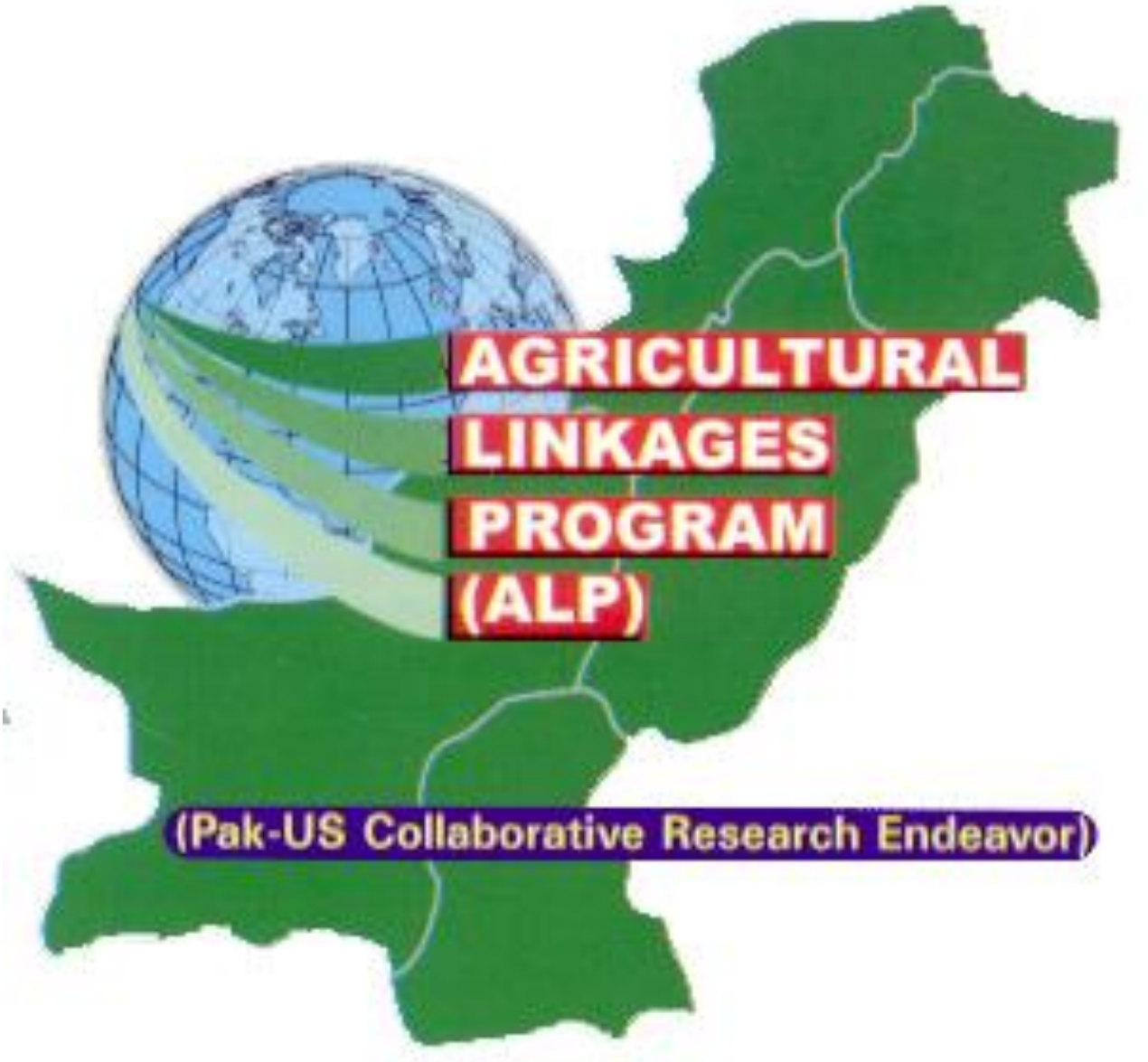
PROGRESS REPORT

ALP 1st Batch (2001-2002)
&
ALP 2nd Batch (2002-2003)



ALP SECRETARIATE, DIRECTORATE OF PLANNING
PAKISTAN AGRICULTURAL RESEARCH COUNCIL
ISLAMABAD

PROGRESS REPORT

AGRICULTURAL LINKAGES PROGRAM (ALP)

Compiled
By
Shujaat Yaqoob
Planning Officer (ALP)
(September 2003)

ALP SECRETARIATE, DIRECTORATE OF PLANNING
PAKISTAN AGRICULTURAL RESEARCH COUNCIL
ISLAMABAD

Table of Contents

EXECUTIVE SUMMERY

Agriculture has special significance for our country as it contributes one-fourth to GDP. It provides employment to approximately half of our total labor force and more than 70% population is directly or indirectly dependent on this sector. We face the challenge of ever-increasing population and depended upon food imports. God Almighty has made us not only self-sufficient but also capable of exporting surplus produce. Flow of funds from Government to PARC has been static for the last several years, although establishment expenditures have been increased constantly leaving very little for research activities. The lack of resources for the agricultural research will have a great setback in the times to come.

An Agricultural Linkages Program (ALP) was created form the sale proceeds of 200.000 M. tons of wheat valued US$ 23.222 million as a grants to Pakistan. The Government of Pakistan allowed PARC to establish an Agricultural Research Endowment Fund (AREF) where all proceeds raised from the sale of US wheat have been transferred. Fund received have been invested in government approved schemes/institutes. The income thus generated is being used for ALP activities/projects in line with the Pakistan's long term research/development goals for the agriculture sector. The goals focus on food security, poverty alleviation, and promoting broad based equitable and sustainable agriculture.

According to the decision of ECC an endowment fund for an amount of Rs.1300 million had to be created by the PARC. However, an amount of Rs.900 million has been received so far, invested in different Govt. schemes while an amount of Rs.400 million is still pending with MINFAL.

Since the creation of Agricultural Research Endowment Fund (AREF), PARC has launched two batches of Agricultural Linkages Program for funding research projects as detailed below:

ALP 1st Batch (2001-2002)

Preliminary proposals/concept papers were invited in December 2000, through press from the scientists of Pakistan for funding under ALP 1st batch (2001-2002). In response, 592 preliminary proposals were received from all over the country. The preliminary proposals were examined and evaluated by the Technical Divisions of PARC and 218 proposals were short-listed/recommended for invitation of detailed projects. The BOD of ALP finally approved 98 projects for funding.

ALP 2nd Batch (2002-2003)

Preliminary Proposals for funding under ALP 2nd batch (2002-2003) were invited on 28th July 2002, through press, web, and direct communication with major Agricultural Research Institutes and Universities.

In response to invitation, 642 preliminary proposals were received for funding under ALP 2nd batch (2002-2003). Out of these, 264 preliminary proposals were short-listed by the Technical Divisions of PARC for invitation detailed projects. These projects are in process of the approval by Technical Advisory Committee (TAC) and Board of Director (BOD) of ALP.

AGRICULTURAL LINKAGES PROGRAMME (ALP)

INTRODUCTION

The Government of Pakistan and Government of the United States of America had gone into an agreement on February 23, 1999 under which the United States has supplied 200,000 tons of wheat valued US $ 23.222 million as a grant to Pakistan to create an Agricultural Linkages Program. The covenant of the Agreement provides that the local currency generated through the sale proceeds of the wheat will be used by Pakistan Agricultural Research Council (PARC) to establish the ALP for promoting research cooperation between Pakistan and the USA in the areas of agricultural sciences. The Government of Pakistan allowed PARC to establish an Agricultural Research Endowment Fund (AREF) where all proceeds raised from the sale of US wheat have been transferred. Funds received have been invested in government approved schemes/institutes. The income thus generated is being used for ALP activities/projects in line with the Pakistan's long term research/development goals for the agriculture sector. The goals focus on food security, poverty alleviation, and promoting broad based equitable and sustainable agriculture.

The Fund provides for all the operational research and development expenditure including supplies and material and local travel for the research personnel to be deployed under the projects. Non-recurring expenditure on items of non-expendable equipment, capital goods, structures, and transport facilities having anticipated usefulness beyond fixed duration of each project will be purchased sparingly.

OBJECTIVE

The objective of the ALP is to promote and support agricultural research and development activities in accordance with the Pakistan's long term development goals and to promote long term scientific cooperation between Pakistan and the United States in agricultural sector.

FINANCIAL AND ACCOUNTING SYSTEM

The PARC financial, accounting and auditing system have been adopted for the implementation of ALP.

FINANCIAL STATUS

According to the decision of ECC an endowment fund for an amount of Rs.1300 million had to be created by the PARC. However, an amount of Rs.900 million has been received so far for the endowment fund while an amount of Rs.400 million is still receivable from the Directorate of Accounts, MINFAL. Efforts are being made to get the balance amount through MILFAL/ Ministry of Finance

ALP SECRETARIAT

The Planning Directorate of PARC will act as ALP Secretariat. Necessary manpower and logistic facilities will be drawn from within PARC resources and the necessary operational expenditure will be met out of ALP fund.

The Director Planning, PARC will be the Executive Director of ALP and will act as Administrative Officer (AO) of the Fund. The Executive Director will be responsible for the administration and operation of the Fund under the authority and powers assigned by BOD. The office of the Executive Director will be located at PARC.

INTERNATIONAL COLLABORATION

In order to internationized the program and to collaborate with the agricultural scientists all over the world, contacts have been made with the International agencies and foreign missions in Pakistan. They are being encouraged to participate in the program to under pin the sustainability of program.

An international ALP Workshop was also organized in collaboration with USDA on 24-26 April, 2001 at PARC Headquarters to internationalize the program and to identify the national agricultural research priorities.

The visits of Pakistani scientists to USA for the collaboration with the US scientists are being processed. So far three Pakistani scientists have visited USA to discuss different research issues of mutual interest.

ON-GOING RESEARCH PROJECTS

ALP 1st Batch (2001-2002)

ON-GOING RESEARCH PROJECTS

(1st Batch 2001-2002)

Preliminary proposals/concept papers were invited in December 2000, through press from the scientists of Pakistan for funding under ALP 1st batch (2001-2002). In response, 592 preliminary proposals were received from all over the country. The preliminary proposals were examined and evaluated by the Technical Divisions of PARC. Of 592, 218 proposals were short-listed/recommended for invitation of detailed projects as detailed below:

Discipline	Recommended	Not Recommended	Total
Crops Sciences	122	192	314
Natural Resources	28	97	125
Animal Sciences	47	67	114
Social Sciences	21	18	39
TOTAL	**218**	**374**	**592**

Out of 218 projects considered by the Technical Advisory Committee (TAC) in its meetings held on 24-25 October 2001 and 14.12.2002 recommended 98 projects for funding under ALP. The BOD of ALP finally approved these 98 projects in its meetings convened on 12.01.2002 and 06.02.2003, three projects could not be implemented due to one or the other reason and three projects are in process. (List at Annex.-I).

Presently 92 projects are ongoing. Following is the discipline and region-wise position of on-going projects:

Region	Discipline				Total
	AS	CS	NR	SS	
PARC/ NARC	5	18	3	1	**27**
Punjab	7	10	6	1	**24**
NWFP	2	10	4	1	**17**
Sindh	3	7	1	3	**14**
Balochistan	-	3	4	-	**7**
AJ & K	-	-	1	-	**1**
NGOs/ Others	-	2	-	-	**2**
Total	**17**	**50**	**19**	**6**	**92**

List showing the Title of projects, Names of PIs, location & cost of projects is at Annexure-I.

Review and Monitoring of On-going Projects:

Monitoring of on-going projects is a regular activity of the ALP secretariat. The implementation of sixty three (63) projects started with the releases of funds to these projects mostly during March/April 2002 after signing of the agreements between PARC and the heads of the host institutions. Six monthly technical and financial progress reports of on-going projects were processed for next release to the on-going projects.

Review meetings have been held in various groups, at PARC headquarters, to review the financial and physical progress of ALP funded projects. These meetings were presided over by the Chairman PARC and the CSOs In charge Technical Divisions of PARC. Main purpose of these meetings was to acquaint the higher management of PARC with the problems being faced by the P.Is and provide solution of the problems to facilitate the project implementation.

Financial Status of Projects:

During the financial year 2002-03, BOD approved 28 projects in addition to 70 projects already approved during the financial year 2001-2002. During the financial year 2002-03, the funds to the tune of Rs. 60.618 million stands released to 71 projects till 30.6.2003 as detailed below:

DISCIPLINE/ REGION-WISE RELEASES TO THE ALP APPROVED PROJECTS UPTO 2002-2003

(ALP 1st Batch 2001-2002)

(Rs in million)

Region	AS		CS		NR		SS		Total	
	Projects	Amount Released	Projects	Amount Released	Projects	Amount Released	Projects	Amount Released	Projects	Amount Released
NARC/ PARC	5	6.983	12	12.058	2	1.779	1	0.795	20	**21.615**
Punjab	6	3.841	10	8.174	4	3.122	1	0.738	21	**15.875**
NWFP	2	2.263	8	6.579	2	1.905	1	1.655	13	**12.402**
Sindh	3	2.929	4	1.949	-	-	3	2.392	10	**7.270**
Balochistan	-	-	3	1.111	3	1.815	-	-	6	**2.926**
AJK	-	-	-	-	1	0.530	-	-	1	**0.530**
TOTAL	**16**	**16.016**	**37**	**29.871**	**12**	**9.151**	**6**	**5.580**	**71**	**60.618**

Projects Evaluation:

Ongoing projects have been reviewed and evaluated through field visits by various teams comprising of the technical, planning, and financial representatives. Activities undertaken under each project were reviewed and suggestions for improvement were made to the P.Is. Difficulties faced by the P.Is during implementation of the projects were also discussed and guidelines for the solution of different problems were offered. Physical progress under most of the projects was found to be satisfactory. Achievements/progress made under each project relating to Animal Sciences, Crop Sciences, Natural Resources, and Social Sciences have been summarized in the next chapters.

ANIMAL SCIENCES

ALP Secretariat received 114 Preliminary Proposals for funding under ALP 1st Batch 2001-2002. Technical Divisions, PARC short-listed 47 preliminary proposals for the invitation of detailed projects and 67 proposals were not recommended. Finally 17 projects of Animal Sciences Sector were approved by BOD of ALP for funding as detailed below:

Region	Projects
PARC/ NARC	5
Punjab	7
NWFP	2
Sindh	3
Balochistan	-
AJ & K	-
NGO/ Others	-
Total	**17**

The projects located at Univ. of Vet. & Animal Sciences, Lahore has been started from 2nd April, 2003. The other projects has completed one year of their operation. The Chairman, BOD, ALP/PARC has reviewed the 1st year progress of the projects located at NARC, while the progress of other projects located outside Islamabad were reviewed/evaluated by the CSO/In charge, ASD. Mid year/review and evaluation of the projects has also been started. The activities of three projects located at Karachi and five at NARC have been visited by ASD and ALP Secretariat and reviewed. In addition the six monthly and annual technical progress reports of the projects have also been evaluated by ASD and have offered comments and suggestion to the PIs.

Brief summaries alongwith achievements of each project are given below:

Project Title: *Protection of Buffaloes against Brucellosis.*

Location: Animal Sciences Institute, NARC, Islamabad

Progress/Achievements:

Brucella abortus strain 19; a smooth strain with reduced virulence and a rough mutated strain RB-51 were procured from NVSL, Ames Iowa US and C.Z veteraneria, Spain respectively. These strains were characterized biochemically for confirmation and limited doses of vaccine from each strain were prepared following the method of Corbel and Macmillan (1966) and Stevems (1994). Vaccine prepared from *Brucella abortus* strain RB-51 was tested for immunogenic response in buffaloes of different age groups i.e. adults, heifers, and calves.

Two serological tests i.e. Indirect ELISA for the detection of antibodies against strain RB-51 and strain 19 was developed and standardized. Humoral immune response of 3 groups of animals was detected by an indirect ELISA. Animals in all groups showed non-significant difference in the mean antibody titres ranging from 0.513 to 0.780.

Project Title: *Ovarian Follicular Dynamics and Endocrine Activity in Postpartum Anoestrus Buffaloes.*

Location: Animal Sciences Institute, NARC, Islamabad

Progress/Achievements:

Ten experimental buffaloes were maintained on routine feeding regimen use at the Livestock Experiment station, ASI, NARC. Mineral analysis and proximate analysis of the feed ingredients to be use in experimental feeds are completed. Calcium, phosphorus, zinc, and manganese were estimated in cotton seed cake, wheat bran, maize, wheat straw, mott grass and desi bajra.

Estimation of crude protein, moisture percentage, dry matter, ether extract, total ash and aflatoxin was done in cotton seed cake, wheat straw, wheat bran, maize, mott grass and desi bajra. Ten blood serum samples of experimental and control group buffaloes were obtained and store at –20 ^{o}C for subsequent analysis of calcium, phosphorus, zinc and manganese. Prepared feed according to the NRC requirements has been fed to the experimental buffaloes for fifteen days before parturition.

Project Title: *Studies on the Prospect of Introducing American Channel Catfish (Ictalurus punctatus) in Pond Fish Culture System of Pakistan.*

Location: AFRI, NARC, Islamabad.

Progress/Achievements:

Construction of fish ponds and indoor facility for rearing Channels Cat Fish has been completed. Test bore has been successfully completed. Final bore, procurement of Ms Pipe (10 inch dia.) for casing and KSB submersible pump under process. Contact has been developed for procurement of Channel Cat Fish Fry Fingerling. Survey of local market has been conducted for the availability of fish feed ingredients.

Project Title: *Molecular Characterization of Pakistani Infectious Broncitis Virus Variants and Development Recombinant Vaccine.*

Location: ASI, NARC Islamabad

Progress/Achievements:

To investigate the seroprevalence of Infectious Bronchitis Virus (IVB), a total of 125 clinical samples were collected from different locations from the poultry suffering from respiratory tract infection. Out of this, 25 samples were processed for the isolation of IBV using cell culture and embryonated egg inoculation methodology. Three isolates of IBV have been isolated from these samples. Furthermore, 28 non-IBV vaccinated flocks were tested for the presence of antibodies against IBV and its variants in their blood. Out of this, 18 flocks have been identified with the history of respiratory tract infection, decline in egg production and damage to their quality. Some of the flocks also showed high titres against IBV variant of type D-274 and D-1466.

The initial investigation has revealed that the flocks non-vaccinated or vaccinated against IBV or its variants showed exposures to these viruses as well, indicating significance of IBV pathogenicity. This indicates that some distinct variants are prevalent in this country, which can not be controlled by using present vaccines against IBV.

Project Title: *Refinement of Multi-nutrient Urea-molasses Blocks Technology Through Research and Development.*

Location: ASI, NARC, Islamabad

Progress/Achievements:

Seven metabolic cages have been got prepared. Chemical etc. required for laboratory analysis were procured. Formalities for procurement of feeds completed. Four cows and four buffalo calves from LRS lot were selected and kept to maintenance feed.

Project Title: *Strategic Breeding of Red Sindhi Cattle (SBRSC.)*

Location: Tropical Agri. Research Center, Karachi

Progress/Achievements:

I Survey of Red Sindhi cattle production environment in Thatta, Hyderabad, Lasbella and Malir districts are in progress. Pedigree performance data of Red Sindhi herd at LES, Karachi has been computerized for last 20 years. Initially Thirty heifers were selected. A group of 25 heifer selected previously was maintained at LES. 5 Red Sindhi cattle have been purchased from Hyderabad and placed at LES, Karachi. Further search for purebred Red Sindhi animals is in progress. Two Liquid Nitrogen containers have been purchased to store the Red Sindhi germ plasm.

Project Title: *Preliminary Studies on the Efficacies of Locally Prepared Staphylococcus Aureus Vaccines in the Control of Mastitis in Dairy Buffaloes*.

Location: Dept. of Clinical Medicine and Surgery, Faculty of Veterinary Sciences, Uni. of Agri. Faisalabad

Progress/Achievements:

A total of 64 *Staphylococcus aureus* isolates were recovered from 100 clinically mastitis quarters of buffaloes. Serial passaging of the selected *S. aureus* isolate was done on blood agar plates. Oncentration of the vaccinal isolate for live and killed vaccines was adjusted spectrophotometrically. Safety testing of live attenuated as well as killed vaccines was conducted in experimental rabbits. Four *S. aureus* mastitis vaccines (live attenuated vaccine, plain bacterin, dextran sulphate adjuvant bacterin, and oil –adjuvant bacterin) were prepared. Evaluation of these vaccines in experimental animals has indicated that these are by and large safe and free of any significant untoward effect.

Project Title: *Implementation of NIR Techniques for Evaluation of Animal Feed.*

Location: Department of Livestock Management, NWFP Agricultural University, Peshawar

Progress/Achievements:

450 feed and fodders are collected and processed for further chemical and biological analysis. Some of these samples are analyzed for few parameters. The data will be used to develop local feed composition and will be available for farmers, extension workers feed traders, manufacturers, researchers and students.. Some of the laboratory facilities are updated for the required analysis. Some required equipments, chemicals, and glassware have already been purchased.

Project Title: *Farming of Mud Crab (Scylla Serrata) in the Coastal Earthen Ponds.*

Location: Center of Excellence in Marine Biology, Uni. of Karachi, Karachi

Progress/Achievements:

Three ponds have been constructed on a sandy patch at Sandspit backwater mangrove area, about 40 Km. away from the Karachi University campus. One grow out pond is about 1000 sq. m. and two rearing ponds are about 20 sq. m. in size. The depth of both the ponds is about 1m. The walls of the channel which connects the ponds were reinforced by block masonry. A channel of about 30 m. was dug to connect the ponds with the sea.

Two hundred crab seeds were stocked in December, 2002 and harvested in the last week of March 2003. Ponds were restocked in April 2003 and total of 987 crabs having an average weight of 89 gram/crab were put in the large pond whereas another batch of 100 crabs having an average weight of 94 grams/crab were stocked in the small pond. They are being fed with trash fish, mussels, shrimp waste and worms etc.

Twenty five to twenty eight crabs were sampled after about thirty days and their weight were recorded and dead crabs were removed whenever found. During first trial an average increase of 109 grams in crab's weight was observed after about three months of farming the mortality rate was found to be 31% which is not high.

Project Title: *Polyculture of Freshwater Prawn Macrobrachium Malcolmsonii with Indian Major and Chinese Carps at Farmers Ponds in Pakistan (Southern zone Agricultural Research Centre.*

Location: VPCI, SARC, Karachi,

Progress/Achievements:

Experimental and control ponds were stocked with fish and prawns at two places in lower Sindh and regular monitoring of growth and survival was observed and found satisfactory. Harvesting of prawns at one farm and prawn and fish at other farm has been accomplished.

The use of inputs in experimental and control ponds has been noted to determine economic feasibility of fish/prawn in polyculture system**.** The complete economic feasibility will be worked out at complete harvesting of ponds.

Project Title: ***Immunobiology and Immunoprophylaxix of Coccidiosis in Chickens.***

Location: Department of Parasitology, University of Agriculture, Faisalabad, Pakistan.

Progress/Achievements:

The overall occurrence of coccidiosis in broiler chicks was found to be 37.7 percent. *Eimeria tenella* (52%) was the most prevalent species followed by *Eimeria maxima* (38.5%) and *Eimeria acervulina* (4.5%). Maximum number of oocyst (developmental stage of the parasite) was recorded on day 9^{th} after infection that gradually decreases on day 10^{th} post infection. Disease was more severe in the chicks given maximum number of sporulated oocysts. Infection has affected the growth and development of lymphoid organs, which are responsible toward off a disease.

Humoral and cell medited immune response of coccidial infected and control chicks (Hubbard breed) and (Starbro breed) were assessed by Indirect haemagglutination (IHA) and Toe web swelling (TWS) tests. Experimental challenge of Chicks (Starboro breed) to produce clinical coccidiosis and immune comparison of infected and control groups. Preliminary results revealed that Hubbard breed chicks are relatively resistant to coccidial infection as compared to Starboro.

Project Title: ***Studies on Tilapia Culture through Controlled Breeding in Saline Areas.***

Location: Fisheries Research Farms, Dept. of Zoology and Fisheries, Uni. of Agri. Faisalabad

Progress/Achievements*:*

Different species of tilapia fish has been collected from the field and their breeding and culturing was done. Tilapia fry has been produced. Sex reversed Tilapia was produced which is under observation for determining the success of the method employed. Growth performance of male and female tilapia was determined mono-sex culture. Male tilapia showed faster growth rate. Experiment has been started in glass aquaria to check the effect of different salinity level on the growth of Tilapia.

Project Title: ***Hyper-Secretion of Xylanase &/or Cellulase by Chaetomium Thermophile for its Application in Poultry Feed Industry (National Institute for Biotechnology and Genetic Engineering.***

Location: NIBGE- P. O. Box 577, Jhang Road, Faisalabad

Progress/Achievements:

To achieve the goal of hyper-secretion of xylanase enzyme from C. thermopile, along with the use of traditional techniques, isolated the whole genomic DNA of Chaetomium thermophile with cold spermidine-sodium dodecyl sulphate buffer. This genome was made purified from the contaminating proteins and also from the RNA.

Project Title: *Efficient Utilization of Local Feed Recourses for Sustainable Increase in Livestock Production.*

Location: Animal Nutrition, N.W.F.P. Agri. Uni. Peshawar

Progress/Achievements:

Initially an exploratory survey of the two different agro-climatic project areas (Gadoon Amazai and Kohat District) was conducted to identify the species of fodder trees that were commonly used by local farmers for livestock feeding. A total of 90 farmers were interviewed and their experience and wisdom on the local use of native fodder trees were recorded. Seven species of fodder trees in Gadoon Amazai and eight species in Kohat district were identified as the most commonly used fodder source for ruminant livestock and these were selected for further investigation of their nutritive value.

There were great variation ($P< 0.001$) in the nutrient composition due to species but the difference due to sub-locations in both the project areas was not significant. Seasonal changes inconsistently affected the nutrients concentrations in *Grewia oppositifolia* leaves. Further research on mineral composition and in vitro digestibility is in progress.

Project Title: *Characterization of Tannins in Feeds and Forages of Pakistan and their Evaluation for Anthelmintic Activity.*

Location: Uni. of Agri. Faisalabad

Progress/Achievements:

- Preparatory work has so far been expedited.

Project Title: ***Molecular Characterization and Pathogenicity of Avian Adeno Viruses Causing HPS (University of Veterinary & Animal Sciences, Lahore)***

Location: Department of Microbiology, University of Veterinary and Animal Sciences, Lahore

Progress/Achievements:

The protocol for calculating LD_{50} is being standardized. The protocol for chicken embryo liver cell culture is being standardized for the propagation of AAdVs antigen. The antigen will be used for the development of screening ELISA. Comparison of various conventional antigen detection assays in progress.

CROPS SCIENCES

ALP Secretariat received 314 Preliminary Proposals for funding under ALP 1st Batch 2001-2002. The Technical Divisions, PARC short-listed 122 preliminary proposals for the invitation of detailed projects and 192 proposals were not recommended. Finally 50 projects of Crops Sciences Sector were approved by BOD of ALP for funding as detailed below:

Region	Projects
PARC/ NARC	18
Punjab	10
NWFP	10
Sindh	7
Balochistan	3
AJ & K	-
NGO/ Others	2
Total	**50**

Projects related to Crop Sciences Division of PARC have been reviewed and evaluated through field visits by various teams comprising of the technical, planning, and financial representatives. Activities undertaken under each project were reviewed and suggestions for improvement were made to the P.Is. Difficulties faced by the P.Is during implementation of the projects were also discussed and guidelines for the solution of different problems were offered. Physical progress under most of the projects was found to be satisfactory.

Brief summaries alongwith salient achievements of each project are given below:

Project Title: *Development of Canola Quality Mustard (Brassica Juncea L,) Genotypes.*

Location: NIFA, PAEC, Tarnab, Peshawar.

Progress/ Achievements:

Genetic variability in traits of economic importance was generated by exposing about 15,000 seed of three B. Juncea exotic lines to 1.2 and 1.4 k Gy gamma rays dose. Shuttle breeding program was initiated to accelerate/shorter the breeding cycle by raising the second generation (M2) in a year at HARS, Kaghan. Selection of 23 desirable plants could only be carried out due to severe lodging of most of the plots, M3 generation was planted at NIFA in Rabbi season (Oct.2002) to make the desired selection, Hybridization program was started and fresh crosses were made between canola type exotic Canadian line and local varieties for introgression of canola quality genes in adapted high yielding local verities. At maturity, seed from 560 successful crosses were harvested and bulked cross combination wise. The 23 putative mutants were analyzed for fatty

acid and total glucosinolates composition on NIRS system. It was observed that 9 of 23 selections have low erotic acid content and low total glucosinolates (double low).

Project Title: ***Development of High Yielding and Well Adaptive Indigenous Canola Hybrids.***

Location: NARC, Islamabad

Progress/ Achievements:

Different approaches were attempted to develop restorer lines for polima-CMS system. Initially, 2 promising restorer lines were crossed with 12 existing CMS lines and F1 seed from these crosses was harvested. These crosses will be soused to estimate their male fertility restoration capability in next generation. Other 6 newly developed restorer lines were also crossed with existing CMS lines and produced sufficient F1seed for further evaluation. In addition, eight new varieties/ lines from diverse origin/source were crossed with best restorer line "R-401" with an objective to transfer R-genes into productive genetic background. Thus fertile F1 plants will be backcrossed with their respective recurrent parents. All available germless was screened for fertility restorer gene. In this regard, 60 open pollinated varieties were successfully crossed with two vigorous CMS lines. It is expected that F1 generation will appear in two distinct classes I.e. male fertile and male sterile. It will help to classify our germplasm in two classes (Lines with restorer gene; lines without restorer gene).The existing 12 CMS lines (A line) and their respective B-lines were maintained successfully. In this regard, intensive crosses were made between maintainer lines and CMS lines. At the same time plants from B-Line were also self-pollinated to maintain genetic purity of maintainer lines.

Project Title: *Genetic Improvement of Brassica Oilseed By Integrative Use Of Conventional And Molecular Biological Approaches*

Location: NWFP Agricultural University, Peshawar

Progress/ Achievements:

This project is designed to improve the Brassica Oilseeds for insect resistance by identifying and transferring the genes associated with this trait among adopted and exotic germplasm through markers assisted inter and intra specific crosses. To achieve the objectives, 120 varieties belonging to Brassica napus, B.Juncea, B. compestris and B. carinata were planted at Kaghan research station in May, 2002 and were inter crossed to achieve 500 inter and intraspecific crosses. These crosses alongwith parents were harvested in October, 2002 and were planted in the field as well as in the pots at Peshawar in the same month. Crosses where seed setting was not achieved at Kaghan have been attempted again at Peshawar.

Project Title: *Integrated Pest Management of Aphids in Canola*

Location: University College of Agriculture, BZ University, Multan

Progress/ Achievements:

The present project was started to develop an IPM strategy for aphid management on canola by

combining host plant resistance, biological, cultural, and chemical control methods. The research was carried out a Multan and Bahawalpur. Two aphid species I.e. Brevicoryne brassicae L Lipaphis erysimi Kalt were predominant species on canola and Raya at both locations. Population of Brevicoryne brassicae. L was relatively more on both the crops at both locations. Among the predators Chrysoperla sp. was recorded at both locations at very early stage of the crop. Ladybird beetle appeared very late in the season. At Multan 31.41% aphids were found parasitized by an unidentified parasitoid (Probably Diaeretiella rapae (M, Intosch). Brassica napus varieties were also screened by recording aphid population in the field at Multan and Bahawalpur, Mean seasonal population of both cabbage aphid and mustard aphid was non-significantly different among the tested varieties of Brassica napus at both locations. Population of mustard aphid was non-significantly different among Brassica juncea varieties at Mjltan, whereas cabbage aphid population was found on UCD-636 (28.16 aphids/10cm inflorescence) and lowest on BRS-3 (9.6 aphids/10 cm of inflorescence).

Project Title: *Some Physiological Studies on Vegetative Growth Pattern and its Impact on Productivity and Malformation of Mango (Mangifera Indica L.)*

Location: University of Agriculture, Faisalabad.

Progress/ Achievements:

Two experiments i.e evaluation of intensity of malformation in CVS. Chaunsa, Alfanso and Anwar Ritual and effect of panicle pruning on induction of vegetative growth and its impact on malformation of mango CVS. Chaunsa, Alfanso, Anwar Rataul and Langra; have been conductive . As regard results heaviest malformation infestation was noted in cv. Chaunsa I.e 30 to 40% of the blooming panicles, which ranged 834-1230 per 35-year old tree. It followed Anwar Rataul where panicle malformation range was 14-23% and number of panicles emerged ranged between 426-772 per 10 ten-year-Old tree. In cv. Alfanso the malformation of panicles ranged from 10-15 percent and the total number of panicles emerged ranged between 371-691 per ten year old tree. As regards preliminary results of pruning of the panicles; it invigorated early lateral growth and particularly when the early pruning was done . The further studies of these flushes are underway to monitor their contribution towards vegetative growth and ultimately the share in bearing panicles of different types I.e healthy and malformed. Some more experiments were planned and started with the following titles. Effect of dose and type of fertilizer on vegetative and reproductive growth and malformation of inflorescence of mango. (cv. Chaunsa, Langra & Dusehri). Effect of split dose application of fertilizers on vegetative and reproductive growth and malformation of Mango (Langra & Dusehri). Effect of root and foliar applied fungicides and amendments on, declining mango trees and malformation.

Project Title: *Studies on Malformation of Mango*

Location: AARI, Faisalabad.

Progress/ Achievements:

Assessment of Mango Malformation in 40 orchards of 8 districts of the Punjab revealed that it has almost 100% prevalence in the orchards of Punjab. The examination of malformed parts of different varieties of mango revealed the association of five fungi. The fungus F.subglutinans appeared to be the most dominant fungus. Comparative study of healthy and malformed tissues exhibited much higher infection levels by F.subglutinans in malformed/symptomatic tissues as compared to healthy ones. Twenty isolates of F.subglutinans were identified. Nineteen were isolated from Punjab Province and one from Mardan (N.W.F.P.) Inoculations on young mango

seedlings to produce disease artificially have been done. Results awaited. DNA extraction of 20 isolates was done. Polymerase chain reaction (RCR) analysis has shown polymorphism bands. Relatedness and variability amongst isolates at DNA level is to be studied.

Project Title: *Integrated Management of Fruit Flies in Pakistan (NARC Component-I)*

Location: NARC, Islamabad

Progress/ Achievements:

In the present studies the combined application of MAT, bat, and crop hygiene was tried. The damages to mango fruits were reduced to 1% in orchards where this package was applied compared with 6% in orchards where only pesticides were applied and 12-25% in orchards where only MAT was applied and 35% where no control measures were applied at Multan. In guava the maximum infestation 3% was observed where package of MAT, BAT, and crop hygiene was applied compared with 20% damage where orchards where sprayed with pesticides six times and 80% where no control measures were applied at Sharaqpur. Parasitoids are being mass produced in laboratory for next year studies on their impact on augmentation in controlling fruit flies. Experiments are also being carried out to determine their density in different field conditions in summer and winter and devise methods to encourage their naturally occurring populations. Training to farmer's weal given at their farms on-application of BAT and crop hygiene for controlling fruit flies. Field days were held for a wariness of the farmers of coming challenges of fruit production in pesticides free environment and adoption of innovative methods of controlling fruit flies.

Project Title:: *Integrated Management Of Fruit Flies In Pakistan (CABI Biosciences Component-II).*

Location: CABI, Rawalpindi.

Progress/ Achievements:

Population studies of fruit fly, Bactrocera Zonate were conducted at five different locations. The flies population was very highduring the month of August, it decreased in September and less than one fly/trap was recorded in the month of December, 2002 at al the five locations. I.e; NIA Experimental Farm, Tando Jam and Habib Fruits Farm, Hyderabad; Nawazabad and Govt. Fruit Farms, Mirpurkhas; and Quaid-e-Awam Agriculture Research Institute, Larkana.

Project Title: *Integrated Management of Fruit Flies in Pakistan (NIFA Peshawar, Component-III)*

Location: NIFA, PAEC, Tarnab, Peshawar.

Progress/ Achievements:

Studies on integrated management of fruit flies were conducted in the target areas of Kohat and Haripur districts. The results revealed that at Kohat, in Umbrella orchard, using MAT, BAT, and cultural practices, caused reduction in mean pest population incidence, fruit infestation and damage 85.9%, 51.1%, respectively than the control. In biopesticide (Neem oil in 0.5% concentration) treated orchard, the corresponding reduction was recorded as 78%.8% and 79.8%, respectively. At Haripur, in umbrella orchard, the reduction in pest incidence, fruit infestation,

and damage was 73.3%, 66.3% and 68.3%, respectively as compared to control. In biopesticide treated orchard, it was in the order of 43.5%, 73.6% and 75.2% respectively. The relative abundance regarding fruit fly species showed that Bactrocera zonata was dominant 997.9%) at Khohat, while B. dorsally was found dominant (84.4%) at Haripur. Additionally, fruit fly parasitoids including Diachamimorpha longicaudata and trybliographa sp. Were recorded from infested fruits collected from Kohat and Haripur.six farmer training workshops were organized and 150 persons trained. About 300 lure baited traps were distributed in the target areas.

Project Title: *Integrated Management of Fruit Flies in Pakistan (Ari, D. I. Khan Component-IV)*

Location: Agricultural Research Institute, D. I. Khan.

Progress/ Achievements:

Diagnostic survey, Research trials on management tactics and population dynamic studies on fruit flies were carried out in melon fields and fruits orchards during the year 2002 at Dera Ismail Khan Division. An intensive survey of the project area was conducted to identify the fruit fly species involved and their extent of damage on Muskmelon, Guava, Mango, and Citrus. The results of the survey revealed that mean extent of damage in muskmelon fields ranged from 12 to 34% and in fruit orchards 8 to 22%. Fruits flies species infesting melon were found Myiopardalis pardalina, Bactrocera cucurbitae and B. Longistylus while B. zonat and B. dorsal is were dominant in mango, guava, and citrus orchards. Integration of Cultural Practices and spotted Bait Application in muskmelon fields gave minimum fruit flies infestation 6.6%) as compared to pesticide cover spray (7.3%) and untreated check)32.6%).Population dynamics studies were carried out in 3 orchards in the vicinity of D.I.Khan and 4 orchards at Paniala (60) km south to D.I.Khan). Plastic traps impregnated with lure a poisons have been installed in each orchard and the flies captured are being documented at weekly interval. This is an ongoing study and will continue round the year.

Project Title: *Integrated Management of Fruit Flies in Pakistan (NIA Tandojam, Component-V)*

Location: NIA, PAEC, Tandojam.

Progress/ Achievements:

Population studies of fruit fly, Bactrocera zonata were conducted at five different locations. The flies population was very high during the month of August, it decreased in September and less than one fly/trap was recorded in the month of December, 2002 at all the five locations, I.e; NIA Experimental Farms, Mirpur khas; and Quaid-e-Awam Agriculture Research Institute, Larkana.

Project Title *Mass Scale Production Of Disease Free True-To-Type Peach Rootsock (Gf677) Plantlets through Tissue Culture For Productivity Enhancement/Economic Self Reliance.*

Location: NARC, Islamabad

Progress/ Achievements:

Explants sterilization was done with various concentrations of NaOC1 (0.25, 0.5, 0.75, 1.0, 1.25 % w/v) to find out the optimum dose for minimum in votro infestation. The best treatment was

0.25% NaOCI, where minimum necrosis (5%) and maximum survival (55%) was achieved. For shoot proliferation study, MS (a high salt medium) and AND (a low salt medium) media were compared with different BAP concentrations 90.3, 06, 0.9 mg 1-1). Data were recorded on shoot proliferation rate; total number of shoots per proliferating explanted and number of shoot more than 2.0 cm in length per proliferating explanted after 4 weeks. From the combined results of different parameters, it was concluded that, of the two media tested, MS was the best for the multiplication of peach rootstock GF 677. BAP showed a strong interaction with the salts of culture media (MS & AND). In both media (MS & AND), 0.6 mg 1-1 BAP was the most affective concentration but the response was dependent on salts concentration of culture media (MS & AND).Of the different concentrations of IBA tested, 3.0 mg 1-1 IBA (T3) were suitable, resulting in 73.33 % root initiation, 5.86 number of roots per rooted explanted and 3.13 number of roots more than 1.5 cm in length per rooted explanted. Acclimatization of rooted plants is in progress in the greenhouse successfully for further shifting in the field.

Project Title: *Resource Conservation Technology for Rice-Wheat System in CRBC Command Areas.*

Location: Gomal University, D.I Khan.

Progress/ Achievements:

The use of resource conservation technology in rice- wheat system not only sustains the productivity of cereal crops but also improves farm income as well as farmers prosperity. Sowing of paddy rice through new techniques boosted up the yield as well as the net income to the farming community compared to the conventional methods. The later involved the high cost of labor, land preparation and also the irrigation water. On the other hand, direct seeding of rice saves the precious time, costly labor as well as the water usage by the crop. It enhances the plant population; better nutrients use efficiency and grain yield.

Project Title: *Post Harvest Research on Perishable Fruits (Guava, Peach) and Vegetables (Tomatoes) in NWFP.*

Location: ARI, Tarnab, Peshawar.

Progress/ Achievements:

Economic Survey n "Post Harvest Losses in Tomato in Peshawar Valley" has been completed. Experiment on the "Effect of Grading, Packing Material and Cold Storage Behavior on the Shelf Life on Tomato" has been performed. Economic Survey on "Post Harvest Losses in Guava in District Kohat" has been conducted. Experiment on the "Effect of Grading, Packing Material and Cold Storage Behavior on the Shelf Life of Guava" is in progress. Literature has been reviewed for economic survey on "Post Harvest Losses in Peaches in Swat" and questionnaire has been developed and pre-tested in the area. Experiment on the "Effect of Grading, Packing Material and Cold Storage Behavior on the Shelf Life of Peaches" has been conducted.

Project Title: *Morphological and Biochemical Variability of the Genus Trichogramma (Hymenoptera: Trichogrammatidae) in Pakistan.*

Location: CABI, Rawalpindi.

Progress/ Achievements:

It has been observed by an Evaluation team that the progress made under the project has not been satisfactory. Hence it is recommended that the project activities may be discontinued. A working paper for consideration by Board of Directors of ALP has been prepared for the purpose.

Project Title: *To Develop Drought Resistant Wheat (Triticum Aestivum L.) Genotypes under Water Stress Condition.*

Location: NIA, PAEC , Tandojam.

Progress/ Achievements:

It was observed that about thirty one genotypes out of hundred have shown more than 60% germination at 0.75 and -1.0 Mpa PEG-6000 stress treatments. Growth reduction was observed in all wheat genotypes crcep these thirty one. The reduction in crop growth is a primary effect of every stress in a growth medium, which may be due to different metabolic disturbances in the plant system. With the encouraging results of some wheat genotypes in the present experiment, 52 wheat genotypes/lines at the experimental farms, NIA, Tandojam. Stress conditions (drought) have been applied to these plants at both places to see their performance sin growth upto maturity.

Project Title: *Exploitation of Forage Legume Diversity Endemic to Salt Range in the Punjab*.

Location: University of Agriculture, Faisalabad.

Progress/ Achievements:

Survey of Soon Valley, District Khushab, in Punjab Province of Pakistan was conducted to explore the legume diversity endemic to it. Five sites keeping in view the topography, soil type, nature of prevailing disturbances, if any, and other related ecological attributes. In addition to legumes, the commonly occurring non-leguminous woody species Acacia modesta was examined the most commonly found species at almost all the study sites. At Sodhi and Knotty garden sites Acacia fernesiana also occurreed very commonly and in some habitats it formed mono-species stands. At Khabeki and Sodhi sites Dalbergia sissoo also existed commonly in some habitats but it was mostly confined to wet places and along theroadside as natural as well as cultivated plantation. Among the herbaceous legumes Medicago denticulate, and Melilotus indica, were commonly foundat all the study sites except the Anga site but during winter season only. The analysis of the pods and leaves of leguminous plants collected from the Soon Valley revealed higher fat content in the leaves and pods of Acacia modesta. Greater energy per unit weight was recorded in the leaves of Acacia nilotica and more protein contents in the legumes of Dalbergia sissoo than those examined in the respective plant organs of other leguminous plants.

Project Title: *Propagation of Sparsely Seeded/Seedless Kinnow Mandarin Using Cell and Tissue Culture Techniques.*

Location: NIAB, PAEC, Faisalabad.

Progress/ Achievements:

Embryos having seedless trait were recognized with their new emerging leaves and were grafted onto rootstock seedlings. The shoot apical meristem were also grafted. The abscission trait expression in seedless strains is in stress of harsh temperature, or upon grafting itself. Seedless trait is often associated with fruit drop and upto 80% seedless clones have leaf drop problem, which were screened out as useless and removed. Six hundred strains were transferred to field in October to November, 2002, of which 5% clones died because of harsh winter temperature till 2nd week of January, 2003.

Project Title: *Adaptation and Commercialization of Throw-In-Type Rice Thresher*

Location: NARC, Islamabad

Progress/ Achievements:

One unit of Throw-in-Type Rice Thresher was imported assembled and commissioned for operation at FMI. Preliminary/Initial testing was done at RRI, Kala shah Kaku and formal testing was conducted at RRI, Dokri, Sind. Data of field performance under the local conditions was recorded which is being analyzed for proper documentation. Following modifications have been identified: Redesigning of drive system for recycling auger. Redesigning for clutch system for power engagement. These modifications will be incorporated before coming season and thresher will be tested for further adoption.Local Manufacturing of Rice Thresher: M/S Mughal Engineering Industries, Larkana, has been assisted in lcoal manufacturing of thresher as per farmers demand. First locally manufactured thresher was demonstrated to the farmers after initial testing who showed full satisfaction with its performance. Initially, a batch of eight units was purchased and used by the farmers within the season. Other local agricultural machinery manufacturers were also introduced with the thresher working. Two other manufacturers have also started manufacturing of the Rice Thresher within season. They manufactured only one unit each for testing during the season. Technical assistance will be provided to the potential manufactures after signing proper agreement as per PARC Agric. Business policy.

Project Title: *Development and Commercialization of Mobile Seed Processing Unit.*

Location: NARC, Islamabad

Progress/ Achievements:

Assessment survey of potential manufacturers revealed that technical know-how exists in the country in manufacturing similar products like manufacturing wheat threshers and rice processing machinery. However, manufacturers lack the knowledge for manufacturing precision seed processing machinery. A manufacturer copied an imported unit of seed cleaner, but could not manufacture a reliable and a precision machine. Design parameters defined are: I) terminal velocity 8 m/sec in aspirator chamber has been determined.(ii) Sieve sizes of different Crops have been determined.(iii) Seed/gram of wheat & mung has been determined. (iv)CFM (cubic feet/meter) for 8 m/sec air velocity in the aspirator chamber has been determined. A test report of an imported seed cleaner has been prepared and results are given in the closed that the imported as well as locally made seed cleaners do not clean seed up to an extent to meet the quality standard; seed cleaning effectiveness is low (85%) and do not separate oats, and barley from wheat seed. Hence, these designs of seed cleaner could not be

Adopted as such for quality seed cleaning and should not be recommended to farmers to clean their seed.

Project Title: *Development of Energy Efficient Wheat Thresher.*

Location: NARC, Islamabad

Progress/ Achievements:

The results from this rather limited study of one season have suggested that though the output of Indian wheat thresher is low as compared to United Wheat thresher but Indian thresher on an average consumed 45% less fuel per hour as compared to united thresher. Whereas. Indian thresher, on an average, used 10% less fuel per tone of output as compared to local thresher. The power requirement of the threshers cannot be measured because of non-procurement of instrumentation. Therefore, further investigation is deemed necessary, after procurement of instrumentation, to conform the results obtained in this one season.

Project Title: *Iron Fortification of Wheat Flour in Pakistan: A Step that Needs Critical Evaluation.*

Location: University of Balochistan, Quetta

Progress/ Achievements:

Collection and analysis of wheat flour and whole wheat Atta for bioavailability iron. A good number of samples are already analyzed and the others are in a process of analysis and collection. Method for analysis of iron, phytate phytase is established. Blood samples and stool samples collection is already initiated to determine the level of anemia and the presence on overall the parasites and their cysts in the stool of children. Side by side the analysis of water samples is also initiated as proposed in the objectives

Project Title: *Studies on Viral Diseases of Major Pulse Crops and Identification of Resistant Sources.*

Location: NARC, Islamabad

Progress/ Achievements:

In case of mung, mash and lentil more than 600 germplasm accessions (exotic and local) were evaluated both under greenhouse and field conditions at different locations in Punjab. A number of lines resistant to MYMV, ULCV and PSbMV have been identified. ULCV has been detected from mash seed-lots collected from different markets. The virus diseases at research station are more serious than farmer's fields. Molecular characterization of MYMV and development of diagnostic tests based on molecular basis has been started in cooperation with NIBGE and AVRDC, Taiwan. Some preliminary results have been achieved and a Cdna probe has been developed for diagnosis of MYMV.

Project Title: *Management of Parasitic Weeds in Rapseseed, Onion and Legume Crops in NWFP.*

Location: NWFP Agricultural University.

Progress/ Achievements:

A total of 14 species of Or-banache and 15 Cuscuta were found as parasites on different weeds

and crops. Four (4) experiments have been planned in Swat/Dir; Karak and D.I.Khan on management of parasitic weeds in Brasica/Canola, Onion, and Gram/Chikpea. Five students were given support to work on their review and special problem as a part of their B.Sc (Hons) requirements and they worked on 8 different topics related to the parasitic weeds.

Project Title *Investigation of Mechanism for Weed Seed Dormancy in Rice Based Cropping System.*

Location: NWFP Agricultural University, Peshawar

Progress/ Achievements:

Soil samples were collected from the rice based cropping system of Paksitan. Similarly seeds of the predominant weed species of wheat were collected from the project area. The samples from the soil seed bank were subjected to germination over different periods and it was observed that seed load in the different farms was variable. The maximum number of seeds germinated from the top 0-10 cm layer of the soil. The different species seeds when germinated in lab; revealed that the behavior of the species was different. Some of the species like lambs quarters, fumitory, and curly dock could not be germinated altogether showing their 100% dormancy whereas the germination response was prompt in the canary grass and meadow peavine. Interesting results were achieved from the Zero Tillage Trial. Further investigations are successfully underway. Two students were given support to work on their review and special problem as a part of their B.Sc. (Hons) requirements and they worked on the dormancy behaviors in weeds.

Project Title: *Collection, Conservation, Evaluation, and Documentation of Horticultural Crop Germplasm and its Wild Relatives.*

Location: NARC, Islamabad

Progress/ Achievements:

Keeping in view the objectives, project was started from July, 2002. First priority was given to the survey and collection of local germplasm from various areas of Pakistan. During first phase of its collection, exploration missions were conducted in NWFP and Northern Areas of Pakistan from December, 2002 to January, 2003. In total, 73 accessions of Vitis vinifera and Vitis jacquemontii were collected, each accession having at least 5-8 cuttings. Accordingly bud-woods of these cuttings were raised in February, 2003 for further transplantation in the field and for the establishment of clonal repository/field genebank at NARC. The preliminary characterization of grapes plant is under progress in accordance with IPGRI descriptor.

Project Title: *In Vitro Conservation and Crypreservation of Plant Germplasm of Vegetatively Propagated Crops.*

Location: NARC, Islamabad

Progress/ Achievements:

Germplasm of grapes and peaches was collected locally from NWFP through expedition and

exotic valuable germplasm material was also acquired from Japan by special request. The material was either treated for root induction or grafted on selected rootstock in collaboration with the scientists from HRP. The germplasm has been successfully rooted and the rest of the germplasm has been successfully grafted on selected rootstock. They are being maintained in PGRP and HRP experimental fields and being looked after to subsequently serve as the mother plants for explant source. These materials will be utilized for in vitro culture establishment. Two research papers were published in the proceedings of the seminar on "Sustainable Utilization of Plant Genetic Resources for Agricultural Production.

Project Title: *Acquisition, Screening, and Utilization of Peas Germplasm for Development of Superior Cultivars.*

Location: NARC, Islamabad

Progress/ Achievements:

Since the start of project, first priority was given to collection and acquisition of peas germplasm from Pakistan and abroad. Initially gene bank of Plant Genetic Resources Programme maintained 102 accessions of pea and out of these 88 were viable. One hundred and two accessions of diverse origin were introduced from ICARDA Genetic Resources Unit. These accessions along with local germplasm were planted in the field during October, 2002 for evaluation. Ninety Nine accessions including wild types, landraces and advanced cultivars, were acquired from 40 countries during report period. These accessions were planted under field conditions for evaluation during November, 2002. These accessions were also sown in the greenhouse for screening against powdery mildew. In order to collect local germplasm from Pakistan, exploration missions were conducted in Punjab, NWFP, and AJK. In total 58 accessions were collected, 41 from Punjab, 11 from NWFP, 2 from AJK and 3 from Northern Areas. These accessions will be evaluated next year. Selected accessions (10303,10567,10478,10628, 10609, 10604 and 10634) along with other germplasm were given to Vegetable Programme for evaluation and selection of superior cultivars.

Project Title: *Study on Genetic Variation In Xanthomonas Campestris Pv. Oryzae in Relation to Resistance in Rice.*

Location: NARC, Islamabad

Progress/ Achievements:

Bacterial blight of rice incidence and severity was monitored in Punjab, Sindh, Balochistan, NWFP and Azad Jammu Kashmir. In Punjab the incidence (%) of bacterial blight ranges from 15-100, 10-70,10-90,15-65,0.100,30-80,45,50-70 and 40-50 in Sargodha. Hafizabad, Sheikhupura, Sialkot, Norowal, Gujranwala, Gujrat, Lahore, Kasur and Okara respectively and severity ranges from 1-7, 1-5, 1-5, -3, 0-5, 0-9,3,3,3, 3-5 in Sargodha, Hafizabad, Sheikhupura, Sialkot, Norowal, Gujranwala , Gujrat, Lahore, Kasur and Okara respectively I. In Sindh the incidence (5) was 0,0-5,5,0-5, 0-5 and 0-5 in Larkana, Shikarpur Dadu, Nawab Shah, Thatta, Badin and Jacob Abad respectively and severity was 0.0-1-1, 1,-,1,0-1 and 1 in Larkana, Shikarpur, Dadu, Nawab Shah, Thatta, Badin and Jacob Abad respectively. In NWFP the incidence (%) range was 0-95, 0.-100, 0 and 0 in Lower Dir, Swat, Malakand Agency and mansehra respectively whereas severity ranges from 0-5, 0-7 and 0 in Lower Dir, Swat, Malakand Agency and Mansehra respectively. In Balochistan (Usta Muhammad) the incidence (%) range was 0-5 while in Azad Jammue Kashmir, no disease was observed. The causal agent of bacterial blight of rice was confirmed through biochemical, physiological, hypersensitive reaction, and pathogen city.

Project Title *Investigation of Role of Germin-Like Proteins (Glps) During Germination/Early Development by Construction of Rice Plants Engineered for Sense and Anti-Sense Expression of Rice GLP.*

Location: University of Arid Agriculture, Rawalpindi

Progress/ Achievements:

Amplification of Glp gene & insertion in cloning vector. Genomic DNA preparation; Primer Design for target gene; Successful PCR based amplification of target gene (Glp gene); Cloning of Glp-gene in plasmid; and Transformation of recombinant plasmid in E-Coli. kPreparation of Glp gene construct for plant transformation: PCAMBIA plasid obtained; Transfomations of pCAMBIA. E.Coli; and Extraction of gene fragment from cloned Glp-gene construct. Standardization of plant transformation protecols: Callus induction; Regeneration; genotype selection; and Antibiotic sensitivity.

Project Title: *Molecular Breeding of Kabuli Chickpea for Ascochyta Blight Resistance and High Yield Potential*

Location: NARC, Islamabad

Progress/ Achievements:

The first year activity of the project included evaluation of Kabuli chickpea germplasm for blight resistance and for economically important traits. In addition, the single plant progenies selected from last year segregating populations were evaluated under field condition for yield traits. In order to identify PCR based (RAPID) makers linked with blight resistance. Hybridization was performed between selected parents with extreme levels of resistance and susceptibility for the development of random inbred lines (RILS). The results of germplasm evaluation study revealed significant differences for blight resistance and yield components. These differences provided scope for the selection of suitable genotypes for exploitation to achieve the objectives. The relationship analysis between yield components revealed positive association of pod number, fruit bearing branches, and total biological yield with total grain yield. This information shows that such traits when available in different lines may be put together for yield enhancement through hybridization. Five genotypes with desired traits were selected for direct and indirect utilization. The blight score of 85 Kabuli genotypes studied for this purpose ranged from 3-8 Nineteen lines with blight score 3 (that indicates resistance reaction) were identified. The segregating populations for hybrids Dasht x Pb1, Balkasar x Pb1 x ILC 482, Pb1 x Balkasar, Pb1x Dasht, ICCV2x Dasht and ICCV2 x Dasht have been advanced to F3 generation.

Project Title: *Increasing Production of Kabuli Chickpea for its Import Substitution.*

Location: AARI, Faisalabad.
Progress/ Achievements:

Procurement of Machinery and Equipment has been made. Contact with PARC, ICRISAT, and ICARDA for acquisition of Germplasm were made and in response to these 206 accessions were received from PARC AND icrisat. These 206 new and 129 existing accessions have been sown during November, 2002 for evaluation. Crossing material (comprising of 12 cross combinations) for creation of variability has been sown . The crop is in progress and results will be incorporated

upon harvesting. The possible crosses will be made at the flowering time to incorporate the resistant blood in the high yielding local varieties. Furthermore, the new combinations will also be made for the evaluation of resistant varieties. In rice based areas (Distts. Sialkot, Norowal, Hafizabad, Gujrat, and Gujranwala) 14 demonstration trials at farmers fields and research farm were sown whereas, 15 demonstration plots intercropped in Sugarcane have also been sown.

NATURAL RESOURCES

ALP Secretariat received 125 Preliminary Proposals for funding under ALP 1st Batch 2001-2002. The Technical Divisions, PARC short-listed 28 preliminary proposals for the invitation of detailed projects and 79 proposals were not recommended. Finally 19 projects of Natural Resources Sector were approved by BOD of ALP for funding as detailed below:

Region	Projects
PARC/ NARC	3
Punjab	6
NWFP	4
Sindh	1
Balochistan	4
AJ & K	1
NGO/ Others	-
Total	**19**

The 3 projects located at NARC and Rawalpindi has been reviewed by the Chairman, BOD of ALP/PARC while the projects located at outstation were reviewed by CSO/In charge, NRD. The two projects located at AZRC, Quetta were physically monitored by the NRD and ALP Secretariat. The six monthly and annual technical progress reports were evaluated by NARD and offered their comments to the concerned projects.

Brief summaries alongwith salient achievements of each project are given below:

Project Title: *Diagnosis and Remedial Measures of Micro-nutrient Deficiencies in Fruit Plants of Economic Importance in Pakistan-Umbrella Project (AARI-Faisalabad Component-I).*

Location: Soil Chemistry Section, Ayub Agricultural Research Institute, Jhang Road, Faisalabad.

Progress/Achievements:

Collected 1218 soil (from 609 locations) and 500 plant samples of citrus and mango orchards from Sargodha and Multan districts during March to December, 2002 and 1208 soil and 494 samples of citrus and mango collected from citrus and mango orchards at Sargodha and Multan districts. The samples are analyzed and were found that only Zn is deficient in soil as well as in plants in both orchards.

Project Title: *Diagnosis and Remedial Measures of Micro-nutrient Deficiencies in Fruit Plants of Economic Importance in Pakistan-Umbrella Project (AARI-Faisalabad Component-I)*

Location: Agri. Research Instt., Sariab, Quetta

Progress/Achievements:

Work initiated to carry out soil sampling in apple growing districts of Balochistan.

Project Title: *Assessment of Nutritional Potential and Performance of Range Species in Balochistan.*

Location: Arid Zone Research Center, Brewery Road, Quetta

Progress/Achievements:

Study on seasonal variation in chemical composition of native range species started during spring 2002 at Hazarganji Chilton National Park, Quetta, Wali Thangi, Central Zarghoon State Forest and Tomagh (Loralai). Samples of 23 range species were collected at different growth stages for detailed chemical analysis and are under study. Study on seasonal variation in biomass and nutrition of *Chrysopogon aucheri* and *Cymbopogon jawarancusa* in highland Balochistan was started during Spring 2001. Chemical analysis is under progress at AZRC. Data on seasonal variation in biomass production and nutritional characteristics of *Salsola vermiculata* were collected during 2002 and 2003. Adaptability and growth of *Haloxylon persicum* is under study. Seeds of various native species of grasses, shrubs and tress were collected from protected ranges in Quetta, Ziarat and Loralai and raised in nursery at AZRD. In order to check the performance of native and exotic range species under different ecological zones, experiments were conducted in Quetta, Tomagh (Loralai) and Nushki areas.

Project Title: *Optimal Tillage Practices for Wheat-Fallow and Chickpea- Fallow Rotations in Southern NWFP.*

Location: Deptt of Water Management, NWFP Agri. University, Peshawar

Progress/Achievements:

Five tillage treatments, No Till (NT), Chisel plough twice and tine type cultivator once (CPTC2), Disc Harrow twice and Tine type cultivator twice ((DHTC2), Mould board plough once and Tine type cultivator once (MBTC2) and Tine type cultivator three time (TC3) are being used at Karak under sandy loam soil. At D. I. Khan, under silty clay soil condition in Rod kohi area tillage experiments are being conducted with Disc Harrow and Tine type cultivator three times (DHTC3), Disc plough and Tine type cultivator three times (DPTC3), Chisel plough and Tine type cultivator three times (CPTC3), Mold board plough once and Tine type cultivator four times (TC4) and Mold board plough and Tine type cultivator three times (MBTC3). Data related to yield and yield components of wheat and chickpea were collected during the cropping season 2002-03.

At Karak site, maximum wheat yield (4012.3 kg/ha) was obtained from MBTC2 treatment. However, the tillage effect on gram yields under sandy loam soil condition was not that greater as observed in the wheat. No tillage produced good yield of gram as compared to the other tillage treatments at Karak. At D.I. Khan, disc plough relatively produced better yield as compared to the other tillage treatment. In general, tillage improved the infiltration rate, reduced the bulk density and soil strength.

Overall the mold board treatment performed better under sandy loam condition at Karak and Disc plough under clay type soil as compared to other treatments in case of wheat.

Project Title: *Soil Fertility Monitoring and Management in Cotton-Wheat System Productivity-Umbrella Project (NARC Component-I) (LRRP, INRES, NARC)*

Location: LRRI, NARC, Islamabad.

Progress/Achievements:

Conducted medium term field experiments at 4 sites on major soil series in the cotton –wheat system at Sikandarabad,(Tehsil Shujabad), Qadirpur (Tehsil Multan), Dunyapur (District Multan), and Lodhran (Tehsil Lodhran).
Cotton was sown in June2002 at the selected locations, on a permanent experimental layout. Soil and cotton plant tissue samples were collected. Agronomic data (i.e. No. of bolls/plant, boll weight, plant population etc) and yield were recorded. Soil samples, after cotton harvest, were collected from each plot. Soil and plant samples collected were also were analyzed.
There was significant increase in number of bolls/plant (10-28%) and boll weight (7-12%).Balanced and integrated nutrient management increased the seed cotton yield over farmers' fertilizer use practice, at all sites. Yield increase varied from 15to 23%. On average crop yield was slightly higher in raised bed sowing as compared to flat sowing.

Project Title: *Soil Fertility Monitoring and Management for Sustaining Cropping System Productivity-Umbrella Project (AJK Component-II) (Department of Agriculture, Gojra, Muzaffarabad, AJ&K)*

Location: Deptt. of Agri., Gojra, Muzafarabad, AJ&K

Progress/Achievements:

The activities included comprehensive and systematic evaluation of the nutritional status of soil and crops in Muzaffarabad, Kotli and Mirpur districts. Plant tissue samples and associated soils samples were collected during study for analysis. Maize leaf samples and associated soil samples collected at two depths from 200 locations in Muzaffarabad and Kotli were analyzed. For nutrient indexing in wheat crop, leaf samples and associated soil samples from 187 locations in Kotli and Mirpur districts collected and analysis work is in progress.
Deficiencies of macro as well as micro nutrients have been found in most of the areas. Crop management data has shown that very little fertilizer is being used and even the farmers that are using fertilizer are not familiar with the nutrients they are adding.

Project Title: *Soil Fertility Monitoring and Management for Sustaining Cropping System Productivity-Umbrella Project (AZRC, Quetta Component III)*

Location: AZRC, Quetta

Progress/Achievements:

The identified target area Jahalwani, Tehsil Rarkhan is an ideal and representative area of the dry land farming system of upland Balochistan. Farmer's problems have been identified applying PRA approach. The documentation of the PRA information is under process. Soil information including soil series, texture and other physical characters of the target area are identified. Soil fertility experiments for monitoring and management have been planted and harvested successfully. Soil sampling carried out for moisture and fertility status.

Project Title: *Soil Fertility Monitoring and Management in Rice-Wheat System Productivity-Umbrella Project (NARC Component-IV).*

Location: INRES, NARC, Islamabad.

Progress/Achievements:

Rice plant tissue and associated surface soils were collected from rice-wheat area of Punjab and analyzed for macro and micro nutrients. All the soils were alkaline in nature and slightly calcareous. Only 10% soil contained adequate organic matter, while all other are in low and medium range of organic matter content. Among macronutrients, nitrogen was deficient in 100% surface and sub-surface soils, 65% surface and 61% subsurface soils were deficient in phosphorus. Potassium deficiency was observed only in 15% soil. Zinc was the only nutrient that was deficient in the rice-wheat area while the copper, Iron and manganese were adequate.
Plat analysis data also showed deficiency of N, P and Zn. Soil analysis have good correlation with plant shoot analysis. This indicated widespread deficiencies of N, P and Zn, these are among the major causes of low yield of rice and wheat.

Project Title: *Recycling of Organic Wastes for Sustainable Crop Productivity-Umbrella Project (UAF Component-I)*

Location: Soil Sciences Deptt, University of Agric. Faisalabad

Progress/Achievements:

Effective microorganisms (EM) were isolated by using appropriate enrichment procedure for the accelerated composting. Laboratory screening under gnotobiotic conditions was carried out to select effective plant growth promoting rhizobacteria (PGPR) to be used to inoculate the composting for preparation of bio fertilizer. The locally fabricated set up including crusher, drier, chopper and fermenter/composter was installed and made functional.
Organic waste (mainly fruit and vegetable waste material) was collected from various sources and processed for composting by using the locally fabricated set up.
Nutritionally enriched compost was prepared by improving the C:N ratio through blending with urea.Enriched compost was compared with non-enriched as well as with chemical fertilizer to evaluate their effectiveness to improve plant growth.

Project Title: *Recycling of Organic Wastes for Sustainable Crop Productivity-Umbrella Project (AAU, Rwp -II)*

Location: Deptt. of Soil Science, University of Arid Agriculture, Rawalpindi.

Progress/Achievements:

Work was done on two aspects; i) Survey of poultry farms in Rawalpindi district and ii) field study to see the effect of poultry litter on the yield of maize fodder and soil fertility. A total of 272 farms were surveyed (tehsil Rawalpindi 134, tehsil Murree 56 and tehsil Kahota 82). Approximately 5000 tons of poultry litter was being produced in these tehsils annually. The poultry liter produced from these farms was being used locally for crop production. The farmers were getting two crops by its single application on maize in summer followed by wheat in winter or vice versa. It was observed that poultry litter was being stored in the form of heaps in the open, which could probably lead to losses of nitrogen as ammonia volatilization or nitrate leaching in case of high rainfall application.
Regarding field study on maize, seven different level of poultry litter ranging from 5-35 t ha-1 were tested in the field under rainfed conditions during summer 2002. The results showed that yield tended to increase with increasing rates of poultry litter.

Project Title: ***Recycling of Organic Wastes for Sustainable Crop Productivity Umbrella Project (NWFP-AUP Component III)***

Location: Dept. of Soil & Environmental Sci., NWFP Agricultural University, Peshawar

Progress/ Achievements:

Conducted survey and sampling of solid industrial wastes (agro-based industries), farm wastes, and municipal solid waste in NWFP. Visited 20 flour, rice, and Ghee mills, Squash/Jams/Marmalade factories in Peshawar, Mardan, Charsadda and Swat and collected relevant information and samples for analysis. Similarly 40 farms in Peshawar, 33 in Charsadda, 25 in Malakand and 40 in Dir have been surveyed Also surveyed and about 40 houses/hotel/juice shops/restaurants in Peshawar. The municipal solid waste samples collected form four major dumping grounds in Peshawar have been assessed for major and minor elements, heavy metals and potentially mineralizable N. The preliminary results suggest that the entire four municipal solid wastes contained considerable amount of plant nutrients as well as heavy metals and showed large potential for mineralizable N.

SOCIAL SCIENCES

ALP Secretariat received 39 Preliminary Proposals for funding under ALP 1st Batch 2001-2002. The Technical Divisions, PARC short-listed 21 preliminary proposals for the invitation of detailed projects and 19 proposals were not recommended. Finally 6 projects of Social Sciences Sector were approved by BOD of ALP for funding as detailed below:

Region	Social Sciences
PARC/ NARC	1
Punjab	1
NWFP	1
Sindh	3
Balochistan	-
AJ & K	-
NGO/ Others	-
Total	**6**

The progress of the project at NARC, Islamabad was reviewed by the Chairman, PARC/BOD while the progress of other projects including the project at NARC was reviewed by the CSO/In charge, SSD. The six monthly and annual technical progress were evaluated by SSD

Project Title: *WTO Trade Liberalization Move: Implications for Pakistan's Agriculture with Special Reference to Sustainable Development, Poverty Alleviation and Environmental Concerns.*

Location: NWFP Agri. University, Peshawar.

Progress/Achievements:

A detail theoretical analysis of WTO's AoA & its conditionality carried out. The data needed for carrying out empirical research based on above theoretical model are being collected. A comprehensive report on theoretical model prepared. A paper based on above theoretical analysis was read at PIDE conference. Needed data on sustainable development, poverty alleviation, and environmental safety relative to trade liberalization are being collected. Nine seminars and workshops arranged for public awareness. Prepared a preliminary report on WTO's Trade Liberalization Move: Suggested Action Plan for Pakistan" and issued for comments and guidance.

Project Title: *Identification and Analysis of Technology Transfer for Sustained Growth in Agriculture as Used by Extension in Sindh, Pakistan.*

Location: Sindh Agriculture University, Tandojam

Progress/Achievements:

Computer has been purchased. Visited libraries and reviewed literature. Questionnaire was developed.

Project Title: *Structure, Conduct, and Performance of the Marketing System, Margins, and Seasonal Price Variation of Selected Fruits and Vegetables in Pakistan.*

Location: Agri. Research Institute, Tandojam, Sindh.

Progress/Achievements:

Review of literature on marketing of fruits and vegetables has been completed. Collection of secondary data, presetting of questionnaire, informal and formal survey has been completed. The data collected from selected respondents has been analyzed. Two seminars on "Production and Marketing of Fruits and Vegetables" have been arranged for the wider dissemination of information among growers.

Project Title: *Determination of Profitability and Efficient Production Packages for Various Vegetables.)*

Location: University of Agriculture, Faisalabad.

Progress/Achievements:

Various studies were carried out to know the economics of tinda gourd, muskmelon, and bitter gourd growing. The results of the study on economics of tinda gourd reveals that the farmers could increase yield per acre by adopting better land preparation, plant protection measures, timely sowing and efficient use of labour for weeding/hoeing. Results of the study on muskmelon suggest that the farmers should allocate more area to Chichawatni variety and apply optimum quantities of nitrogen, phosphorus, potassium, manure, irrigation, and proper weeding to obtain higher yield. The findings of study on bitter gourd indicate that manure, fertilizer, and labour used for controlling weeds and earthing up are important in increasing the yield of bitter gourd.

Project Title: *The Economic Valuation of Indus Delta Mangrove Ecosystem.*

Location: Sindh Development Studies Center (SDSC) Uni. of Sindh, Jamshoro

Progress/Achievements:

The study suggests that there is positive relationship between the growth in mangrove forests and flora & fauna with fresh water. Reduced production of off-shore fisheries was observed through respondent feedback. This was largely attributed to over-fishing (the off-shore area is generally subject to open access) and decrease in mangrove area. The urban drainage to sea especially in Karachi works as a fertilizer for mangroves.

Project Title: *Application of Farm Planning Models to Analyze the Choice of Oilseed Crops at Regional and National Levels.*

Location: AERU, NARC, Islamabad.

Progress/Achievements:

Prototype Model was constructed for major cropping zones. Secondary data of oil seed crops (nine crops in total i.e. Cotton, Rapeseed and Mustard, Groundnut, Sesamum, Linseed, Castor seed, Soybean, Sunflower and Safflower) for a duration of last thirty years from 1969-70 to 1987-88, was analyzed using the excel software. Five-year averages were estimated on yields and area allocation to different oilseed crops. Results were presented graphically to highlight area allocation and production trends. A comprehensive review was carried out to synthesize oilseed development approaches adopted from national and regional perspectives. Approaches adopted in India and China was specifically reviewed to understand most relevant experiences of our neighborhood. A questionnaire was designed for the purpose of primary data collection on oilseed crops in the selected districts of all the agro-ecological zones of Pakistan.

RESEARCH PROJECTS

ALP 2nd Batch (2002-2003)

RESEARCH PROPOSALS

(ALP 2ND Batch 2002-2003)

PARC invited Preliminary Proposals for funding under ALP 2nd batch (2002-2003) on 28th July 2002, through press, web, and direct communication with major Agricultural Research Institutes and Universities.

In response to invitation, 642 preliminary proposals were received for funding under ALP 2nd batch (2002-2003). Out of these, 264 preliminary proposals were short-listed by the Technical Divisions of PARC, as detailed below:

Discipline	Recommended	Not Recommended	*Total*
Animal Sciences	59	59	***118***
Crop Sciences	131	220	***351***
Natural Resources	45	65	***110***
Social Sciences	29	34	***63***
TOTAL	**264**	**378**	***642***

Detailed projects from 264 successful scientists were invited. In response, 228 detailed projects were received and 36 PIs had not responded. Out of 228, 12 projects were incomplete and not processed further. Following is the status of detailed projects received at ALP Secretariat for further processing:

Discipline	Detailed Projects			*TOTAL*
	Received	Not received	Incomplete	
Animal Sciences	49	5	5	***59***
Crop Sciences	105	24	2	***131***
Natural Resources	39	2	4	***45***
Social Sciences	23	5	1	***29***
TOTAL	**216**	**36**	**12**	***264***

According to approved procedures of ALP, the detailed projects have to be reviewed by two national referees and overseas cooperating scientist. Out of 228 *(216+12)*, 216 detailed projects were sent to two national referees for technical appraisal and 11 projects were detained due to incomplete information. Following is the result status of **technical appraisal of 216 detailed projects** by the two national referees:

Referee's Recommendations	***Discipline***				***Total***
	AS	***CS***	***NR***	***SS***	
Not Recommended by both referees	4	7	4	1	***16***
Recommended by both referees as such and subject to some modifications.	17	44	21	13	***95***
Recommended by one referee subject to some modifications.	10	16	10	5	***41***
Recommended by one referees.	-	10	2	1	***13***
Result awaited.	18	28	2	3	***51***
TOTAL	***49***	***105***	***39***	***23***	***216***

The project appraisal reports from 51 referees are still awaited. Now these projects will be get reviewed/ evaluated by the new referees / reviewers.

As per procedure, detailed projects were also sent to USDA for technical evaluation/comments by overseas cooperating scientist.

Following is the result status of the technical evaluation by the overseas cooperating scientists:

Discipline	Recommended	Not Recommended	Total
Animal Sciences	29	30	***59***
Crop Sciences	49	82	***131***
Natural Resources	23	22	***45***
Social Sciences	7	22	***29***
TOTAL	***108***	***156***	***264***

Detailed projects recommended by the both referees as such and with certain modification (95) got revised/ modified by the authors of the projects before their submission to TAC for consideration/ recommendation as detailed below:

Discipline	**Revised Detailed Projects**		**Total**
	Received	**Not Received**	
Animal Sciences	16	1	17
Crop Sciences	38	6	44
Natural Resources	19	2	21
Social Sciences	13	-	13
TOTAL	**86**	**9**	**95**

The 4th TAC meeting held on 25-26Th August, 2003 considered 86 projects. The projects will be considered in the BOD of ALP for final approval.

ANNEXURE-I

LIST OF ON-GOING PROJECTS FUNDED UNDER ALP
(1ST BATCH 2001-2002)

(Rs. in Million)

ANIMAL SCIENCES

S No.	Title of the Projects	PI & Address	Cost
1	Preliminary studies on the efficiency of locally prepared *Staphylococcus Aureus* vaccine in the control of Mastitis in dairy buffaloes	Dr. Ghulam Muhammad Associate Prof. & Chairman Dept. of Clinical Medicine and Surgery, Faculty of Veterinary Sciences, Uni. of Agri. Faisalabad	0.754
2	Farming of mud crab (Scylla serrata) in the coastal earthen-ponds	Prof. Dr. Javed Mustaquim Professor of Marine Biology Center of Excellence in Marine Biology, Uni. of Karachi, Karachi-75270	2.385
3	Protection of buffaloes against brucellosis	Dr. Rukhshanda Munir Sr. Scientific Officer Animal Sciences Institute, NARC, Islamabad	2.458
4	Ovarian follicular dynamics and endocrine activity in postpartum anoestrus buffaloes	Dr. Nemat Ullah Principal Scientific Officer Animal Sciences Institute NARC, Islamabad	2.985
5	Polyculture of freshwater prawn, *Macrobrachiuii malcolmsonu* with Indian major and Chinese carps at farmers ponds in Pakistan.	Dr. Rafia Rehana Ghazi, Director (VPCI), SARC, Karachi,	1.984
6	Immunobiology and immunoprophylaxis of coccidiosis in chickens	Dr. Masood Akhtar, Asstt. Professor, Department of Parasitology, University of Agriculture, Faisalabad, Pakistan.	1.463
7	Studies on the prospect of introducing American channel cat fish (*Ictalurus puncutatus*) in pond fish culture system of Pakistan – A pilot project.	Mr. Abdul Rab, SSO AFRI, NARC Islamabad.	3.035
8	Studies on Tilapia culture through controlled breeding in saline areas	Dr. Iftikhar Ahmed Associate Professor Fisheries Res. Farms, Dept. of Zoology and Fisheries, Uni. of Agri. Faisalabad	0.898
9	Molecular characterization of Pakistani infectious bronchitis virus variants and development recombinant vaccine	Dr. Khalid Naeem Sr. Scientific Officer, ASI, NARC Islamabad	2.967
10	Implementation of NIR technique	Dr. Mohammad Mohsin Siddiqui	1.946

	for the evaluation of animal feeds.	Associate Professor Department of Livestock Management, NWFP Agricultural University, Peshawar	
11	Molecular characterization and pathogencity of avian adeno-viruses causing HPS	Dr. Mansur ud Din Ahmad, Associate Professor, Department of Microbiology, University of Veterinary and Animal Sciences, Lahore.	2.746
12	Hyper-secretion of xylanase &/or *cellulase thermophile* for its application in poultry feed industry.	Dr. Farooq Latif PSO NIBGE- P. O. Box 577, Jhang Road, Faisalabad	1.743
13	Refinement of multi-nutrient urea-molasses blocks technology through research and development	Dr. Imdad Hussain Mirza Sr. Scientific Officer (AN) ASI, NARC, Islamabad	0.952
14	Strategic breeding of red Sindhi cattle (SBRSC)	Dr. U. N. Khan Director General, Tropical Agri. Research Center, Karachi	2.785
15	Characterization of tannins in feeds and forages of Pakistan and their evaluation for anthelmintic activity	Dr. Zafar Iqbal Associate Prof. Sets 9/10, Khalid Hall, Uni. of Agri. Faisalabad	0.968
16	Efficient utilization of local feed recourses for sustainable increase in livestock production.	Dr. Ghulam Habib Associate Professor (Animal Nutrition), N.W.F.P. Agri. Uni. Peshawar	1.854
17	Immuno-prophylaxis of Foot and Mouth Disease (FMD) in bovines.	Dr. Khushi Muhammad Associate Professor, Dept. of Microbiology, University of Veterinary & Animal Sciences, Lahore.	5.945
CROP SCIENCES			
18	Umbrella Project Component-I: Development of canola quality mustard (Brassica juncea L) genotypes.	Syed Anwar Shah, PSO, NIFA P.O.Box 446 , Tarnab, Peshawar.	1.350
19	<u>Component-II:</u> Development of high yielding and well adaptive indigenous Canola Hybrids	Dr. Naazar Ali, National Coordinator/CSO, Oilseed Res. Prog., NARC, Islamabad.	1.869
20	<u>Component-III:</u>Genetic improvement of Brassica oilseed by integrative use of conventional and molecular biological approaches.	Prof. Dr. Zahoor Ahmad Swati Director, Institute of Biotechnology and Genetic Engineering, NWFP Agri. University, Peshawar	1.919

21	Component-IV:Integrated pest management of aphids in canola	Dr. Mohammad Aslam Uni. College of Agri. B.Z.U. Multan	1.346
	Umbrella Project		
22	Component-I: Some physiological studies on vegetative growth pattern and its impact on productivity and malformation of mango (*Mangifera indica L.*)	Dr .Muhammad Ibrahim Professor (Horticulture) University of Agric. Faisalabad.	1.384
23	Component-II: Studies on malformation of mango.	Dr. Ahmed Saleem Akhtar, Director Plant Protection Instt., Faisalabad.	2.241
24	Component-I: Integrated management of fruitflies in Pakistan (NARC Component)	Dr. Ghulam Jilani Director (Entomology & Ecotoxicology) CSD, NARC Islamabad.	3.672
25	Component-II: Integrated management of fruitflies in Pakistan (CABI Biosciences) Component)	Dr. M. Ashraf Poswal, Director, CABI-Biosciences Centre, Data Gunj Bakhsh Road, Satellite Town, Rawalpindi.	4.254
26	Component-III: Integrated management of fruitflies in Pakistan (NIFA, Peshawar Component)	Dr. Sana Ullah Khan Khattak, Head, Entomology Division/PSO Nuclear Institute for Food & Agriculture Tarnab, Peshawar.	2.368
27	Component-IV: Integrated management of fruitflies in Pakistan (ARI, D. I. Khan Component)	Dr. Abdul Latif, Entomologist, Agricultural Research Institute, D.I. Khan.	2.063
28	Component-V: Integrated management of fruitflies in Pakistan (NIA, Tandojam Component)	Mr. Qamar-ul- Hassan Siddiqui, Head, Entomology/PSO Nuclear Institute of Agriculture, Tandojam.	2.012
29	Component-VI: Integrated management of fruitflies in Pakistan (ARI, Sariab, Quetta Component)	Mr. Muhammad Karim Shawani, Entomologist, Agricultural Research Institute, Sariab, Quetta.	2.031
30	Mass scale production of disease free true-to-type peach rootstock (GF 677) plantlets through tissue culture for productivity enhancement/ economic self reliance	Dr. Hafeez-ur- Rahman SSO Horticulture Res. Institute, National Agric. Research Center, Islamabad.	2.129
31	Resource conservation technology for rice-wheat system in CRBC command areas.	Dr. Inayat ullah Awan Assistant Professor (Agronomy) Faculty of Agriculture, Gomal University, D. I. Khan	2.750

32	Post Harvest Research on Perishable Fruits (Guava, Peach) and Vegetable (Tomatoes) In NWFP	Mrs. Manzoor Nazli Grading & Packing Specialist, Food Technology Section, ARI, Tarnab, Peshawar	1.637
33	Morphological and biochemical variability of the genus Trichogramma (Hymenoptera: Trichogrammatidae) in Pakistan	Mr. Farooq Nasir Scientific Officer CABI Regional Biosciences Centre, Opposite 1-A Data Gung Baksh Road, P.O. Box 8, Satellite Town, Rawalpindi	4.166
34	To develop drought resistant wheat (Triticum aestivum L.) genotype under water stress condition	Sheikh Muhammad Mujtaba PSO, Nuclear Instt. for Agriculture P.O.Box 70060, Tandojam, Sindh.	1.070
35	Exploitation of legume diversity endemic to salt range in the Punjab.	Dr .Mumtaz Hussain Asstt. Professor (Botany.) University of Agric. Faisalabad.	1.095
36	Propagation of sparsely seeded/ seedless kinnow mandarin using cell and tissue culture techniques.	Dr. Mrs. Nafees Altaf CSO/Director, NIAB P.O.Box 128 Faisalabad.	1.328
	Umbrella Project		
37	Component-I: Adaptation & commercialization of throw-in-type rice thresher	Mr. Abdul Waheed Zafar, Principal Engineer, FMI, NARC, Islamabad.	2.332
38	Component-II: Development and commercialization of mobile seed processing unit	Dr. Tanveer Ahmad, Sr. Engg. , Farm Machinery Institute, NARC, Islamabad.	2.679
39	Component-III: Development of energy efficient wheat thresher.	Mr. M. Tahir Anwar Sr. Engg. Farm Machinery Institute, NARC, Islamabad.	2.558
40	Iron fortification of wheat flour in Pakistan: A step that needs critical evaluation.	Prof. Dr. Masoom Yasinzai Professor of Biochemistry University of Balochistan, Quetta.	1.100
41	Studies on viral diseases of major pulses crops and identification of resistant sources.	Dr. Muhammad Bashir Principal Scientific Officer (Plant Virologist) Pulses Program, Crop Sciences Institute, NARC, Islamabad	2.701
	Umbrella Project		
42	Component-I: Management of parasitic weeds in rapseseed and mustard and legume crops in NWFP	Dr. Khan Bahadar Marwat, Chairman, (Weed Science) NWFP Agri University, Peshawar	1.753
43	Component-II: Investigation of Mechanism for seed dormancy in rice based cropping system.	Dr. Gul Hassan Asstt. Professor, Weed Science NWFP Agri University, Peshawar	0.400

44	Survey and integrated pest management of cotton insect pests in Balochistan.	Mr. .Muhammad Karim Shawani, Entomology Section. Agri. Res. Instt. Sariab, Quetta.	1.200
	Umbrella Project		
45	Component-I: Collection, conservation, evaluation and documentation of horticultural crop germplasm and its wild relatives	Dr. Rasheed Anwar, Director PGRI, NARC, Islamabad.	3.000
46	Component-II:In vitro conservation and cryopreservation of plant germplasm of vegetatively propagated crops	Dr. Mustafa Sajid Sr. Scientific Officer Plant Genetic Resources Institute (PGRI), NARC, Islamabad	2.107
47	Component-III:Acquisition screening and utilization of peas germplasm for development of superior cultivars.	Dr. Abdul Ghafoor, SSO PGRI, NARC, Islamabad.	2.100
48	Study on genetic variation in Xanthomonas compestris pv.oryzae in relation to resistance in rice.	Dr. M. Afzal Akhtar, SSO CDRI, NARC, Islamabad.	4.821
49	Investigation of role of Germin-like proteins (Glps) during germination/ early development by construction of rice plants engineered for sense and anti-sense expression of rice glps.	Dr. S.M. Saqlan Naqvi, Asso. Prof. (Biological Sciences) Uni. Arid Agriculture, Rawalpindi.	2.473
	Umbrella Project		
50	Component-I: Molecular breeding of Kabuli chickpea for Ascochyta blight resistance and high yield potential	Dr. Ahmad Baksh Maher Sr. Scientific Officer Pulses Program, NARC, Islamabad.	2.701
51	Component-II :Increasing production of Kabuli chickpea for its import substitution	Dr. Muhammad Afzal Director Pulses Research Institute, AARI, Faisalabad.	1.328
	Umbrella Project:		
52	**Component 1:** Pathobiology of Foliar Spots of Wheat and their Integrated Management.	Mrs. Shamim Iftikhar SSO, IPEP, NARC, Islamabad	4.069
53	**Component 3:** Evaluation and incorporation of new genetic	Dr. Iftikhar Ahmad DDG, IPEP, NARC, Islamabad	3.000

	diversity in Pakistani wheats for stripe (yellow) rust resistance.		
54	**Component 4:** Identification of sources of resistance to Karnal bunt disease of wheat.	Mr. Javed Iqbal Mirza SO, CDRI, Sunny Bank, Murree Substation, Murree	2.540
55	Assessment of Suitable Sealant material (s) for increasing the gas-tightness of Public Sector warehouses and Tarpaulins used for covering the open-stacks (ganjees).	Syed Asim Rehan Kazmi, SSO, GSRI, SARC, Karachi Code No. 75270	5.258
56.	Sustainable Cropping Patterns for Pothowar Plateau.	Dr. Shahbaz Ahmad, Prof. of Agronomy, University of Arid Agriculture, Rawalpindi.	3.036
57.	Introduction of soft fruit (strawberry, black berry, rasp berry, black currant) in the potential areas of Pakistan for economic returns.	Dr. Khalid Mahmood Qureshi, SSO, IFHC, NARC, Islamabad.	4.000
58.	Mutation breeding for high grain yield, improved quality and earliness in non-aromatic rice (*Oryza sativa L).*	Abdul Wahid Baloch PSO, Nuclear Institute of Agri. P.O. Box 70060, Tandojam, Sindh.	1.112
59.	Production of doubled haploids wheat with longer coleoptile.	Dr. Fida Muhammad Associate Prof., (Plant Breeding), NWFP Agric. Univ., Peshawar.	1.859
60.	Control of phytopathogenic microorganisms by bacteriocins from indigenous strains.	Prof. Dr. Sheikh Ajaz Rasool, Sr. Prof., Deptt. of Microbiology, Univ. of Karachi, Karachi-75270.	2.133
61.	Conservation and sustainable utilization of agro-biodiversity of under-utilized crops.	Dr. Zahoor Ahmad, PSO, PGRI, NARC, Islamabad	1.896
62.	Studies on mycotoxins in corn.	Dr. Yasmin Ahmad, PSO, IPEP, NARC, Islamabad	2.500
	Coordinated Project: Investigations on Indian Crested Porcupine, *Hystrix indica,* Damage and Management in Agricultural and Forestry Systems in Pakistan.	Mr. Abdul Aziz Khan, Director, Plant Protection, CSD, PARC, Islamabad. **(Coordinator)**	7.540
63.	**Component 1**: Investigations on Indian Crested Porcupine, *Hystrix indica,* Damage to Forest Flora and Development of Prevention Practices in Tarbela-Mangla Watershed Areas.	Dr. Iftikhar Hussain SSO, VPCL, NARC, Islamabad	2.866
64.	**Component 2:** Biology and Management of Porcupine, *Hytrix*	Prof. Dr. Afsar Mian Dean, Sciences, Arid Agri. University,	2.094

	indica in Centeral Punjab.	Rawalpindi.	
65.	**Component 3:** Developmental Biology, Feeding Pattern and Management Strategy against Indian Crested Porcupine *(Hystrix Indica)* in Sindh and Balochistan Provinces.	Mr. Amjad Pervez SSO, VPCI, SARC, Karachi Uni., Karachi	1.962
66.	Quantification of maize yield losses from leaf blights and improving maize populations for grain yield and leaf blight resistance.	Dr. Hidayat-ur-Rehman, Prof., (PBG), NWFP Agri. Univ. Peshawar	2.173
67.	Integrated Nematode Disease Management (INDM) in some cereals, fruits and vegetables of Pakistan.	Dr. Shahina Fayyaz Officer Incharge, National Nematological Research Centre, University of Karachi, Karachi	3.435

NATURAL RESOURCES

	Umbrella Project		
68	Component-I: Diagnosis and Remedial Measures of Micro-Nutrient Deficiencies in Fruit Plants of Economic Importance in Pakistan (AARI-Faisalabad)	Dr. Muhammad Ibrahim Agri. Chemist (Soils) Ayub Agric. Soil Chemistry Section, Ayub Agricultural Research Institute, Jhang Road, Faisalabad.	2.337
69	Component-II: Diagnosis and Remedial Measures of Micro-Nutrient Deficiencies in Fruit Plants of Economic Importance in Pakistan (ARI-Sariab, Quetta)	Mr. Muhammad Idrees, Director,(Horticulture), Agri. Research Instt., Sariab, Quetta.	1.563
70	Assessment of Nutritional Potential and Performance of Range Species in Balochistan.	Dr. Muhammad Islam Scientific Officer Arid Zone Research Center, Brewery Road, Quetta	1.973
71	Optimal Tillage Practices for Wheat-Fallow and Chickpea-Fallow Rotations in Southern NWFP	Dr. Muhammad Jamal Khan Professor/Chairman Deptt of Water Management, NWFP Agri. University, Peshawar	2.500

	Umbrella Project Title: Assessment, Indexing and Management of Nutrients Status of Soils for Crop Production.		
72	Component-I: Soil Fertility Monitoring and Management in Cotton-Wheat System Productivity (NARC, Islamabad).	Dr. A. Rashid Chief Scientific Officer, Soil Fertility and Plant Nutrition Program, LRRI, NARC, Islamabad.	2.700
73	Component-II: Soil Fertility Monitoring and Management in major Cropping Systems of AJK (AJK, Muzaffarabad)	Dr. Muhammd Bashir Butt, Soil Chemist, Deptt. of Agri., Gojra, Muzafarabad, AJ&K	1.150
74	Component-III: Soil Fertility Monitoring and Management in Dryland Cropping Systems of Balochistan (AZRC, Quetta)	Mr. Ahmad Sami Ullah Team Leader (Land & Water Section), AZRC, P..O Box 63, Quetta	1.150
75	Component-IV: Soil Fertility Monitoring and Management in Rice-Wheat System (NARC, Islamabad)	Dr. Fayyaz Hussain, SSO,INRES, NARC, Islamabad.	2.000
	Umbrella Project		
76.	Component-I: Recycling of Organic Wastes for Sustainable Crop Productivity—(UAFaisalabad)	Dr. Muhammad Arshad Professor, Soil Sciences Deptt, University of Agric. Faisalabad.	2.013
77.	Component-II: Recycling of Organic Wastes for Sustainable Crop Productivity (AAU, RWP)	Dr. .Mushtaq Ahmed Khan Chairman, Deptt. of Soil Science, University of Arid Agriculture, Rawalpindi.	1.642
78.	Component-III: Recycling of Organic Wastes for Sustainable Crop Productivity (NWFP-AUP)	Dr. Zahir Shah Associate Professor Deptt, of Soil & Envirn. Sciences NWFP Agri. University, Peshawar	1.645
79.	Impact of sewage wastes (effluent and sludge) on soil properties and quality of vegetables.	Prof. Dr. Muhammad Qasim Khan Chairman, Department of Soil Science Gomal University, D.I.Khan.	4.153
	Coordinated Project: National Coordinated project on Management of salt affected soils and brackish waters in Pakistan.	Dr. M. Salim (Coordinator), CSO/DDG (INRES), NARC, Islamabad.	
80.	**Component 1:** NIAB, Faisalabad.		4.017
81.	**Component 2:** SSRI, Pindi Bhatian.		3.190

82.	**Component 3:** UA, Faisalabad.		4.287
83.	**Component 4:** SALU, Khairpur .		3.513
84.	**Component 5:** ARI, Peshawar.		3.094
85.	**Component 6:** ARI, Quetta		2.930
86.	**Component 7:** NARC, Islamabad		3.993
	SOCIAL SCIENCES		
	Umbrella Project		
87.	WTO trade liberalization move: Implications for Pakistan's agriculture with special reference to sustainable development, poverty alleviation and environmental concerns.	Dr. Anwar F. Chishti, Asso. Professor (Agri. Economics) NWFP Agri. University, Peshawar.	3.000
88.	Structure, conduct and performance of the marketing system, margins, and seasonal price variation of selected fruits and vegetables in Sindh. A cointegration analysis.	Dr. Ali Muhammad Khushk Sr. Scientific Officer, AERU, Agri. Research Institute, Tandojam, Sindh.	2.500
89.	Determination of profitability and efficient production packages for various vegetables.	Dr. Bashir Ahmad, Professor & Chairman Deptt of Farm Management, University of Agriculture, Faisalabad.	2.500
90.	Application of farm planning models to analyze the choice of oilseed crops at regional and national levels	Dr. Muhammad Azeem Khan Scientific Officer AERU, NARC, Islamabad.	3.000
91.	The economic valuation of Indus delta mangrove ecosystem	Dr. Abida Taherani Professor Sindh Development Studies Center (SDSC) Uni. of Sindh, Jamshoro	0.500
92.	Identification and analysis of technology transfer for sustained growth in agriculture as used by extension in Sindh, Pakistan.	Dr. S. S. Bokhari Asstt. Professor Sindh Agri. Uni. Tandojam, Sindh	0.500

PROJECTS IN PROCESS

1.	**Component 2:** Investigation on barley yellow dwarf virus (BYDV) in wheat crop in Pakistan.	Dr. Shahid Hameed SO, CDRI, NARC, Islamabad.	3.892

2.	Development of heat tolerant wheat varieties	Dr. Muhammad Aqil Khan Director, Wheat Res. Instt., Ayub Agri. Res. Instt., Faisalabad	3.159
3.	**Component 1:** Planning, Coordination, Monitoring and Dissemination of Technology on Management of Indian Crested Porcupine, *Hystrix indica,* in Pakistan.	Mr. Abdul Aziz Khan, Director, Plant Protection, CSD, PARC, Islamabad.	0.618

PROJECTS NOT IMPLEMENTED

ANIMAL SCIENCES			
S. No	**Title of the Projects**	**PI & Address**	**Cost**
1	Studies on the effect of Bovine Somatotropins (rbST) on productive and reproductive parameters of Kundi buffaloes in Sindh.	Dr. Bashir Ahmed Shiekh Professor Deptt. Of Veterinary Physiology and Biochemistry, Sindh Agriculture University, Tandojam, Sindh	2.975
CROPS SCIENCES			
2	Novel methods to test & develop cotton heat- tolerance genotypes, exploiting male gametophyte as an effective plant breeding tool.	Dr. Ali Hassan Baloch, SSO, Cotton Research Station, Usta Muhammad, Balochistan	1.215
SOCIAL SCIENCES			
3	Farmers capacity building through information technology in Pakistan.	Dr. Muhammad Zakria Zakar Asstt. Professor of Sociology Department of Sociology, Uni. of the Punjab, Lahore	4.749

ON-GOING RESEARCH PROJECTS

ALP 1st Batch (2001-2002)

RESEARCH PROJECTS

ALP 2nd Batch (2002-2003)