF/NSLP/B-BU(714)	Meritorious Prof. Dr. Mudassir Asrar Dean, Faculty of Life Sciences University of Baluchistan, Quetta.
5.	Design and Application of Photocatalytic Nanocoatings for Treatment of Polluted Water PSF/NSLP/P-FJWU(711)	Dr. Rohama Gill Assistant Professor Department of Environmental Sciences Fatima Jinnah Women University Rawalpindi

6.	Evaluation of Selected Phytase Transgenic Wheat Lines in Soil under Contained Environment PSF/NSLP/P-FCCU(699)	Dr. Asma Maqbool Associate Professor Biological Sciences Department, Forman Christian College (A Chartered University) Ferozepur Road, Lahore
7.	Isolation, Molecular Characterization of Pathogenic Bacteria and Development of Fish Vaccine for Culturable Fish Species of Pakistan PSF/NSLP/P-UVAS(701)	Dr. Muhammad Hafeez-ur-Rehman Assistant Professor Department of Fisheries and Aquaculture University of Veterinary and Animal Sciences, Lahore
8.	Use of Indigenous Fruit Extracts as Nutraceuticals and Their Therapeutic Efficacy Against Clostridium perfringens in Broiler Chicken PSF/NSLP/P-UVAS (689)	Dr. Gulbeena Saleem Assistant Professor Department of Pathology, University of Veterinary and Animal Sciences, Lahore
9.	Preparation of Industrially Important Instant Starches (Cold Water Swell-able) and its Application in Food Products PSF/NSLP/S-KU(692)	Dr. Tahira Mohsin Ali Assistant Professor Department of Food Science and Technology, University of Karachi, Karachi
10.	Molecular Epidemiology and Population Genetic Analysis of Anaplasma Species Isolated from Ticks, Humans and Animal Hosts PSF/NSLP/P-UoS (697)	Dr. Farhan Ahmad Atif Associate Professor (Medicine) College of Veterinary & Animal Sciences (CVAS) Jhang Sub Campus
11.	A Comparative Assessment of Allopathic Drugs and Selected Medicinal Plants Potential against Infertility using Animals Model PSF/NSLP/P-GCUF(710)	Dr. Zahed Mahmood Associate Professor Department of Applied Chemistry & Biochemistry, Government College University Faisalabad
12.	Optimization, Validation and Multiplexing of 11 ChrX MiniSTRs in Pakistani Population PSF/NSLP/P-UCP(712)	Dr. Muhammad Saqib Associate Professor Faculty of Life Sciences University of Central Punjab, Lahore

13.	Pilot scale production and popularization of compost tea as organic fertilizer nutrient source PSF/NSLP/KP-NIFA (705)	Mr. Zahid Ali Sr. Scientist NIFA, Peshawar
14.	Optimization of Environmental and Nutritional Standards for Mass Production of Mealworm Meal Under Tropical Environment of Pakistan PSF/NSLP/KP-UAP (709)	Prof. Dr. Sarzamin Khan Department of Poultry Science The University of Agriculture Peshawar

ANNEXURE XII

LIST OF PROGRESS REPORTS OF NSLP PROJECTS RECEIVED DURING 2017-2018

A. Semi Annual Reports

Sr. No.	Project No.	Project Title	Reports
1.	PSF/NSLP/P-UAAR (695)	Molecular Cloning and Heterologous Expression of Endopolygalacturonas gene in *E. coli* as a Promising Application for Food Industry	1st
2.	PSF/NSLP/KP-CIIT(666)	Improvement of Carotenoid Contents and Herbicide Tolerance in Transgenic Potato for Commercial Cultivation	1st
3.	PSF/Res/P-BZU/Bio (657)	Formulation, Fabrication and Characterization of Self Assembling Bioreducible Chitosan Based Nanoparticles for Biomedical Applications	1st
4.	PSF/Res/B-BU/Bio (667)	Develop web-accessible Documented and Illustrated Information on Plants of Balochistan	1st
5.	PSF/Res/P-FJWU/Envr (145)	Design and Application of Photocatalytic Nanocoatings for Treatment of Polluted Water	1st
6.	PSF/Res/C-IST/Envr (146)	Design and Assessment of Cost Effective Portable Point of Use Device for Antimicrobial Water Disinfection: Solar Strides for Green and Sustainable Development	1st
7.	PSF/NSLP/P-FCCU(699)	Evaluation of Selected Phytase Transgenic Wheat Lines in Soil under Con-	1st

		tained Environment	
8.	PSF/NSLP/P-UVAS(701)	Isolation, Molecular Characterization of Pathogenic Bacteria and Development of Fish Vaccine for Culturable Fish Species of Pakistan	1st
9.	PSF/NSLP/P-UVAS (689)	Use of Indigenous Fruit Extracts as Neutraceuticals and Their Therapeutic Efficacy against Clostridium perfringens in Broiler Chicken	1st
10	PSF/NSLP/S-KU (692)	Preparation of Industrially Important Instant Starches (Cold Water Swellable) and its Application in Food Products	1st
11	PSF/NSLP/P-UoS (697)	Molecular Epidemiology and Population Genetic Analysis of Anaplasma Species Isolated from Ticks, Humans and Animal Hosts	1st
12	PSF/NSLP/KP-NIFA(492)	Breeding high Yielding Mungbean (*VignaRadiata) L.Wilczek)* genotypes for the agroclimatic conditions of Kuram Agency	2nd
13	PSF/NSLP/P-AU (489)	Development of Technology Rich Seeds for Improving the Performance of Crops	2nd
14	PSF/NSLP/S-PARC (603)	Evaluation Of Chili Varieties For Qualities Production, High Yield And Disease Resistance In Lower Sindh	2nd
15	PSF/NSLP/GB-KU (449)	Assessment of Function Composition and Development of Value Added Products from Mulberry Fruits of Gilgit Baltistan	2nd
16	PSF/NSLP/P-BZU (394)	Nutritional Profiling and Antioxidant Potential of Selected Vegetables Waste and its Utilization for the Pro-	2nd

		duction of Value Added Foods	
17	PSF/NSLP/P-AU (531)	Delivery of Protien and Micronutrients to School going Children through Shelf Stable Ready to Eat Crispy Nutribars	2nd
18	PSF/NSLP/P-UAAR (346)	Functions in Buffalo Calves with Induced and Spontaneous Neonatal Diarrhoea Associated with Escherichia Coli.	2nd
19	PSF/NSLP/KP-NIFA (656)	Commercialization of Existing Technology of Mushroom and Popularization of Oyster and Milky Mushrooms as Cottage Industry for Economic Uplift of Landless Communities of KPK, Balochistan& Upper Punjab.	2nd
20	PSF/NSLP/C-CIIT (663)	Exploring Potential of Eco Friendly Allelochemicals and Their Analogs to Manage Weed Infestation in Wheat (*Triticumaestivum* L.)	2nd
21	PSF/NSLP/B-BUITEMS (488)	Assessment of Yeast Species Efficacy for the Biological Control of Post Harvest Fungal Diseases of Fresh Fruits of Balochistan	3rd
22	PSF/NSLP/GB-KU(478)	Assessment of Maize Legume Multiple Intercropping System for Sustainable Production in GilgitBaltistan	3rd
23	PSF/NSLP/KP-AU (270)	Genetic Transformation of *Brassica Carinata* for Low Viscosity Biodiesel Production	3rd
24	PSF/NSLP/P-AU (285)	Assessment of Genotoxic Effects of Metals in Fish using Comet and Micronucleus Assays	3rd

25	PSF/NSLP/P-AU (296)	Development of Conditioned (Omega-3 rich) Meat and Eggs through Modifications in Feed Ingredients	3rd
26	PSF/NSLP/P-AU (357)	Diagnosis of Acaricide Resistance in Ticks of Cattle and Management of Acaricide Resistant Ticks by Using Medicinal Plant Extracts	3rd
27	PSF/NSLP/P-US (382)	Detection and Innovative Management of Postharvest Disease Incursions in Citrus	3rd
28	PSF/NSLP/P-UAAR (308)	Development of Genetic Evaluation Model for Dhanni Cattle as Potential Beef Cattle in Potohar Region of Punjab	3rd
29	PSF/NSLP/P-AU (489)	Development of Technology Rich Seeds for Improving the Performance of Crops	3rd
30	PSF/NSLP/P-UAAR (313)	Ants – Aphid's Mutulistic Association, its Impact on Biological Parameters of Aphids and Predation of *Coccinelids*	3rd
31	PSF/NSLP/KP-AU (270)	Genetic Transformation of *Brassica Carinata* for Low Viscosity Biodiesel Production	3rd
32	PSF/NSLP/KP-GU(424)	Entomocidal Studies of Plant Materials against Maize Weevil (*Sitophilusoryza*) and Side Effect on Parasitoid *AnisoptromanlousCalandareae* (Howard)	3rd
33	PSF/NSLP/P-UAAR (264)	Improving Yield, Quality and Storage Life of Bell Pepper by Use of Food Grade Chemicals	3rd

B: First Annual Reports

Sr. No.	Project No.	Project Title
1.	PSF/NSLP/KP-NIFA(492)	Breeding high Yielding Mungbean (*VignaRadiata) L.Wilczek)* genotypes for the agroclimatic conditions of Kuram Agency
2.	PSF/NSLP/P-AU (489)	Development of Technology Rich Seeds for Improving the Performance of Crops
3.	PSF/NSLP/S-PARC (603)	Evaluation Of Chili Varieties For Qualities Production, High Yield And Disease Resistance In Lower Sindh
4.	PSF/NSLP/GB-KU (449)	Assessment of Function Composition and Development of Value Added Products from Mulberry Fruits of Gilgit Baltistan
5.	PSF/NSLP/P-BZU (394)	Nutritional Profiling and Antioxidant Potential of Selected Vegetables Waste and its Utilization for the Production of Value Added Foods
6.	PSF/NSLP/P-AU (531)	Delivery of Protien and Micronutritients to School going Children through Shelf Stable Ready to Eat Crispy Nutribars
7.	PSF/NSLP/P-UAAR (346)	Functions in Buffalo Calves with Induced and Spontaneous Neonatal Diarrhoea Associated with Escherichia Coli.
8.	PSF/NSLP/KP-NIFA (656)	Commercialization of Existing Technology of Mushroom and Popularization of Oyster and Milky Mushrooms as Cottage Industry for Economic Uplift of Landless Communities of KPK, Balochistan& Upper Punjab.
9.	PSF/NSLP/C-CIIT (663)	Exploring Potential of Eco Friendly Allelochemicals and Their Analogs to Manage Weed Infestation in Wheat (*Triticumaestivum* L.)

C: Second Annual Progress Reports

Sr. No.	Project No.	Project Title
1.	PSF/NSLP/B-BUITEMS (488)	Assessment of Yeast Species Efficacy for the Biological Control of Post Harvest Fungal Diseases of Fresh Fruits of Balochistan
2.	PSF/NSLP/GB-KU(478)	Assessment of Maize Legume Multiple Intercropping System for Sustainable Production in GilgitBaltistan
3.	PSF/NSLP/KP-AU (270)	Genetic Transformation of *Brassica Carinata* for Low Viscosity Biodiesel Production
4.	PSF/NSLP/P-AU (285)	Assessment of Genotoxic Effects of Metals in Fish using Comet and Micronucleus Assays
5.	PSF/NSLP/P-AU (296)	Development of Conditioned (Omega-3 rich) Meat and Eggs through Modifications in Feed Ingredients
6.	PSF/NSLP/P-AU (357)	Diagnosis of Acaricide Resistance in Ticks of Cattle and Management of Acaricide Resistant Ticks by Using Medicinal Plant Extracts
7.	PSF/NSLP/P-US (382)	Detection and Innovative Management of Postharvest Disease Incursions in Citrus
8.	PSF/NSLP/P-UAAR (308)	Development of Genetic Evaluation Model for Dhanni Cattle as Potential Beef Cattle in Potohar Region of Punjab
9.	PSF/NSLP/P-AU (489)	Development of Technology Rich Seeds for Improving the Performance of Crops

D: Final Reports

Sr. No.	Project No.	Project Title
1.	PSF/NSLP/KP-NIFA (253)	Nutrient Management of Deciduous Orchards (Plum) Through Foliar Feeding
2.	PSF/NSLP/KP-AU (271)	Development of Abiotic Stress Tolerant Rice
3.	PSF/NSLP/KP-AU (293)	Utilization of Maggots as an Alternative Animal Origin Protein on the Production Performance of Meat and Egg-Type Bird
4.	PSF/NSLP/KP-AU (421)	Isolation and Structural Elucidation of the Antimicrobial Compounds Effective against the Wilt Pathogens from *Penicillum* sp. EU0013
5.	PSF/NSLP/KP-GU(424)	Entomocidal Studies of Plant Materials against Maize Weevil (*Sitophilusoryza*) and Side Effect on Parasitoid *AnisoptromanlousCalandareae* (Howard)
6.	PSF/NSLP/P-BZU (130)	Breeding for impact of different temperatures on bt cruciferous crops and development of resistance to insecticides in*plutellaxylostella*
7.	PSF/NSLP/P-AU (185)	Evaluation of Some Cereal Derived Polysaccharides as Natural Biological Response Modifiers and Their Therapeutic Efficacy AgainstCoccidiosis in Chicken
8.	PSF/NSLP/S-SAU (236)	Biological Control of Okra Mealy Bug by Fungal Bio-Control Agents
9.	PSF/NSLP/S-SAU (242)	Integrated Pest Management in Organic Cotton and its Impact on Yield and Lint Quality Characteristics
10.	PSF/NSLP/S-HEJ (290)	Synthesis of Combinatorial Libraries of Cyclic Peptides in Search of Novel Medicinal Agents
11.	PSF/NSLP/P-UAAR (264)	Improving Yield, Quality and Storage Life of Bell Pepper by Use of Food Grade Chemicals
12.	PSF/NSLP/P-NIBGE (273)	Investigation of the Mechanisms Responsible for

		Adherence in Bifidobacterial Species: it's Relevance to the Development of Effective Bifidobacterial Probiotic Products
13.	PSF/NSLP/P-AU (285)	Assessment of Genotoxic Effects of Metals in Fish using Comet and Micronucleus Assays
14.	PSF/NSLP/P-UAAR (313)	Ants – Aphid's Mutulistic Association, its Impact on Biological Parameters of Aphids and Predation of *Coccinelids*
15.	PSF/NSLP/P-NIBGE (315)	Diversity of Symbiotic and Free Living Plant Growth Promoting Rhizobacteria in the Root Nodules and Rhizosphere of Chickpea
16.	PSF/NSLP/KP-NIFA (203)	Development & Validation of Technologies for Pesticide Residue Management in Fruit and Vegetable Produce
17.	PSF/NSLP/P-UAAR (314)	Nematodes Infecting Temperate Fruits in Pakistan and their Management
18.	PSF/NSLP/P-PU (510)	Employing Chitinolytic Bacteria for Biological Control of Termites
19.	PSF/NSLP/P-GCU (291)	Survey and Detection of *Wolbachia* in Natural Insect Population of Pakistan
20.	PSF/NSLP/P-NIBGE (319)	Developing a Sustainable Formulation for Biological Control of Rice Bacterial Blight and Yield Increase Using Native Growth Promoting Bioantagonists
21.	PSF/NSLP/P-UAAR (346)	Evaluation of Intravenous Hyperosmotic Sodium Bicarbonate Solution as an Adjunct to Antibiotic Therapy on Acid-base Status and Cardiovascular Functions in Buffalo Calves with Induced and Spontaneous Neonatal Diarrhoea Associated with Escherichia Coli.

ANNEXURE-XIII

LIST OF PROJECTS MONITORED ON SITE DURING 2017-18

Sr. #	Project No. and Title	Name and Address of P.I
1.	Breeding for Impact Of Different Temperatures on Bt Cruciferous Crops and Development of Resistance to Insecticides in Plutella Xylostella PSF/NSLP/P-BZU (130)	Dr. Syed Muhammad Zaka Assistant Professor Department of Entomology Faculty of Agricultural Sciences & Technology, BZU, Multan
2.	Role of Nucleopolyhedrovirus in Management of Cotton Bollworm (Helicoverpa armigera Hubner PSF/NSLP/P-BZU(246)	Prof. Dr. Muhammad Ali Shah Director, Institute of Biotechnology Bahauddin Zakariya University, Multan
3.	Nutritional Profiling and Antioxidant Potential of Selected Vegetables Waste and its Utilization for the Production of Value Added Foods PSF/NSLP/P-BZU (394)	Dr. Saeed Akhtar Associate Professor Department of Food Sciences, BZU, Multan
4.	Formulation, Fabrication and Characterization of Self Assembling Bioreducible Chitosan Based Nanoparticles for Biomedical Applications PSF/NSLP/P-BZU (713)	Dr. Furqan Muhammad Iqbal Assistant Professor Department of Pharmacy Bahauddin Zakria University, Multan
5.	Evaluating the Potential of Zero Energy Cool Chambers (ZEEC) for Horticultural Crops PSF/NSLP/P-CIIT (664)	Dr. Samina Khalid Assistant Professor COMSATS Institute of Information Technology (CIIT) Vehari
6.	Synthsis and Characterization of Nano-ferrities for Thermoelectric Power Generation PSF/Res/P-IUB/Phys (189)	Dr. Muhammad Azhar Khan Assistant Professor, Department of Physics The Islamia University of Bahawalpur
7.	Detection and Innovative Management of Postharvest Disease Incursions in Citrus PSF/NSLP/P-US (382)	Dr. Zafar Iqbal Principal & Chairman Plant Pathology Department University College of Agriculture University of Sarghodha
8.	Developing Various Dimensions Of Indigenous Hydroponics System	Prof. Dr. Rai Niaz Ahmad Vice Chancellor, PMAS Arid Agriculture

	PSF/NSLP/P-UAAR (543)	University Rawalpindi.
9.	Development of Mechanically Reinforced Silica Based Bioactive Glass (SiO2 CaO-P2O5) Polymer Composites for Potential Application in Osteochondral Defect Site PSF/Res/P-CIIT/Chem (570)	Dr. Farasat Iqbal Assistant Professor Interdisciplinary Research Centre in Biomedical Materials (IRCBM) COMSATS Institute of Information Technology Lahore
10.	Label Free, non Invasive Biomimetic Sensor for Detecting Oral Cancer PSF/Res/P-CIIT/Med (477)	Dr. Usman Latif Assistant Professor IRCBM, COMSATS Institute of Information Technology Lahore
11.	Next Generation Granular Biomedical Ceramics for Rapid Bone Defect Repair PSF/Res/C-CIIT/Med(297)	Dr. Aqif Anwar Chaudhry Assistant Professor Interdisciplinary Research Center in Biomedical Materials COMSATS, Lahore
12.	Employing Chitinolytic Bacteria for Biological Control of Termites PSF/NSLP/P-PU (510)	Prof. Dr. Javed Iqbal Qazi Department of Zoology, University of the Punjab
13.	Insect Resistance Management by Vegetative Insecticidal Protein (VIP) Based Biopesticide PSF/NSLP/P-FCCU (655)	Dr. Deeba Noreen Baig Assistant Professor Biological Science Department FCCU, Lahore 0333-4308303
14.	The Development and Evaluation of Thermostable Vaccine against Peste des Petits Ruminants PSF/Res/ P-UVAS/Bio (544)	Prof. Dr. Tahir Yaqub Director Institute of Biochemistry and Biotechnology, UVAS Lahore 03006950418
15.	Development of Indigenous Technology to Produce High Energy from RDF Gasifier for Zero Waste PSF/ILP/P-PCSIR/Envr (083)	Dr. M. Khalid Iqbal Senior Scientific Officer CEPS, Pakistan Council of Scientific & Industrial Research, Lahore. 0334-4389356
16.	Development of Gluten Free Flour from Indegenous Sources and its Biological Evaluation on Celiec Patients” NSLP/P-PU (196)	Prof. Dr. Saeed Nagra, Professor, Institute of Chemistry, University of the Punjab, Lahore Dr. Samra Imran, Govt College of Home Economics, Lahore

ANNEXURE-XIV

LIST OF SCIENTIFIC PUBLICATIONS PRODUCED THROUGH NSLP SUPORTED COMPLETED PROJECTS DURING FN YEAR 2017-2018

Sr. No.	Project No	Publications
1.	PSF/NSLP/S-SAU(236)	Khanzada, A.M., R.N. Syed, M.A. Khanzada and A.M. Lodhi. 2017. Comparative effectiveness of entomopathogenic fungi against okra mealy bug *Phenacoccus solenopsis. Pak. J. Bot*.,
2.	PSF/NSLP/S-SAU(236)	Khanzada, M.A, Khanzada, A.M., Rajput, A.Q., Syed, R.N. and Lodhi, A.M. 2017. Control of okra mealy bug *Phenacoccus solenopsis*through fungal biocontrol agents.*Int. J. Agri. & Bio*.
3.	PSF/NSLP/P-NIAB(277)	N. Suleman, M. Hamed and A. Riaz. 2017. Feeding potential of the predatory ladybird beetle *Coccinella septempunctata* (Coleoptera; Coccinellidae) as affected by the hunger levels on natural host species. Journal of Phytopathology and Pest Management. 4(1): 38-47.
4.	PSF/NSLP/KP-AU(281)	Gul S, Khan MS, Ullah M, AhmadW, Shah SUA, Khushal M (2017)Physiological and biochemical assessment of sugarcane calli (cp 77/400) against various level of salinity stress. International Journal of Biology and Biotechnology. 14 (2): 179-185.
5.	PSF/NSLP/KP-AU(293)	Ibrar Hussain, Sarzamin Khan* ,Asad Sultan, Naila Chand, Rafiullah Khan, Waqas Alam, Naseer Ahmad. International Journal of Biosciences | IJB ISSN: 2220-6655 (Print) 2222-5234 (Online),http://www.innspub.net, Vol. 10, No. 4, p. 255-262, 2017, Department of Poultry Science, University of Agriculture, Peshawar, Pakistan. Key words: Broiler, Mealworm, Growth performance, Carcass yield, Antibody titer. http://dx.doi.org/10.12692/ijb/10.4.255-262 Article published on 2017

6.	PSF/NSLP/KP-AU(293)	Silkworm (Bombyx mori) Meal as Alternate Protein Ingredient in Broiler Finisher Ration. (Paper Attached), Manuscript ID (PJZ_MH20161018081018_Rafi-Ullah et al) List of Authors: Rafi Ullah1, Sarzamin Khan1,*, Abdul Hafeez1, Asad Sultan1, Nazir Ahmad Khan2, Naila Chand1 and Naseer Ahmad1, 1.Department of Poultry Science, The University of Agriculture, Peshawar, 25130, Pakistan, 2.Department of Animal Nutrition, The University of Agriculture, PJZ 0097-2017
7.	PSF/NSLP/P-UAAR(308)	Moaeen-ud-Din, M. and G. Bilal. 2017. Effects of breed, various environmental and maternal factors on growth traits in cattle. Journal of Animal & Plant Sciences, 27(5): 1415-1419. (Published available at www.thejaps.org.pk/docs/v-27-05/02.pdf)
8.	PSF/NSLP/P-US (382)	Innovative strategies for eco-friendly management of citrus blue mold disease caused by *Penicillium italicum* Whemer, Agriculture & Food 5:361-365. 2017
9.	PSF/NSLP/KP-AU(421)	Irshad, S., Zafar Iqbal, H.U. Shah and S. Hussain. 2017. Invtiro antagonistic activity of selected fungal species against wilt causing phytopathogens. *Sarhad Journal of Agriculture*.
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