Annual Report 2009-10

Faculty Development
Technology Transfer
Product Commercialization

Endowment Fund Secretariat

University of Agriculture, Faisalabad

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ANNUAL REPORT (2009-10)

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ENDOWMENT FUND SECRETARIAT (EFS)
UNIVERSITY OF AGRICULTURE, FAISALABAD

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MESSAGE FROM THE VICE CHANCELLOR

Endowment Fund started functioning in 2006 with a mandate of Faculty Development (FD), Technology Transfer (TT) and Product Commercialization (PC). Cooperation among scientists in agriculture sector at UAF and other national institutes of higher learning within Pakistan and United States is encouraged by sponsoring Technology Transfer Projects.

In 2009, an independent Executive Director was appointed to head the Endowment Fund Secretariat (EFS). New activities under FD, TT and PC were initiated. Main features of these activities were increasing delivery capacity of the available human resource to conduct marketable research and its dissemination to the end users. Expansion in TT activities included demonstration of technologies through model farming on UAF campus and at farmers fields, exhibitions, horse and cattle shows, etc. Outreach program carried out by the faculty was extremely useful in community services and resource mobilization. Briefly, in year 2009-10, Endowment Fund enabled UAF in developing capacity and establishing strong communication with the stakeholders in agriculture sector at national and international levels. I expect 2010-11, a year of building formal linkages of UAF among stakeholders within Pakistan and elsewhere, especially in the United States of America. This is mention worthy that UAF has declared 2011, “a year of Pak-US educational legacy”, which will help further the scope of Pak-US collaborations.

I appreciate the efforts made by the staff of the EFS for effectively marketing the activities of EFS leading to good number of proposals received from the faculty and their implementation.

(PROF. DR. IQRAR AHMAD KHAN)
Vice Chancellor/Chairman BoD

EXECUTIVE SUMMARY

Endowment Fund was established with the assistance of USDA under "Food for Progress" agreement. The principal amount (Rs. 650.00 million) received through GOP is invested in the scheduled banks on the recommendation of an Investment Committee and the income generated is used for funding Technology Transfer, Faculty Development and Product Commercialization programs.

Under faculty development (FD) program, BoD of the Endowment Fund (EFS) initially allowed to start short term trainings abroad for UAF faculty members. During the year 2009-10, scope of FD was broadened to provide funding for organizing/participation in seminars/ workshops/ conferences, and short visits for increasing interaction/ cooperation among the scientists in different parts of the world. In year 2009-10, three faculty members got short training from USA, Canada and Australia. EFS sponsored 14 travel grants to present papers in conferences, 05 travel grants for short visits, and funded 08 seminars/conferences in the UAF. The activities funded by EFS has helped in capacity building and triggered motivation among the UAF faculty for applied research and innovation.

During the year 2009-10, technology transfer activities were also expanded to demonstration projects and organizing festival (Kisan Melas/Fairs) at UAF. The BoD approved 08 outreach projects, 13 projects as demonstration and 03 projects as Melas/Fairs. These activities have tremendously increased the interaction among the stakeholders and end users of research output of the UAF. Massive community mobilization has been witnessed in year 2009-10 after launching the new activities on the UAF campus and in the field.

Under product commercialization component, Business Incubation Centre was established in collaboration with CSF and HEC at the UAF. Thirteen products based on research at UAF were selected for commercialization and their business briefs were got developed. EFS also sponsored registration of "UAF Tech. Company (Pvt.) Ltd. – (U-TECH)" and Executive Director of EFS is ex-officio Director of the company. Three seminars were organized by the EFS to sensitize the stakeholders about the concepts of saleable research and its commercialization. These activities have been successful in introducing the faculty with the concept of business incubation, entrepreneurship and have generated interest of businessmen in the UAF.

(PROF. DR. ZAFAR IQBAL)
EXECUTIVE DIRECTOR

Section-1

FACULTY DEVELOPMENT

FACULTY DEVELOPMENT

OVERVIEW

Under this component following programs are being sponsored:

1. Short Term Training abroad (4 months)
2. Travel Grant to present papers (abroad)
3. Travel Grant for short visits (abroad)
4. Organizing Seminars/Workshops/Conference at UAF

PROGRESS DURING THE YEAR 2009-10

1.1 SHORT TERM TRAININGS

The following three applicants approved by BoD in its meeting held on 21.02.2009 completed short term training abroad during the year under report.

Sr.#	Description	Status
1.	**Dr Amir Shakeel,** Lecturer, Deptt. of Plant Breeding & Genetics Title: Gene Mapping Techniques Host Institute: The University of Georgia **USA**. (duration: 4 months)	Completed
2.	**Dr. M. Yaqoob**, Associate Professor, Department of Livestock Management, UAF Title: Application of precision farming technologies (DGPS/GIS) to animal grazing systems Host Institute: Nova Scotia Agriculture College, **Canada** (duration 04 months)	Completed
3.	**Dr. Iftikhar Ahmad**, Assistant Professor, Institute of Horticultural Sciences, UAF Title: Post Harvest Management of Cut flower Host Institute: The University of Queensland, GATTON, Qld 4343, **Australia** (Duration 4 months)	Completed

1.2 TRAVEL GRANTS

The scope of Faculty Development program was broadened to provide funding to faculty members for participation in seminars/workshops/ conferences (inland & abroad). In this context, funding was provided as travel grants to 14 faculty members to present papers at international seminars/conferences. The list is as under:

Sr.#	Name of Grantee/ Purpose of Travel Grant	Country Visited
1.	**Dr. Ashfaq Ahmad,** Associate Professor, Deptt. of Agronomy Resource use Efficiency of Maize under Different Levels of Nitrogen under Semi-Arid Condition of Pakistan (paper presented in Association of Academies of Sciences in Asia (AASA) workshop on Environment and Resources, 25-28 September, 2009)	Turkey
2.	**Prof. Dr. Shahzad Maqsood Ahmad Basra,** Deptt. of Crop Physiology Seed Priming: A Simple and Low Cost Solution for Alleviation of Salt Stress in Wheat (paper presented in MSSC Water Supply, Agriculture and Salinity Management Workshop, 28.09.2009 to 01.10.2009)	USA California
3.	**Dr. M. Sohail Sajid**, Assistant Professor, Deptt. of Parasitology Prevalence and Associated Determinants of Gastrointestinal Helminthes in Domestic Animals of District Toba Tek Singh, Pakistan (paper presented in The 2nd Federation of the Asian Small Animal Veterinary Association (FASVA) Congress 2009, 03-05 November, 2009)	Thailand
4.	**Dr. Faqir Muhammad,** Assistant Professor, Deptt. of Physiology & Pharmacology Dermatotoxic effects of orally administered ciprofloxacin in sweating and non-sweating animal models (paper presented in 11th World Congress of pediatric Dermatology, 16-20 November, 2009)	Thailand
5.	**Prof. Dr. Ahrar Khan,** Deptt. of Veterinary Pathology Pathological Effects of Cypermethrin in Broiler Chicks (paper presented in 16th World Veterinary Poultry Association Conference, 07-13 November, 2009)	Morocco
6.	**Prof. Dr. Rai Niaz Ahmad,** Deptt. of Irrigation & Drainage Bed-furrow system to replace conventional flood irrigation in Pakistan (paper presented in 60th International Executive Council (IEC) meeting of International Commission on Irrigation and Drainage (ICID) and 5th Asian Regional Conference, 05-12 December, 2009)	India

7.	**Dr. M. Arshad,** Associate Professor, Deptt. of Irrigation & Drainage Water percolation losses under water conservation technologies in rice-wheat cropping system (paper presented in 60th International Executive Council (IEC) meeting of International Commission on Irrigation and Drainage (ICID) and 5th Asian Regional Conference, 05-12 December, 2009)	India
8.	**Prof. Dr. Muhammad Sarwar,** Institute of Animal Nutrition and Feed Technology Blood Metabolite and Hormonal Response of Growing Lambs to Intensifying Dietary Crude Protein with or without Ionophores and Probiotics (paper presented in International Conference on Agricultural and Animal Science, 25-29 February, 2010)	Singapore
9.	**Prof. Dr. Zafar Iqbal,** Deptt. of Parasitology *In Vitro* Validation of Anthelmintic Activity of *Butea Monosperma* and *Calotropis Procera* (paper presented in 46th MSPTM Annual Scientific Conference, 23-26 March, 2010)	Malaysia
10.	**Prof. Dr. Aman Ullah Malik**, Institute of Horticultural Sciences Fruit harvest maturity determination for mango cultivars Sindhri and Samar Bahisht Chaunsa, (Paper presented in 9th International Mango Symposium, April 7-13, 2010)	China
11.	**Dr. Mahr-un-Nisa,** Assistant Professor, Institute of Animal Nutrition and Feed Technology Nutritional Evaluation of Enzose as Replacement of Corn Grain for Growing Lambs. (Paper presented in 3rd International Scientific Conference on Small Ruminant Production, 8-11 Feb, 2010.	Egypt
12.	**Dr. Arfan Yousaf,** Assistant Prof., Deptt. of Clinical Medicine & Surgery Effect of Treatment with Tri-S odium Citrate Alone and in Combination with Levamisole HCI on Total Milk Bacterial Count in dairy Buffalo Suffering from Sub-Clinical Mastitis. (Paper Presented in 9th Buffalo Congress 2010, 25-28 April, 2010)	Argentina
13	**Dr. Tanveer Ahmad,** Assistant Professor, Deptt. of Clinical Medicine & Surgery Therapeutic Efficacy of Antibiotics and Bacerin-toxoid in Sub-Clinical Streptococcus Agalactiac Mastitis in Dairy Buffaloes. (Paper Presented in 9th Buffalo Congress 2010, 25-28 April, 2010)	Argentina

14.	**Prof. Dr. Muhammad Sarwar,** Institute of Animal Nutrition and Feed Technology Influence of bypass protein on buffalo productivity (Paper Presented in 9th Buffalo Congress 2010, 25-28 April, 2010)	Argentina

Travel Grants for Short Visits (Institutional Collaboration)

In addition to participation in seminars/conferences etc., the following travel grants for specialized short visits abroad were awarded for strengthening international collaboration:

Sr. #	Name and Address	Country Visited
1.	Prof. Dr. Iqrar Ahmad Khan Vice Chancellor, UAF	Washington State University USA and meetings to explore avenues for further collaboration in R&D, Capacity building and placement of trainees. (November 25 to December, 4, 2009).
2.	Prof. Dr. Asghar Ali, Deptt. of Agronomy	France Paris, Agocampus Ouest and other Universities/Institute (31 May to 12 June 2010) with the delegate.
3.	Prof. Dr. Muhammad Iqbal, Deptt. of Farm Machinery & Power	France Paris, Agocampus Ouest and other Universities/Institute (31 May to 12 June 2010) with the delegate.
4.	Prof. Dr. Asif Ali, Director External Linkages, Deptt. Directorate of External Linkages	France Paris, Agocampus Ouest and other Universities/Institute (31 May to 12 June 2010) with the delegate.
5.	Mr. Aafaq Ahmad Tiwana, Member of BoD, EFS Chief Executive, Farmers Associates Pakistan, Lahore	France Paris, Agocampus Ouest and other Universities/Institute (31 May to 12 June 2010) with the delegate.

1.3 SEMINARS/CONFERENCES/WORKSHOPS/TRAININGS ORGANIZED AT UAF

Endowment Fund Secretariat provided financial support to organize the following Seminars/ Conferences/Workshops/Trainings by the faculty members at the campus:

Sr. #	Name of organizer	Seminar/Workshop
1.	**Prof. Dr. Faqir Muhammad Anjum,** Director General, NIFSAT	Food Safety Issues in Current Scenario (December 16, 2009)
2.	**Prof. Dr. Laeeq Akbar Lodhi,** Dean, Faculty of Veterinary Science	Stakeholders' Workshop for Developing modules for trainers and trainees of DVM internship program (One-day Workshop held at UAF on 21.01.10)
3.	**Prof. Dr. Asif Ali,** Director, External Linkages	Development of Unified Agricultural Research System Comprising of Education, Research and Extension (One-day Workshop held at UAF on 25.01.10)
4.	**Prof. Dr. Shahnaz Akhtar Rana,** Deptt. of Zoology & Fisheries	The 30th International Congress of Zoology (Three-days Congress held at UAF on 2-4 March, 2010)
5.	**Dr. Jalal Arif,** Associate Professor, Deptt. Agri. Entomology	The challenges of Knowledge revolution and state of agriculture in Pakistan (April 27, 2010)
6.	**Prof. Dr. Faqir Muhammad Anjum,** Director General, NIFSAT	Economic Use of Post Harvest Cold Chain (May 19-21, 2010)
7.	**Prof. Dr. Muhammad Ashraf,** Dean, Faculty of Sciences	Agro – Biodiversity: Threats and Solutions (June 16, 2010)
8.	**Prof. Dr. Faqir Muhammad Anjum,** Director General, NIFSAT	Food Industry Needs – Based Projects for Research in Academia (June, 17th 2010)

Section-2

TECHNOLOGY TRANSFER

2.1 BRIEF OVERVIEW OF THE PREVIOUS YEAR (2008-09)

At the time of launching of Endowment Fund, only outreach projects were conceived under Technology Transfer component. During 2008-09, concept of technology transfer evolved and the portfolio expanded to include the proposals of demonstration/ exhibition and annual fairs. These projects are executed at the campus and the activities are intermittent in nature which the faculty members can manage with less time and effort. The BoD approved 08 projects as outreach, 13 projects as demonstration and 03 projects as Melas/Fairs. These projects were initiated w.e.f. 1-3-2009 to establish Technology Park at UAF.

2.2 PROGRESS DURING 2009-10

The Technology Transfer program was made more flexible and scientists were asked to submit concept proposals at any time throughout the year. However, the proposals fulfilling the mandate of EFS were processed depending upon the availability of funds. Response was excellent and a lot of proposals were received. PIs of eligible concept papers were asked to submit full blown proposals which were evaluated through experts nominated by the Vice Chancellor/Chairman BoD. Out of 64 project proposals TAC in its meeting held on 29.04.2010 recommended only 20 projects. The BoD in its meeting held on 30.04.2010 approved 15 projects as detail below:

A. Outreach Projects

Sr.#	Title of the Project	Name of PIs
1	Technology transfer of value Addition in Floriculture to Farmers	Prof (Rtd.) Dr. Muhammad Aslam Khan, Institute of Horticultural Sciences, UAF
2	Redefining of the cropping pattern in various ecological zones of Punjab	Prof. Dr. Ehsanullah, Deptt. of Agronomy, UAF
3	Preparation of Policy Paper on Economic Aspects of Irrigation Water	Dr. Muhammad Ashfaq, Associate Professor, Deptt. of Agri. Economics, UAF
4	Impact of wheat price policy on food security in Pakistan	Prof. (Rtd.) Dr. Muhammad Siddique Javed, Deptt. of Business Management Sciences
5	Citrus Diagnostic and Certification Services	Muhammad Mubin, Lecturer, Centre for Advance Studies in Applied Genetics and Saline Agriculture (CAGSA), UAF

6	Internship/ outreach program for the students of University of Agriculture, Faisalabad	Prof. Dr. Allah Bakhsh, Director Research, UAF
7	Establishment of Biomonitoring Cell for Certification of BT Cotton Efficiency	Dr. Shazia Anwer Bukhari, Research Officer/ Lecturer, Centre of Agricultural Biochemistry and Biotechnology (CABB)
8	Umbrella project for faculty outreach through short hands-on training courses	Dr. Asif Ali, Director External Linkages, UAF

B. Demonstration Projects

Sr.#	Title of the Project	Name of PIs
1	Field Demonstration of Salt Tolerant Tree and Forage Species on Salt-affected Land at Proka Farm, UAF	Muhammad Saqib, Assistant Professor, Institute of Soil & Environmental Sciences, UAF
2	Operation and Management of Drip Irrigation System for Demonstration at PARS Location: PARS	Prof. Dr. Rai Niaz Ahmad, Director, Water Management Research Center, UAF
3	Demonstration of a Groundwater Model to Simulate Pumping Effects on Water table of a Faisalabad Water Supply Scheme. Location: Pumping area in Chiniot	Prof. Dr. Allah Bakhsh, Department of Irrigation and Drainage, UAF
4	Skill Development in Reverse Engineering at Agricultural Machinery Pool, UAF	Prof. Dr. Muhammad Iqbal, Deptt.: Farm Machinery & Power, UAF
5	Technology Transfer through on farm demonstration of innovative techniques for the sustainable bovine dairy farming and keeping herd healthy by manipulation of management practices Location: University Dairy Farm	Dr. Muhammad Riaz, Associate Professor, Department of Livestock Management, UAF

6	Use of low quality Water in Conjunction with Amendments During Reclamation of Salt-Affected Soils by Growing Wheat and Sesbania Crops Location: Proka farm	Dr. Ghulam Murtaza, Associate Professor, Institute of Soil & Environmental Sciences, UAF
7	Demonstration and Transfer of Entomological Technologies as Income Generating Source for Small Farmers Location: PARS	Prof. Dr. Muhammad Ashfaq (T.I.), Dean, Faculty of Agriculture, UAF

2.3 PROGRESS/ACHIEVEMENTS OF ONGOING PROJECTS

The progress of the Technology Transfer projects in the form of brief achievements is given in the following page

TECHNOLOGY TRANSFER BATCH-I

TT-02/07: Technology Transfer for Using Tube Well Water on Salt-Affected Soils for Crop Production

Name of PI : Dr. Ghulam Murtaza , Associate Professor, Inst. Soil & Env. Sci., UAF
Date of initiation : 1-7-08 (duration: 3 years)
Total Cost : Rs.2.965 million
Funds released : Rs.1.919 million
Funds utilized : Rs.1.786 million

Main thrust/theme

Pakistan is facing an acute shortage of good quality water for irrigation. Ground water is used to supplement irrigation requirements but its quality is mostly hazardous. The pumped ground water from these tube wells is 6.77×10^{10} m, of which 70-75 % is brackish. Continuous use of such low quality ground water without appropriate management practices or amendments could make the soils saline/sodic. By now, about 3.5 mha soils have developed surface salinity/sodicity due to the use of poor quality irrigation waters. Farmers in arid and semi-arid regions are forced to exploit low quality ground water, which needs addition of a Ca-source. Otherwise such waters could result in deterioration of soil health and economic yield as well as produce quality. Considerable research work on the use of low quality water for irrigating crops has been carried out in Pakistan and abroad, but farm level adoption needs site-specific consideration because of differences in edaphic factors. Some studies on the economical use of brackish water for reclamation of salt-affected soils have been successfully completed in the Fourth Drainage Project Area, Faisalabad (FDP A) with the participation of farmers with good adoption rate by the local farmers. Since the gravity of salt problem soils and waters varies considerably, the technology transfer already established for such situations still needs continuous involvement of farmers to address the site-specific issues. It is, therefore, planned to demonstrate and replicate the known package of technology at the Proka Farm II, UAF to establish the Technology Park for productive use of poor quality soils and waters. This way, large abandoned areas will become productive and income of rural masses will increase to help alleviate the rural

poverty. Therefore, this program was extended to Proka Farm II of the UAF to reclaim the degraded soil.

Objectives

- To study and demonstrate the reclamation effectiveness of ground water in conjunction of canal water with or without using inorganic amendments.
- Growth response of rice-wheat and sorghum-barseem crops in rotation to amelioration strategies on saline-sodic soils.
- To educate farmers invited at the "Kissan Mela(s)" about the reclamation technologies for salt-affected soils using low quality water.

Achievements during the period under report

Wheat: TW– CW + G @ 50% WGR vs TW – CW+ Gypsum @ 100 %WGR

On the basis of one year results, gypsum affected better and faster improvement in pH_s, EC_e, and SAR. It is concluded that saline-sodic water with EC and SAR higher than the critical levels of 1 and 10 dS m^{-1}, respectively could successfully be used to reclaim saline-sodic (sandy loam) soils following rice-wheat and sorghum-barseem crop rotations. No significant change in physical properties of soils was observed because improvement in these properties is a long term process. Addition of gypsum proved much better for rice and wheat crops. Rice proved better crop for soil amelioration while wheat yielded better and thus contributed more for net benefit than rice. Sorghum proved a better crop for soil reclamation whereas barseem gave better yields and thus increased the net benefit to farmers. Although salt-affected soils and saline-sodic water resources are often viewed as representing major environmental and agricultural challenges, yet such soil and water resources can be productively used.

Technology Transfer Activities: Three meetings were held with the farmer community of nearby villages in which contact farmers also participated. In these meetings, farmers were educated about the causes of salinity and different aspects of the technology used in the designed studies. Common problems of farmers like fertilizers recommendations, seed rates, crop rotation etc. were discussed and proper recommendations were given accordingly. Further, farmers were motivated to get their tube well waters and soils

Rice: TW– CW + G @ 50% WGR vs TW – CW+ Gypsum @ 100 %WGR

Sorghum: TW– CW + G @ 50% WGR vs TW – CW+ Gypsum @ 100 %WGR

analyzed to evaluate their salinity status for effective recommendations to overcome salinity associated problems. Field activities at Proka Farm II were telecasted on TV Channel (Sohni Dharti).

TT-03/07: Improving Water Use Efficiency of Cereals through ACC-Deaminase Biotechnology

Name of PI : Prof. Dr. Muhammad Arshad (*T.I.*), Inst. Soil & Env., Sci., UAF
Date of initiation : 1-1-08 (duration: 3 years)
Total Cost : Rs. 2.485 million
Funds released : Rs. 1.802 million
Funds utilized : Rs. 1.701 million

Main thrust/theme

Water scarcity in agriculture sector is becoming very serious problem in hampering the crop yields. One of the several strategies to reduce the pressure on scarce water resources could be to increase the efficiency of water use in agriculture. One strategy to overcome the limitation of plant growth by soil drying could be to promote root gro wth to allow water uptake from greater soil volume. Ethylene is a plant hormone that is involved in the regulation of many plant physiological responses especially under stress conditions. Water stress has been extensively associated with elevated release of endogenous ethylene by the plant which results in root growth inhibition dramatically. It is highly likely that sensitivity of plants to water stress might be due to a sharp surge in ethylene production. It implies that the regulation of ethylene under water stress conditions can eliminate the inhibitory effects of water stress on plant growth. 1-Aminocyclopropane-1- carboxylic acid (ACC) is the immediate precursor of ethylene in higher plants. Fortunately, there are certain plant growth promoting rhizob acteria (PGPR) which contain a unique enzyme, ACC-deaminase that hydrolyses ACC and decreases ethylene in inoculated plant roots. It is well established fact that inoculation of seed/plant with these PGPR increase growth of inoculated plants. More root growth can result in better water use efficiency through exploiting greater soil volume. In the laboratory of Soil Microbiology and Biochemistry, Institute of Soil & Environmental Sciences, several indigenous strains of PGPR containing ACC-deaminase were isolated from the rhizosphere of wheat and maize. These PGPR were screened for growth promoting activity in wheat and maize under axenic conditions. A direct correlation was found between ACC-deaminase activity of the PGPR and root growth. Under natural field conditions, PGPR containing ACC-deaminase activity showed very promising results for improving growth and yield of inoculated plants even in the presence of high levels

of nitrogenous fertilizer. These rhizobacteria were also used effectively in rhizobium consortia inoculants to increase nodulation in legumes. All these studies clearly demonstrated that plant growth could be controlled by either changing the ethylene synthesis endogenously and/or in the close vicinity of root through careful selection of rhizobacteria to be used as inocula. Therefore, the project is aimed at enhancing growth and yield of wheat (*Triticum aestivum* L.) and maize (*Zea mays* L.) by improving water use efficiency through bacterial ACC-deaminase activity at local farms. A biofertilizer will be prepared using the PGPR containing ACC-deaminase activity. The quality parameters and consistency of biofertilizer will be defined to use under field conditions. Then the biofertilizers will be provided to the farmers for improving crop production under water stress conditions. Adoption of this technology will help in increasing yield of cereals by improving water use efficiency and resultantly, pressure on water resources could be decreased.

Objective

- To improve water use efficiency of cereals through ACC-Deaminase Biotechnology

Achievements during the period under report

In the first two year trials conducted in District Toba Tek Singh, PGPR (Q-7 and ACC-14) found effective were used to prepare the biofertilizers by using different kinds of compost (enriched with SSP, rock phosphate or urea) as carrier of bioinoculants. Inoculum was applied as seed inoculation or as inoculated compost (biofertilizer). Improved growth and yield parameters due to inoculation from same amount of water were used which served as an indicator of better water use efficiency. Results revealed that seed inoculation or inoculated compost (biofertilizer) caused significant increases in growth and yield parameters of wheat, sorghum and maize over respective uninoculated NPK control under variable no. of irrigations. However, inoculated organic fertilizer (biofertilizer) was the most effective treatment. Since, less than optimum no. of irrigations were applied which may imply that the technology is useful in promoting the growth and yield of wheat, sorghum and maize under limited water supply. Two Farmer's field day were held on 5th December, 2009 at the Farm of Muhammad Shahid, Chak No. 519 G.B. and 24th April, 2010 at the Farm of M Naveed, Chak No. 381 J.B. Toba Tek Singh. Farmers themselves observed better plant growth in response to seed

inoculation or band application of compost based biofertilizer, as compared to uninoculated NPK control in the field.


Trials conducted in collaboration with Farmers of Toba Tek Singh

TT-04/07: Computer Assisted Identification of the Large Ruminants

Name of PI : Prof. Dr. Muhammad Younas, Faculty of Animal Husbandry, UAF
Date of initiation : 1-7-08 (duration: 3 years)
Total cost : Rs. 4.204 million
Funds released : Rs. 3.308 million
Funds utilized : Rs. 3.190 million

Main thrust/theme

Animal identification is an important consideration for improving animal performance, maintaining proper records for further selection and breeding decisions. A variety of identification systems have been practiced in modern dairy farms and experimental stations. The well known systems in vogue are (i) The conventional components attached to the collar around the animal's neck (2) Calvin gate system (3) special integrated circuits, (ICs) with minimum size of transponders (4) systems of identification and registration of animals to control their movements from birth to slaughterhouse. Any system to be adopted must match with the ISO certification and WTO standards. The main objective of the project is the atomization of the dairy herd kept at Livestock Experiment Station (LES), UAF through electronic IDs using neck chain transponders (NCT) and rumen boluses (RB) identifiable by the computer reader devices. The large

ruminants, buffaloes were selected to put under these electronic identification devices (EIDs). The animals when walked in milking areas were identified by EIDs so that their milk recording is made through milking machine, correct and entered in the record. A model system of animal identification for Pakistani conditions will be developed that will be economical and affordable. The system may be adopted by the peri-urban dairy farmers, progressive breeders and fattening units, etc.

Objectives

- To compare the computerized ID devices like transponders and rumen boluses, their application safety and durability.
- The efficiency of reading and recognizing the devices.
- The trends and extent of providing a temper proof system, cost effectiveness and management ease.
- Daily behavioral responses of large ruminants to these devices.

Achievements during the period under report

The main objective of the project was to introduce computerized identification system at the Livestock Experiment station (LES), UAF. Neck Chains Transponders and Ceramic Rumen Boluses were used on lactating buffaloes. These electronic devices i.e. transponders and rumen boluses were compared with control group on traditional tattoo numbers or ear tags. It has been concluded that this system can be adopted for our dairy animals successfully. The milk production data, behavior and health status of lactating dairy buffalo observed during study period suggest that this system can be used efficiently for our dairy animals. At present this system seems to be more feasible for large dairy enterprise to be run on commercial basis as all the electronic devices have to be imported. By the advent of corporate farming and commercial ventures, the Ids system has to match the efficient management and proper recording of animals. Some affordable system will be developed to provide future replication incentives in the livestock industry and are expected to lead to efficient management of dairy enterprise.

TT-10/07: Demonstration of Multinutrients Foliar Feeding Technology for Sustainable Crop Production

Name of PI : Dr. Muhammad Yaseen, Associate Professor, Inst. Soil & Env., Sci., UAF.
Date of initiation : 1-1-08 (duration: 3 years)
Total Cost : Rs. 2.244 million
Funds released : Rs. 1.803 million
Funds utilized : Rs. 1.752 million

Main thrust/theme

Micronutrients play an active role in the plant metabolic processes starting from cell wall development to respiration, photosynthesis, chlorophyll formation, enzyme activity, nitrogen fixation and oxidation-reduction reaction. The decreased amount of available micronutrients in soils and their limited uptake by plants widen the gap between potential yield of a crop and average farmer's obtained yield of that crop. To narrow down this gap, foliar feeding of micronutrients emerged as an innovative technology as it can be 10 to 20 times more efficient than soil application. However, this efficiency is not always achieved in actual practice due to unfavorable weather and improper formulation and application techniques. Therefore, judging what foliar materials to apply, when to apply and how to apply are important principles to make best uses of this technique. The addition of an appropriate appetizer/activator/bio-stimulant to micronutrients formulation could be effective to maximize efficiency of foliar feeding of multinutrients and also made it cost-benefit. Outcomes of extensively conducted trials on farmer's fields and feedback from farmers about foliar feeding of multinutrients created dire need to disseminate this technology in local farming community. Therefore, present project was used as an extension tool to teach farming community of Tehsil Toba Tek Singh about the benefits of newly emerging and innovative technology of foliar feeding of multinutrients.

Objectives

- Demonstration of foliar spray for improving crop production on farmer's field with farmer's doses of soil applied fertilizers.
- Improving nutrient use efficiency by foliar feeding of multinutrients.
- Development of protocol for foliar application for optimum return under field conditions.
- Estimating cost-benefit ratio of the technology.
- Dissemination of technology by holding farmers' field days.

Achievements during the period under report

The basic objective of this technology transfer program was to persuade farmers to adopt new innovations in the field of agriculture by using basic extension principles i.e. visit to farmer's fields, teaching on site by demo-trials and group discussions. A series of demonstration experiments were conducted on farmer's field in nine different Chaks of Tehsil Toba Tek Singh. Multinutrients @ 500, 1000 and 1500 ml acre^{-1} were applied as foliar spray on wheat and cotton crops without disturbing farmer's followed agronomic practices. Treatments of 1500 ml acre^{-1} foliar spray increased wheat grain and seed cotton yields up to 25-35% due to increase in all growth and yield contributing parameters of both the crops compared to control. Similarly, maximum uptake of macronutrients (N, P & K) and micronutrients (Fe, Cu, B, Mn & Zn) by wheat grains was observed in this treatment indicating production of higher yields probably due to efficient uptake of nutrients. Therefore, results on all sites concluded that application of multinutrients foliar spray @ 1500 ml acre^{-1} was found most effective; however it was closely followed by the application rate of 1000 ml acre^{-1}. Comparative results on growth parameters of wheat and cotton between sprayed and unsprayed plots were shown to mass gatherings of farmers of project and surrounding areas by holding a farmer's field day on 11th April at Chak 378JB for wheat crop. Distinguished feature of these two farmer's field days was that the outcomes of foliar feeding technology were demonstrated by farmers themselves instead of principal investigator and his team. Secondly, this technology transfer program motivated farmers so successfully that now they are applying this technology for raising production of not only wheat and cotton but also other crops especially for citrus production. Overall, the main successful achievements of this project are two i.e. income generation and registration of foliar spray under the trade name of *Uni-Micropower*. Results of all demonstration trials and scale of income generation elucidated that farmers of the area were fully convinced to adopt the technology.

Farmer's Field Days

TT-21/07: Construction of Mobile Dip and Demonstration and Dissemination of Its Use for Tick Control

Name of PI : Prof. Dr. Zafar Iqbal, Deptt. of Veterinary Parasitology, UAF
Date of initiation : 1-1.09 (duration: 3 years)
Total cost : Rs. 1.862 million
Funds released : Rs. 0.942 million
Funds utilized : Rs. 0.808 million

Main thrust/theme

Like other parts of the world, tick infestation is one of the major problems of livestock industry in Pakistan. *Boophilus (B) microplus* is the commonest and most dangerous of all the species of hard ticks parasitizing buffalo and other livestock in Pakistan. Ticks cause heavy blood losses in cattle in addition to their role as a vector in the transmission of protozoal, bacterial, viral and ricketssial diseases. Chemical control of ticks is the most widely used practice throughout the world despite development of resistance against the commonly used acaricides and risks associated with their use. One of the concerns of the farmers is the cost of chemical control. In Pakistan, farmers usually use the injection of avermectins to keep their animals tick free during the season of peak tick infestation. High cost of avermectin injections compared to treatment with other wetable acaricides, treatment cost paid to veterinary staff for drug administration and time consumed in handling of individual animals for injecting the drugs are major drawbacks associated with this practice. Use of plunge dips is the most economical and easiest method of treating large animals with acaricides in less time. In this method, only three to four people can treat hundreds of animals at one time. The plunge dips either mobile and/or their modified form can be constructed at communal level and during the peak tick season, the whole village can use this facility to treat their animals, by sharing the treatment cost. That is why current project was designed to (i) educate the farmers regarding tick and tick born disease and different control strategies, (ii) construct the dip to demonstrate its use and convince other farmers to adopt this treatment method and to (iii) detect the development of resistance in ticks against commonly used acaricides in Pakistan.

Objectives

- To demonstrate the use of mobile dip for the control of ticks on animals
- To increase awareness of the farmers on tick biology, their role in transmission of diseases and management strategies
- To investigate the development of resistance in ticks against commonly used acaricides

Achievements during the period under report

The activities during the reporting period included (i) collection and identification of tick samples, (ii) demonstration of using animal dips for the control of ticks, (iii) efficacy of cypermethrin as an acaricide, (iv) investigations on tick resistance against acaricides and (v) farmers days for awareness. The taxonomic studies on ticks revealed presence of *Hyalomma marginatum* and *Boophilus microplus* in the study area. Therefore, there was no addition in the record of species of ticks. Animal dip technology introduced in the field was well accepted by the farmers and was effective, economical and convenient to use. Cypermethrin used was found very effective in reducing the tick burden on the animals. For investigations on tick resistance, tick colonies were established and work is under way. Awareness on the tick biology, their role in transmission of diseases and management strategies were communicated to the farmers through group discussions, printed materials and demonstrations. During the last year of the project, efforts will be made to expand the activity to the other villages of the study area.

Acaricidal solution is being prepared in the DIP

A farmer taking his animal to the DIP

Animal being washed out in the DIP

A farmers gathering at farmer's day

TT-23/07: Use of Sodium Bicarbonate for optimum weight gain of growing buffalo calves and goats

Name of PI : Prof. Dr. Muhammad Sarwar, Director, Inst . Ani. Nut. & Feed Tech., UAF
Date of initiation : 1-1-08 (duration: 3 years)
Project cost : Rs.2.0980 million
Funds released : Rs.1.622 million
Funds utilized : Rs.1.519 million

Main thrust/theme

Constant supply of nutrients is part and parcel for attaining optimal growth in growing ruminants. However, hot and humid environment has always been a constant threat

to growing goats which not only limit feed consumption but also hamper their weight gain and thereby profitability associated with this enterprise. Higher nutrient demand because of higher metabolic activities are usually satisfied by incorporating nutrient rich feed ingredients in growing animal feed. Fermentation of rapidly fermentable feed ingredients usually reduces rumen pH by increasing the overall volatile fatty acid production and may lead to ruminal acidosis which not only reduces nutrients intake but also compromise growth in growing goats. Decreased feed intake is considered one of the main attributes of decreased rumen pH in hot-humid environment. Different nutritional strategies have been proposed to increase feed intake and weight gain in growing ruminants with varying degree of success. Supplementation of sodium bicarbonate (SB) seems to be a practical approach to dilute or eliminate the adverse effects of feeding high concentration diet in hot-humid environment by increasing the feed consumption through counteracting ruminal and systemic acidosis. Increased nutrients consumption by supplementation of SB has been documented in exotic dairy cows in various foreign studies while scientific literature regarding SB effects in growing goats under tropical conditions is scanty. Furthermore, physiological status, productive potential and feeding strategies of growing goats reared in tropical conditions vary from that of ruminants reared in temperate region. So, direct application of SB outcome obtained from experiments conducted on exotic large ruminants on growing goats under tropical conditions may not be a wise act. Therefore, the present study was planned to examine the influence of varying level of SB on nutrients intake, their digestibilities, nitrogen balance and weight gain in growing goats.

Objectives

- To determine the influence of varying sodium bicarbonate levels on parameters like nutrient intake, nutrient digestibility and nitrogen metabolism in calves and goats
- To determine optimum weight gain in growing calves and goats
- To disseminate research outcome to the farming community through seminars/ workshop and farmer day activities

Achievements during the period under report

A demonstration study was conducted in Toba Tek Singh by involving five different goat farmers of the district. Sixty growing goats, twelve goats from each farm, of almost

similar age (24-32 week old) were selected to observe/demonstrate the potential benefits of adding sodium bicarbonate (SB) in the diet for weight gain at farmer's field in Tehsil Toba Tek Singh. Five diets with similar energy and protein contents were formulated containing 0, 0.40, 0.80, 1.20 and 1.6% SB concentration. Ingredients availed at farmer level was used for the formulation. Duration of the trial was 12 weeks, with first 3 week as adaptation period while each week after every three week served as collection period and there were three collection periods. Goats received ad libitum feed but 10% weigh back during collection period. Feed was offered twice a day while drinking water was made available round the clock. Upon termination of the trial, a farmer's day was organized on 13th Nov.2009 at the location of experimental site in T.T.Singh to educate and encourage the farmers to use SB in goat diet for increased weight gain. Leaflets reflecting the outcome of the trial in Urdu language was published and distributed among the farmers. A big number of farmers (about 300) attended the event.

TT-29/07: Epidemiology of parasitic fauna of domestic animals of Tehsil Toba Tek Singh

Name of PI : Prof. Dr. Muhammad Nisar Khan, Department of Parasitology, UAF
Date of initiation : 1-1-08 (duration: 3 years)
Total cost : Rs. 2.332 million
Funds released : Rs. 1.667 million
Funds utilized : Rs. 1.459 million

Main thrust/theme

Parasitic infections are one of the greatest causes of diseases worldwide causing lowered livestock productivity leading to economic losses at national level. There are two types of parasites, endoparasites and ectoparasites. They cause retarded growth

lowered productivity, mortality and high economic losses. There are a number of factors that influence the prevalence of endoparasites. These include age, sex, breed, worm population, weather condition and husbandry or management practices. In Pakistan, earlier studies indicated that prevalence of parasitism in ruminants of various regions rang from 25.1 to 92 % but none of these studies reported risk factors influencing the parasitic diseases. In this project prevalence of parasitic diseases will be documented and associated risk factors influencing parasitism will be determined which will provide baseline data in planning control program in the study area. After documentation, deworming schedule will be made and transferred to local dairy farmers in the study area. Guidelines to the farmers will also be provided regarding associated risk factors influencing parasitism to end with control of parasitism in the study area resulting in reduction of economic losses to the dairy industry in the study area.

Objectives

- To estimate economic losses incurred by various parasites
- To evaluate the efficacy of commercially available anti-parasitic drugs against various parasites.
- To transfer the latest technology/information to the dairy farmers regarding the control of parasites.
- To train the farmers for safe deworming.

Achievements during the period under report

A study was carried out to determine the economic value of treating cattle and buffaloes with anthelmentic and anticoccidials. Screening of cattle and buffaloes was done for presence of helminthes by examination of fecal samples. Positive animals were divided into four groups; two of cattle and buffaloes each so that each group consist of 25 animals. Oxyclozanide medicated buffaloes (E= 96.66%) and cattle (E= 95.64%) showed a significant decrease in fecal egg counts on day 14 post-treatment. An average daily increase of 0.89 and 0.71 liters of milk along with 0.42 and 0.37% more fat per buffalo and cattle, respectively was observed in Oxyclozanide medication. The economic value of reduced production of infected animals was estimated as US$ 0.47 (Pak Rupees 40) and US$ 0.41 (Pak Rupees 35) per animal per day for cattle and buffaloes, respectively. In second experiment 45 goats positive for coccidiosis were randomly divided into three groups and treated with Tolrazuril, Amproium and third was non-medicated. On day 7 of treatment, all goats of group B

(Toltrazuril treated) stopped shedding oocysts while 8 (53.33%) goats of group A (Amprolium treated) stopped shedding oocyst. After the treatment, goats of group B gained 2.2 kg body weight over a period of 15 days compared 1.2 kg weight in group. The lowest weight gain (0.5 kg) was weighed in goats of group C (non-medicated). It is concluded that control of goat coccidiosis through single treatment of toltrazuril is economically beneficial.

Farmers' day

Oral medication of Oxyclozanide

TT-31/07: Dissemination of Technologies for Profitable Dairying at Farmer's Level.

Name of PI : Dr. Muhammad Qamar Bilal, Associate Professor, Dept. Livestock Management, UAF.
Date of initiation : 1-1-08 (duration: 3 years)
Total Cost : Rs. 2.319 million
Funds Released : Rs. 2.024 million
Funds Utilized : Rs. 1.960 million

Main thrust/theme

In Pakistan, animal production is increasing at slower rate compared to human population resulting in deficiency of animal protein in the diet of our people. The annual milk is over 36 million tons but still country has to import milk and milk products to fulfill the domestic demand. There are many factors of low productivity in Pakistan but limited genetic potential exploitation mainly due to under feeding, high incidence of diseases and farming on traditional lines are leading factors. It is imperative to ensure regular provision of quality feed and fodder even during slump periods because our animals are underfed both in quantity and quality resulting to produce less milk. Reduction in cost of feeding and regular supply of quality fodder is possible through training/educating the farmers about high yielding fodder varieties, proper stage of fodder cut, silage making, straw treatment, urea molasses blocks and ration formulation. Reduction in economic losses due to diseases is imperative as they are very high at farmers' level. Due to diseases not only production losses occur but also milk quality is deteriorated mainly due to mastitis. To increase quality milk production at national level, it is imperative to keep dairy animals healthy. It is possible through training of the farmers about vaccination, dipping, deworming and mastitis control program (milk screening test, milk let down techniques, milking methods and teat dipping). It is expected that effective dissemination of above mentioned management techniques will lead to boost milk production, improve the financial status of the farmers and strengthen the dairy sector and national economy. In study area (TT Singh) farmers have huge population of dairy animals but managing/raising them on traditional lines that results low profit. Hopefully, the knowledge of farmers about profitable dairying and financial status of the farming community will improve to a lager extent as a result of project activities.

Objectives

- To introduce the technologies in field with farmer's participation to reduce calf mortality and age of maturity in heifers.

- To train farmers about technologies related to feeding management of dairy animals.
- To introduce the dairy herd health management packages at farmers' level.

Achievements during the period under report

Technologies related to feeding management (silage making and phosphorous supplementation) and health management (vaccination, deworming, dipping, methods of milk let down and milking) of dairy animals were disseminated. Silage was found to be the best substitute of green fodder. Super juice was found very effective to control pica and to improve the body condition in heifers. In lactating animals, milk yield also increased due to phosphorous supplementation. Deworming and dipping improved the health and production status of dairy animals. Farmer's learned the way of vaccination and best methods of milk let down (by concentrate) and milking (by full hand). Farmer's awareness and adoption trend about recommended technologies disseminated in 2nd year increased to a large extent (urea treated wheat straw, 91.66%; urea molasses block 75%: ration formulation 83.33%). Four farmer's days were organized on 03-10-2009, 20-12-2009, 10-04-2010 and 20-06-2010. Farmers responded very well and showed extra-ordinary interest towards the adoption of recommended practices.

Demonstration of silage making

Demonstration of vaccination

Farmer's day on 02-06-2010

Demonstration of milking method

Demonstration of deworming and ticks control

TT-34/07: Survey and management of mite pests of stored grains in Tehsil Toba Tek Singh

Name of PI : Dr. Muhammad Hamid Bashir, Assistant Professor, Department of Agri. Entomology, UAF
Date of initiation : 1-1-08 (duration: 3 years)
Total cost : Rs.2.173 million
Funds Released : Rs.1.585 million
Funds Utilized : Rs.1.294 million

Main thrust/ theme

Stored grain and stored product mites are a serious problem throughout Pakistan. They not only damage stored grain but also cause occupational health problems to farmers and workers associated with grain storage and milling. The mites cause both qualitative as well as quantitative losses. The flour prepared from infested grains has more tendency to stick together, acidic and hygroscopic in nature, having a fusty smell. As a result of their infestation, along with weight reduction, the grain looses the viability. They penetrate the seed from the micropylar end and initially consume the embryo of the seed. The infested seed thus looses the viability. In cases of severe infestation the entire contents of the grains may be consumed. The short developmental cycle at optimum conditions favours rapid population growth. These mites may cause secondary damage by raising the moisture contents and generating much heat which subsequently favours the bacteria and fungi that will deteriorate the quality of the produce. These situations need comprehensive studies on the collection, identification and distribution of the mite pests. The studies on the ecology, biology and control are also needed. The studies will be conducted for identification and control of these mites. The same will be conveyed to the farmers.

Objectives

- To elucidate the exact picture of incidence and losses caused by different mite species.
- To explore the existence of different mites in different localities of Toba Tek Singh, Punjab.
- To evaluate/ explore different mite pest management strategies culminating into integrated pest management.
- To develop a strategy in order to control and management of stored grain mite pests.
- Demonstration / dissemination of technology by holding farmer's field day with the collaboration of the extension field staff of the area.

Achievements during the period under report

During the reporting period, one new species *Rhizoglyphus tritici* was collected and identified from many villages of tehsil Toba Tek Singh from wheat samples. Addition of this species made a total of 6 species of stored grain mite pests from tehsil Toba Tek Singh. Out of these, two were new to science. Mite pests played a role in reducing the

PI addressing a farmer day

Wheat grains damaged by mites

germination of the seed from different localities of Tehsil Toba Tek Singh at farmer's holdings. The results revealed that mite population had negative correlation with germination of the seeds of maize, mung and wheat after storage of three months under laboratory conditions. A significant positive correlation existed between infestation and mite population in seed of all the commodities.

Studies on the acaricidal activities of extracts from locally available plants *Datura ferox* and *Melia azedarach* and bifenthrin were carried out. The data were recorded after 1,2,3 and 4 weeks. Aqueous extracts of plants were used in concentrations of 100%, 50%, 25% 12.5% and 6.5%. While bifenthrin was used in concentrations of 100, 50, 25, 12.5 and 6.25 ppm. *Datura ferox* and *Melia azedarach* gave maximum mortality at 100 % concentration during all the experimental time. Similar results were recorded from bifenthrin. All the concentrations inhibited the population buildup. Maximum population was inhibited at the concentration of 100 ppm. Besides corner meetings seven large farmer meetings were arranged in the project area to demonstrate the innovative technologies.

TT-35/07: Dissemination of Raised Bed Technology to Address water Shortage in Irrigated Areas

Name of PI : Prof. Dr. Rai Niaz Ahmad, Water Management Research Centre, UAF.
Date of initiation : 1-1-08 (duration: 3 years)
Total Cost : Rs.1.907 million
Funds Released : Rs.1.256 million
Funds Utilized : Rs.0.897 million

Main thrust/theme

Growing of corps on raised beds is one of the improved irrigation methods being practiced all over the world with several advantages which are well documented. But unavailability of the suitable machinery to help grow our major crops using this method was the major limitation. However, farmers have been found to use ridge-furrow irrigation method for growing certain crops in the county which is not a substitute for bed-furrow planting method when compared on the basis of water savings and increased crop productivity. The Water Management Research Centre (WMRC) of the University of Agriculture, Faisalabad designed and developed a four rows wheat beds planting machine which makes two beds and three furrows along with sowing in a single operation. The bed-furrow method provides an opportunity to farmers for the inter-cropping of sugarcane in growing wheat during March. The machine has been improved to plant cotton and maize on beds as well. The machine is locally fabricated and can easily be further improved for different situations. Keeping all this in view, it was planned to transfer this technology (machine) to the farmers for its test, demonstration, and fine tuning after getting feed back from he farmer's community.

Objectives

- To introduce **University Bed Planter** to grow cotton and maize on bed-furrow system for improving their water productivity;
- To demonstrate Raised Bed Technology and Laser Land Leveling at Farmer's fields in comparison with traditional irrigation practices;
- To search and address the constraints, both at the farmers and technology level, to adopt the raised bed technology among farming community.

Achievements during the period under report

The project activities in this financial year (July 2009 to June 2010) continued with data collection regarding yield and water saving from already planted cotton on 48 acres. The autumn maize bed planting demos were established on 13 acres in the month of July, 2009. Final results at the end revealed 10-30% increase in yield of maize under bed planting in comparison to ridge planting with 29.42% water saving. Spring maize trails were also conducted on about 15 acres in Rabi 2009-10 in different villages viz. 251/GB, 253/GB, 258/GB and 267/GB, where 13.91% increase in yield was recorded with 33.15% water saving. Cotton bed planting resulted in 10-15% increase in yield with 34-42% water saving in comparison to ridge sowing. Farmers greatly appreciated the technology and due to its promising results, the area under cotton bed planting in Kharif 2010 increased up to 1000 acres, out of which 73 acres were selected for research and data collection in different villages viz. 247/GB, 249/GB, 251/GB, 258/GB, 267/GB, etc. This farmers' adoption of technology on hundreds of acres in the project area is an indication of the high acceptance of this technology by the farmers.

Cotton on beds

Maize on beds

TT- 38 /07: Investigating Aquifer Storage and Recovery Techniques to Recharge the Saline Groundwater at Farmer's Field

Name of PI : Prof. Dr. Allah Bakhsh, Department of Irrigation & Drainage, UAF
Date of initiation : 1-1-08 (duration: 3 years)
Total Cost : Rs. 2.333 million
Fund Released : Rs. 1.842 million
Funds Utilized : Rs. 1.609 million

Main thrust/theme

The techniques of storing surplus good quality water into the aquifer and pumping the same water during periods of high crop water requirements is called Aquifer Storage and Recovery (ASR). ASR techniques are cost effective alternatives which aim at storing surplus water during flood periods and recovering it during times of water shortages. These techniques provide an option to the farmer like water bank deposit especially when the groundwater quality is brackish. These techniques are being used in USA, and Australia and in many other countries. ASR may be a new concept in Pakistan and needs to be tested and adapted to overcome the water shortages in the country. Therefore, this research project was designed to focus on evaluating the aquifer storages and recovery concept at the farmer's fields based on its technical, economical and environmental impacts. The aquifer was investigated, recharged, monitored and evaluated for groundwater qualities of the injected and pumped water to determine the aquifer recovery efficiency and aquifer suitability. The project outcome has resulted in the development of groundwater recharge technique (ASR) which will help in promoting the sustainable use of groundwater resources by controlling the falling water table and minimizing the secondary salinization issues in the saline zone of groundwater throughout the country.

Objectives

- To study the physical and chemical characteristics of the aquifer planned for Aquifer Storage and Recovery (ASR) techniques in the saline groundwater zone of Tehsil Toba Tek Singh at farmer's field using resistivity survey meter.
- To investigate the effects of volume, rate and periods of surplus water storage on groundwater quality and lateral and vertical extent of the injected water in the aquifer.
- To monitor the quality of groundwater injected and pumped and evaluate the recovery efficiency and suitability of the aquifer for implementing the ASR concepts by ensuring the farmer's participation and the Agri. Extension personnel.

Achievements during the period under report

After installation and development of pumping well, ASR mechanism was designed and built at Chak No. 405/JB, T. T. Singh to treat the canal water before injection into the aquifer. The water treatment tank consisted of three sections: 1. Inlet section with screens for receiving canal water and removing debris material; 2. Silting section for allowing sediments to settle; 3. Filtration section for removing finer sediments. After completion of ASR mechanism, volume of 51 m^3 (51000L) was injected at the rate of 1.06 m^3/min (0.625 ft^3/sec) and was stored for 7 days, which was recovered and water samples were collected to monitor the change in the quality of water. After recharging the aquifer, the native groundwater quality improved as a result of mixing of injected water with the native water, which has EC of 4 dS/m. Water was injected under gravity for 48 min and was recovered completely during 28 min. As pumping continued the pumped groundwater quality changed from 1.05 to 4 dS/m Fig 2. Similarly recovery efficiency increased but recovery efficiency depends on limit of permissible EC of pumped water. For example for EC of $\leq$ 3 dS/m, the recovery efficiency was 83%. For complete recovery i.e. when groundwater attained the EC of native groundwater, the recovery efficiency was 125%.

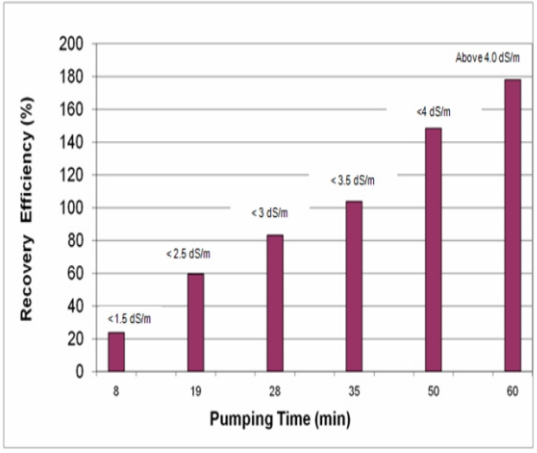


Fig.1 Pumping Time and Recovery Efficiency

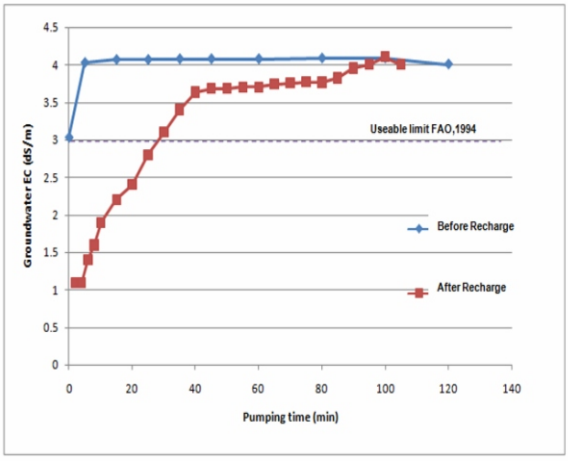


Fig.2 Relationship between EC and Puming Time

The design, installation and testing of ASR technology showed that it can serve as a feasible subsurface storage and can be used as a substitute of surface water storage, which can minimize water loses, save land and can serve as a subsurface water bank. The system is capable of storing water and delivering it at the time of peak water requirement. It is a reliable method to recharge the groundwater and may also be called as "Reverse Tubewell". More treatments are under process to investigate its different aspects such as different volume of injected water and different retention times. The benefits of ASR system have been demonstrate d to the farmers of the area by arranging farmer's day on December 22, 2009 and June 30, 2010. A conference also has been planned to share the experience and knowledge of using ASR technology for storing water in the aquifer during water surplus period and recovering it when needed.


PI Demonstrating ASR Technology at farmer day

TT-43/07: Control of Newcastle Disease in Rural Poultry of District T.T. Singh

Name of PI : Dr. Muhammad Arsha d, Associate Professor, Department of Veterinary Microbiology, UAF
Date of initiation : 1-1-08 (duration: 3 years)
Total cost : Rs.1.967 million
Funds released : Rs. 1.271 million
Funds utilized : Rs.1.259 million

Main thrust/theme

Poultry eggs and meat are valuable sources of protein in the era of protein insufficiency in Pakistan. The products from rural poultry are always ranked higher by the consumer due to delicious taste. Poultry industry in Pakistan is the back bone of our commercial as well as rural economy. It contributes significantly to Nation's GDP. There are about 1105.91 million poultry birds in Pakistan, among which rural poultry is about 152.44 millions. It plays a vital role in the village economy with the contribution of up to 3611 million eggs and 100.41 metric tons of the total poultry meat. Newcastle disease caused by a virus is the top ranking disease of rural poultry in Pakistan. Sero-prevalence of ND in unvaccinated rural poultry in district Faisalabad was recorded as 40.5% . The present project was, therefore, started to apply the already standardized epidemiological techniques to control the disease in rural poultry of Tehsil Toba Tek Singh. Practical demonstration of vaccination, meetings, lectures, farmer days and pri nted material is

creating awareness in rural population of the area to control the most important disease of rural poultry.

Objectives

- To involve rural families/persons having poultry to create awareness for the control of ND in rural poultry.
- To apply epidemiological techniques on ND in rural poultry of the area.
- To introduce the scientifically designed ND control program for rural poultry in the area.
- To reduce economic losses caused by the disease in rural poultry.

Achievements during the period under report

PI discussing with rural women

Five villages were randomly selected and more than 425 families/persons were registered during the year. Sero-prevalence of ND was measured in birds of five selected villages and found as 40.2 %. All the birds of five villages were vaccinated against ND at an interval of 10 weeks. The people of the five villages were given awareness about control of ND through broachers, lectures, small meetings. The young people of the villages were trained for vaccination of their birds against ND. Post-vaccinal antibody titres were measured against ND in egg yolk/sera of the vaccinated birds in the five selected villages. No outbreak of ND was reported in the five selected villages.

TT-45/07: Distribution and Management of Root-Knot Nematodes (Meloidogyne spp.)

Name of PI	: Dr. Tariq Mukhtar, Associate Professor, Deptt of Plant Pathology, Pir Mehr Ali Shah University of Arid Agriculture, Rawalpindi
Date of initiation	: 1-1-08 (duration: 3 years)
Total cost	: Rs.2.222 million
Funds released	: Rs.1.730 million
Funds utilized	: Rs.1.633 million

Main thrust/theme

To achieve sufficient production essential for maintaining a sustainable supply of food in Pakistan, farmers must be cognizant of plant parasitic nematodes responsible for low yields and appropriate pest management systems because without the expertise to understand the problem, the various management options are of limited value. Root knot nematodes are ubiquitous in distribution and cause immense yield losses to vegetables. Various nematode management strategies include: chemical control, physical control, resistant varieties, use of antagonistic plants and organic amendments, utilization of biocontrol agents, crop rotations etc. Taxila is main producer of vegetables in District Rawalpindi. All the major vegetables grown in this area are attacked by one or the other species of root knot nematodes. There is dearth of information regarding incidence, prevalence and severity of these nematodes in this area. The project under execution focuses on the determination of incidence of these nematodes in tehsil Taxila and their management using all the available strategies.

Objectives

- Determination of the incidence, severity and prevalence of root knot nematodes in different localities of tehsil Taxila.
- Damage assessment of various inoculum levels of *Meloidogyne* species on important vegetables grown in the area.
- Testing different varieties of main vegetables for source of resistance.
- Transfer of expertise relating to nematode management to farmers.

Achievements during the period under report

The incidence and severity of root-knot nematodes was determined on different vegetables grown in Tehsil Taxila during the survey conducted for the reported period. Almost all the vegetables were attacked by root knot nematode and maximum incidence was recorded on cucumber during the period. The incidence recorded on other vegetables was found to be much lower. As regards severity of root -knot nematodes, it was found to be almost low in all the vegetables. The frequency of occurrence of root-knot nematodes was 100.'% in cucumber and bitter gourd. Among different root-knot species, *Meloidogyne incognita* was found to be the most prevalent followed by *M. javanica.* Out of 12 tomato cultivars, maximum numbers of galls were observed in case of Money maker, Chico, Tiny Tim, Savio, Shady Lady, Riogrande, Titano,

Highly infected field of cucumber

Farmers in a training session

Nagina and Peelo and were regarded as highly susceptible. Minimum galls, egg masses and reproduction factor were observed In case of Rutgers and Roma and were regarded as tolerant against both *M. incognita* and *M. javanica.* The awareness regarding identification and management of root-knot nematodes was also created among the farmers and field staff and they are now able to recognize the problem and execute the control measures.

TT-48/07: Demonstration of Light Equipped Power Insect Killer (LEPIK Technology) for Mechanical Insect Pest Control in Cropland

Name of PI : Prof. Dr. Rashid Ahmad Khan, Deptt. Forestry, Range Management & Wildlife, UAF.
Date of initiation : 1-1-08 (duration: 3 years)
Total cost : Rs. 2.243 million
Funds released : Rs. 1.462 million
Funds utilized : Rs. 1.173 million

Main thrust/theme

Use of pesticides against crop pests is hazardous for all living beings therefore alternate biological, mechanical, physical, ecological control measures be introduced and popularized. Currently demonstrated "Light Equipped power Insect Killer" is an effective mechanical insect pest control device which kills all flying insects before egg laying, strengthen biological pest management forces thus minimizes reliance on chemical control.

Objective

- Introducing "Light Equipped Power Insect Killer (LEPIK)" in the field of agriculture for non-chemical control of insect pests.
- Improving efficacy of the LEPIK device by modifying its various parts and using the most attractive light for higher insect response on the basis of field experience.
- Conducting large scale field experiments involving local framers to familiarize this technology in agriculture sector.
- Translating field experience into suitable recommendations, i.e. best time for field operation, optimum coverage speed of the machine during treatment, row to row distance of crops and field size etc. for operating the machines in croplands to achieve better insect control results.

Achievements during the period under report

During the execution of this project, five farmers or team leaders (two big landlords and three small land holders) were selected to use this facility at different localities in the area of Tehsil T.T.S ingh. Collected data show that both small and large farmers were found to be satisfied about the efficacy of this machine however large farmers frequently asked to provide its tractor operated model. Interviews of the respondent farmers and other related field investigations have indicated that weekly cleaning of crops using LEPIK machine gives reliable pest control results. Insect collection during the current year certify the presence of insect Orders like Coleoptera, Lepidoptera, Diptera, Ephemoptera, Hemioptera, Orthoptera, Dermaptera, Plecoptera, Thysanoptra, Homoptera, Mesoptra and Trizoptera while the insects falling under the Orders Diptera (51%), Coleoptera (18%), Lepidoptera (17%) and Hemioptera (8%) were observed in the

P.I. addressing the Kissan Mela

Recent and old model of LEPIK machine.

highest number (n50). During current year, almost 161 hectare area at five localities was successfully treated with LEPIK machine. Cold and windy weather was found to negatively affect the insect response toward this mechanical insect control device. During field trials, mainly susceptible crops like cotton, sugarcane, rice, sesame and all vegetables were successfully treated against insect pests. As far as improvement of the LEPIK machine is concerned, more effective, durable, light weight and compact (without plastic pipe) model has been designed, fabricated and exhibited in the Kissan Mela held on 23.12.2010.

TT-37/07: Impact Assessment and Evaluation of Projects under Endowment Fund at Tehsil Toba Tek Singh

Name of PI : Prof. Dr. Ashfaq Ahmad Mann, Chairman Deptt. of Rural Sociology, UAF
Date of initiation : 1-1-08 (duration: 3 years)
Total Cost : Rs. 3.058 million
Funds Released : Rs. 1.869 million
Funds Utilized : Rs. 1.535 million

Main thrust/theme

The role of the present project is to conduct impact assessment/evaluation of all the projects of Endowment Fund underway in the rural areas of District Toba Tek Singh, in terms of work plan, procedures, objectives and activities of these projects. On the basis of this assessment and evaluation, further suggestions will be made to improve the effectiveness of the use of Endowment Fund for rural development programs. Endowment fund schemes are meant to facilitate skill-development and provide training to the farmers for utilization of new technology. Technology Transfer projects are of different types with specific objectives and methodologies. This study is making an evaluation of the on-going activities from different dimensions from time to time and makes an assessment of their existing work. At the end, suggestions will be made for future research agenda and new development programs.

Objectives

- To investigate the Agro-economic and social characteristics of the people/farmers in the projects area.
- To make evaluation from time to time activities of on-going projects.
- To conduct impact assessment of the projects under Endowment Fund.
- To suggest policy implications and give recommendations for future research, development and technology transfer programs under Endowment Fund at UAF.

Achievements during the period under report

Visits of the projects sites were carried out to observe the proper functioning of the projects under FDTTCP. Meetings with contact persons and communities were made in the villages where activities are going on. In this year the meetings with the women in these villages were also made to know the women perspective and opinion about the new technologies which the projects are introducing in the villages. Because women are also involved in agriculture in these areas especially in poultry and livestock.

Observation of farms and sites were also recorded. Check list, Focus Group Discussions and field/ project sites observation used as tools for evaluation in this period. Meetings with PIs & Project staff were carried out for Sharing knowledge and information on the progress of the projects and location and changes in the location of villages. Separate report of every project prepared and feed back and results discussed with the concerned project teams. Project team observed that there are some projects which are very beneficial for farmers. Few projects' functioning is not up to the mark. Few are not giving the results according to the expectations of the farmers and also not according the objectives of the project. Final recommendations will be formulated after the completion of all ongoing projects.



PI and research Associates interviewing and visiting the project sites

TECHNOLOGY TRANSFER BATCH-II

A: OUTREACH PROJECTS

TT-1/09: Transfer of Pheromone Control Techniques for the Control of Fruit Fly to the Farmers of District Lasbela, Balochistan, Pakistan

Name of PI : Prof. Dr. Abdul Hameed Bajoi, Vice Chancellor, Lasbela University Uthal Balochistan
Date of initiation : 1-3-09 (duration: 3 years)
Total Cost : Rs. 1.576 million
Funds Released : Rs. 0.585 million
Funds utilized : Rs. 0.309 million

Main thrust/theme

Having five distinct Agro – Ecological Zones, any crop, fruit and vegetable can be grown in Balochistan. At present 70-80 per cent of temperate and sub tropical fruits of Pakistan are being grown in Balochistan. Banana, papaya guava, and chicku, melons and cucurbits are the major fruit and vegetable crops of District Lasbela. Although growers of the area have no competition from other areas yet they can not get better price of their produce due to poor quality and disease infested fruits and vegetables. Fruit fly is the main cause of reduced production of the fruits and vegetables in Lasbela district. The project will help to the farmers of Lasbela regarding control of fruit fly through utilization of low cost and sustainable control technology.

Objectives

- To transfer pheromone trap technology to farmers through LUAWMS faculty members and staff of Department of Agriculture Extension Government of Balochistan.

Dr. Abdul Hameed Bajoi, Vice Chancellor of LUAWMS/ Principal Investigator of Project Delivering His Key Lecture on concept and Control of fruit Fly By using Pheromone Control Techniques at Uthal.

- To reduce the use of Agro-chemicals and introduce other methods to control fruit fly.
- To minimize the pollution hazards with maximum out put.
- To increase the production and improve quality of fruit and vegetables in Balochistan.

Achievements during the period under report

The trainings were arranged with collaboration of Agriculture Extension Department and NRSP at farmer fields of Uthal, Bela and Wider. The Fruit orchards specially Guava, Chickoo, Jujube and cucurbits were selected for installation of Traps. The Inhaled Fruit Flies in Traps were varying from crop to crop and area to area. Maximum Population of Fruit Flies (7172 numbers of fruit fly per trap) were observed at winder on Guava crop and minimum population of fruit flies (32 numbers of fruit fly per trap) were observed at Bela on cucurbit. The fruit damages by the fruit fly in these areas were 3-5% less than previous year. Respectively the population of fruit fly was also decreased up to 15%.

Fruit flies attracted on Pheromone trap showing Population of fruit fly in the area and Efficacy of Traps

Demonstration and Installation of Pheromone Traps in an orchard of Guava at Winder

TT-2/09: Salt Affected Soils - Technologies Associated with their Management

Name of PI : Muhammad Anwar Zaka, Assistant Agri. Chemist, Soil Salinity Research Institute, Pindi Bhattian
Date of initiation : 1-3-09 (duration: 3 years)
Total Cost : Rs 1.503 millions

Funds Released : Rs 0.491 millions
Funds utilized : Rs 0.410 millions

Main thrust/theme

Traditional sources of soil organic matter such as animal waste, crop residues and green manure are rapidly declining due to burning of waste / residues and utilization of straw as animal feed. An alternative source of organic matter is municipal solid waste (MSW). The use of composted MSW to agricultural fields is considered a low-cost alternative to open landfill disposal or incineration. Application of MSWC is becoming an important practice to enhance and sustain soil organic matter status and crop production. Although application of MSWC improves nutrient status and physical properties of soil, however, there is justified concern regarding potential accumulation of heavy metals in surface soils including the possible migration of toxic metals into the food chain. This needs development of a well balanced and integrated nutrient management plan that utilizes MSWC in combination with mineral fertilizers. In view of the prevailing situation of water shortage in Pakistan, groundwater is being exploited, of which 70-75 % is brackish. The quality of ground water limits its use for irrigation and soil reclamation purposes moreover rehabilitation of the barren land is needed to meet the food demand of the ever increasing population. Previous research on the poor quality water in Pakistan suggested its management with different amendments for reclamation as well as crop production yet the farm level adoption needs site specific considerations and disseminations to the farming community. Keeping this in view the project was started at three permanent farmer field sites at Shirbaga, Jhugian Pir and Kotmurad Pindibhattian. Integrated nutrient / brackish water management experiments as per plan were conducted using Rice-wheat crop rotation.

Objectives

- To disseminate practically viable, economically feasible and environmentally safe nutrient and brackish water management plan for moderately salt affected soils in rice- wheat cropping system of Punjab, Pakistan.
- To transfer technologies for economic utilization of salt affected soils to farming communities

Achievements during the period under report

Site specific integrated use of chemical fertilizer with municipal solid waste compost (80:20) gave higher paddy / grain yield however it remained non significant with integrated use of chemical fertilizer with MSWC (80:20). Brackish water + gypsum application on the basis of soil and water gypsum requirement produced statistically equivalent paddy/grain yield with canal water + soil gypsum requirement. The application of MSWC along with chemical fertilizer helped for improving soil fertility status with minor increase in heavy metal concentration in soil but less than pollutant concentration. However, environmental concern regarding heavy metals for long term use of MSWC with chemical fertilizer will be concluded after completion of three year studies.

Gathering at farmers' day

Experimental sites in the project area

TT-3/09: A Rural and Peri-Urban Outreach Mastitis Control Program Focusing on Transfer of Technologies Developed by University of Agriculture, Faisalabad

Name of PI : Prof. Dr. Ghulam Muhammad, Chairman Deptt. of Clinical Medicine & Surgery, UAF
Date of initiation : 1-3-09 (duration: 3 years)
Total cost : Rs. 1.737 million
Funds released : Rs. 0.699 million
Funds utilized : Rs. 0.482 million

Main thrust/theme

With at least 20% of cows and buffaloes afflicted with mastitis, this dairy animal disease is one of the most important health problems of dairy animals in Pakistan. Control of mastitis is imperative (a) to reduce the staggering economic losses associated with the disease and to enable the commercial and small holder dairy farmers operate their farms on profitable basis (b) to improve the quality of raw milk available to common consumers and milk processing industry, and (c) to produce milk which is wholesome and conforms to the standards of WTO Accord which may enable Pakistan to enter into milk export market. In a "taking the university to the people" approach, farmers are being trained by **hands-on and 'learning by doing'** training in mastitis control through early detection by Surf Field Mastitis Test, post milking antiseptic teat dipping, systemic dry cow therapy, prompt treatment of clinical cases, vaccination and proper milking and management.

Objectives

- To enable rural and peri-urban dairy farmers diagnose mastitis at an early sub clinical stage with the use of Surf Field Mastitis Test
- To help rural and peri-urban dairy farmers control mastitis through the use of post milking antiseptic teat dipping/spraying, systemic (i.e. in the form of injection) dry cow therapy, use of a Montanide™-adjuvanted *S. aureus* + *Str. agalactiae* bacterin-toxoid mastitis vaccine and prompt treatment of clinical cases and improved milking and management practices.

Achievements during the period under report

Fifty dairy farmers in 3 villages and 2 dairy farmers in peri-urban area of Faisalabad were selected. A benchmark survey (knowledge-aptitude-practice; KAP survey) was conducted as a part of M. Phil thesis. Milk samples from the animals of participating farmers were collected for isolation of mastitis pathogens and determination of antibiogram. Three Farmer Field Days were conducted. Farmers were trained in mastitis control through early detection by Surf Field Mastitis Test (SFMT), post milking

PI Training the farmers

Mastitis vaccine developed for use in the project area

antiseptic teat dipping, systemic dry cow therapy, prompt treatment of clinical cases, vaccination and proper management. Dairy animals of participating farmers were vaccinated with Montanide™-adjuvanted *S. aureus* + *Str. agalactiae* bacterin-toxoid mastitis vaccine. Surf Field Mastitis Test kits and teat dip/sprayer were provided to registered farmers. A female worker of the Department trained the rural women in diagnosis of sub clinical mastitis with the help of SFMT and control of mastitis. In addition, an attempt was made to train the rural youth in the diagnosis, treatment and control of mastitis.

TT-4/09: Technology Transfer for the Control of Inclusion Body Hepatitis Hydropericardium Syndrome in commercial poultry by the use of improved adjuvanted vaccine produced indigenously

Name of PI : Prof. Dr. Iftikhar Hussain, Dept. of Microbiology, UAF.
Date of initiation : 1-3-09 (duration: 3 years)
Total Cost : Rs. 2.691 million
Funds Released : Rs. 1.343 million
Funds Utilized : Rs. 1.148 million

Main thrust/theme

Poultry production has made an astounding progress over the past few years in Pakistan. Despite being well established and well organized, the poultry industry in Pakistan is still confronted with many acute and fatal diseases such as Newcastle disease, infectious bursal disease, infectious avian bronchitis, chronic respiratory disease and hydropericardium syndrome. Of theses IBH-HPS causes huge economic

losses to the poultry industry in Pakistan since 1987. The disease is also called 'Angara' disease in Pakistan, after the place Angara Goth, near Karachi, 'Leechy disease' or 'Litchi disease' in India, after the peculiar appearance of the heart floating in pericardial fluid, which appear similar to the deshelled leechy (lichee) fruit or inclusion body hepatitis-hydro-pericardium syndrome (IBH-HPS). IBH-HPS has been observed in broilers, aged 3 to 5 weeks or over 5 weeks of age and occasionally in layer and breeder pullets aged to 20 weeks. The disease is characterized by its sudden occurrence and high morbidity, with a high mortality of up to 80% in broiler and low mortality of below 10% in layers, associated with hydropericardium. Most of the problems are still uncontrolled, including IBH or hydropericardium hepatitis syndrome. To curtail the problem of vaccine failure a *montanide-adjuvanted* IBH-HPS vaccines will be prepared and evaluated for its protective parameters as compared with different formalin inactivated and oil adjuvanted HPS vaccines.

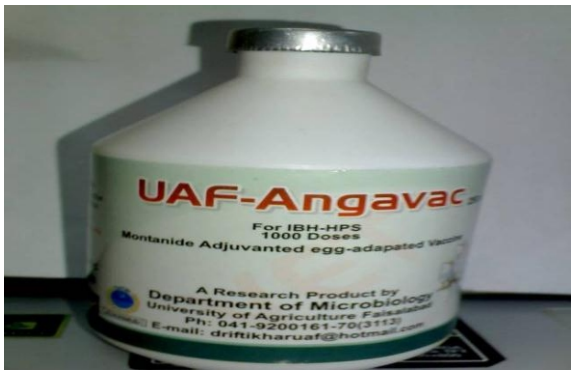
Objectives

- To introduce scientifically developed montanide-adjuvanted IBH-HPS vaccine
- To create awareness to broiler farmers to use the improved montanide-adjuvanted IBH-HPS vaccine developed and produced with indigenous virus seed through demonstration.
- To transfer the vaccine production and development technology to private vaccine producers through a workshop.
- To analyze the reduction of economic losses as a result of montanide-adjuvanted IBH-HPS vaccine using biostatistical techniques.

Achievements during the period under report

Isolation of Indigenous virus and culturing of virus for vaccine was completed and vaccine was prepared. In around Narwala, 50 broiler farms were registered for technology transfer and vaccination. Villages include Chak # 29 JB, Chack # 60 Shahbazpur, Chak # 273 JB, Giala Kalan, Nattho Chak, Chak # 61 JB, Chak # 63 JB, Chak # 41 JB, Chak # 68 JB and Amen Purr Bangle. Reduction of mortality among vaccinated flock was observed after giving improved montanide-adjuvanted IBH-HPS vaccine. High antibody titer was observed at 7, 14 and 21 day after vaccination. The efficacy observed was more than all commercially available vaccines. A farmer day was held at Disbar Poultry farm at Chak # 273 JB Mahlan on 25-02-2010.

Farmers Day at Chak # 273/JB Mahlan



Montanide adjuvanted egg-adapted vaccine

TT-5/09: Low Cost Technologies for Enhanced Ruminant Animal Productivity

Name of PI : Dr. Mahr-un-Nisa, Assistant Prof. Inst. Ani. Nut. & Feed. Tech., UAF.
Date of initiation : 1-3-09 (duration: 3 years)
Total Cost : Rs. 1.589 millions
Funds released : Rs. 0.845 millions
Funds utilized : Rs. 0.676 millions

Main thrust/theme

The low ruminant animal productivity is one of the main problems which impede their profitable rearing in Pakistan. There may be many causes for this low productivity but feed scarcity and reduced feed efficiency are the main factors. This low productivity can be ameliorated by using such technologies which can help make feed available during lean period and improve its efficiency. Treating crop residues like cereal straws with urea and ensiling with corn steep liquor will improve their nutritional worth which can be fed to ruminant animals during fodder scarcity season. This problem can also be tackled through preservation of fodders especially when it is present in excess quantity. In dairy animals, just before parturition, large amount of Ca is drained from the blood which is utilized in the mammary glands for the synthesis of colostrum. This rapid loss of Ca, if not replaced, results in milk fever or hypocalcaemia. Through nutritional manipulation, hypocalcaemia may be prevented. After parturition, lactating animals had higher metabolic rate that tended to make the cellular environment acidic. A high dietary cation anion difference (DCAD) in diet, being alkalogenic in nature, reduces the

extent of that acidity, improving animal feed intake. Proper DCAD manipul ation will help in preventing several metabolic disorders. The present study was, undertaken to obtain base-line information on the level of adoption of the technology, its effect on feed intake, growth rate, milk yield and its composition, prevention of milk fever and constraints of technology adoption.

Objectives

- Propagation of cost-effective technologies for enhanced animal productivity
- Augmenting milk production and preventing milk fever in buffaloes and cows through dietary means
- Training of the farmers to conserve fodders for year round availability
- Educating the livestock farming community regarding livestock keeping on scientific lines

Achievements during the period under report

During 1st activity, wheat straw was treated with corn steep liquor (CSL) and urea. For this purpose, 12 progressive farmers were registered and 9600 kg CSL was provided to the farmers. This quantity was sufficient to treat 60000 kg wheat straw. During next year, more farmers were also interested in this activity and 11000 Kg CSL was provided to the farmers to treat 70000 kg wheat straw. This activity was redone as per demand of farming community because they were convinced from this activity in previous year. Two farmers did this activity by themselves which shows that this technology has been adopted by farming community.

For milk fever prevention technology, salt packets containing 200g $CaCl_2$ each were provided to the farmers. One packet of this salt was fed daily to each animal for one month before parturition and this salt probably brought to -110

Demonstrations of technologies and farmers day in the project area

g/kg dietary DM DCAD. Two pregnant animals of each farmer received this salt packet which saved their animals from milk fever. Salt packets containing $NaHCO_3$ each were also provided to the farmers to feed the animals to minimize the effect of sever summer on reduction in feed intake, milk yield and reproductive performance. It was observed that animals fed +330 DCAD diet produced more milk and their reproductive performance was also better than those animals which were fed conventional diet. The farmers were trained how to feed this salts to get desired results. The University provided technical support and gave incentives in the form of $CaCl_2$, $NaHCO_3$ and mineral mixture. On their request they were explained how to prepare this salt and were also told from where they can buy these salts from some scientific stores.

During silage making, corn fodder was harvested at milk stage. After fine chopping, material was filled in the silo using wheeled tractor to eradicate air. The silo was then sealed with an plastic sheet and plastered with a blend of wheat straw and mud. After 30 days, the pit was opened and corn silage was gradually introduced in the diet of animals. This process was also carried out for making sorghum silage. The silage making practices were conducted on private farms in front of farmers that helped them to adopt this technique. This technique has not only helped to preserve fodders when it was in excess but it also ensured quality supply of fodder though out the feeding period. The farmers were very impressed and were willing to continue this practice in future.

TT-6/09: Enhancing crop productivity on salt-affected soils through combined use of soil applied gypsum and pre-sowing seed treatments

Name of PI : Dr. Saif Ullah, Assistant Professor, Inst. Soil & Env. Sci., UAF.
Date of initiation : 1-3-09 (duration: 3 years)
Total cost : Rs. 1.996 millions
Funds released : Rs. 1.010 million
Funds utilized : Rs. 0.795 million

Main thrust/theme

Rice and Wheat are the world's two most important cereal crops, contributing 45% of the digestible energy and 30% of total protein in human diet, as well as a substantial contribution to livestock. Poor germination and seedling emergence are the major problems leading to reduced yield. Seed germination is a serious problem in salt-affected soils. High concentration of soluble salts in the root zone is the most detrimental factor for germination, growth and yield reduction. Salinity-sodicity affects the availability of nutrients and water, lowers the quality of arable lands and alters the

structure of ecological communities. Modifications of plant practices including sowing methods, seed priming etc. can minimize the tendency for salt to accumulate around seeds, which in turn can improve the establishment and yield of crops. Priming in the semi-arid tropics has been reported to increase emergence and lead to better plant stands, more vigorous plants, better drought tolerance, earlier flowering, earlier maturing and higher grain yield. The saline-sodic soils with high sodium content are compact and generally form a hardpan on the soil surface. This compactness prevents plant root proliferation and reduces salt leaching. Thus the reclamation of such soils with simple leaching by flooding remains ineffective.

The application of gypsum enhances leaching by improving soil hydraulic conductivity. It is the cheapest amendment in Pakistan and can be used for the amendment of saline soils. It provides a source of calcium (Ca^{2+}) to replace excess sodium (Na^{+}) from the cation exchange sites. The replaced Na^{+} is then leached away from root zone with excess irrigation. Considerable research work on the use of gypsum as an amendment and seed priming has been done in Pakistan and abroad, but farm level adoption needs site specific consideration because of the difference in edaphic factors. It is therefore planned to demonstrate the said research at the Proka Farm II for productive use of poor quality soils and water.

Objectives

- To demonstrate the effectiveness of seed invigoration techniques for enhancing crop productivity on salt-affected soils.
- To enhance farm income by cultivating rice and wheat with pre-sowing seed treatments and modest application rate of gypsum on saline-sodic soils.

Comparison pf different seed priming treatments in rice and wheat

Achievements during the period under report

The productivity of rice crop with respect to paddy and straw yields was considerably higher for seed priming with saturated gypsum solution and soil applied gypsum @ 50% SGR. While soil reclamation with respect to pH_s, EC_e and SAR remained considerably better and faster with the same treatment. Similarly for wheat crop maximum grain and straw yields were recorded with seed priming with 1% KCl solution and soil applied gypsum @ 50% SGR. This suggests that crop productivity on salt-affected soils can be increased by pre-sowing seed treatments and soil applied gypsum.

TT-7/09: Documentation of Traditional Agricultural Knowledge and Technologies in Punjab, Pakistan

Name of PI : Prof. Dr. Iqrar Ahmad Khan, Vice Chancello r, UAF.
Date of initiation : 1-3-09 (duration: 3 years)
Total cost : Rs. 3.047 millions
Funds released : Rs. 1.192 million
Funds utilized : Rs. 0.804 million

Main thrust/theme

The history of Agriculture in Indian subcontinent can be traced back in 6th millennium BC in Indus Valley (Randhawa, 1980). Throughout history, human beings have domesticated plants and animals and shaped harsh and remote environments to guarantee their survival. Generations of farmers and herders have for more than 12 thousand years, developed ingenious farming systems to overcome extreme climatic conditions, geographic isolation and scarcity of natural resources. This patient work has resulted in magnificent reservoirs of globally significant agricultural biodiversity and valuable cultural inheritance. However, many of these systems are now under sever threats from global development challenges, including climate change, rural impoverishment, exodus towards urban areas and exclusion of local economies from international markets, and are at risk of disappearing forever. In 2002, FAO initiated a wide program on conservation and adaptive management of Globally important Agricultural Heritage systems (GIAHS) aiming to establish the basis for the global recognition, conservation and sustainable management of such systems and their associated landscapes, biodiversity, knowledge systems and cultures (FAO, 2002). An understanding of local knowledge systems, including institutions and organizational structures, can support existing sustai nable practices and expedite appropriate changes. On the basis of their own experience in the field of development, a growing number of individuals and organizations have come to appreciate the importance of working with

and through local systems, instead of trying to work around them (Dommen, 1988). Despite being one of the oldest agricultural civilizations, efforts have never been made to document the traditional agricultural knowledge and technologies in Pakistan. This project was, therefore, conceived to document the indigenous/traditional agricultural knowledge. The documented information will be used as a reference and the knowledge/technologies found useful may be integrated with the modern/intensive agricultural farming. Moreover, materials signifying the traditional technologies will also be collected. As an outcome, sufficient material will be available to establish an agricultural heritage museum in the university as a part of GIAHS initiative. This hopefully, will follow collaboration with other institutions, like UNESCO and the World Heritage Convention, to guarantee the sustainability of the globally important traditional agricultural systems. This work will provide a better understanding of agriculture and its development in Pakistan. It will provide tourism and educational opportunities for the general public as well. Hopefully, it would attract visitors from a wide area, including international visitors, and provide an educational and cultural attraction for a large number of underprivileged residents, particularly students, in the region.

Objectives

- Conservation and adaptive management of Globally Important Agricultural Heritage Systems in the light of initiative taken by FAO in 2002
- Establishment of the basis for the global recognition, conservation and sustainable management of traditional farming systems, biodiversity, knowledge system and cultures
- Documentation of the traditional indigenous agricultural knowledge and technologies
- Integration of traditional and modern agricultural technologies for sustainable production

Achievements during the period under report

First year surveys revealed that our local communities are rich in indigenous knowledge and technologies of agriculture. This wealth of agricultural knowledge and technologies is rapidly disappearing. Therefore, documentation of this knowledge was marvelous in the form of videos, photographs and establishment of an Agricultural Heritage Museum (AHM). Survey team was extremely impressed from the response of farmers and they cherished the memories of past and enthusiastically participated in the meetings. This report contains few of hundreds of photographs, which will be a part of final report. There was a great diversity of nomenclature for different agricultural practices and technologies. It has, therefore, been proposed that a directory of different local names/nomenclature for different agricultural practices and technologies be developed by the end of the project.

Inauguration of AHM at UAF

A conventional Belna at AHM

Some glimpse of conventional technologies

B. DEMONSTRATION PROJECTS

TTD-1/09: Demonstration of Plant Pathological technologies at U-Road on the Main Campus, University of Agriculture, Faisalabad.

Name of PI : Dr. Nazir Javed, Chairman, Deptt. Plant Pathology, UAF
Date of initiation : 1-3-09 (duration: 3 years)
Total Cost : Rs.0.304 millions.
Funds released : Rs.0.084 million
Funds utilized : Rs.0.084 million

Main thrust/theme

Several plant pathological technologies could not be properly transferred to the farmers due to lack of infrastructure and meager financial resources. There have always been felt a missing linkage between the academia, research and the industry, especially for the agri. stake holders that resulted into poor interaction & technology transfer activities. There are several ways for the management of plant diseases. The use of chemicals is very expensive and also causes health problems and environmental pollution. Keeping in view the safe use and antagonistic ability of different bio-control agents against various fungal, bacterial, viral and nematode diseases of plants their use is highly recommended for the management of plant diseases. The bio-control agents like *Trichoderma harzianum etc.* and bio-products of plant and microbial origin can be utilized on commercial basis. Seed may also act as a carrier of important diseases that can upset the production of any crop. Numerous cases of economic losses caused by seed borne diseases have been reported worldwide.

Objectives

- To acquaint the end users about the effectiveness of the technologies related to biological management of the diseases and seed health activities
- To develop confidence of the stakeholders in the utilization of these technologies
- To train the stakeholders and issue advisory services to solve their plant pathological problems.

Achievements during the reporting period

The soil borne plant pathogens (*Rhizoctonia and Fusarium*) are highly destructive group of plant diseases particularly root diseases. They constitute a major complex group of plant disorders that is hard to control through other measures. The demonstration of

successful biological control of selected diseases of various host plants caused by soil-borne plant pathogens under the field conditions is a landmark in search of new avenues of plant protection. The root rot and wilt disease of economic plants caused by *R. solani* and *Fusarium spp*. considered to be uncontrollable, can now be controlled effectively through the use of antagonistic organism. The results obtained during the experiments were significant. Seed treatment with different fungicides to control the seed borne pathogen. Seed health testing and seed treatment is a part of seed pathology, which is essentially an applied discipline. The problem of seed-borne diseases has assumed great importance in the world of agriculture because of international seed trade and exchange of germplasm. More than a thousand host pathogen combinations of seed borne diseases are known and the number is rapidly increasing. Seed borne diseases were effectively minimized by seed certification and efficient seed treatments. Future break through in seed pathology depends primarily on the awareness among the stake holders about these seed health techniques. These techniques of seed health and bio-control of pathogens will have a tremendous impact on the agricultural production in Pakistan.

TTD-2/09: Establishment of demonstration orchard for transfer of technology to the growers at PARS

Name of PI: Prof. Dr. Faqir Muhammad Tahir, Inst. of Hort. Sci., UAF
Date of initiation : 1-3-09 (duration: 3 years)
Total Cost : Rs. 0.971 million
Funds released : Rs. 0.544 million
Funds utilized : Rs. 0.444 million

Main thrust/theme

Growth and development of fruit industry cannot take place properly without involvement of technical knowledge. Every step of fruit culture starting from seed sowing up to harvesting needs some special technology to make it an economical business. Unluckily, our fruit growers are following very old and traditional cultural operations in the orchards due to which our yield per hectare is very low as compared to other advanced countries and that is also of very inferior quality. Generally, the farmers deal the field crops and orchard trees in the same manner although, the operations of the orchard are totally different than field crops and as a result they spend more time, labour and investment and get less returns. Soil and climatic conditions of Pakistan are quite suitable for producing high yields of good quality fruits and if the quality is maintained, Pakistani fruit is much liked in all its importing countries. There is a great scope for foreign exchange earning by exporting fresh fruit and their byproducts to Middle East and Europe. Main factors to maintain the quality are nutrition, irrigation, plant protection and cultivation. Farmers should be motivated to adopt new technologies needed for improved quality and quantity and this is only possible by actual demonstration of such technologies in the field. Hence this project was started to demonstrate new ideas of researches to the fruit growers.

Objectives

- Practical demonstration of new technologies for the orchardists.
- Transfer of new ideas of research to the farmers.
- Replacement of years old and traditional cultural practices by new ones.
- Enhance fruit yield of superior quality.
- Maintain the health of fruit trees and to make then disease free.

Achievements during the period under report

After site selection, land was prepared and leveled properly by laser leveler. Layout was done for citrus, mango and date palm varieties by using different planting distances. Pits were made by using post whole digger and refilled by proper media after its fumigation. Different varieties of citrus, mango and date palm were transplanted in the pits at proper time. Basins were made around the plants to activate basin irrigation system. Gaps of plants were filled in the next planting season. Zero tillage showed better results than cultivation. Use of weedicide proved best method for weed control.


Laser leveling


Layout


Digging of pits

TTD-3/09: Collection and Establishment of Germplasm unit (GPU) of Fruit plants at Square No. 32.

Name of PI : Dr. Saeed Ahmad, Associate Professor, Inst. of Hort. Sci., UAF
Date of initiation : 1-3-09 (duration: 3 years)
Total cost : Rs.0.604 million
Funds released : Rs.0.118 million
Funds utilized : Rs.0.076 million

Main thrust/them

Experimental gardens of Institute of Horticultural Sciences are consisting of very old material, due to non-collection of germplasm even from within the country in the past. Therefore, the student's research is being replicated on a few fruit varieties. Consequently, the recommendations on different parameters of productions of upcoming varieties are lacking. Secondly, the students are unaware of the characteristics of such gene pool available in the country. Therefore, it was planned to collect and introduce the germplasm at least from within the country and establish the Germplsm Unit (GPU) at the University Campus. Such an effort might lead to evolution of new varieties, techniques to be recommended to growers of the area. Moreover, availability of the gene pool with known characteristics will help scientists to conduct research experiments of current and upcoming issues of horticulture industry like biotic stresses, drought stress, salinity stress and various fatal insect, pests and diseases.

Objectives

- To establish Germplasm Unit of mango, citrus, ber and date palm for identification, demonstration and student research

- To introduce new 50 varieties of mango, 15 varieties of citrus, 6 varieties of ber and 10 varieties of date palm (by collection) for demonstration and to extend the availability period of fruits
- To conduct research on different aspects of (yield, quality and post harvest) new varieties of fruit crops
- To provide pedigree/healthy plants of new promising varieties to the growers
- To encourage farmers to establish orchards of various promising fruit varieties.

Achievements during the period under report

The Area of Square No. 32 was divided into blocks and Plots. A map was prepared according to the lay out. 20 varieties of mango, 6 varieties of citrus, 6 varieties of ber and 4 varieties of dates were collected from Shujabad, Sargodha, Sahiwal and Bahawalpur. These were transplanted in different blocks according to the layout design. These plants are under close observation and five students of M.Sc (Hons.) are engaged to collect the data relating to performance, morphological characteristic and genetic variations of these varieties. Zero tillage has been introduced. Weedicides and lawnmower are being used to eradicate the weeds.

Transplantation of date palm suckers

Situ grafting in mango

Zero tillage and use of herbicides

Plants of Ber varieties in square No. 32

TTD-4/09: Controlled Atmosphere Technology For Storage and Export of Horticultural Crops

Name of PI : Prof. Dr Aman Ullah Malik, Inst. Hort. Sci., UAF.
Date of initiation : 1-3-09 (duration: 2 years)
Total cost : Rs. 1.383 million
Funds released : Rs. 1.088 million
Funds utilized : Rs. 0.992 million

Main thrust/theme

Fresh fruits and vegetable are highly perishable commodities being susceptible to rapid decay and deterioration at postharvest stage. Being living entity these are continuously undergoing various physical, physiological and biochemical changes even after harvest. From consumer's perspective these undesirable changes need to be minimized, although cannot be stopped. One of the main interventions in reducing postharvest losses of fruits and vegetables and maintaining freshness/quality is their storage under proper conditions/environment. In Pakistan, traditionally, cold storages have been used for storage of fresh commodities and the technology employed is by keeping produce at low temperature and high humidity. This technology gives limited success in increasing storage and shelf life of fresh produce. A more advanced technology is Controlled atmosphere (CA) storage, which involves precise control of gaseous composition around commodity to reduce the rate of respiration and ethylene production, besides low temperature and high humidity control. This helps to extend the useful marketing period of the fresh commodity during storage, transport and distribution, and maintains quality and nutritive of the product over that achievable by the use of temperature only. Another aspect of CA-technology is its increasing use for sea-freighting of fresh produce for export. Mangoes is one of our most important crop with high export potential, however, the high cost of air freight (e.g., Karachi to Europe: By air Avg. Rs. 120/kg compared to Rs. 20/kg by sea) limits its potential export volumes to distant markets. Another area of growing interest is the use of low cost Modified Atmosphere Packaging (MAP) to enhance storability and shelf life of fresh produce. Keeping in view the potential of these new technologies this project was initiated with following objectives

Objectives

- To demonstrate the benefits of controlled atmosphere technology for extended storage of locally grown horticultural crops.
- Demonstrate benefits of modified atmosphere-technology in horticultural crops.
- Dissemination of information on controlled and modified atmosphere technology.

Achievements during the project under report

During the reported period, a study was executed to demonstrate the potential benefits of Controlled Atmosphere (CA) technology of horticultural crops. The optimum CA condition for mango cv White Chaunsa was 1% O_2 and 4 % CO_2 in which fruit can be potentially stored/shipped up to 4 weeks with 6-8 days of shelf life. For commercial viability of sea-freight consignments, postharvest diseases particularly stems end rot needs to managed (pre and postharvest). Demonstration work on two varieties of Apple (Red Delicious and Golden Delicious) showed that CA combinations of 1% O_2 and 5% CO_2 with RH. 80-90% at 1°C is best for both cvs of apple to store them up to 9 months. Demo on chilies has also been conducted and 3% O_2 and 5% CO_2 at 10° C exhibited comparatively less weight loss, decay percentage, ethylene production and wrinkling

CA stored mango fruit (cv. White Chaunsa) after 54 days of harvest

Red Delicious & Golden Delicious Apples after 9 months of CA storage

and extended shelf life up to 3-4 weeks. Modified Atmosphere Packaging (MAP) demo was designed for taking advantage for short-term storage/transportation of mangoes. Modified Atmosphere demo on mango (White Chaunsa) showed that under cold storage conditions at 9°C and 11°C, a three week postharvest handling/storage/shipping period provided seven and nine days respectively of post-shipment handling /ripening period. While, if the storage/shipping is extended to 4 weeks, the 9°C storage temperature provided 7-8 days of post-storage handling/ripening period, compared with 4 days in case of 11°C. Bagged fruit were slightly firm with lower peel colour and disease development level; however it did not significantly suppress disease at ripening or extended shelf life. Modified Atmosphere demo on mango cv. Sindhri showed that this

variety has potential of 3-4 weeks of storage/shipping followed by handling, ripening and marketing provided careful harvesting and postharvest handling and management is ensured. Modified Atmosphere demo on okra showed that non perforated packaging can be used to store okra at 13°C for 2 weeks with a shelf life of two days at ambient (25°C).

TTD-5/09: Demonstration of innovative technology of the department at the Main Campus, University of Agriculture, Faisalabad.

Name of PI : Prof. Dr. Rashid A. Khan, Chairman, Deptt. Forestry, Range Management & Wildlife, UAF
Date of initiation : 1-3-09 (duration: 3 years)
Total Cost : Rs. 0.382 million
Funds Released : Rs. 0.228 million
Funds Utilized : Rs. 0.226 million

Main thrust/theme

FTS trap (an innovative technology of the department) is an effective control of mango mealy bug as it restrict the insects reach to the tree crown and entrap/kill a few escaped egg carrying females while coming down to the ground for egg laying thus give complete non-chemical control of this damaging insect pest of mango fruit.

Objectives

- To demonstrate innovative Funnel Type Slippery Trap technology for the safety of mango crop against mealy bug attack at the campus.
- To help mango growers in adapting the displayed technology by providing the required technical skill.
- To convert this demonstration event into a sustainable contact between farming community and the agriculture scientists of the university for enhancing quality mango production in the country.

Achievements during the period under report

This project was awarded to demonstrate Funnel Type Slippery Trap (FTS tarp) technology against mango mealy bug to popularize this non-chemical pest control technique among mango growers. Under this project, all mango trees growing at the campus have been equipped with FTS traps. The traps were kept clean and their positions were maintained from January to the end of May. Mango mealy bugs lay eggs

Crawling up nymphs gathered out at the base of FTS trap (unsuccessful nymphs)

Congregated nymphs at the base of mango tree stem (easy kill).

Entrapped egg carrying females taken out for disposal

Egg carrying females entrapped in the FTS trap

around mango trees, eggs hatch during early January and the nymphs crawl up via tree stem to reach the fruiting parts. The erected FTS traps restrict their upward movement and kill their maximum number. It has been estimat ed that only 6.5% nymphs reaches their destination if alternate paths are properly plugged (n55). Successful nymphs feed on cell sap at fruit bearing branches and mature there. Winged males copulate them and the egg carrying females come down for egg laying in the soil on their, these are ultimately entrapped in the funnel of FTS trap and get killed due to rise in temperature during May. In case of acute attack, the entrapped egg carrying females were taken out and properly disposed off to make this technology a success. The studies have indicated that installation of FTS traps have subsided the mango mealy bug attack at the campus and almost 20-25% increase in fruit production has been harvested by different families (n30) after the installation of FTS. Due to installation of FTS traps, Mango mealy bugs could not reach the mango tree crowns. Ultimately the insects have crawled up almost 18 different alternate host plants. A study is going on to verify whether the females bugs using alternate host lay fertile egg on maturity or not.

TTD-6/09 : Demonstration of strategies for enhancing cereal yields under normal conditions.

Name of PI : Prof. Dr Shahzad Maqsood Ahmad Basra, Crop Physiology, UAF
Date of initiation : 1-3-09 (duration: 3 years)
Total cost : Rs. 0.224 million
Funds released : Rs. 0.570 million
Funds utilized : Rs. 0.440 million

Main thrust/theme

Poor and erratic seedling emergence is one of the constraints to achieve better crop stand with vigorous seedling growth in cereals which has necessitated the search for low cost technologies to improve the stand establishment and yields in many field crops. Seed priming techniques have received greater attention in recent years and are widely used to enhance the cereals performance by improving crop stand and yield. Use of seed priming techniques to improve crop stand offers a viable and pragmatic option. Many seed priming techniques developed have been tested and appraised under field conditions to improve crop stand and yield performance in cereals. Appraisal of these low cost priming techniques in cereals is the most promising for resource poor farmers, which must be displayed/demonstrated and disseminated.

Objectives

To demonstrate and transfer the low cost seed priming strategies to improve the crop stand and yield performance in cereals including wheat, rice and maize under normal as well delayed planting conditions at Technology Park, UAF.

Achievements during the report period

After two seasonal demonstration trials in direct seeded rice, among various seed priming techniques employed, osmopriming with $CaCl_2$ has pronounced effect on crop stand and yield performance in wheat, maize and rice under normal as well delayed planting conditions and can be successfully employed at farmer's field. In addition, hormonal priming with salicylic acid (SA) has also potential to ameliorate the adverse effects in wheat and maize when planted under late sown conditions. These priming techniques improved the crop stand, agronomic and yield components and seed quality in these crops. Irrespective of synthetic chemicals use of moringa leaf extracts (MLE diluted 30 times) as a natural source seems promising alternative organic priming agent. A video has been previously prepared and is being provided to EFS for record and same was displayed on the departmental stall at Kisan Mela. A brochure has been prepared and distributed among the farming community and stakeholders at the event. Urdu articles have been published in popular Zarai digest, Seed news magazine and distributed among the farming community.

Demonstration of seed priming to improve the wheat performance under normal condition

Demonstration of seed priming to improve stand establishment in direct seeded rice

TTD-7/09: Demonstration of technologies developed by the department of agronomy in the University of Agriculture, Faisalabad

Name of PI: Prof. Dr. Zahid Atta, Chairman, Department of Agronomy, UAF
Date of initiation : 1-3-09 (duration: 3 years)
Total Cost : Rs. 0.559 million
Funds Released : Rs. 0.151 million
Funds utilized : Rs. 0.108 million

Main thrust/theme

Increased concern about the use of synthetic herbicide has necessitated the search for eco-friendly and sustainable weed management. Allelopathic suppression of weeds has received greater attention in recent years as possible alternative for weed management. Use of allelopathic plant water extracts in for weed suppression offers a viable and pragmatic option. In our previous studies application of allelopathic plant water extracts

in combination with reduced herbicide dose (up to 75 % reduction in herbicide use) was effective for weed suppression in many field crops including wheat, cotton rice, maize and mugbean.

Objectives

- To harvest maximum production with minimum inputs on sustained basis
- To disseminate eco-friendly weeds management techniques

Achievements during the period under report

In case of cotton, more than 55% weed inhibition was achieved from the application of allelopathic water extracts. Application of allelopathic water extracts in combination with half dose of herbicide gave as effective weed suppression as was achieved from

standard dose of herbicide. The results are according to the expectations and support the concept of allelopathic water extracts can be used to decrease the herbicide usage.
In case of maize crop, allelopathic crop water extracts reduced the dry weight of weeds by 76%. Allelopathic crop water extracts in combination with Prim extra Gold at 540 g

a.i. ha^{-1} (1/2 dose) showed 82% inhibition in dry weight of weeds. Herbicide dose was reduced 50% in combination with plant water extracts.
In case of wheat crop, allelopathic plant water extract combined with half dose of Atlantis applied as early post-emergence (30DAS) spraying gave as good weed suppression as was achieved by recommended dose of Atlantis. Grain yield was also high in all weed control methods as compared to control.

TTD-8/09: Demonstration of Elite Breeding Lines of Different Crops at U-Road in the Main Campus, University of Agriculture, Faisalabad

Name of PI : Prof. Dr. Faqir Muhammad Azhar, Department of Plant Breeding and Genetics, UAF
Date of initiation : 1-3-09 (duration: 3 years)
Total cost : Rs.0.282 million
Funds released : Rs.0.112 million
Funds utilized : Rs.0.064 million

Main thrust/themes

The faculty members in the department of Plant Breeding and Genetics, are looking for, in addition to teaching graduate and postgraduate classes, the plant material of major crops that may exhibit the yield potential at farmer's field under stressed and non-stressed growing environments. The postgraduate students attempt numerous crosses involving local and exotic plant material of various crops, and these are evaluated for different parameters in segregating generations. Based upon the performance of F_2 hybrids, they are grown till F_6 generations, keeping in view the quantity and quality of the produce, and finally bulked. Towards this end, the research workers here have been able to breed numerous lines of cotton, wheat, pulses, maize, brassica, etc. Some of these advanced lines are being tested in provincial and national trials. Similarly lines of wheat and other major crops are assessed at provincial research stations/progressive farmers before there are included in national and provincial comparative test. But for want of appropriate infrastructure in the department needed for these testing e.g. insufficient vehicles, non-availability of sub-stations of the department, the plant breeders are unable to do such screening exercise under varying environmental conditions. With the funding provided by Endowment Fund Secretariat, the breeders in

the department have been able to demonstrate and compare the potential of elite lines of major crops at the campus.

Objectives

- Demonstration of potential strains of wheat, cotton, mungbean, oilseed and maize crops.
- Compare the performance of elite lines with the commercial varieties.
- Improve the average yield of crops put on demonstration

Achievement during the period under report

During the period under report two elite lines of cotton namely PB-899 and PB-900 were planted on U-road for demonstration purposes. The lines were planted in non-replicated plots. On the onset of flowering, the two strains exhibited distinguishable plant features, for example, PB-900 appeared to be early maturing as compared with PB-899, by two weeks. It is unfortunate that due to late planting on 7.6.2009 both the strains showed the symptoms of CLCV, but the performance of the strains was comparable. This was interesting to the farmers' and students. In addition, the students found the lines, due to small leaves, useful for breeding against moisture stress tolerance (Picture-1). In order to compare the potential of two university hybrids i.e. UH_1 and UH_2 these were

A view of Cotton and maize crops on U-Road

A view of mungbean and sunflower crops on U-Road

planted with 7 other hybrids of Monsanto (namely, 919, Pioneer (30-y-87), MMRI, Sahiwal (FH-972, FH-810, FH-898) and Syngenta (NK-6621 and DK-61-42) Growth and development of two University hybrids UH_1 and UH_2 appeared to be luxurious and bumper (picture-2). Four advance lines of mungbean i.e, AUM-18, AUM-28, AUM-2002 and AUM-6375 were planted on U-road on 7.8.2009. For making comparison with other commercial varieties of NIAB and AARI, NM54 and NM 92 from NIAB, and 6601 from AARI were also planted in the field. During growth and development, the two university lines namely AUM-18 and AUM-6375 were shown to be early in maturity, and maturity was synchronous which is desirable for mechanical harvesting (Picture-3). Four sunflower hybrids H_1, H_2, H_3 and H_4 were compared with four commercial hybrids. The commercial hybrids i.e. Hysun33, and Hysun30 were from Hysun Seed Company, and other two from AARI namely FH372 and H331. Growth of the university hybrids was uniform, and attractive to the students. Head of H_1 and H_3 was bigger than commercial hybrids. FH-331, a new commercial hybrid recently approved for general cultivation exhibited better look (picture-4). Four elite lines of wheat i.e. 9272, 9244, 9189 and 9452 exhibited distinguishable morphological plant characters e.g. spikes and plant stature. At booting stage, differences in earliness was discernible e.g. lines 9452 was found one week earlier than other lines. Similarly from the four brassica lines i.e. AUB-99-14, KAN-14L, AUB-16L, DGL-15L, the university lines AUB-99-14 started to flower 15 days earlier than other lines.

TTD-9/09: Facilitation of the Demonstration of Different Technologies under UAF-Technology Park Projects at Postgraduate Agricultural Research Station (PARS), University of Agriculture, Faisalabad

Name of PI : Mr. Amir Saeed Rana, Assistant Professor/ Superintendent PARS, Directorate of Farms, UAF
Date of initiation : 1-3-09 (duration: 3 years)
Total cost : Rs.1.815 million
Funds released : Rs.1.227 million
Funds utilized : Rs.0.846 million

Main thrust/theme

National average yield of major crops are much below than the yield achieved at experimental stations while these are not comparable with international average. By identifications of constraints in adoption of improved technologies, agriculture production can be increased at least at the level achieved by the research stations/organizations. By demonstration of proven technologies, it will be a great contribution towards reducing

the yield gap between potential yield and average yield. In this view, facilitation is being provided to various demonstration projects being executed at PARS.

Objectives

- To facilitate the Principal Investigators of UAF-Technology Park Demonstration Projects at Postgraduate Agricultural Research Station (PARS).
- Provision of Land for demonstration of different Farmer's friendly Technologies to P.I's.
- Provision of available Agricultural Machinery of PARS to facilitate PIs. for demonstration.

Achievements during the period under report

Facilitation was provided to PI's of EFS-Demonstration Projects at PARS as under:

- Labour was provided to PI's as per their requirement.
- Help for basic operations e.g seed bed preparation
- The Machinery Pool of PARS was maintained which is used to accomplish needs of PIs accordingly.
- Manpower and mechanical support for establishment of Model Orchard at PARS
- Efforts were made to improve facilities at PARS.
- All possible cooperation was provided even at project own cost to PIs of other projects to make an affective demonstration of any technology
- Students were also involved to conduct their research on different technologies.
- Farmer days were organized in collaboration with different organizations

TTD-10/09 : Demonstration of Techno-chemical method for reclamation of hard Layered saline sodic soils

Name of PI: Prof. Dr. M. Shafi Sabir, Dean, Faculty of Agri. Engg. & Tech. UAF
Date of initiation : 1-3-09 (duration: 3 years)
Total cost : Rs.0.261 million
Funds released : Rs.0.129 million
Funds utilized : Rs.0.127 million

Main thrust/theme

Reclamation of saline sodic soils is extremely difficult, as these soils behave negatively when normal cultural applications are adopted on them. The leaching of undesirable salinity and sodicity with good quality irrigation is possible, but with a slow pace. Use of chemical to reduce the effect of saline sodic soil characteristics, gypsum has become the cheapest source for reclamation. Very little efforts are made to engage mechanical (physical) amendment for improving soil conditions at a faster rate. There is a consensus of scientist that no single solution is available for the reclamation of all types of salt borne soils. In most of the saline sodic soils, deflocculated particles play havoc with the soil permeability. Little research endeavor is available regarding interaction of tillage practices with the other soil reclamation techniques. Every tillage implement creates different tilth levels. There is a need to investigate the differential response of various tillage practices with other reclamation techniques. Selecting the type of implement or combination to reclaim such a saline sodic soil is an up till task. This study is taken up to determine the best suitable tillage package alongside chemical and biological inputs to reclaim saline sodic soil in particular the coarse soil of Proka II UAF Farm.

Objectives

To demonstrate the techno-chemical technology for reclamation of saline sodic soils on the Campus.

Achievements during the period under report

The study was taken up to develop a suitable package of mechanical amendment for reclamation of saline-sodic soil. Physical methods, combined with chemical and biological amendments were employed for experimentation to reach at suitable

solution. Soil and water samples were analyzed and tabulated. The mechanical amendments included sub-soiling, chisel plowing, disk harrowing and rotavator as well as the use of cultivator (Conventional) as control treatment. Gypsum 50 and 75 % of the recommended dose were applied as chemical amendment in the field plots before first phase of sowing wheat. The biological amendment as green-manuring, farm- yard manuring and or rice husk mulching will be done after wheat harvest. The experimental site was selected at Proka II UAF farm, which is comprised of 10 acres (4 hectares). Twenty plots each of 198 × 110 ft dimension were prepared according to the assigned levels of three replications for each treatment. After preparation of field plots wheat was sown in lines with the drill. The data for wheat germination rate, growth rate, height of crop and no of tillers were collected. Further work is in progress and end-results will be compiled after wheat harvest.

Saline sodic soil

Zero grade leveling

Chemical Amendment (Gypsum)

Mechanical Amendments (rotavator)

Mechanical seed drilling

Wheat emerging rows

Wheat on soil with 75% Gypsum treatment

75 day old

90 day old

Matured wheat

Demonstration at farmer's day

TTD-11/09: Demonstration of Improved Boom sprayer and Zone Disk Tiller Drill.

Name of PI : Prof. Dr. Muhammad Iqbal, Deptt: Farm Machinery & Power, U AF
Date of initiation : 1-3-09 (duration: 3 years)
Total Cost : Rs. 0.428 Million
Fund Released : Rs. 0.324 Million
Funds Utilized : Rs. 0.312 Million

Main thrust/theme

Average crop yield of crops in the country is much below the international standards. Thus, transition from subsistence farming to profitable farming can only be achieved through the adoption of efficient and effective resource conservation technologies. Wheat crop is grown on 8.6 million hectare and rice on 2.9 million hectare in the country. The seeding time of wheat overlaps the harvesting time of rice crop. Preparation of seedbed by conventional methods delays the seeding time of wheat resulting in excessive use of diesel fuel energy and reduction of wheat yield. The use of

9-row zone disk tiller drill, a resource conversation machine, for seeding wheat just after harvesting rice crop saves 72% diesel fuel and increases yield by 10% because preparation of seed zones and seeding wheat are accomplished in one pass operation in standing paddy stubble field.

Cotton crop is grown on 2.9 million hectares of the country. Cotton growers spray 12-13 times during the growth period of crop. The traditional boom sprayers spray only from top over the leaves which do not kill the insects completely, therefore, the yield is affected. The newly designed 14-row improved boom sprayer has the ability to spray the cotton crop both over and under the leaves. The boom of improved boom sprayer, a resource conservation technology, has drop pipes with two swivel nozzles at the lower end of each drop pipe. The swivel nozzles can be adjusted at any angle both in horizontal and vertical plane to kill the target insects. This sprayer has another auxiliary boom to spray the crop from over the leaves whenever needed. The numbers of sprays needed by this sprayer are reduced to half with 100% insect mortality and increase in crop yield by 10%.

Objectives

- Fabrication of one unit of "Improved Boom Sprayer" and one unit of "Zone Disk Tiller Drill" for field plot demonstration
- Preparation of demonstration plots for physical operation of both the machines (Improved Boom Sprayer and Zone Disk Tiller Drill)

Achievements during the period under report

Both the machines, improved boom sprayer and zone disk drill, have been re-developed and fabricated using material from local market.

Demonstration plots of zone disk tiller drill were prepared both at the Agronomy Farm main campus and PARS of the University of Agriculture, Faisalabad. Wheat crop was planted both by existing and improved zone disk tiller drills. Data regarding field performance of machines related to soil physical properties and crop growth parameters were collected and statistically analyzed. Field working operation of improved and existing zone disk drills was demonstrated to the farmers at the time of seeding wheat and crop stand before harvesting crop. The improved zone disk tiller drill having large size wavy disks, rotating at greater rotary speed, pulverized the seed zones better than the existing zone disk drill. The better pulverized seed zones provided


Crop stand at grain formation



Farmers gathering before harvesting at PARS


Field data collection before sowing



Wheat sowing demonstration with ZDTD

suitable soil strength to emerging seedlings. Therefore, better mean seed emergence rate index (9.41% plants emerged per day) was observed for wheat sown by improved zone disk drill than that with the existing zone disk tiller drill (9.38% plants emerged per day). The effects of better pulverized seed zones were reflected in favorable soil strength, increased seed emergence rate index and greater crop yield for the crop planted with improved zone disk tiller drill. The mean crop yields were 3.87 t/ha and 3.6 t/ha under improved and existing zone disk tiller drills respectively. Moreover grain straw ratio was 0.94 and 0.83 under improved and existing zone disk tiller drills respectively.

Demonstration plots of improved boom sprayer were prepared at PARS, UAF. Corn was planted in 76.2 cm row to row distance in order to facilitate the field spray operation by improved boom sprayer. Crop spraying operation was demonstrated to the farmers. The farmers looked the operation of sprayer for spraying both over and under the cotton leaves.

TTD-12/09: On farm demonstration of technologies for accelerated growth of calves and weaners for reducing the age at first calving of replacement dairy heifers

Name of PI : Dr. Shaukat Ali Bhatti, Associate Prof. Institute of Animal Nutrition and Feed Technology, UAF
Date of initiation : 1-3-09 (duration: 3 years)
Total cost : Rs. 1.300 million
Funds released : Rs. 0.651 million
Funds utilized : Rs. 0.434 million

Main thrust/theme

Lower growth rate of calves during early months and after weaning is a major issue which is either due to underfeeding or imbalanced feeding. This results in higher age at first calving in heifers. Average age at calving in Nili-Ravi buffalo, Sahiwal and Holstein cows is 55, 46 and 29 months, respectively. Age at puberty and calving is related with weight. It is negatively correlated with plane of nutrition. Heifers can be bred when they have attained 60% of their adult body weight. Assuming an average adult weight of a buffalo to be 550 kg, buffalo heifers can be bred when they have attained a weight of about 330 kg. If buffalo heifers can grow at average rate of 500 g per day from the date of birth, they can attain the critical weight (of about 330 kg) required for breeding at the age of 22 months and can calve at the age of 33 months which is 22 months earlier than the current calving age of 55 months in buffaloes. Similarly, Sahiwal heifers can attain puberty at the age of 18 months (against 34 months) at a weight of 225 kg (60% of 375 kg) with an average growth rate of 380 g per day and calve at the age of 28 months against current calving age of 46 month which is 16 months earlier than current caving age. The reduction in age of calving means saving the feeding cost of a buffalo and cow heifer by about Rs. 40,000 and 24,000, respectively. This may facilitate farmers or investors to produce replacement buffalo heifers for export purposes, too.

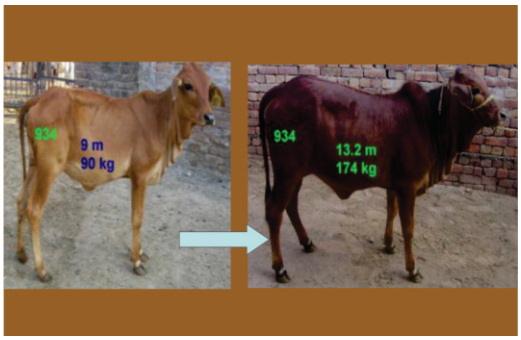
The major cause of underfeeding is irregular supply of fodder to the livestock round the year. Expensive inputs are always cheaper. By feeding livestock according to their requirements will be beneficial both for the livestock and its owner. The livestock are healthy and more productive and the owner is happy because he gets more returns from livestock in a lesser time than otherwise thus making it an economically viable enterprise.

Objectives

The objectives of the present project are to demonstrate:

- The livestock farmers how to attain a better growth rate of calves during first three months.
- How to raise the healthy calves after weaning
- The effect of concentrate feeding and regular supply of fodder on age at puberty and first calving in dairy heifers

Achievements during the period under report



The female Sahiwal calve were raised on whole milk. These animals were weaned at 8 weeks against the traditional weaning at the age of 12 weeks. These calves had a growth rate of 470 grams per day and their average weight at the age 12 weeks was 55 kg. This growth rate and weight at day 84 is excellent during the pre-weaning period of the Sahiwal calves. Thus, feeding milk up to 8 weeks instead of 12 weeks saved a lot of labour involved for feeding milk to the animals.

Twenty four Sahiwal heifers, having different age and weight were fed on iso-caloric and iso-nitrogenous rations varying in protein sources (canola meal, soybean meal or cotton seed cake) and 50% sorghum silage on dry matter basis. Results indicated that the average daily gain achieved in Sahiwal heifers in this trial is much higher than the existing growth rate of other similar animals at the Livestock management farm.

Average growth rate of buffalo female calves during the weaning period was 500 gram per day. This is an excellent growth rate during this age.

Fifteen tons of Lucerne hay, 2 tons of barseem hay and 1.5 tons of oat hay was prepared at different months of the year. Twenty-six tons of oat silage was prepared in March 2009 and twenty-five tons of silage was prepared form the sorghum crop in August 2009. The field officers of Livestock and Dairy Development Department belonging to Faisalabad

Division were given presentation on hay and silage making and were shown the prepared hay and silage on the site

Videos of the technologies were displayed at the University Festival-2010 at the stall of the Endowment Fund Secretariat. The prepared hay and silage was also displayed at the stall of Faculty of Animal Husbandry during the University Festival-2010. Female young heifers raised under this project participated in beauty competition for Sahiwal cow. Four of the female young stock (Milk teeth class) secured first four positions in the beauty competition arranged by Research Centre for Conservation of Sahiwal during the University Festival-2010.

TTD-13/09: Demonstration of farmer friendly equipments developed by department of poultry science

Name of PI : Prof. Dr. Ahsan Ul Haq, Chairman, Department of Poultry Science, UAF
Date of initiation : 1-3-09 (duration: 3 years)
Total Cost : Rs.0.687 Million
Funds Released : Rs.0.320 Million
Funds Utilized : Rs.0.236 Million

Main thrust/theme

Poultry industry has developed tremendously in the last four decades but still it is far behind the advanced countries while fulfilling the nutritional requirements of the Nation. Poultry farmers are still using the conventional methods of farming while advanced countries are using latest techniques and technologies in this sector. At present students and farmers do not know how to use these techniques and technologies in a precise way. On the other hand some farmers are importing the modern equipments which are not applicable in our climatic conditions. Such equipments are needed to be modified according to the climatic and managemental condition of the country and should be farmer friendly. The department of Poultry

Science is continuously in touch with the industry in order to provide them the most trained manpower. The feedback from the industry indicated that poultry farmers, supervisor and students are lacking in handling and understanding the advanced electronic equipments being used in the poultry industry. The present project was designed and executed, based upon the development and demonstration of advanced technologies and techniques being used in poultry industry at international level. Demonstration of these technologies at farmer level will help them towards precise and profitable poultry farming.

Objectives

- Introduction of locally developed techniques and technologies to the farmers for precise and profitable poultry farming.
- Demonstration of poultry mechanization and automation to the stake holders for enhancing productivity with more efficiency.

Achievements during the period under report

During first phase of the project capital items including electronic temperature controller, auto-ignition kit, heating chamber with blower and gas cylinder were purchased. The equipments purchased for the fabrication of gas brooding system were assembled together as shown in the pictures.

Temperature controller

Auto Ignition Kit

Heating chamber

Gas brooding system

Positioned with timer

Actuator motor

Feeder

Wench system

During the second phase after the completion of gas brooding systems, the equipments for the fabrication of intermittent feeding system were purchased. These equipments were electronic positioner with timer, actuator motor, wench system, and feeders. These equipments were assembled together for the fabrication of intermittent feeding system according to pictures given below.

After the completion of gas brooding and intermittent feeding system, practical demonstration of operations and handling of these systems was conducted to the students and farmers at Poultry Research Center

Demonstration to students and farmers

C: FESTIVALS

TTM-1/09: Spring and winter flower exhibition/ demonstration for transfer of technology at UAF

Name of PI : Dr. Atif Riaz, Assistant Professor, Institute of Horticultural Sciences, UAF
Date of initiation : 1-3-09 (duration: 3 years)
Total Cost : Rs. 0.555 million
Funds released : Rs. 0.312 million
Funds utilized : Rs. 0.133 millions

Main thrust/theme

Floriculture industry of Pakistan is progressing with a very slow pace due to many reasons; the most important is the lack of technical knowledge. Most of the nursery growers are laymen and non-technical. They do not have know how of new technologies and required skills for this and cannot perform different cultural practices according to the recommendations which is a major limitation in the development of floriculture

industry. Different cultural practices such as nutritional management, plant protection, watering, etc. are not performed to optimum level, particularly the propagation and nursery practices are very faulty and very few sources are available for provision of clean and healthy plants/seeds for annual flowers. Consequently, high quality flowers and plants are not being produced although soil and climatic conditions of Pakistan are quite suitable for producing all kinds of good quality flowers. Holding regular exhibitions and demonstrations of floriculture products can play a major motivational role for growers to adopt new technologies for the improvement of flowers in terms of quality and quantity. Students, researchers and common people can also be engaged in such healthy activity by organizing regular flower shows by reputed centers of floricultural studies such at University of Agriculture, Faisalabad, which holds credibility and confidence of the community engaged in this industry.

Delegates visiting Flower exhibition

Objectives

- To create awareness among people about this industry.
- To transfer latest and advanced technologies of growing of chrysanthemum and other annual flowers to growers through field demonstration.
- To share the advances on post harvest management of the products
  Dissemination of new technologies achieved from various research organizations

Achievements during the period under report

Annual Chrysanthemum and Autumn Flower and winter annual flowers shows were organized in University of Agriculture Faisalabad, Pakistan on 14th to 16th of December 2009 and 22nd to 26th of March, 2010 respectively, with collaboration of Endowment fund UAF. Participants were from different research institutions, extension department, nurseries, growers, and students from different field of studies. These exhibition imparted awareness among researchers, general public, farmers and students about the importance of flowers in human life. These shows helped to introduce modern concepts about planting material and equipments available and enabled the participants to collaborate with other organizations concerned with Floriculture and Landscape. Latest and advanced technologies for growing chrysanthemum rose and other annual flowers to growers were practically demonstrated. Recent advancements in post harvest management of floricultural products were also disseminated as well as demonstrated which were developed by various research organizations. It is also engaged in capacity building for improving ornamental crop production and to provide on-job training for the Horticulturists.

Students making different floral arrangements

TTM-2/09: Demonstration of modern technologies through Kissan Mela

Name of PI : Prof. Dr. Sher Muhammad, Director, Directorate of Farms, UAF
Date of initiation : 1-3-09 (duration: 3 years)
Total Cost : Rs. 3.091 million
Funds released : Rs. 2.009 million
Funds utilized : Rs. 0.993 millions

Main thrust/theme

Farmers are the ultimate beneficiaries of the agricultural knowledge and technologies developed in agricultural universities and research institutes. Therefore, a deep-seated and sustainable system for interaction between the farmers and researchers is of prime importance in conducting problem oriented basic and applied research on one hand and boosting up agricultural production on the other. Moreover, some forward-looking farmers make advances in the crop and animal husbandry. Such advancements remain contained to their personal use and do not go to masses for overall increase in the agricultural production of the country. Therefore it was planned to invite farmers in the festival to promote an interaction between farmers, teachers, students and researchers to share and streamline the informal research endeavors of progressive farmers. Technical sessions included extension papers on cotton production technology, rice production technology, sugarcane production technology, water management and livestock management. Exhibition of the research outputs of the university and other organizations at the occasion provided better chances of their dissemination and possible improvements. The horse and cattle show is an important traditional event for healthy competition and enjoyment. It had been made a part of the festival, which included competition for milk production, tent pegging and horse dances. Co-curricular activities of the students are crucial for their personality development and mental grooming. Active participation of the students in these activities furnishes them with confidence, inculcate creative thoughts and enable them to face the challenges of practical life. Such activities act as waves of freshness for their mental nourishment to exert more in their studies.

Opening ceremony

Objectives

- Creation of awareness about modern technologies among the farmers.
- Increasing interaction among farmers and agricultural scientists.
- Display of modern machinery and equipments in the field of agriculture.

Achievements during the period under report

Agricultural technologies developed at the University of Agriculture, Faisalabad and elsewhere both in public and private sectors were displayed at the University Festival (March 22-26, 2010). Progressive and common farmers were invited all over the Punjab. Renowned scientists from various organizations participated and delivered special lecturers to the farmers gathered on the occasions to acquaint them with the latest technologies for enhancing crop and livestock productivity. The issues of the farming community were discussed by the panel of experts and suitable remedial measures were suggested. New agricultural technologies and their use were demonstrated in the field. Moreover, seed of improved crop varieties was also displayed and sold to interested farmers. So far the project has been highly successful in introducing improved agricultural technologies to the ultimate users i.e. farmers through University Festival and Kissan Mela. Through these occasions all stakeholders get opportunity to have direct face-to-face interaction with each other and share their views, experience and knowledge. It is perhaps the best mode of integration of indigenous knowledge and science based knowledge.

TTM-3/09: National horse and cattle show for farmer's education

Name of P: Prof. Dr. Muhammad Younas, Dean Faculty of Animal Husbandry, UAF
Date of initiation : 1-3-09 (duration: 3 years)
Total Cost : Rs. 1.160 million
Funds released : Rs. 0.763 million
Funds utilized : Rs. 0.376 millions

Main thrust/theme

The University of Agriculture, Faisalabad (UAF) is the Alma Mater of all Agriculture organizations in this city of Agriculture. The UAF is the best institution in taking this leading role in Agriculture, Livestock shows, especially in harvesting season of the crops. They provide lot of amusement and entertainment to the farming community who are the backbone of the Agrarian economy of

Minister for Agriculture (Malik Ahmad Ali Aulakh), Minister for Law (Rana Sana Ullah Khan), and Vice Chancellor (Prof. Dr. Iqrar Ahmad Khan) UAF inaugurating Horse & Cattle Show.

the country. Such fairs & shows provide training opportunities to our students, teachers and farming community, their participation, interaction for mutual benefits and to improve our research & development (R&D) programs through farmer's interaction and feedbacks. This will keep our farmers to stay competitive and learn more about the global agriculture. Such activities are vital for the Agriculture sector and provide tremendous scope of interaction, generate lot of economic activities, learning opportunities, provide a chance of much more social interactions and above all livelihood for many involved in animal agriculture. This project is envisaged to provide all these benefits through the activities like Horse Show, Horse Dance & Horse Riding, Tent Pegging Competitions, Cow/Buffalo Milk Competition, Cattle Judging, etc.

Objectives

- To organize the horse and cattle show each year in Feb-March for farmer's education and awareness.
- To encourage farmers to produce best animals and create a healthy competition among the farmers.
- Building linkages with farmers, managers, breeders and industry with Academia. Educate farmers/students, enhance their learning and use this opportunity for capacity building of the young teachers and a chance of Training to Trainers/Judges.
- Education of students and competitors for showing and presenting of animals.
- To encourage horse riding, milk competitions, interest among animal lovers and display of pure breeds.
- The University Horse Riding and Milk Competition Teams will be strengthened to bring more fame and laurels to the Campus.

Achievements during the period under report

Horse and Cattle Show was organized on March, 27-31, 2009 and invited local farmers and presented to Kissan Convention which was attended by more than 2000 farmers and other residents of the city. This event provided farmer's education and training and arouses their interest for animals and their humane

Minister for Law (Rana Sana Ullah Khan), and Vice Chancellor (Prof. Dr. Iqrar Ahmad Khan) UAF inaugurating Poultry Exhibition

treatment. Best riders and best animals inspired the farmer's for keeping best animals. Many international delegates came to witness the show. Horse Dance and Horse show competition was held among more than 500 swars (riders) at the University Ground. Last session of prize distribution was chaired by the president of the AJK.

French visitor, Iranian del egate, Thai delegation, American Counselor to Pakistan and President of the AJK Govt. were among the few personalities who attended the Horse and Cattle Show. Some dignitaries like Mr. Sartaj Aziz and a higher delegation of FAP came to see this event. One documentary was also prepared and displayed at all University exhibitions during the year 2009.

Section-3

PRODUCT COMMERCIALIZATION

3.1 OVERVIEW

The objective of this component is to provide funding to commercialize cutting edge technologies developed by Agri. Scientists. Following achievements were made under this component during 2009-10.

HEC in collaboration with USAID and CSF (Competitive Support Fund) organized a conference on May 25-26, 2009 on public/private partnership, to discuss and devise a framework for innovation management and its commercialization. **Innovation working group** under the guidance of Dr. Sohail Naqvi, Executive Director, HEC was entrusted with the assignment to find out the ways to manage innovation and its commercialization. The partners HEC, USAID and CSF would monitor the developments and finalize the framework for full scale commercialization.

Consequent upon the meetings held in Islamabad on the issue above, UAF signed an agreement with CSF and HEC on August 6, 2009 to establish a Business Incubation Center (BIC) at UAF. The cost sharing by CSF and UAF is given as under :

(Rupees in million)

	CSF	UAF	Total
1st year	9.365	4.480	13.845
2nd year	7.535	4.480	12.015
TOTAL	16.900	8.960	**25.860**

The matching grant to cover UAF share is provided by Endowment Fund from the Product Commercialization component.

3.2 ESTABLISHMENT OF BUSINESS INCUBATION CENTER

EFS coordinated with CSF & HEC for reaching an agreement. EFS was the focal point for all the correspondence with other partners. EFS initiated the case for soliciting the approval of Syndicate of the UAF. The Syndicate in its meeting held on 12.09.2009 ratified the agreement.

EFS as an implementing agency, initiated the recruitment process through Registrar's Office. Director and Manager joined BIC on 01.02.2010 and 13.02.2010, respectively.

The BoD in its meeting held on 03.10.2009 and 30.04.2010 approved Rs. 5.432 million for construction of BIC office which comprises of:

1. Display Hall
2. Director's Office

3. Manager's Office
4. Other Offices
5. I.T. Manager's office
6. Conference Hall
7. Other (Kitchen, Store etc.)

Background of BIC

Business Incubation is a business support process that accelerates the successful development of startup companies by providing entrepreneurs with an array of targeted resources and services. Incubators nurture young firms helping them to survive and grow during the critical startup period when they are most vulnerable. Incubators provide hands on management assistance, access to financing and exposure to critical business or technical support services. Incubators have different goals including diversifying rural economies providing employment and transferring technology from universities and major corporations. As the academic affiliated business incubators have a great impact on entrepreneurs, students and universities, the CSF in collaboration with HEC has taken the initiative to form four model incubation centers at four Pakistani universities.

Vision of BIC

To develop an entrepreneurship culture and capacity by creating knowledge based enterprises, thus upgrading Pakistan's economic competitiveness.

Mission of BIC

Nurturing startup companies and young firms by helping them to grow and survive when they are most vulnerable.

Objectives of BIC

Business Incubation Center, UAF, has been established with the following objectives:

- To provide management guidance, technical assistance and consulting tailored to young growing companies.
- To develop start up and fledgling companies by providing entrepreneurs with an array of targeted resources and services.

- To create linkages between academic/ R&D institutions and private sector, aimed at creating knowledge based enterprises.
- To facilitate entrepreneurs with well equipped laboratories, extensive libraries, powerful computer systems, technology expertise, a well-educated workforce and subject matter experts.
- To promote innovative research based initiatives.

3.3 DEVELOPMENT OF BUSINESS BRIEFS

In this context, the UAF signed an agreement with M/s Development Pool, Lahore to prepare business briefs of some products for commercialization. Following 13 Business Briefs were developed

No.	Name of the Scientist	Technologies/Products
1	Prof. Dr. Faqir Muhammad Anjum, DG, NIFSAT, UAF	Aquatic Feed
2	Prof. Dr. Faqir Muhammad Anjum	Texturized Vegetable Protein (TVP)
3	Dr. Fawwad Ahmad, Assistant Professor, Department of Poultry Science, UAF	Automatic Feeding System
4	Prof. Dr. Iftikhar Hussain, Department of Microbiology, UAF	An egg-adapted Inclusion body hepatitis-hydro pericardium syndrome (IBH-HPS) montanide adjuvanted vaccine for poultry
5	Prof. Dr. Muhammad Iqbal, Deptt. Farm Machinery & Power, UAF	A zone disk tiller drill system
6	Prof. Dr. Muhammad Iqbal	An improved boom sprayer
7	Prof. Dr. Muhammad Iqbal	A boom sprayer test bench
8	Prof. Dr. Mumtaz A. Khan, Inst. of Hort. Sci., UAF	Citrus Budwood Certification and Propagation Program at UAF
9	Prof. Dr. Ghulam Muhammad, Deptt. of CMS, UAF	Commercialization of Mastitis Vaccine
10	Prof. Dr. Ghulam Muhammad	Commercialization of innovative Surf Field Mastitis Test kit for farmers' level detection of hidden mastitis

11	Dr. Shaukat Ali, Associate Professor, Inst. of Animal Nutrition & Feed Tech., UAF	Zinc Sulphate Fertilizer (21% Zn, Crystal)
12	Dr. Khalil ur Rehman, Associate Professor, Deptt. of Chemistry, UAF	Isolation and purification of enzymes for production of diagnostic kits
13	Prof. (Rtd) Dr. Rana Muhammad Aslam Khan, /Prof. Dr. Muhammad Aslam Pervaiz, Insti. Hort. Sci., UAF	Rose perfume

3.4 ESTABLISHMENT OF A COMPANY

The EFS supported the UAF for establishment of a company under the name "UAF Tech. Company (Pvt.) Ltd. – (U-TECH)" registered in 2010 with the following two main objectives:

a. To market and promote R&D (Research and Development), products and new techniques and technologies developed by scientists of the university.
b. To commercialize agricultural and livestock products by using various business models such as franchising, technical licensing, transfer of technology arrangements, marketing rights, appointment of agents, distributors, dealers etc. with private parties for various activities.

The BIC will incubate this company to successfully launch its program afterwards.

Composition of Executive Committee of Company

The Executive Committee of the Company comprises of the following:

1. Vice Chancellor, UAF — Chief Executive
2. Treasurer — Director
3. Executive Director, EFS — Director
4. Director, BIC — Director

3.5 SEMINAR/WORKSHOP

To sensitize the university community regarding concepts of business incubation and entrepreneurship, the following events were arranged by EFS during the current year:

Sr.#	Event	Title	Date	Venue
1.	Lecture	Business Incubators and Technology Parks by Dr. Sarfraz A. Mian, Chairman, Department of Marketing and Management, School of Business, Oswego State University of New York, USA	August 4, 2009	UAF
2.	Seminar	Business Incubators – Linking Researchers and Entrepreneurs for Product Commercialization	October 3, 2009	UAF
3.	Seminar	OmniGen An Immunomodulator (NeutroGenomics) for Animal Health (an example of transforming an idea to an asset) by Prof. Dr. Neil Forsberg,	June 30, 2010	UAF

Section-4

FINANCIAL REPORT

4.1 INVESTMENT OF FUNDS

The principal amount of Rs. 650.0 million was invested during 2006-07 under the relevant rules, which increased to Rs. 726.00 million in 2009-10 due to addition of 15% of share from profit on investment in the years 2007-08, 2008-09 and 2009-10 (to counter the impact of inflation/devaluation), The principal Amount was invested in the Banks on the recommendation of investment committee and after approval of Chairman BoD. Table-1, indicates the income from investment in chronological order. The growth of income may be visualized in Figure 1. The financial year 2009-10 closed with an income of Rs.103.072 million, showing an increase of Rs.20.892 million (25.42%) over the year 2008-09.

Table-1 Investment and Income

(Rs. in million)

Description	2006-07	2007-08	2008-09	2009-10
Principal Amount (PA)	680.000	700.000	710.000	726.000
Income	40.607	55.267	82.180	103.072

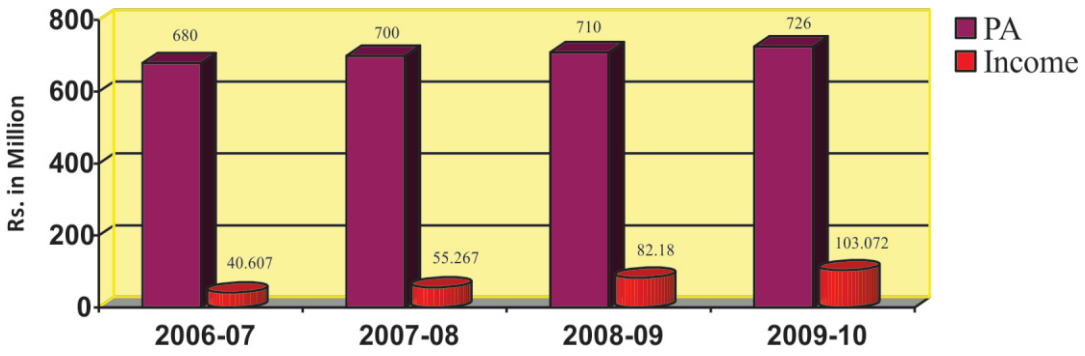


Figure 1: Growth of Principal Amount (PA) and Income from Investment

4.2 ESTIMATES FOR THE FINANCIAL YEAR 2009-10

Income

The income from investment out of Endowment Fund was originally estimated at Rs.101.099 million during the financial year 2009-10. Actual income, however, increased

to Rs. 103.072 million. The total allocated funds for the year 2009-10 remained at Rs. 186.496 million (Table-2).

Allocation/Expenditure

Income from investment is allocated to components of Faculty Development (FD), Technology Transfer (TT) and Product Commercialization (PC). Figure 2 displays the component wise expenditure of Endowment Fund Secretariat over the years. Expenses under FD and TT gradually increased owing to diversification and expansion of activities under FD and increasing projects under TT component. However, fund utilization in PC component remained low due to lethargic response of scientists in Product Commercialization. With the setup of Business incubator at UAF the activities in PC component are expected to increase in future.

Table-2 Allocations/ Expenditure and Budget Estimates (2009-10)

(Rs. in million)

Allocations/expenditure	Budget Estimates	Revised Estimates
Unspent balance for 2008-09	83.397	83.397
Income from Investment 2009-10	101.099	103.072
Total amount available for allocation	184.496	186.496
Expenditure against components	169.496	37.530
Transfer to Principal Amount	15.000	16.000
Unspent balance	---	132.939

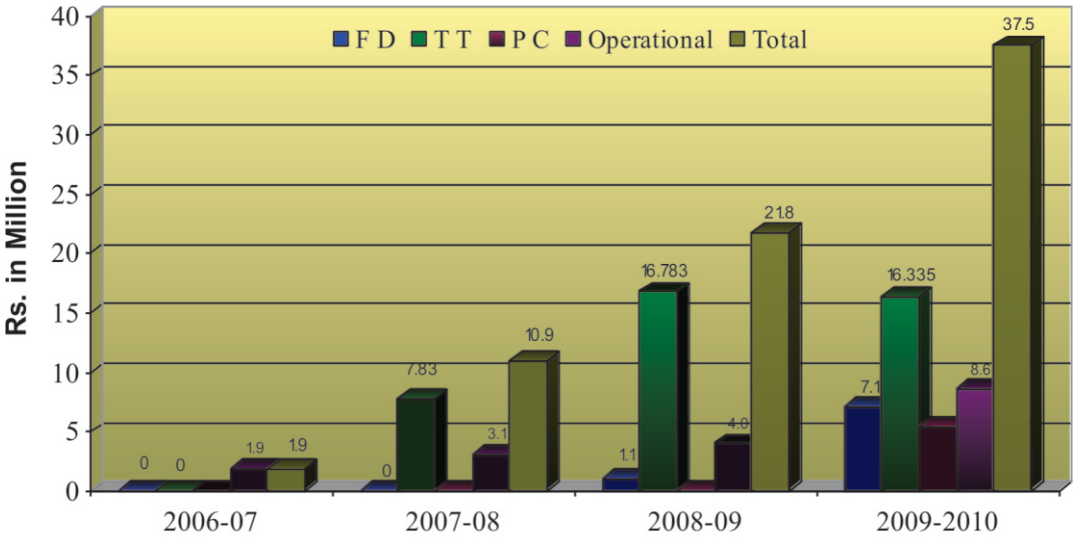


Figure 2: Growth of Component Wise Expenditure

During the year under report, the expenditures were originally estimated at Rs. 169.496 million. However, as result of fewer activities under Faculty Development and Product Commercialization, the year closed with an expenditure of Rs. 37.530 million. Component wise break-up of expenditure has been given as under.

Table-3. Component-wise allocation/Expenditure During the year 2009-10

(Rs. in million)

Name of components	Allocation	Expenditure	Unspent Balance
Faculty Development (30%)	58.950	7.139	51.810
Technology Transfer (40%)	55.421	16.335	39.085
Product Commercialization (20%)	40.021	5.449	34.571
Operational Cost (10%)	15.104	8.606	6.497
Grand Total	**169.496**	**37.530**	**131.965**

ANNUAL EXPENDITURE STATEMENT (RUPEES)
OPERATIONAL BUDGET 2009-2010

Code	Head	Expenditure (2009-2010)
A 01273	Honorarium	220,820
A 03201	Postage and Courier etc.	6,980
A 3202	Telephone and Trunk Calls, E-mails/Internet	28,636
A 03702	Management (Contractual Services)	394,285
A 03805	Traveling Allowance	112,262
A 03807	POL Charges	423,554
A 03901	Stationary	56,183
A 03902	Printing and Publications etc.	106,265
A 03903	Seminars/Workshops	1,592,706
A 03904	Hire of Vehicles	-
A 03905	News papers, periodicals and Books	5,887
A 03907	Advertising & Publicity	19,907
A 03940	Unforeseen	301,495
A 6301	Entertainment Charges & Gifts	752,254
A 09203	Purchase of IT Equipment	470,568
A 09501	Purchase of Transport	3,676,332
A 09601	Purchase of Plant & Machinery	-
A 09701	Purchase of Furniture & Fixture etc	-
A 13001	Repair of Transport	28,422
A 13101	Repair of Plant & Machinery	-
A 13201	Repair of Furniture & Fixture	9,580
A 13301	Repair and Maintenance of Office Building	400,000
A 13703	Repair of IT Equipment	-
A 12470	Other – Civil Works	-
Grand Total		**8,606,136**