Agricultural Innovation Program for Pakistan (AIP)

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ACRONYMS

AARI	Ayub Agriculture Research Institute
AAUR	Arid Agriculture University, Rawalpindi
AI	Artificial Insemination
AIP	Agricultural Innovation Program
AJK	Azad Jammu And Kashmir
AR Farms	Adaptive Research Farms
AR4D	Agricultural Research for Development
ARI	Agriculture Research Institute
ARS	Agronomic Research Station
ASI	Animal Science Training Institute
ASLP	Australian Sector Linkages Project
ATI	Agriculture Training Institute
AVRDC	The World Vegetable Center
AWD	Alternate Wetting And Drying
AZRI	Arid Zone Research Institute
BARDC	Baluchistan Agricultural Research and Development Center
BARI	Barani Agricultural Research Institute
BLB	Bacterial Leaf Blight
BUITEMS	Balochistan University of Information Technology, Engineering and Management Sciences
CA	Conservation Agriculture
CCRI	Cereal Crops Research Institute
CGIAR	Cumulative Group of International Agricultural Research
CGS	Competitive Grants System
CIMMYT	International Maize and Wheat Improvement Center
COs	Community Organizations
CRI	Citrus Research Institute
DAP	Diammonium Phosphate
DAR	Directorate of Agriculture Research
DG	Director General
DSR	Direct Seeding of Rice
DSS	Decision Support System
DVC	Dairy Value Chain
ETV	Enterotoxaemia Vaccine
FAO	Food And Agriculture Organization of the United Nations
FEAST	Feed Assessment
FGDs	Focus Group Discussions
FMD	Foot and Mouth Disease
FSC&RD	Federal Seed Certification and Registration Department
GB	Gilgit Baltistan
GS	Green Seeker
Ha	Hectares
HEC	Higher Education Commission
HRD	Human Resource Development
HS	Hemorrhagic Septicemia

ICARDA	International Center for Agricultural Research in the Dry Areas
ICI	Imperial Chemical Industry
ICT	Information and Communication Technology
IFPRI	International Food Policy Research Institute
IITA	International Institute of Tropical Agriculture
ILRI	International Livestock Research Institute
IPM	Integrated Pest Management
IRD	Informal Research and Development
IRRI	International Rice Research Institute
IRS	Internationally Recruited Staff
KP	Khyber Pakhtunkhwa
KSK	Kala Shah Kaku
L&DDD	Livestock & Dairy Development Department
LCC	Leaf Color Chart
LDDDB	Livestock and Dairy Development Department of Balochistan
LSOs	Local Support Organizations
M&E	Monitoring and Evaluation
MEW	Mega Environment for Wheat
MMRI	Maize And Millet Research Institute
MR	Moderately Resistant
MS	Moderately Susceptible
MSF	Mission Strategic Framework
NAC	National Advisory Committee
NARC	National Agriculture Research Center
NARS	National Agricultural Research Scientist
NE	Nutrient Expert^{tm}
NRS	National Recruited Staff
NRSP	National Rural Support Program
NSTHRI	National Sugar and Tropical Horticulture Research Institute
NUYT	National Uniformity Yield Trial
ODK	Open Data Kit
OPV	Open Pollinated Variety
PARB	Pakistan Agricultural Research Board
PARC	Pakistan Agricultural Research Council
PARD	Pakistan Academy for Rural Development
PAU	Punjab Agriculture University, Ludhiana, India
PIASA	PARC Institute for Advanced Studies In Agriculture
PPR	Peste-Des-Petits Ruminants
PVS	Participatory Varietal Selection
QAARI	Quaid-E-Awam Agriculture Research Institute
QPM	Quality Protein Maize
RA	Research Associate
RCA	Roberts Cotton Associates Ltd.
RCBD	Randomized Complete Block Design
RRI	Rice Research Institute
SARS	Summer Agricultural Research Station
SB	Super Basmati
SDS	Sodium Dodecyl Sulfate
SEP	Socio Economics Program, CIMMYT

SSNM	Site Specific Nutrient Management
SSRI	Social Sciences Research Institute
t / ha	tons / hectare
TAC	Technical Advisory Committee
TEVTA	Technical Education and Vocational Training Authority
TMK	Tando Muhammad Khan Seed Corporation
UAF	University Of Agriculture, Faisalabad
UC	Union Council
UC Davis	University of California, Davis
USAID	U.S. Agency for International Development
USDA	United States Department of Agriculture
VG	Vegetable Growers
VO	Village Organizations
WRI	Wheat Research Institute
WRIS	Wheat Research Institute Sindh
ZT	Zero Tillage
ZTHS	Zero Tillage Happy Seeder

SUMMARY

During the reporting period (October 2015-March 2016) 'Agricultural Innovation Program for Pakistan' (AIP), reinforced the result based approach to propel and achieve the development objectives. AIP delivered enhanced agriculture productivity via innovation, resulted in improved livelihood of destitute and impecunious farmers. The project is implemented across four diverse cross-commodity key themes namely, new varieties seeds, new technologies (mechanization), value chain development (durum wheat, rice, vegetables, perennial horticulture and livestock) and human resource development. Moreover, introduced Competitive Grants System and initiated the discussion on the creation of Provincial Agricultural Research Boards for Development (AR4D) in three provinces.

The AIP livestock component targeted 2,386 livestock farmers from 44 villages of Bahawalpur district of Punjab province on farm management to improve milk productivity through balanced feeing and Adlib water supply. AIP also extended livestock activity radius and selected 12 additional villages fall in the vicinity of project to benefit additional farmers. Farmer participatory farm productivity trials were conducted in 21 villages including 12 in Punjab province; five in Khyber Pakhtunkhwa (KP) province; two in AJK; and three in Sindh province, with 369 livestock holders rearing 799 milking animals including cattle and buffalo. The livestock component, in partnership with the National Agricultural Research Center (NARC), has initiated village based seed enterprises for improved fodder varieties of wheat, barley and oats with selected farmers at two farmer's field sites namely Beghal and Dhulli in Chakwal district.

AIP-vegetable carried out 75 trials, comprising of 171 varieties of six different vegetables, and 1,700 farmers have participated in on-site trainings to adopt improved packages of production technologies. Average net profits from protected and off-season tomato for Sindh and Punjab provinces were US$ 5,483/ha in 2015 and US$ 9,484/ha in 2016.Vegetable component has identified varieties for open-field off-season frost-free production environment. The yield of the identified varieties is three times higher than local lines, and 50 percent higher if grown under low tunnels technology. Moreover, AIP has made discernible achievements; declared and forged the first national onion seed production village Shuga, district Buner of KPK province.

In AIP-Wheat, Informal Research and Development (IRD) approach introduced and conducted 7,200 paired plot on farm demonstrations to fast track deployment of newly released, high yielding rust resistant wheat varieties. Additionally, 750 farmers from across Pakistan were imparted trainings on farm and on station research and conducted demonstration, exposure visit to show activities on wheat seed, variety and agronomic practices for creating knowledge and demand for new seed varieties and best bet agronomic practices. The project facilitated Public-Private Partnership and successfully produced and sold more than 900 tons of quality wheat seeds during last autumn generating a gross incremental income of $ 390135.5. The amount is equivalent to 65% of total investment made in AIP wheat commissioned projects.

Among the main breakthroughs from AIP-Maize, the launch of two protein enriched maize, better known as Quality Protein Maize (QPM), in Pakistan. Evaluation of stem borer tolerant open pollinated maize varieties without the application of chemical pesticides was carried out at Cereal Crops Research Institute (CCRI), Pirsabak, Nowshera, KP province, Maize millets research institute (MMRI) Yusafwala-Sahiwal, Punjab province and NARC. The results from these trials will figure out to identify stem borer tolerant germplasm/varieties which can be further registered for commercial production of the seed.

AIP-Rice has targeted 1,172 advanced rice lines with various traits, distributed to 11 institutions throughout the country in the public and private sectors for evaluation against biotic (BLB) and abiotic (submergence, drought, salinity and heat) tolerance, yield potential and grain quality. Furthermore, Alternate Wetting and Drying (AWD) water saving technology introduced to the farmers which has plummeted water use starkly. A maximum of 40 percent water saved, resulted in

saving of approximately Rs. 2500-3500 per acre for the farmers. During rice season 2015, AIP-Rice in partnership with Engro Fertilizers distributed 10,000 kg of certified seed of Basmati to 515 farmers from the Sheikhupura district of Punjab province. In partnership with 17 national institutes, AIP-crop management/agronomy reached to 4,147 farmers. They were assisted in application of improved techniques on 794 sites, trained 443 stakeholders and disseminated conservation agriculture (CA) technologies through field days to 2,910 farmers. The technology includes Zero tillage, ridge planting of wheat to farming community in Punjab, Sindh and Balochistan. Local modification of zero till happy seeder was also supported that helped to plant wheat without burning of rice residue and thus save resources and environment pollution.

AIP-Perennial horticulture component has reached out to 2,088 beneficiaries through various project interventions including 55 trainings, field days, conferences and symposium. In addition, 2694 acres of land has been brought under new technologies demonstrating 5 fruit commodities (grapes, citrus, mango, guava, and Pistachio). In Human Resource Development component all 14 AIP scholars in MS and PhD programs in eight land grant universities in the U.S. are progressing well in their courses.

After the 18th amendment, Agriculture is now a provincial subject. Therefore, AIP- primary partner Pakistan Agricultural Research Council (PARC) is facing challenges to established research boards in three provinces which were supposed to execute competitive grant system. The boards establishment requires legislation from provincial assemblies which is a time taking process. Hence, to surmount the challenge, PARC is exploring other options to implement Competitive Grant System.

Women inclusion in agriculture activities in Pakistan is challenging. Although, to ensure and fortify women inclusion in the project activities AIP devised a dynamic and women focused strategies and ensured women participation; AIP targeted 15,000 women in various activities ranges from trainings, modern management practices, introduction of new seeds and technologies.

AIP annual work plan developed for year 4 of the project under the Mission Strategic Framework. To maximize the effectiveness of the work plan a number of meetings were held with implementing partners, information were mustered and pondered advertently. Furthermore, USAID feedback was incorporated and final version submitted to USAID. A robust and rigorous monitoring was carried out in different project areas to ensure that activities are on track and in line with the monitoring plan. Output indicators were monitored rigorously and fortified that the partners make discernible achievements. These efforts amplified the performance of the project and targeted 50,000 beneficiaries in the reporting period.

Security risks particularly in Sindh and Balochistan provinces has caused delay in carrying out some of the activities, however, AIP is incessantly committed to improve the Pakistan's agricultural productivity and increase the livelihoods of farmers in partnership with all stakeholders.

BACKGROUND

The 'Agricultural Innovation Program for Pakistan' (AIP) works to increase agricultural productivity and incomes in the agricultural sector through the promotion and dissemination of modern practices in the following sectors: cereals (wheat, maize, and rice), livestock and horticulture (fruits and vegetables). Project management is vested in a unique consortium of CGIAR Centers and the Pakistan Agricultural Research Council (PARC), led by the International Maize and Wheat Improvement Center (CIMMYT). AIP aims to foster the emergence of a dynamic, responsive and competitive system of science and innovation that is 'owned' by Pakistan and will catalyze equitable growth in agricultural production, productivity and value. AIP is rooted in the principles of AR4D, with particular emphasis on building partnerships between public research and those it serves, including farmers and the private sector; increasing investments; generating, sharing and making use of agricultural knowledge for development; and demonstrating and building awareness of the development impacts and returns from agricultural innovation.

AIP operates through three Activity Windows: commissioned projects, a competitive grants system and human resource development (HRD). Work within these activity windows addresses complex agricultural systems which is divided into four 'Science Windows' – cereals and cereal systems, livestock, vegetables and perennial horticulture. The key indicator of AIP's success will be the number of smallholder farmers who adopt or benefit from productivity or value-enhancing technologies. CIMMYT is the primary implementing partner and prime grantee; managing and taking overall responsibility for AIP and providing direct oversight of the agronomy, wheat and maize commissioned projects within the cereals and cereal systems science window. Four international partners (the International Livestock Research Institute, or ILRI; University of California, Davis; The World Vegetable Center, or AVRDC; and the International Rice Research Institute, or IRRI) lead on commissioned projects in livestock, tree fruits, vegetables and rice, respectively, while PARC serves as both the hosting partner and the lead on a province-inclusive competitive grants system. Combined, those organizations are CIMMYT's "primary partners."

1. Livestock

1.1. Dairy Value Chain

1.1.1 Disease Awareness and Prevention Campaign

Foot Mouth Disease (FMD) affected 30-40 percent of the large ruminants in the dairy value chain (DVC) operational villages in Jhang and Bahawalnagar districts of Punjab province and milk production reduced up to 90 percent, and caused 60-80 percent mortality rates in calves. Some farmers claimed that on an average they lost about PKR 100,000 (US$ 1000) due to FMD in 2014.

In October 2015, AIP-Livestock in collaboration with the provincial livestock line departments successfully vaccinated all large ruminants in all six project dairy (9,641 animals) with the third booster dose (supplied by FAO). AIP-Livestock team is continuously monitoring FMD situation in all of study villages and as of today no case of FMD has been reported. This helps to gain farmers confidence, credibility and the farmers are highly receptive to interventions.

1.1.2 Calf Survey in Punjab province and Gilgit-Baltistan region

The available literature indicates that in Pakistan the overall mortality rate of buffalo calves are 9.4 percent. The calves are a neglected entity in livestock sector due to high feeding costs and low return from sale at weaning age. AIP-livestock engaged in this grey area of research, and in October 2015 collected information on management practices related to rearing of calves. Data of 201 calves from districts Bahawalnagar and Jhang of Punjab province and 146 calves from Gilgit Baltistan were collected. Major constraints identified were feeding and health care resulting in low growth rate and improper housing. Based on these identified constraints farmer participatory trials on deworming and feeding of calf starters is planned for coming year.

1.1.3 Empowerment of poor female livestock farmers

AIP-Livestock focused on women empowerment especially widows & women from poorer households who depend on livestock for their livelihoods. Two events were organized for women on November 25, 2015 in villages Chella and 166/JB In collaboration with the District Livestock Office, Jhang. Women includes 119 and 117 participants from both villages showed great interest and actively participated in these sessions. Ms. Shamshad Bibi, an AIP farmer beneficiary in the water and balanced feeding trial in Chella, was the guest speaker at the 166/JB village session, and shared her experiences with women farmers. In the same event, concentrate feed bags were distributed among 78 resource poor women livestock farmers to improve milk production of their milking animals.

1.1.4 Livestock Director Generals (DG's) and Directors meeting

AIP-Livestock organized a half day knowledge sharing meeting on December 8 for livestock DG's and Directors of all provinces to update them about AIP-Livestock's diversified activities. The meeting focused on sharing the work of AIP-Livestock with partners, and obtaining feedback on how livestock component can improve the efficiency in different provinces/ regions. Director Livestock FATA pledged his fullest cooperation in implementing activities and requested ILRI to start livestock activities in FATA agency. AIP-Livestock project manager agreed and explained that the INGO registration process of ILRI has to be approved before initiating activities. The meeting was useful and successful.

1.1.5 Sustainability of interventions introduced by AIP-livestock

AIP-livestock initiated the establishment of livestock farmer's associations (LFA) in Chella village of Jhang district and was formally inaugurated on January 23, 2016. At the inaugural meeting 79 men and 36 women participated. At this meeting, the members elected the office bearers and took the oath to work for one year in collaboration with AIP-livestock staff. This is an effort towards sustainability of interventions through this type of association.

1.1.6 Farm Productivity Trials: farmer participatory approach to improve management practices

The adoption of improved management practices through participatory approach provides sound platform to improve livestock productivity, with view AIP-livestock extended their project activity radius and selected 12 additional villages in vicinity of already selected project villages in Bahawalnagar. Farmer participatory farm productivity trials were conducted in 21 villages including 12 in Punjab; five in KP; two in AJK; and three in Sindh, with 369 livestock holders rearing 799 milking animals (cattle and buffalo).

Trials were conducted to improve balance feeding and adlib water supply, leading towards higher milk productivity and profitability. The detail of these farm productivity trials is given in Appendix 11. The farmers were given water buckets to measure amount of water, weighing scales to measure amount of fodder and feed, and milk measuring jugs. The impact of adlib water and balance feeding on milk production was demonstrated to farmers, and response to milk production was from +0.5 liter to +1.5 liter per day per animal. Through participatory approach farmers directly learned how balance feeding and adlib water supply improves milk productivity.

1.1.7 Dissemination and awareness programs in Punjab and KP provinces

In Bahawalnagar district of Punjab province, 11 farmer awareness programs were conducted during January 5 to 17, 2016 to disseminate results of farm productivity trials to neighboring farmers within and for those from other villages. About 2386 livestock farmers from 44 villages of district Bahawalnagar attended these awareness programs. Farmers participated in these trials further explained to fellow farmers that it is simple to improve animal milk productivity just by managing balanced feeding and adlib water supply. The feeding chart was also distributed among farmers offers different combination of balanced feeding for cattle and buffalo. During these awareness programs in Bahawalnagar, 33 livestock farmers (three from each village) received one concentrate bag as an appreciation for getting first, second and third position in terms of their animal's highest milk productivity per animal per day during the trial period. This was the reward of perfectly adopting the improved dairy practices as guided by AIP team and also helps to motivate other farmers to improve efforts for higher milk productivity.

A total three farmer's days were organized in collaboration with the livestock department, in KP. In these events a total 1311 farmers participated includes 1240 from Swat and 71 from Mardan. The purpose was to disseminate the awareness on balanced feeding and advantages of adlib water and their impact on milk production. Feeding charts were also distributed among the participants to be used as a practical guide. Three farmers in each village where the farmer participatory trials were conducted also received bag of 50 kg concentrate feed. This was an appreciation for getting first, second and third position in the trial.

1.1.8 Agriculture Expo in Faisalabad, Punjab province

AIP-livestock participated in Agriculture Expo organized by the University of Agriculture, Faisalabad (UAF) from February 29 to March 6 at UAF expo center. Visitors showed a keen interest in AIP-Livestock activities in Pakistan. A total of 308 participants visited our stall and received information related to livestock sector. AIP-Livestock publication material was also distributed on livestock production. AIP-Livestock stall won third position.

1.1.9 Spring festival/shows in Punjab and Balochistan - 2016

Rajanpur district of Punjab province: AIP-Livestock in partnership with UAF and Livestock and Dairy Development Department, Government of Punjab, organized a Cattle Show in Fazilpur village on March 6, 2016. Cattle, buffalo, goat and sheep farmers/ herders from various parts of Punjab participated in the competition. In 2014, only most popular local breeds Nuqri (goat) and Mundri (sheep) were awarded cash prizes as a token of appreciation to the farmers for promoting of indigenous breeds in the areas. Subsequently, this year altogether 13 different indigenous breeds were invited to participate in the beauty contest which includes nine breeds of goat and four sheep breeds. AIP-Livestock awarded cash prizes in recognition to herders' accomplishments in reaching high body weights in that animals and for their commitment to promote pure indigenous breeds. It is expected to improve productivity and profitability of subsistence small holders in Pakistan.

The Horse and Cattle Show at Sibi, Balochistan is traditionally known as "Sibi Mela". It is an historic national event that has been celebrated for centuries. This historic event has enveloped itself with animal market, animal breeds and their class competitions. The nucleus of the event and source of economic blessings of the region is the "Bhagnari" cattle breed. This cattle breed is the heaviest draught breed of Pakistan. The Sibi Show was celebrated on February 27, 2016.

The AIP-ILRI encouraged the famers by distributing appreciation certificate and prizes among position holders in cattle show. . The appreciation certificates and net prizes were given to the winners of the best animal comprised Bhagnari and Nari-Master cattle breeds and Balochi, Rakhshani, Bevergh, Harnai, Krakul sheep and Barbri goat. The Ubaidullah Babat Lala, Minister and DG of livestock highly appreciated the effort of AIP-ILRI, and awarded a shield for their devotions.

1.2 Range, Fodder and Feed

1.2.1 Fodder seed distribution of improved varieties

The scarcity of fodder production is the major limiting factor for livestock production, from mid-April to June and mid-October to December. In past decade, national and multi-national companies have promoted high yielding fodder varieties, but farmers are growing old and traditional varieties of fodder which are low productive and does not suffice the feed requirements. AIP-Livestock distributed different fodder seeds of improved varieties to improve the supply of fodder crops with the objective to introduce improved varieties and link the farmer with improved seed suppliers. However, different fodder seeds were distributed but Rye and Mott grass was highly appreciated by farmers and remained at the top in discussion among farmers all over the Pakistan. A complete detail of fodder seed and its plantation is given in Appendix 12.

1.2.2 Village Based Seed Enterprise (VBSE) in Chakwal

The informal seed sector is based mainly on seed, preserved on the farms, and exchanged at a community level or traded in local markets without any official oversight. Many farmers are unaware of institutionally available seed or are unable to access it, but farmers receive information through informal networks about quality seed and its source.

Addressing this constraint, AIP-Livestock in partnership with the National Agricultural Research Center (NARC) established improved varieties of wheat, barley and oats with selected farmers to initiate village based seed enterprises at two sites (Beghal and Dhulli) in Chakwal district on two farmers field. The NARS scientists were involved throughout this activity to identify clear procedures for quality control. About 70 percent of the seed produced at VBSE was successfully marketed at premium price. The market price for wheat was around PKR 1500/50 kg, whereas VBSE farmers were able to sell seed from PKR 2500 to 3500 per 50 kg bag. It is observed that VBSE farmers can earn net income of up to Rs. 20,000 per ha from wheat, while for oat and barley it is almost double to triple (PKR 60,000). This might be due to extra effort and services supplied by research staff and guidelines from seed certification departments.

1.2.3 Effect of rotational grazing on rangeland and livestock productivity

a) Chakwal, Punjab Province

The pastoralists of the Chakwal area attempt to increase their livestock number to achieve immediate economic returns, which ultimately decrease ground vegetation coverage and increased soil erosion. Under the AIP rangeland activity the main objective was initially to protect the degraded rangeland areas, measure its biomass productivity over specific periods (after spring and monsoon summer rainfall). Further initiative was to develop a model for local communities to demonstrate the impact of rotational grazing on their livestock productivity.

To study the effect of stocking rates on small ruminant and rangeland productivity at both sites (Begal and Dhulli villages), three grazing plots were developed includes grazed in spring season (May–July) and summer season (August-October). One control plot was set as an unprotected grazed area. The experimental ewes were allowed for grazing 6-8 hours daily before monsoon and after monsoon.

In Begal, ewes grazed on protected rangelands before and after monsoon showed a higher than average daily live-weight gain (62 and 48 g, respectively) compared to un-protected rangelands (20 and 36 g, respectively). The net live-weight gain in ewes for 59 days on protected rangeland grazing is low due to lower availability of range-vegetation (before and after monsoon 3.4 to 3.6 kg respectively). However, the net live-weight gain in ewes grazed on un-protected rangeland was very poor (1.17 and 2.5 kg respectively before and after monsoon).

In Dhulli, ewes grazed on protected rangelands before and after monsoon showed higher average daily live-weight gain (79 and 53 gram, respectively). The ewes grazed on un-protected rangelands

lost weight (-4.78 g) before monsoon, and gained 25 g) after monsoon. The net live-weight gain (before and after monsoon 4.66 to 3.15 kg respectively) in ewes on protected rangeland grazing is low due to lower availability of range-vegetation. However, the net live-weight gain in ewes grazed on un-protected rangeland was very poor (-0.33 and 1.73 kg respectively before and after monsoon).

b) Ziarat, Balochistan

The gross rangeland area of Balochistan province is 34.7 million ha, and rangeland resources are the major land use in the province. The objectives of this study were to examine the biomass production and the scope of the rotational grazing on community rangelands of Balochistan province and to assess the effect of continuous grazing and controlled grazing on rangeland and small ruminant productivity.

In Ahmadun, a site (115 ha) which had been protected from grazing since last year was divided into four blocks, and another 28 ha block was selected as a control (grazed area). Total biomass was measured in June 2015 using the line intercept method, and was repeated in July-November 2015. For the first time in Pakistan, a nondestructive method was used to estimate vegetation cover of rangelands. Thus, the VegMeasure® software was successfully used to quantify vegetative ground cover in Balochistan rangelands. This is a non-commercial (free-license) software that allows accurate analysis of vegetative ground cover.

To study rotational grazing, 230 sheep each were selected for the protected and un-protected areas of rangeland. The grazing area for the two types of grazing systems (protected and un-protected) allocation was similar (115 ha) each. The experimental ewes were allowed to graze 6-8 hrs daily for a period of 68 days (29 August 2015 to 04 November 2016). All the experimental ewes were ear tagged before the start of experiment.

In the rotational grazing trial, the ewes that grazed on protected rangelands showed higher than average daily live-weight gain (32.4 g) compared to ewes that grazed on un-protected range lands (18.4 g) The net live-weight gain for ewes grazed on protected rangeland over the 68 day period was almost double (2.2 kg) than the ewes (1.25 kg) grazed on un-protected rangeland.

1.2.4 Rangeland Activities in Cholistan Desert

The rangelands in Cholistan desert, Bahawalpur district of Punjab cover an area of 26,000 km^2, and are topographically divided into two geomorphic regions based on parent material, soil and vegetation. The wind resorted sandy desert covers about 18,130 km^2 in the southern region known as Greater Cholistan.

The information on seasonal forage production on rangeland is scarce and thus there is a need to determine the seasonal forage production pattern in the rangeland. To measure aboveground dry matter allocation, a representative sand dune landscape at Din Garh in Lesser Cholistan that is managed by Pakistan *Council of Research in Water (PCRWR)* was selected for the study. The sand dune has a uniform stand of natural vegetation, and 2 ha plots in replicate were selected on the undulating sand dunes for protected and unprotected treatments. Both the un-protected and the protected plots were sampled during fall (November 2015).

The total fresh biomass production (kg ha^{-1}) was 1001 and 325 in protected and unprotected areas. In un-protected areas, the dominant grasses were Dactyloctenium aegyptium, Lasiurus scindicus, Cenchrus ciliaris, and constituted 83 percent of the total biomass production. In un-protected area due to regular grazing, the grasses are mostly disseminated and shrubs like Haloxylon salicornicum, Haloxylon recurvum and Salsola imbricate contributes 50 percent of the total biomass, and is a source of income for local community. It contains a high content of nitrate that is used on a large scale in the soda ash factory for soap manufacturing. Dry matter production was more responsive to rainfall in the grazed than in the un-grazed plots.

1.3 Small Ruminants Value Chain

1.3.1 Assessment of different supplemental feeding strategies for higher productivity in Chakwal

AIP-Livestock introduced cactus to the farmers in dry areas of Chakwal in Punjab province its adaptation tested and its value as an animal feed evaluated. Three supplemental feeds were formulated based on available fodder including oat, lucerne and spineless cactus for the assessment of productivity of small.

The four categories of animals (ewes/ does/ lambs/ kids) which belong to four farmers were divided into four groups; A, B, C and D. The number of animals varied in each group due to differences in numbers of heads owned by each farmer. The animals in group A, B and C were offered supplemental feed formulation based on green oat, cactus and lucerne, respectively. The animals were grazing for 5-6 hours daily on rangeland followed by supplemental feeding ration mixed at 2 kg/ head/ day with oat, cactus and lucerne in the evening. However, the animals in the control group D) were maintained as per farmer practice on 6-8 hours dailyl grazing only.

The ewes fed on oat and lucerne based supplemental feed showed similar higher live-weight gain (67g/day) followed by cactus based supplemental feed (33g/day).

1.3.2 Increasing goat productivity through improved breeding bucks in Bahawalpur

In Pakistan, most of the farmers mix goat breeds without clear breeding objectives so genetic performance improvements are rather arbitrary. Two pure Beetal (Makichini) breed bucks were provided to the local community of Chak 93DB to improve productivity and incomes from goat production. Five farmers' goat flocks are involved in this breeding program. The breeding strategy (like breeding season, supplemental feeding to breeding stock, and record keeping of the breeding) was discussed with project beneficiaries. The mating of five farmers' goat (20-30 each) was initiated in November and first kidding (offspring) is expected in April 2016.

1.3.3 Development of Model cum Training farms at Dhulli, Chakwal

AIP-Livestock initiated the development of "Model cum Training farms for Small Ruminants" in Dhulli, Chakwal. Five farmers were selected at Chakwal for the development of model farms on the basis of a 50 percentage share of a total estimated cost PKR 752,000 (US$7500). The objectives were to:

i. Demonstration of integrated model farm concept to small ruminant's farmers for higher productivity linked with improved value chain system.
ii. Development of integrated farmer participatory animal-fodder-range production approach to enhance poor farmers' income.
iii. Capacity development regarding proper animal production
iv. Train other farmers on the concept of small ruminant value chain on these model cum training farm

Two Small Ruminants Model Cum Training Farms were completed at Chakwal. The first farm was inaugurated on November 24, 2015 and the second on December 6, 2015. On both occasions senior scientists from PARC and NARC were present. The team also visited the other three model farms under construction, and the fodders/crops demonstrations including the cactus field linked with model farms. A total of 120 farmers participated in these events. Senior leadership explained the concept of model farming and quality production of small ruminants.

1.3.4 Capacity development and knowledge sharing activities

a) Training on "Agro-ecological monitoring of rangelands and cactus agronomic practices"

A four day workshop on Agro-ecological monitoring of rangelands and cactus agronomic practices was offered to 13 participants. The main purpose of this training workshop was to introduce and practice the VegMeasure software for the Digital Vegetation Charting Technique, to monitor vegetation on natural rangelands. This method helps to evaluate ecosystem health and long-term sustainability. The workshop also served to highlight the importance of cactus and its best agronomic practices. Thirteen participants from different institutes of Pakistan, working mainly on rangelands participated in this workshop.

b) Awareness of farmers on feed formulation for higher productivity.

An awareness program on small ruminants feed formulation for farmers was organized at NARC in Islamabad on December 14, 2015. The objective of the program was to demonstrate practically the small ruminants feed formulation process and develop linkages with NARC, Animal Nutrition Scientists. The event was attended by 17 farmers from Dhulli, in which they learnt about the feed ingredients, feed formulation, grinding, mixing and packing at feed mill animal sciences institute (ASI) /NARC and at a private feed mill in Islamabad.

c) Three days training program on input services on animal health care, feed and fodder supplies, and marketing for educated unemployed

AIP-Livestock in partnership with Bahuddin Zakaryia University (BZU), Multan in Punjab province, organized three days training from 26-28 January 2016 for educated unemployed youth at BZU. The training provided practical knowledge on small ruminant value chain. A total of 27 participants from Bahawalpur, Bahawalnagar, Dera Ghazi Khan, Rahimyar Khan and Multan attended the training which comprised of 12 theory and practical aspects of small ruminants health, feed/fodder, breeding and marketing etc. this was followed by an exposure visit to the model research farms at BZU, Multan.

2 Vegetables

2.1 Protected Cultivation of Vegetables

This sub-project activity has two aspects includes; improving protected cultivation in Khyber Pakhtunkhwa (KP), Punjab, Balochistan, Gilgit-Baltistan (GB) and Azad Jammu & Kashmir (AJK), and developing natural off-season vegetable production activities in Punjab and Sindh. As the main cropping season is still in progress this report focuses on the trials underway.

2.1.1 Identify and promote best varieties of crops grown under protected cultivation

(a) On-station Validation Trials

A total of 25 trials with 171 varieties and hybrids under three different planting conditions at 25 locations are being undertaken with provincial partners (Table 1). Seed was produced from advanced lines of tomato, cucumber, sweet pepper, chili, bitter gourd and marrow last year.

Table 1 On-station validation trials of different vegetable varieties and hybrids currently underway									
Crops	**Protected cultivation**			**Natural off-season**			**Normal Growing Season**		
	Variety / hybrid	**Trial**	**Location**	**Variety/ hybrid**	**Trial**	**Location**	**Variety/ hybrid**	**Trial**	**Location**
Tomato	4	2	2	12	2	2	62	9	9
Cucumber	17	2	2				3	1	1
Sweet pepper	9	3	3						
Chili	35	2	2				2	1	1
Onion							12	2	2
Soybean							15	1	1

- **Natural Off-season:** In Chakwal, trials of four commercial tomato hybrids yielded 60 percent to 80 percent better than the local check variety Roma.
- **On-station Normal Growing Season:** Four hybrids from elite AVRDC tomato lines have yielded 44-70 percent higher than the local check Naqeeb. Other studies underway are: tomato (5 trials of 58 hybrids or elite AVRDC lines) and trials of cucumber, chili, onions and 13 vegetable soybeans.

(b) On Farm adaptability Trials

A total of 50 trials with 96 vegetable varieties or hybrids have been conducted in collaboration with 11 main provincial partners in three provinces namely Punjab, Khyber Pakhtunkhwa and Balochistan under protected structures and natural off-season conditions at 50 locations in Punjab and Sindh provinces. Demonstration plots with 181 farmers for tomato, cucumber, sweet pepper, chili, bitter gourd and vegetable marrow reached 1692 farmers through exposure visits and training activities from across Pakistan which enabled the participating farmers to adopt improved packages of production technologies (Appendix 2). Trials included both protected cultivation and natural off-season cropping (**Error! Reference source not found.**)

Table 2 on farm adaptability trials of different varieties/ hybrids of vegetable crops						
Crops	**Under protected cultivation**			**Natural off-season**		
	Variety / hybrid	**Trials**	**Locations**	**Variety / hybrid**	**Trials**	**Locations**
Tomato	18	11	11	24	6	6
Cucumber	15	7	7	13	4	4
Sweet pepper	4	4	4	3	3	3
Chili	4	5	5	3	3	3
Bitter gourd	5	3	3	1	1	1
Vegetable marrow	6	3	3	-	-	-

Protected Cultivation:

Tomato: Two years of trials have shown that commercial hybrids (Sahil, Anna, Deenar and Fonto) and two public sector hybrids (Sallar and Sandal) had equally good yields and resistance against diseases like blight (Fig. 2). The performance of 12 other varieties/hybrids is being compared with these checks. Average net profits from protected and off-season tomato for Sindh and Punjab provinces were assessed and were US$ 5,483/ha in 2015 and US$ 9,484/ha in 2016.

Figure 3 Tomato "Sahil" at Rawalpindi

Figure 2 Cucumber under, insect net with extra shoots removed at Bhikhi-Sheikhupura

Figure 1 Intercropped bitter gourd with cucumber at Chevanda-Faisalabad

Cucumber trials with 15 varieties or hybrids under plastic tunnels were sown in November in eight locations across Pakistan (Fig 2). AVRDC provided farmers with temperature and humidity tools to monitor daily growing conditions to minimize their disease problems and spraying. As a result of which production cost has lowered and net profit has increased. Capacity building of farmers were enhanced as a result of improved knowledge after adoption.

Sweet Pepper: Four varieties or hybrids were grown using healthy nursery raising techniques taught to the farmers by AIP Vegetables and transplanted in four locations including Islamabad, DI Khan, Sheikhupura and Faisalabad to assess their performance. Intercropping with bitter gourd is growing in popularity in Punjab province.

Chili: a repeat trial of four varieties or hybrids is being conducted in five locations including Muzaffarabad, Rawalpindi, DI Khan, Faisalabad and Sheikhupura.

Bitter Gourd: Repeat trials with five varieties / hybrids are being conducted in farmers' fields in three locations including DI Khan, Faisalabad and Sheikhupura either as sole crop or as an intercrop (Fig. 1)

Marrow: Last year eight varieties/ hybrids were tested and these have been narrowed down to six superior hybrids for repeat trials in farmers' fields in three locations

Natural Off-Season

- **Cucumber /Sweet Pepper / Chili /Bitter Gourd:** Trials of 13 elite cucumber lines are underway in four locations. Three sweet peppers are being evaluated in two locations, three chilies at two locations, and two lines of bitter gourd are being evaluated at Mansehra.
- **Tomato:** Farmers' field trials of 24 varieties or hybrids were conducted in six locations. In the open field at Thoha Mehram Khan-Talagang, the best hybrid T-1359yielded 47.6 t/ha; more than three times that of local varieties Simiti and Tarnab. In this area farmers normally pick their crop before frosts and keep it in rooms to ripen. AIP-AVRDC tested mini tunnels to extend the growing period to fetch a good price, and this dramatically increased the yields of T-1359 by 50 percent to 71.7 t/ha.

Figure 4 Immature fruit picked by farmer at Thoha Mehram Khan

Figure 5 Grading of ripened fruit from immature fruit for marketing

Figure 6 Mini tunnels promoted by AVRDC for farmers at Thoha Mehram Khan

2.1.2 Improved insect and disease management to reduce pesticide use in protected cultivation

Growing vegetables under plastic tunnels provides winter frost protection but during foggy days temperatures drop and humidity increases by up to 80 percent. In a continuation of last year's IPM surveys in six locations, four more surveys were carried out in the Swat areas of KP, showing that priority vegetable crops were sprayed an average of 15-20 times. The main pests and diseases were identified farmers in five locations trained in IPM techniques and healthy seedling production.

Figure 7 Demonstration of kairomone traps at farmer's field Bahawalpur

A week long Training of Trainers on IPM practices under protected cultivation was organized by the AVRDC Regional office in Hyderabad via Skype with support from professors from PAU Ludhiana and in conjunction with AVRDC Pakistan staff. A full training book was provided to participants.
The use of drip irrigation, insect nets, kairomone and yellow sticky traps were promoted through 14 trainings on "Healthy vegetable seedling production and IPM techniques", for367 (86 female) beneficiaries in 13 locations (Fig. 2.7).Farmers were provided with temperature and humidity meters to monitor the weather inside their plastic tunnels to reduce sprays. In Bahawalpur farmers have installed kairomone traps on more than 80 hectares.

2.1.3 Identify and promote new crops for protected cultivation with higher economic returns

High tunnels are not used from May to September. Last year coriander and spinach were successfully grown under green nets and three varieties of each of these crops will be trialed at 10 locations again this season.

2.1.4 Identify and Promote Improved Protected Cultivation Systems

An additional 23 systems (20 on farms) have been installed across three provinces on areas of 250 m^2 to 500 m^2 under plastic tunnels (Fig. 8).The effect of drip and furrow irrigation on water and fertilizer efficiency and crop growth is being measured in 45 tunnels growing cucumber, tomato, bitter gourd and vegetable marrow in seven locations. Last season, drip systems saved from 16 to 34 percent of water and 20 to 30 percent of fertilizer compared to conventional practices. The biggest saving of water (68 percent) and fertilizer (92 percent) were achieved in the sandy soil of Noorpur Thal (Table 3.)

Figure 8 recently installed drip irrigation system in Pishin, Balochistan province

Table 3: Saving of water (%) and fertilizer (%) applied through drip irrigation vs. furrow irrigation

District	Crop	Drip Irrigation (liters)	Furrow Irrigation (liters)	Water saving (%)	Fertigation by drip (kg)	Fertigation by furrow (kg)	Fertilizer saving (%)
Swat	Tomato, Cucumber Veg Marrow	25117	32068	21.7	6.0	8.0	25.0
	Tomato, Cucumber	23292	27915	16.6	5.0	7.0	28.6
Haripur	Tomato	10189	14329	28.8	16.0	20.0	20.0
DI Khan	Cucumber Bitter Gourd	18252	25459	28.3	5.3	10.0	47.5
Sheikhupura	Cucumber	9860	14915	33.9	4.0	17.0	76.5
Faisalabad	Bitter gourd	2000	2508	20.3	2.5	3.3	23.1
	Cucumber	7788	8558	9.0	3.5	5.0	30.0
Khushab	Tomato	21965	68400	67.8	3.3	45.0	92.0

2.2 Improved Mungbean Production

Official mungbean production and yield data for 2013 – 2015 show significant production and yield increases in the target districts in 2015 after the project started; Bhakkar - area (7 percent), production (12 percent), yield (4 percent), and Layyah - area (22 percent), production (42 percent) and yield (17 percent). Mungbean production expansion now well exceeds the target of 3500 ha. There were few field activities during the winter season as mungbean is a spring/ summer crop, and the main focus was on capacity building and trials for implementing new practices in the coming season.

2.3 Identify opportunities to improve mungbean production

As a part of the traditional and rice-wheat cropping system as well as through inter-cropping (irrigated); and double cropping in the wheat-fallow areas of the Pothwar region (rainfed)

a) **Mungbean intercropping with sugarcane** A total of 30 ha of 0.4 ha demonstration plots were established by mid-March by 75 farmers which is well beyond the target of 25 ha. There are 87 farmers who have established 50 ha of mungbean intercropped with sugarcane in Sindh and Punjab province and under double cropping in the Pothwar rainfed system. Full training in mungbean production technology was provided by two national partner institutes (Fig. 2.9) and a further 32 ha will be planted by interested farmers.

Figure 9 Agronomist explaining the application of *Rhizobium + PSB* inoculum to mungbean seed to farmers before planting as an intercrop with sugarcane in Sajawal district in Sindh province, Feb, 2016.

d) Mungbean double cropping in Pothwar region of Punjab province

The Pulses Program, NARC, Islamabad assisted 49 farmers to sow demonstration plots of 0.4 to 0.6 ha each. There were two high yielding varieties; NM-11 and NCM-13 were planted in seven clusters on totaling 25.2 ha in Pindi Gheb and Attock. Improved production practices including line sowing, application of Rhizobium + PSB-Phosphorus Solubilizing Bacteria, post-emergence chemical weed control and IPM to control insect pests were followed.

An analysis of rainfed double cropped mungbean crops in five districts in Pothwar region (Figs.10 &11) grown by 49 farmers showed mean yields from 580 to 1053 kg/ha compared to the national average of 779 kg per ha in 2014-15. Net profit ranged from US$ 191 to 608/ha (Rs.19, 450 – 61975).

Figure 10 A bumper crop of mungbean near maturity in Rawalpindi district under rainfed conditions.

Figure 11 A late crop in Chakwal district produced 700 kg/ha under the rainfed double cropping system in Pothwar region (Oct. 1, 2015).

2.3.1 Evaluate the efficiency and effectiveness of the national seed supply system and assess the opportunity to develop "seed villages" for production of high quality seed of improved varieties

A total of 38 tons of basic or pre-basic seed of improved varieties has been produced by two national institute partners. In addition, a partnership with Mumtaz Seed Company Ltd., produced 142 tons of seed. We now have enough high quality seed to sow 7000 ha; equal to almost a third of Pakistan's entire current crop. This can produce over 5000 tons of pure seed; ten times the work plan goal.

2.3.2 Evaluate methods including resistance breeding for improving postharvest storage to reduce bruchid damage

(a) Training to minimize postharvest storage losses

Five training programs were conducted by partners on mungbean storage and safety in handling chemicals for 290 participants against the work plan target of 100 (Fig. 12).

Figure 12 Mr. Niaz Hussain, ARO, AZRI, Bhakkar demonstrating how to wrap and seal seed bags after placing fumigation tablets inside during mungbean postharvest training at Darya Khan, Bhakkar on 17.11.15

(b) Bruchid resistance breeding in Pakistan, Taiwan and Hyderabad

AVRDC headquarters in Taiwan is sending 30 bruchid resistant lines to Pakistan for multiplication and testing. Seed from 12 Pakistan crosses will be field tested in April. Screening of 141 families in an F_3 population in Hyderabad has identified 33 with no damage and no adult emergence.

2.3.3 Identify opportunities for adoption of IPM practices in mungbean cultivation

IPM training: Off-season trainings on IPM, disease and pest identification and mungbean production technology were conducted for 397 participants including 39 women against the work plan target of 300.

2.3.4 Assess the opportunities for mechanical harvesting of mungbean

Mechanical harvesting of mungbean is new to Pakistan and requires crop desiccation. Trials of six desiccants in 2014 found that paraquat (Gramoxone @ 3000 ml/ha) was the most effective, drying the crop in 3-4 days with no impact on seed quality. Eight successful farmer trials of desiccation and mechanical harvesting were conducted in August in Bhakkar and Layyah districts and in Pothwar region and Attock district in October. An economic analysis showed that combine harvesting saved farmers US$ 60 per ha on harvesting and threshing, and saved 22.5 hours per ha with 4% less seed breakage compared to manual harvesting.

2.4 Vegetable Value Chains

Training and capacity building programs continued and intensified in this reporting period of Year 4 in both the seed value chain and fresh value chain components of the approved work plan. Seed industry backstopping, postharvest and value adding technology generation also continued.

2.4.1 Increased vegetable seed production to improve supplies and reduce prices to farmers

(a) Conduct evaluation trials for improved varieties of at least 3 major vegetables

- **Tomato:** A total of 24 AVRDC advanced lines (11 from last season trials and 13 new lines) were transplanted in Mingora-Swat in April 2016. In Sindh 13 AVRDC lines were transplanted in August 2015 but onlyAVTO-1288 performed well under the very hot conditions. Seed is being bulked up.
- **Chili:** In Umerkot-Sindh only 8 of 13 AVRDC advanced chili lines transplanted in July 2015 survived the hot conditions. Ten harvests up till January assessed yields and quality. Lines AVPP-0705 and AVPP-9704 were best suited for drying. The best eight lines will trial again in March 2016.
- **Onion:** The last season's trial was repeated at ARI, Mingora- Swat, but with nine varieties or hybrids. The plants are being raised in the nursery, with field planting in July, 2016.

(b) Build capacity and provide technical backstopping on improved seed production, processing, packaging, storage and marketing

Two training of trainers were conducted on onion seed production for 26 participants in Gilgit Baltistan and in Shuga-Bunir by ARI Mingora-Swat with 55 participants. Periodic visits to Juglote (GB), Mingora (KP), Gujranwala and Faisalabad (Punjab), Tandojam (Sindh) and Quetta (Balochistan) were conducted by the Vegetable Seed Specialist to support seed growers of onion, chili, tomato, okra and peas.

(c) Facilitate seed production of improved varieties of at least four major vegetable on 40 ha of land to meet the seed requirement for 2,000 ha production for seed, fresh and/or processing

Over 14 tons of vegetable seeds have been produced over the last two seasons (Fig.13)

Table 4 Weight of seed produced in 2014- 2015 by partners and their contract farmers

Institute /Seed Company	October 2014-March 2015		April –September 2015			Total (Kg)
	Onion	Tomato	Chili	Okra	Peas	
ARI Quetta, Balochistan	1040	-	-	188	-	1228
AZRI Umarkot, Sindh	126	-	2471	-	-	2597
ARI, Mingora, KP	288	-	-	292	193	773
VRI-AARI, Faisalabad, Punjab	-	18	-	830	2115	2963
NARC, Islamabad, Federal Area	65	-	-	250	-	315
Beacon Seeds, Kunri, Sindh	206	-	2669	-	-	2875
ARCO Seeds, Gujranwala, Punjab	-	-	-	1995	1700	3695
Total	1725	18	5140	3555	4008	14446

Figure 13 Vegetable seed packs with USAID/AIP and partners' brands (A-1.5 kg & 1 kg pouches of onion seeds; 25 kg gunny bag of peas seeds; C-1 kg perforated cloth bag of peas seeds; D-1 kg pouches of okra seeds

Over the 2015/16 winter 16.7 ha was sown for seed production of onion, tomato and peas in five sites (Fig. 14-16). Between Oct 2015-Sept 2016, a further 20 ha for seed production will be sown by eight partner institutes; onion (5.9ha), tomato (0.6 ha), chili (2 ha), okra (6.5ha) and peas (5 ha).
Over the winter 16.7 ha was sown for seed production of onion, tomato and peas in five sites across the country. Between Oct 2015-Sep 2016, a further 20 ha will be sown for seed production, by eight partner institutes, including onion (5.9ha), tomato (0.6 ha), chili (2 ha), okra (6.5ha) and peas (5 ha)

Figure 14 Onion mother bulbs plantation at Juglote, Gilgit Baltistan

Figure 15 Onion variety Swat 1 weeding and hoeing before earthing up in Mingora, KP province

Figure 16 Rouging off type plants in peas seed crop in Chiniot, Punjab province

(d) Link farmer-seed producers with key private seed companies, seed markets, technology providers and business development services for increased profitability and sustainability

Six coordination meetings have been organized with seed producers and dealers in Punjab, KP and Balochistan. Farmer groups have been successfully linked up with Zamindar Seeds Mingora, Siddique & Sons, Faisalabad, ARCO Seed, Beacon Seeds in Kunri, Sindh and Kashmala Seeds in Quetta. With onion seed yields up to 370 kg/ ha and a price of US$ 25/kg in Sindh Province the net profit was calculated at US$ 6,172/ha after deducting the cost of production worth USD2,897/ha. The comparable net profit for onion seed production in Balochistan was estimated at US$ 4,327/ha.

(e) Establish seed villages in Punjab, Sindh, Balochistan and KP provinces

Shuga village was formally declared as a Seed Village on February 25, 2016 (Fig. 17). AIP/AVRDC will support them with a Vegetable Seed Thresher and field implements. An additional seed village has been identified in Kuchlaak, Balochistan province, and further consultations are planned in Punjab and Sindh. Consultations have also continued with government agencies involved in seed production supervision to discuss the process of certification, and a workshop to discuss the implications of the Seed Act for small seed producers is planned.

Figure 17 Jubilant Shuga Growers Association members with AIP Team at Seed Village declaration

2.4.2 Evaluate value chains for major vegetable crops to assess and promote improved post-harvest and value adding technologies

(a) At least six postharvest and value adding technologies for the priority vegetables developed

Various postharvest and value adding technology studies were carried out by provincial partners and in the AVRDC Regional office in Hyderabad, India to identify and introduce varieties and technologies for improved vegetable quality, improved shelf life and processing attributes.

- **Packaging study in onion, tomato and chili:** In a replicated nine-day study of storage methods in Quetta under temperatures of 7-17^{o}C, the best quality was for onion stored in gunny bags and carton boxes, and tomato stored in gunny bags or wooden crates. There was no effect for chili.
- **Storage study in onion:** Sprouting in seven varieties stored on the floor of a ventilated store was assessed in a replicated 5-month trial from September to February. Less than 20 percent sprouting was noted in Trich Mir and Tarnab Red while the other varieties had 50-100 percent sprouting.
- **Chili drying and storage study for aflatoxin reduction:** A trial in Sindh tested six different drying processes on aflatoxin levels but no significant differences were found between treatments.

(b)Review postharvest and value adding technologies available locally and from other countries and assess their applicability to local/provincial situation

Trials with a tunnel-type solar drier and a solar drier with a rotary ventilator in Hyderabad India confirmed their value for use in Pakistan to hygienically dry chili.

Figure 18 Zero energy cool chamber (ZECC)

A simple and low-cost cooler (Zero Energy Cool Chamber - ZECC) was also fabricated and tested (Fig. 18). It can keep temperatures 10-15°C cooler than ambient and maintain about 90 percent RH to

reduce postharvest deterioration. The first one in Pakistan will be evaluated at the Vegetable Section of NARC, Islamabad.

(c) Build R&D capacity of partners on postharvest research; develop HRI postharvest lab

Since October, 2015 two more national R&D partners have joined and the room for the HRI lab has been identified. Two postharvest workshops were held; a national gathering on August 28, 2015 in Faisalabad led by AVRDC Hyderabad staff, and a provincial workshop for 15 scientists at Thatta.

(d) Trainings on postharvest management for at least 200 future trainers and 2,000 farmers and other value chain actors in the four provinces

A total of 363 participants including 101 women were trained in nine Training of Trainers (TOT) programs on onion and tomato harvesting, curing, sorting and storage, and on drying and value addition in onion, tomato and chili (Fig. 19 & 20). These master trainers in GB, Punjab, Sindh and Balochistan will help train other farmers in coming months.

Figure 19 Hands on trainings on value adding technologies

Figure 20 All-female training participants in Hunza, Gilgit Baltistan

3 Cereal and Cereal Systems– Wheat

3.1 Increasing Wheat Production through Rapid Diffusion of new High Yielding, Rust Resistant Wheat Varieties

3.1.1 Identification and validation of newly released wheat varieties through participatory varietal selection (PVS)

191 Participatory Varietal Selection (PVS) trials comprising 12 new high yielding, disease resistant wheat varieties were conducted across three provinces, namely Punjab, KP and Sindh, for validating their performances and farmers' preference locally. The findings from this research will be used to select best varieties to go into seed production stream and variety popularization next season in the target areas.

3.1.2 Fast tracking deployment of wheat varieties for delivering genetic gains to farmers fields and buffering possible incidence of wheat rust

More than 7,200 paired plot on farm demonstrations were conducted using Informal Research and Development (IRD) approach to fast track deployment of newly released, high yielding, rust resistant wheat varieties. It is evident that AIP has clear focus on smallholder farmers including women farmers (figure 21).

In addition to fast tracking genetic gains to the farmers' fields, this initiative has popularized new varieties and created knowledge and demand in far-flung areas of all four provinces, namely Punjab, KP, Sindh and Balochistan and Gilgit Baltistan region, through the engagement of Rural Support Programs (RSPs), public and private sector partners.

3.1.3 Creating knowledge on using new, high yielding wheat varieties through Diamond Trials

55 Diamond Trials (2x2 factorial on farm trials) were conducted for creating knowledge about replacing old and obsolete wheat varieties by new high yielding, rust resistant ones.

Most widely grown but rust susceptible varieties in each province were compared with best bet new wheat variety with the objective of replacing the former ones.

Field observations indicated clear differences between various treatments. Heavy infestation of rust was also observed on most of the farmers' widely grown wheat varieties in the trial (Figure 22).

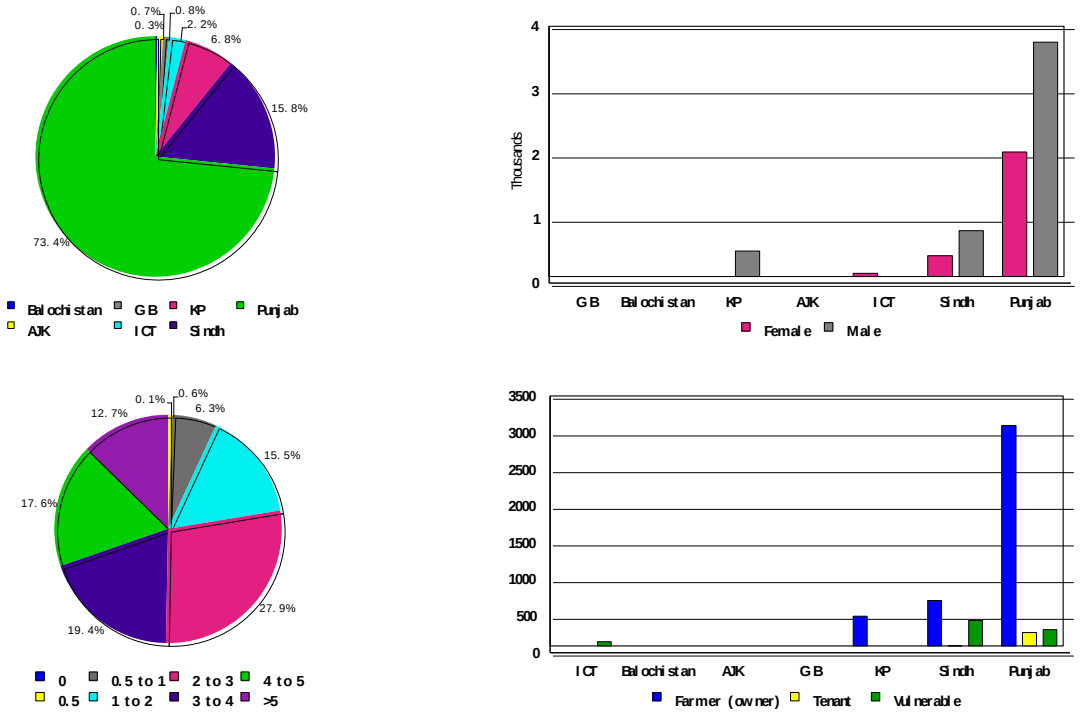

Figure 21 Major features of collaborating farmers in AIP wheat 2015-16; top left pie chart-coverage of activities by provinces, bottom pie chart-proportion of AIP collaborators by the size of their holdings, top right bar chart-proportion of female and male farmer collaborators by provinces and bottom right bar chart-proportion of owner cultivators, tenants and vulnerable as collaborators in the project.

Figure 22 Heavy infestation of rust was also observed on most of the farmers' widely grown wheat varieties in the trial

3.1.4 Production and provision of seeds of recently released wheat varieties through public-private partnership

Currently, 485 seed growers are multiplying quality seed of 15 new high yielding, rust resistant wheat varieties (few of them also include recently approved by Variety Evaluation Committee) on more than 6,000 acres (2,453 ha).

Considering average quality seed yield of 3 t/ha, estimated quantity of seeds produced will be around 7,000 tons, which is a015dequate to cover more than 55,000 ha with new seed varieties in the far-flung areas of Pakistan in the coming season.

Seed sales data was collected from the AIP wheat partners that collaborated for producing and provisioning wheat seeds. The gross income of the project partners from additional wheat seed sale is equivalent to 65 percent of total budget of the commissioned project in AIP wheat (Table 5).

Table 5 Summary of additional wheat seed sold by private seed companies and public sector organization during autumn 2015 from the seed produce during 2014-15

Province*	No. of organization	Type of organization	Quantity of additional seeds produced through AIP (t)	Value of additional seed sale (Millions of Rupees)	Value of additional seed sale ($)
Balochistan	1	Private seed company	10.13	0.58	5704.0
KP	1	Public sector**	485.25	22.15	215061.4
KP	1	Private seed company	350.05	14.72	142953.4
Sindh	7	Private seed company	58.73	2.69	26416.7
Total	10		904.16	40.14	390135.5

*One of the private seed companies in Punjab produced 2.9 ton seeds of two new wheat varieties but decided to use those seeds to further multiply seeds from last year stock

**Department of Agriculture Extension-KP

3.1.5 Effective Fungicides Introduced, Evaluated and Registered for Controlling Wheat Rusts

a) Yield loss assessment of wheat due to rust using fungicides

Folicur, Nativo and TILT fungicides approved by US Federal law for crop protection are being evaluated in the second year of study to establish the yield loss of wheat due to rust that can be reduced using any of these fungicides in the event of sudden outbreak of wheat rusts in Pakistan.

The trial on stripe rust was conducted at Cereal Disease Research Institute (CDRI) Nowshera, KP and Crop Crops Research Institute (CDRI), NARC Islamabad.

Leaf rust study was at Regional Agricultural Research Institute (RARI) and Wheat Research Institute (WRI), Faisalabad, and stem rust study was at CDRI Karachi and WRI Sakrand.

Rust disease scores and reactions, grain and straw yield data are being recorded. Complete data of the trial are expected to be available by mid-June.

Field observations revealed visible differences between various fungicide treatments and test varieties (Figures 23).

Figure 23 Field observations revealed visible differences between various fungicide treatments and test varieties

3.1.6 Development of durum wheat value chain

a) Durum Wheat National Uniform Yield Trial (DWNUYT)

Durum Wheat National Uniform Yield Trial (DWNUYT) was conducted in 12 locations; 5 rainfed and 7 irrigated across Pakistan. Evaluated 15 durum wheat lines along with one durum wheat and two bread wheat checks.

Field observations of the trial indicated that couple of durum wheat entries could be competitive with the best check varieties in the trial. Relatively there was less disease pressure on durum wheat lines compared to bread wheat. All the data of the trial will be available by mid-June.

b) Identify best wheat varieties through laboratory analysis for product based wheat and popularize those among stakeholders in Pakistan

Processing and end use quality of at least 15 recently released bread wheat varieties (released after 2010) will be analyzed to find out their gluten strengthens and extensibility along with other nutritional qualities to address the market needs. Identification of wheat varieties for specific utility will help the industries and communities. Better quality wheat could improve the nutrition and health of millions of Pakistanis. One commissioned project each has been awarded to three grain quality laboratories as follows:

(a) Food Quality & Safety Research Institute (FQSRI), PARC, Karachi, Pakistan
(b) Grain quality laboratory, Wheat Research institute (WRI), Faisalabad, Pakistan
(c) Food Sciences and Product Development Institute (FSPDI), Islamabad, Pakistan

As soon as adequate grain samples for new wheat varieties are available from the new harvest and necessary laboratory equipment are put into place, this analysis will be undertaken and results will be popularized with various actors of wheat value chain to create new processing and other business opportunities from this research.

3.2 Training and Capacity building

More than 400 participants representing Rural Support Program (RSP) staff, seed company staff, seed growers, other farmers collaborating on various on farm research and demonstrations were trained on improved wheat crop, seed production and seed quality management.

750 farmers from across Pakistan were given exposure visit of on farm and on station research and demonstration sites to show activities on seed, variety and agronomic demonstrations for creating knowledge and demand for new seed varieties and best bet agronomic practices (Figures 24).

750 farmers from across Pakistan were given exposure visit of on farm and on station research and demonstration sites to show activities on seed, variety and agronomic demonstrations for creating knowledge and demand for new seed varieties and best bet agronomic practices (Figures 24).

Figure 24 Exposure visits to station research and demonstration sites

4 Cereal and Cereal Systems– Maize

4.1. Development/ Introduction of Climate Resilient Maize

During this reporting period harvesting of the following climate resilient maize trials have been conducted.

- 224 white maize climate resilient hybrids sourced from CIMMYT's Latin America and Southern Africa regional offices (Mexico and Zimbabwe) and from the International Institute of Tropical Agriculture (IITA, Nigeria).
- 100 white maize climate resilient open pollinated varieties (OPVs) sourced from CIMMYT's Southern Africa regional office (Zimbabwe) and IITA.
- 42 yellow maize climate resilient hybrids sourced from CIMMYT's Latin America regional offices (Mexico) and IITA.
- 32 drought tolerant maize inbred introduced from IITA.
- 12 low soil nitrogen tolerant maize OPV introduced from IITA

The above list of summer (Kharif) 2015 trials were grouped under 52 sets and evaluated and harvested at different trial sites located in Khyber Pakhtunkhwa, Punjab and Sindh provinces and GB region. The evaluation of these trials will further help AIP maize partners to identify elite traits adapted to specific testing environments. The data from these trails will be analyzed and interpreted to help identify best performing entries and suitable seasons for future commercial production. In addition, the performance data from the trails will be combined and analyzed with previous season's data to further check entries continued performance across seasons and years in comparison with local checks.

In addition of testing the varieties under the AIP platform, good performing entries were tested under national uniformity yield trials (NYUT) which is independently conducted by PARC. Under NUYT, entries are given unique code by PARC and performance data is gathered from more than 10 locations based on those codes. The codes are designed to avoid human bias for known entries and/or institutions submitted their varieties for evaluation under NUYT. Below is the list of materials included under NUYT conducted in Kharif 2015.

Table 6 Summary of AIP maize varieties included under NUYT (Kharif 2015)

S. No.	Type of Maize under NUYT	Total number	CIMMYT Germplasm Source
1	White kernel OPVs	13	Zimbabwe
2	White Kernel Hybrids	20	Zimbabwe
3	White Kernel Hybrids	5	Mexico
4	Yellow kernel Hybrids	5	Mexico
5	Yellow kernel Hybrids	3	Colombia
	Total	46	

Figure 25 Maize parental lines arrival to Pakistan from CIMMYT's regional offices (Colombia, Mexico and Zimbabwe)

Table 7 list of biofortified maize under evaluation in Pakistan (Spring 2016)

S. No.	Trial Name/ code	Trial description	No of entries	No. of sets	Trial status	Crop stage
1	14TTWCWQZN	White kernel hybrids enriched with QPM and Zn	12	3	New trials of QPM+Zn	Vegetative stage
2	16EIHYBPROA	Orange maize (Pro A enriched)	36	10	New/ongoing trials from CIMMYT-HQ	Vegetative stage
3	15AEIRHPVA	New yellow kernel ProA hybrids	8	3	CIMMYT Colombia	Vegetative stage
4	15AEIRHZN	New yellow kernel Zn enriched hybrids	10	3	CIMMYT Colombia	Vegetative stage

4.2 Development/ introduction of biofortfied maize

Among the main breakthroughs from the AIP maize in this reporting period was the launch of two protein enriched maize, better known as Quality Protein Maize (QPM), in Pakistan. These are the first kinds of QPM hybrids in the country and the seeds are currently being produced and distributed by National Agricultural Research Center (NARC). The hybrids have higher quality level than normal maize which helps to reduce malnutrition mostly among children either by direct consumption or indirectly through other products. The seeds of the two new hybrids named by NARC as QPHM 200 and QPHM 300 were officially distributed to farmers and other stakeholders on February 17, 2016, during a national event held in Islamabad. In addition to protein, AIP maize is also evaluating maize germplasms enriched with Provitamin A and Zinc (Table 7). These germplasms will improve the diet of millions of Pakistani particularly children who are in need of nutritious foods.

Figure 26 (top) Launching ceremony of biofortified maize in Pakistan and (Bottom) Promotional seed bag for the new QPM hybrids

Figure 27 Federal Minister for MNFS&R and other dignitaries visiting maize trials during the AIP maize national field day held at NARC, Nov. 2015

4.3 Development/ Introduction of Biotic Stress Tolerant Maize

During the reporting period, AIP-maize evaluated 15 (including checks) stem borer tolerant open pollinated maize varieties without the application of chemical pesticides. The trials were planted at Cereal Crop Research Institute (CCRI) Pirsabak, KP, Millet and Maize Research Institute (MMRI) Yousafwala, Punjab, and National Agricultural Research Center (NARC), Islamabad. All the required data have been collected and the results are being analyzed. The results from this trial will help to identify stem borer tolerant entry (ies) which can be further registered for commercial production of the seed. In addition, the best performing entries can be used as source germplasm to develop stem borer tolerant hybrids in a conventional method. Upon commercialization, best performing entries will reduce the use of pesticides that can save the environment from pollution.

From December 8-10, 2015, AIP-maize conducted a training course on the biotic stresses in maize in Islamabad. The training focused on identification and management of major insects and diseases of maize in Pakistan. Local and international resource persons shared their experiences and guidelines developed to strengthen NARC's stem borer screening facility. Accordingly NARC assigned a designated lab rooms and personnel for the mass rearing of field and storage pests of maize which is essential for the screening of biotic stress tolerant maize. A total of 36 participants from public and private sector institutions attended the training.

Figure 28 Glimpse of the training workshop, December 2015

4.4 Enhancing the Maize Seed Sector

AIP maize handed over the parental lines/breeder seed of 49 improved maize hybrids and OPVs to 12 public and private partners of Pakistan. The improved varieties were selected by the partners based on field performance. CIMMYT allocated the parental seed that will help to produce the maize seed in Pakistan. This initiative of enhancing the local capacity of seed companies will increase access and availability of quality seeds at affordable price. The current seed price of hybrid seed ranges from USD 6-8 per Kg which is among the highest in South Asia. Furthermore, Pakistan spends more than USD 65 million annually for the importation hybrid maize seed. Hence, fast tracking the deployment of maize germplasms through the AIP will not only reduce the input cost to farmers but also lessen the burden of the national exchequer.

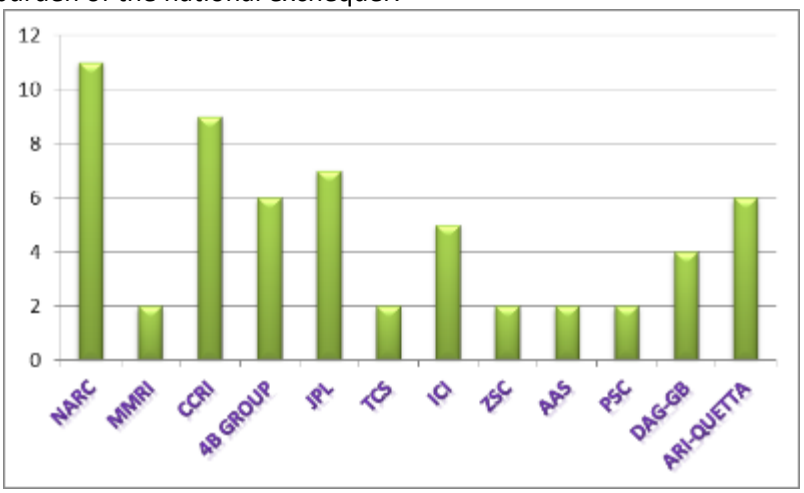

Figure 29 Number of maize hybrids/OPVs allocated to AIP maize partners

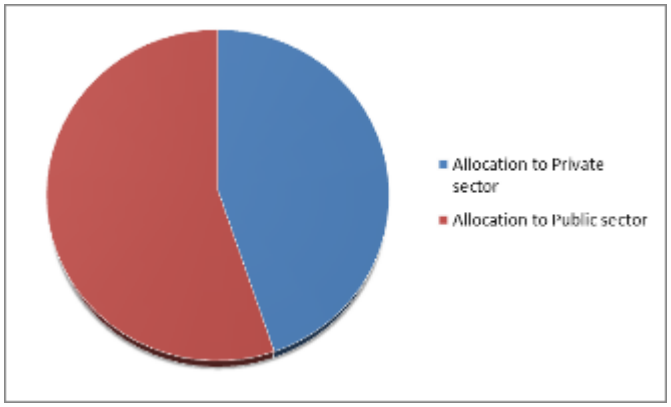

Figure 30 Share of allocated maize varieties between private and public partners

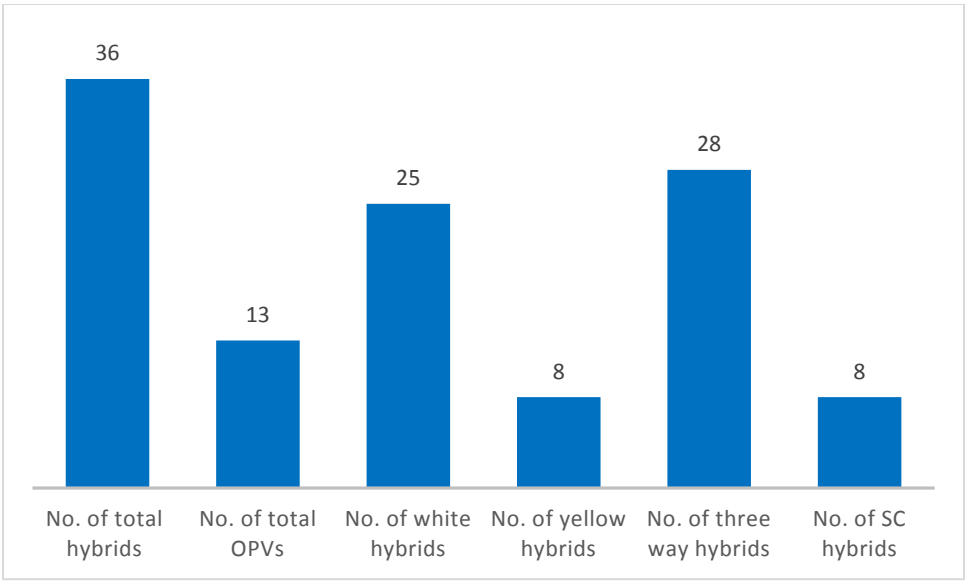

Figure 31 Types of maize hybrids/OPVs allocated to AIP maize partners

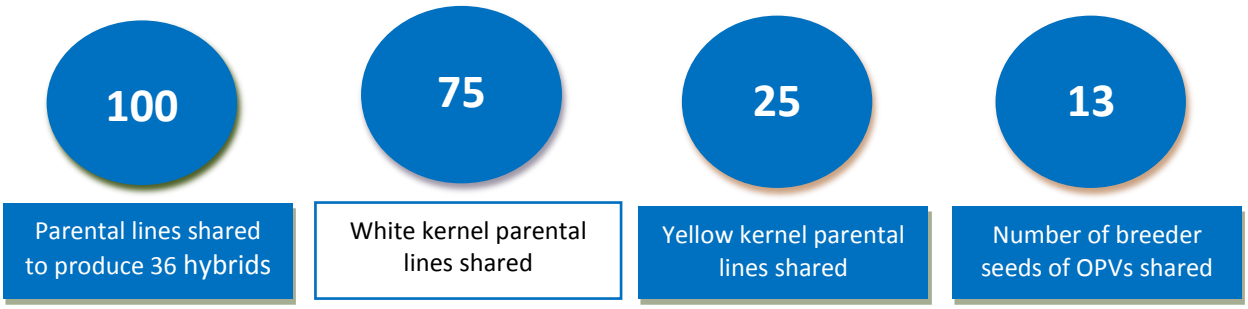

Figure 32 Number and nature of parental lines/breeders seeds distribute to partners

The parental lines allocation was held during a national event held on February 17, 2016 at NARC Islamabad with the presence of relevant stakeholders. During the occasion Secretary in charge for Ministry of NFSR, Dr. Muhammad Hashim Popalzai said *"we know how precious parental seeds are, and at times it will take up to eight years to develop them and another 3-4 years to constitute hybrid seeds. However, we are receiving them from CIMMYT under Agricultural Innovation Prorgam and I urge all the stakeholders to utilize these valuable assets."* while appreciating the role of CIMMYT in

this ground breaking initiative which is the first in the history of maize in Pakistan. In addition, Mr. Faiysal Hayat, Deputy Manager of Jullundur Private Ltd also addressed the audience representing the private sector. In his speech Faisal said ”these parental seeds will help us to produce the seed locally. As the private sector we know the value of parental seed and we understand clearly that our collaborations under AIP will enable us to provide quality seed at affordable price to our farmers”, he concluded his remarks by requesting a continued support from CIMMYT and USAID and by thanking US government for the support.

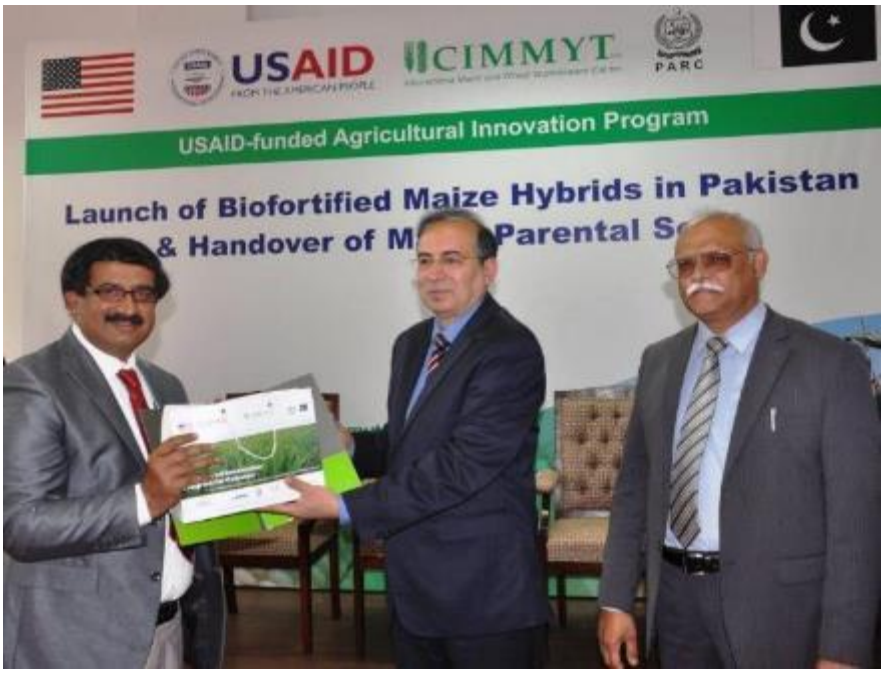

Figure 33 Dr. M. (L-R) Faisal Hayat, private seed company, Dr. M. Hashim Popalzai, Secretary Incharge MNSF&R, right Dr. Nadeem Amjad, Chairman PARC.

Figure 34 Field demonstrations of allocated maize hybrids and OPVs at NARC, Islamabad.

5 Cereal and Cereal Systems– Rice

5.1 5.1. Breeding Program for Improved Indica and Basmati Rice

5.1.1 New Generation of High-Yielding, Stress-Tolerant, High-Quality Indicia and Basmati Varieties

More than 1172 advanced rice lines having various traits were distributed to 11 institutions throughout the country in public and private sectors for evaluation against biotic (BLB) and abiotic (submergence, drought, salinity and heat) tolerance, yield potential and grain quality. In addition, 224 rice lines were also being tested for salinity and drought tolerance at Soil Salinity Research Institute, Pindi Bhattian, Punjab province. Germplasm sets for specific traits were tested in observational yield trials in appropriate field locations for the relevant stress. The selections were made on the basis of field performance, tolerance to the trait, plant type and better grain characteristics.

A total of 187 lines were selected out of 824 lines which were evaluated at Rice Research Institute (RRI) Kala Shah Kaku in Punjab province for biotic and abiotic stresses. Of the selected lines, 101 are high yielding elite , 53 are Super Basmati bacterial leaf blight (BLB) resistant, 23 tolerant to drought and salinity, and 10 lines of IR-6 *Sub1* for submergence tolerance. Similarly, RRI Dokri also selected 10 IR-6 *Sub1* lines and 5 heat tolerant rice lines on the basis of yield performance than local variety IR-6. In lower Sindh, 304 advance lines for higher yield, submergence, salinity and drought tolerance were evaluated at Rice Research Station Thatta and identified 20, 5 and 4 lines for flood tolerance, drought and salinity tolerance. At ARI Mingora Swat selected 16 high yielding elite lines and 4 submergence tolerant lines. These lines will be further evaluated in micro yield trials at different locations. Once the farmers' have access to these varieties in couple of years, they may achieve approximately 10% higher yields with low production costs.

Figure 35 AIP Rice and RRI scientists selecting IRRI material planted at RRI Kala Shah Kaku

Similarly, NIBGE has identified 15 BLB resistant Super Basmati and 6 drought tolerant lines for final selection and further varietal development. In addition, Variety Evaluation Committee (VEC) approved BLB resistant variety BR-1 was planted by 10 farmers for field evaluation and seed increase at half acre each. Farmers produced 160 kg seed for further distribution to other fallow farmers.

Out of 224 advance lines planted at Soil Salinity Research Institute (SSRI), Pindi Bhattian, 50 lines out yielded the check varieties Shaheen Basmati, PK-386, and Ks-133 for salinity, 4 for high salinity and 31 for drought tolerance.

Along with high yielding Elite lines, BLB and submergence tolerant lines were also evaluated by private sector organizations (Emkay Seeds and Engro Fertilizers) at Farooqabad and Muridke, Sheikhupura areas and selected few lines on the basis of tolerant to different traits and yield. Zinc-enriched variety was also identified by Engro Fertilizer.

Figure 36 Farmer examining BR-1 in his field at Muridke

5.1.2 Up-scaling of High-Yielding Basmati 515 Variety in Punjab

Under this activity, 10,000 kg of certified seed of Basmati 515 was distributed among 305 farmers during the planting season for planting on 2000 acres in Sheikhupura, Gujranwala, Mandi Bahauddin, and Sialkot districts of Punjab (Appendix 8). In addition, certified seed of Basmati 515 was also distributed in non-traditional areas in collaboration with AIP partner in private sector, Engro Fertilizers, Sheikhupura. By distribution of Basmati 515, farmers will have choice to grow other varieties, which gives 10% higher yield of worth extra income Rs. 6000/acre than super basmati. Basmati 515 is best suited for DSR due to low tiller capacity. Ultimately, agricultural production will increase and millers/ exporters be benefit from it and will be able to export good quality rice varieties.

Most of the farmers of the project area have planted this variety by using their own random transplanting practices. However, these farmers were provided with information about Dry Seeding of Rice (DSR) and Alternate Wetting and Drying (AWD) and applying good management practices to get maximum paddy yield. Of these, 50 farmers established one acre demonstration on OPPM by random transplanting to compare with their own practices. The average plant population in these plots was 20 plants per meter square, which is very close to recommended 80,000 plants per acre. The yield advantage data varied among the farmers. On an average Basmati 515 farmers obtained 8 percent higher yields than Super Basmati. Maximum 15 percent higher yield was achieved.

5.2 Improved Crop Management

5.2.1 Extension of Direct Seeding Technology in Different Rice Ecosystems

DSR technology was demonstrated on 974 acres of 322 farmers in different rice growing areas with the support of public sector (RRI, Kala Shah Kaku, RRI, Dokri, ARI, Tandojam (Sindh); Balochistan Agri. Research & Development Centre Jafarabad (Balochistan); Engro Eximp, Sheikhupura from private sector. In Punjab and Sindh, majority of the farmers used drill for DSR however, in Balochistan 20 farmers established their DRS plots with broadcasting of soaked seed. Different rice varieties were sown according to the ecologies. In Punjab province, mainly Basmati 515 was used for DSR followed by Super Basmati and PK-386. In Sindh, IR-6, NIA Mehran and Shandar were planted. NIAB IR-9 and Super Basmati were planted in Balochistan province. In Punjab province, most of the farmers used lazer levelling the field before dry sowing. The highest number of the DSR acreage was in Punjab province 937 acres in Gujranwala, Sheikhupura, Mandi Bahauddin, and Sialkot, 17 in Thatta, Sindh province and 20 in Jafarabad, Balochistan province. According to survey conducted by Engro Eximp during 2014, farmers acknowledge DSR benefits including good crop stand, saving in cost/ time/ labor/ fuel/ water, conservation and environment.

Data on different parameters were recorded from DSR plots in comparison with farmers' practices. Field results have shown that germination rate was highest in DSR with broadcast of soaked seed followed by DRS with drill. The lowest number of plants was found in farmers field (Table 8).

Table 8 Germination count in various plots in Sheikhupura, Gujranwala, Mandi Bahuddin in Punjab province

Sr.#	Planting technique	Lowest plants/m^2	Highest plants/m^2	Average
1	Direct seeding of rice (Drill)	80	110	95
2	Direct seeding of rice (Broadcast)	90	130	110
3	Farmers practice	15	20	17.5

The yield difference varied from farmers to farmers using different DRS sowing methods. Some had complained that paddy yield was higher with broadcasting than drill. However, over all yield increments of DSR plots with new machine were 12-20 percent higher vs. conventional plots sown through transplanting. Achieved average benefit of Rs. 4000-5000 per acre, in addition of water saving of Rs. 3500-5000 per acre and cost saving of Rs. 4000 on land preparation, puddling, transplanting. Benefits of time saving and environment friendliness are in addition. The yield advantage was attributed to more number of plants/sq meter (90-120) in DSR vs. 15-20 plants per square meter in transplanted plots. In another set of DSR demonstration on 50 acres in Muridke, average 5.2 t/ha yield of basmati 515 was obtained over conventional planting and on an average Rs. 20000-25000/ha monitory benefit was gained with DSR. In another set of DSR extension one farmer from Sialkot area planted 34 acres during 2014. Keeping in view the advantage he planted 170 acres of Super Basmati by DSR. Of these, 150 were with modified drill and 20 by broad casting and obtained 5.5 t/ha with drill vs 4.5 t/ha by broadcast. This farmer saved 3 kg/acre seed with drill, over all saving of Rs. 7000/acre on water, fuel and labour.

In Usta Muhammad, Jaffarabad, Balochistan province, farmers obtained over 6 t/ha yield of IR-6 and NIAB IR-9 with DSR as compared to 4.7 t/ha under conventional practice (Table 9).

Table 9 Demonstration of DSR in Jaffarabad, Balochistan province

S#	Name	Village	Tehsil	Area Under DSR	Variety	Yield (t/ha)
1	Zaheer Abbas Jamali	Goth Balach Khan Jamali	Usta Muhammad	4	IRRI-9	6.12
2	Muhammad Ali Jamali	Goth Balach Khan Jamali	Usta Muhammad	4	IRRI-9	5.44
3	Muhammad Ibrahim Jamali	Goth Haji Hot Khan Jamali	Usta Muhammad	2	IRRI-6	6.44
4	Pir Bux Jamali	Goth Peroz Khan Jamali	Usta Muhammad	2	Super Basmati	4.24
5	Adam Khan Jamali	Goth Azad Khan Jamali	Usta Muhammad	2	Super Basmati	3.84
6	Iqbal Ahmed Jamali	Goth Janan	Gandakha	3	IRRI-9	5.04
7	Muhammad Siddique Rahujo	Goth Mir Allah Bux Rahujo	Gandakha	3	Super Basmati	3.44
				20		

In Thatta (Lower Sindh province), on an average 5.5 t/ha paddy yield of Shandar was obtained with DSR as compared to 4.5 t/ha with conventional planting achieving an extra Rs. 20,000/ha (Table 10). In lower Sindh, farmers normally keep standing water in conventional method of broadcasting till seed germination and establishment of seedlings. Since, rice seed drilling was used in dry soil and no

standing water for long time was maintained in demo plots. Therefore, approximately 25-30 percent of irrigation water was saved as compared to conventional method of broadcasting and flooding.

Table 10 Demonstration of DSR in Thatta area (Lower Sindh)

S #	Name of grower	Address	Area	Variety	Paddy yield (kg/ ha)
1	Mr. Mushtaque Ahmed Khuwaja	Thatta Agri. Farm, near Makli, Thatta	04 acres	Shandar	5,550
2	Mr. Muhammad Khan	Village Brohi, Thatta	02 acre	IR 6	4,920
3	Mr. Jan Muhammad	Chhatto chand, Thatta	04 acres	IR 6	5,280
4	M/S Qureshi farm	Budho Talpur, Sujawal	04 acre	NIA Mehran	5,340
5	Mr. Illahi Bux	Amra Road, Sujawal	03 acre	Shandar	4,850
Total			**17 acres**		

5.2.2 Demonstration of Alternate Wetting and Drying

To popularize AWD's water-saving technology, perforated water measuring tubes were distributed to 100 farmer growing Basmati 515 in the Sheikhupura, district of Punjab province with collaboration of Engro Fetilizers during rice season 2015. One pipe was installed for one location each. The results on water saving revealed that there was a substantial reduction in water use with AWD as compared to farmers' practice. Water saving varies between locations and a maximum 40 percent water saving was measured with AWD. Most of the farmers saved 3 irrigations with the help of water measuring pipes. However, on average 20 percent water reduction was recorded in AWD plots. Farmers saved Rs. 2500-3500 per acre by reducing the cost of fuel and electricity on pumping of water. In AWD plots, the crop did not lodge and 100-150 kg/acre higher paddy yield was obtained. The results revealed that on an average farmers earned an extra Rs. 20000/ ha with DSR and AWD.
Similarly, advisory services were also provided to four big farmers in Thatta area, to popularize DSR and water saving technology on 400 acres with the help of scientists of Rice Research Station Thatta. The farmers were educated regarding irrigation time . They were also awarded regarding the importance of irrigation water availability in field at critical crop stage. The installation of water measuring pipes in field and data recording in pipes are also introduced to farmers. The results revealed that on average farmers saved 2 irrigations with AWD pipes of worth Rs. 2000/acre with no penalty in yield loss.

5.3 Improved Post-Harvest and Quality Control

5.3.1 Evaluation of hermetic storage bags

The IRRI Super bag reduces post-harvest losses and can help preserve the freshness and quality of commodities. Super bag reduces the flow of both oxygen and water between the stored grain or seed and the outside atmosphere. When properly sealed, respiration of grain and insects inside the bag reduce oxygen levels from 21 percent to 5 percent. This reduction reduces live insects to less than 1 insect/kg of grain without using insecticides - often within 10 days of sealing.

An experiment for the evaluation of hermetic bags was established in January 2014 at National Agricultural Research Centre Islamabad. After one year of paddy storage, difference in moisture level, physical grain quality, stored grain insect pests and germination were evaluated. The results revealed that the moisture level has increased during storage in jute and PP bags and remained the same in hermetic storage even after one of storage. Eventually, higher level of moisture contents induced the incidence of stored grain pests and low head rice recovery. Hermetic storage also improved the germination of seed by 20-25 percent.

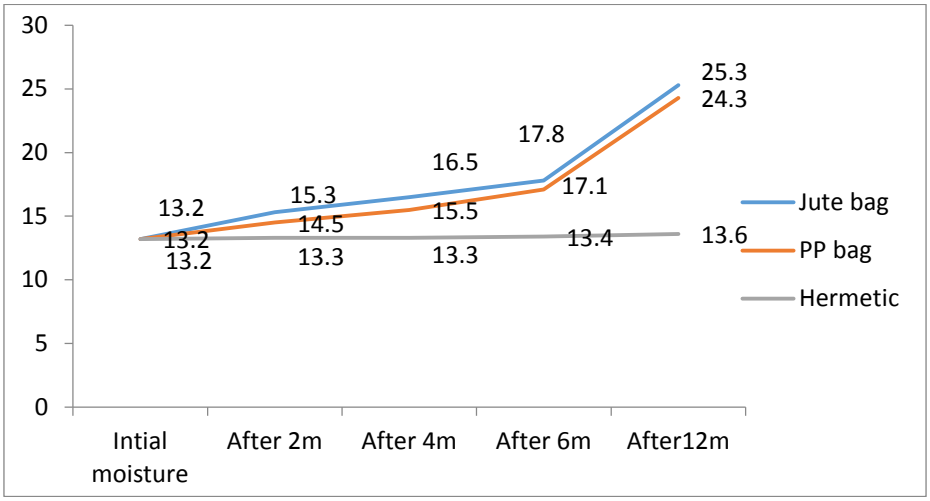

Figure 37 Moisture level with time

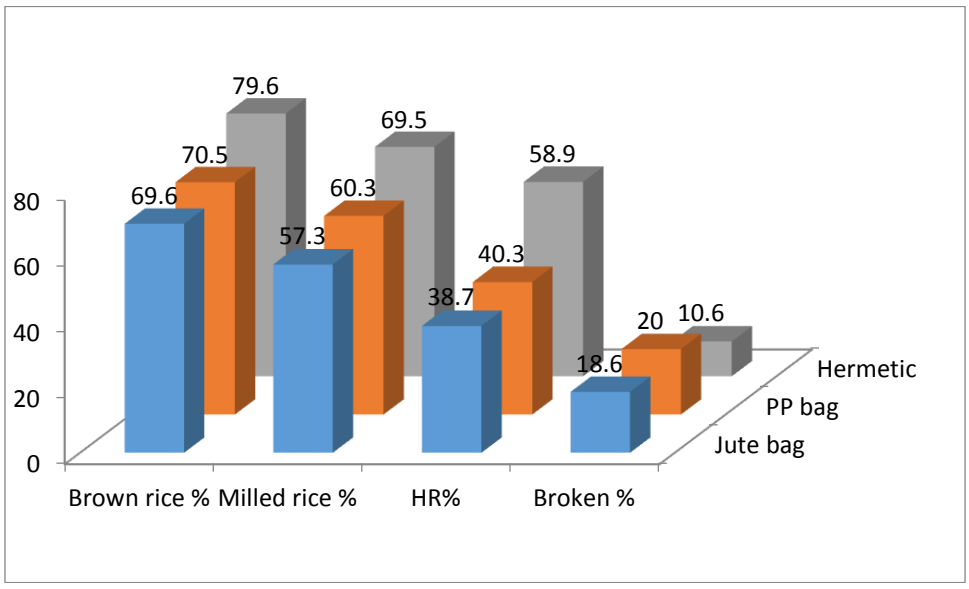

Figure 38 Physical grain quality under different storage system

5.3.2 Performance testing of different harvesting machines

The performance of a number of New Holland and Kubota harvester were tested when harvesting farmer's crops. Parameters measured includes reel speed, ground speed, drum speed and air flow. Grain losses were measured at the front end and from the thresher of the combines.

Tests on the New Holland combines showed:

- Reel speeds were very high. The recommended reel speeds is 10-20 percent faster than ground speed. Reels speeds varied from 7-9 km/hr while ground speeds ranged from 3-6 km/hr. High reel speeds relative to ground speeds contributed to front end losses of 100-200 kg/ha. There was a "second cut" stems in the sample which suggests that reel speeds are too fast. The operators claimed they were using high reel speeds as some of the crops were lodged.
- Threshing drum speeds were very high. The recommended peripheral drum speed is 12-16 m/sec which equates to a drum speed of 600 rpm for a 40 cm drum diameter. Only 1 combine had a drum speed below 700 rpm with most combines operating at 900-1000 rpm. This resulted in higher percentage of broken and damaged grains and also a number of skinned grains.
- Airflow over the sieves was low which resulted in more trash in the paddy sample. Airflow speeds measured ranged from 3-4 m/sec which is at the bottom end of the range. To clean the sample air speeds could be increased to 6-8 m/sec.

Figure 39 New Holland harvester

In a number of instances the operators said the combines were set up this way as the farmers sell their grain on total weight and they were not too concerned about trash and broken grains or moisture level of the grain. What the farmer didn't want to see was any grain spilt on the ground. The combine harvester owners are paid on the acreage they harvest in a day so they want to operate as quickly as possible hence the very high drum /threshing speeds.

Tests on the Kubota combines showed:

- Less damage to the grain as separation is done through stripping the grain from the panicle rather that threshing the whole crop
- Grain samples contained less trash as the straw is not taken into the machine
- Front end losses in some instances were high (160-200kg/ha) as a result of very high ground speeds (8-9km/hr.)

Overall harvesting recommendations:

- Harvest at 20-22% moisture
- Keep ground speeds below 7km/hr.

Figure 40 Kubota harvester

- Set front reel speed 10-20 percent faster than ground speed
- Set thresher drum speed 600-650rpm depending on drum diameter
- Set air speeds over sieves 6-8m/sec

5.3.3 Evaluation of physical quality parameters of paddy harvested by different combine harvesters

There were many complaints from millers and farmers that the combine harvesters cause excessive grain damage and harvest losses, which ultimately affect the grain quality. Keeping in view, IRRI evaluated the wheat combine "New Holland" along with rice combine "Kubota" for paddy and grain quality parameters from basmati growing areas of Sheikhupura (Punjab province).

The paddy samples collected from wheat combines contained many green and immature grains. Grain moisture was above 25 percent while green and immature grains were 81 percent higher than "Kubota". Paddy also contains very high percentage of skinned and broken grains which suggest that the combine harvesters are operating with very high drum speeds. There is also a second cut material which may be due to harvesting lodged crops and may also suggest that the reel speeds are not being correctly matched to ground speeds of the harvesters. The percentage of grain shattering was also substantially higher in case of using wheat combines (Table 11). Harvesting losses and grain quality were much better with the Kubota rice combine harvesters than the converted New Holland wheat combines.

Table 11 Comparison of different combines for paddy quality

Category	**Kabuta Combine**	**New Holland (Wheat Combine)**
Trash/second cut	Clean (Nil)	High
Green grains per 100gms	75	400
De-husked grains per 100gms	None	50
Broken grains per 100gms	50	175
Grain shattering (kg/ha)	100	250

When tested for physical grain quality parameters, this resulted in head rice recovery is less than 50% in case of wheat combine, which is 24% and 21% lower than manual and Kubota harvesting, respectively (Table 12). The broken percentage is almost 50% higher too, indicating that substantial losses do occurs to grain quality by using wheat combine along with paddy quality. These results suggest that the quality of paddy coming from the combines into the mill needs to be more closely examined. It is estimated that by adopting new improved harvesting machines like "Kabuta" about Rs.3.6 billion could be saved annually from losses in paddy and grain quality.

Table 12 Physical quality characteristics of different harvesting methods*

Quality Parameters	Manual	Kubota	Wheat Combine
Moisture content	14	14	14
Brown rice (%)	78	74	68
Milled rice (%)	63	61	54
Head rice (%)	58	56	44
Broken rice (%)	5	5	10

*Basmati 515

5.4 Capacity Building for Rice Researchers and Extension Officers

5.4.1 Workshop on "Rice breeding and varietal evaluation" for scientists

- One day workshop on "Rice breeding and varietal evaluation" was organized at RRI, Kaka Shah Kaku in collaboration with Rice Research Institute on October 6, 2015. A total of 30 research scientists and students from nine research organizations all over the country attended the workshop. Among these, there were 7 female participants from NIBGE and Agri College, Punjab University, Lahore. Two IRRI scientists, Drs. Surapong Sarkarung (Breeder) and CasianaVera Cruz (Biotechnologist/Pathologist) imparted the training as resource persons.
- The workshop was comprised of theoretical application of different breeding tools as well as hands on training in laboratory and field. Dr. Abdul Rehman IRRI Rep briefed the participants about AIP project activities, particularly introduction and evaluation of rice germplasm having various biotic and abiotic stress tolerances. While talking on the objectives of workshop, Dr. Surapong shared his experiences and handling of breeding materials, selection of broad-based rice germplasm consist of "new" plant types, plant selection derived from BC of SB combining BLB (Xa4, 5&21) with good grain quality and yielding ability, evaluation of IR 6 with sub 1, BLB resistance advanced breeding lines having tolerance to abiotic stresses (salinity, drought and heat). Vera Cruz talked on molecular breeding for biotic stress and shared her experience on the identification and characterization of promising breeding lines for biotic stresses particularly development of BLB resistant Super Basmati lines. The hands on training in lab was mainly on the BLB identification and BLB inoculum preparation, whereas emphases was given on selection criteria of promising lines in the field. The participants found the training quite useful particularly the students benefited the most in handling large populations in the field.

5.4.2 Training of rice farmers in paddy handling

- One day awareness training on "Harvest and post-harvest paddy handling" was organized at Village Dhahir, Muridke, Sheikhupura on November 16, 2015 in collaboration of Engro Fertilizers. A total 85 farmers and combine harvester operators attended the training. The main emphasis was given on the importance of quality paddy, optimum time of harvesting, selection of good harvester-Kabuta and maintenance of combine/ replacement of kit, farm level drying and hermetic storage. With this intervention, farmers will be

benefited by minimizing the harvest and post-harvest losses, harvest good quality paddy, earn premium price of paddy in market, millers will have quality paddy, with high milling recovery and hence will have quality rice for local and international markets

Figure 41 Participants of breeding training

Figure 42 Participants of Post-harvest handling

6 Cereal and Cereal Systems– Agronomy

6.1. Dissemination of Conservation Agriculture Technologies

AIP agronomy component disseminated improved technologies on more than 491 farms. Trained 322 stakeholders including farmers, service providers and agriculture professional. Moreover, disseminated improved production techniques to 2910 farmers through farmer field days and events in the project areas.

6.1.1 Extending partnership for out scaling CA technologies

AIP agronomy extended partnership for dissemination of improved technologies to five additional national partners namely, National Sugar & Tropical Horticulture Research Institute (NSTHRI) Thatta

and Arid Zone Research Institute (AZRI) Umerkot in Sindh, Model Farm Services Center (MFSC) Peshawar and Miankhel Seeds DI Khan in KP province and Agriculture Research Institute (ARI) Jaffarabad in Balochistan province.The focus was to reach more farmers in the project area. A total of 17 national partners collaborated for implementation of AIP agronomy activities in Pakistan.

6.1.2 Demonstration of CA technologies:

AIP agronomy in collaboration with 17 national partners assisted 491 farmers for application of improved technologies in Punjab, Sindh, KP and Balochistan provinces of Pakistan. Farmers applied zero tillage wheat planting on 248 sites, ridge planting of wheat on 162 sites and laser land leveling on 81 sites in project area.

a. Zero tillage wheat planting was done after rice / legumes (mung bean / guar) / maize in districts of Jafarabad in Balochistan; Jacobabad, Shikarpur and Thatta districts of Sindh and Faisalabad, Bhakkar and Chakwal in Punjab province and Nowshera and DI Khan districts of KP. In Jaffarabad Balochistan, AIP collaborated with service providers through provision of training and ZT drill for upscaling of technology in rice – wheat area. Zero till wheat planting helped farmers in saving of RS. 7500 / ha in cost of cultivation at the time of wheat planting.
b. Demonstrations of ridge planting of wheat were established on 162 sites in districts of DI

Figure 43 Zero tillage planted wheat in DI Khan, KP

Khan, Nowshera, Mardan, Peshawar, Swabi in KP; Hyderabad, Matiari, Shaheed Benazir Abad, Tando M Khan, Umerkot and Thatta in Sindh; Bahawalnagar, Bahawalpur, Bhakkar, Gujranwala, Gujrat, Khushab, Layyah, Lodhran, MB Din, Mianwali, Sheikhupura, Sialkot and Vehrai in Punjab. Ridge planting helped farmer save 30 percent irrigation water in comparison with farmer practice and ease in irrigation management.

c. AIP agronomy supported Model Farm Services Centers (MFSC) in dissemination of LASER land levelling and 81 farmers in districts of DI Khan, Nowshera and Peshawar utilized services of laser land leveling. The technology was also demonstrated in Jaffarabad district of Balochistan. LASER land leveling has helped farmers save 25 percent irrigation water and improve the yield by 12 percent.

Figure 45 LASER land levelled field in DI Khan

Figure 44 Ridge planting of wheat in Bhakkar, Punjab

6.1.3 Training of stakeholders on CA techniques

Before the start of wheat planting, trainings on CA techniques such as Zero tillage planting, ridge planting, LASER land levelling and fertilizer management were organized for 322 stakeholders that included farmers, operators and support staff of national partners.

a. Trainings on conservation agriculture techniques was organized on October 26 and 27 and November 04, 2015 for 210 farmers, staff of NRSP and agriculture extension. This training improved the awareness among farmers and were instrumental to apply zero tillage and ridge planting in districts of Bhakkar, Mianwali and Khushab and Bahawalpur districts.
b. Training on use of zero tillage for wheat planting was organized for 42 participants at Baloch Farm located in Shikarpur district of Sindh in collaboration with ARI Jaffaraabd. The training event helped the community to understand benefits of ZT technique and zero tillage planting was done on more than 230 acres in Baloch Farms.
c. In KP province, Department of Agriculture Extension has 22 LASER leveling units for its Model Farm Services Centers (MFSC) across the province. AIP in collaboration with its national partners Agriculture Extension, KP province and On Farm Water Management (OFWM), Punjab province trained 70 trainees on 'LASER land levelling' to enhance the capacity of tractor operators, farmers and agriculturalists from KP province at DI Khan and Nowshera on Jan. 5-7 and 19 – 21, respectively. Capacity building of LASER operators in KP province would help to use 22 LASER in effective way and increase precisely leveled area in coming days.

Figure 46 Participants of LASER land leveling training in Nowshera, KP

6.1.4 Dissemination of technologies through field days

National partners organized 30 field days including 2 in Balochistan, 9 in the province of KP, 15 in Punjab and 5 in Sindh province for dissemination of improved techniques. More than 2910 farmers attended these events in districts of Jaffarabad in Balochistan, Nowshera, Kohat, DI Khan and Mardan in KP, Bahawalpur, Bhakkar, Sheikhupura, Sialkot, Narowal, Faisalabad in Punjab and Matiari, Shaheed Benazir Abad, Umerkot and Thatta in Sindh province.

Farmers have opportunity to interact with fellow farmers, observe field under improved practices of ridge planting, bed planting, zero till planting, wheat planting with ZTHS and fertilizer management and LASER land leveling.

Figure 48 Field day on ridge planting in Hala, Sindh

Figure 47 Field day in Gandakha, Jaffarabad, Balochistan

6.2 Pilot Testing and Refinement of New CA-Based Implements and Technologies

Under this activity, ZTHS was modified locally and evaluated in rice – wheat area, 134 farmers planted wheat and maize through new seeders like ZTHS and MC bed planter and 121 stakeholders were trained on the use of new seeders.

6.2.1 Local modification of new CA planters and evaluation

a. After successful evaluation of ZTHS in rice – wheat area of Punjab during wheat season 2014-15 on 33 farms, CIMMYT initiated ZT happy seeder modification and local manufacturing with the help of a private manufacturer Shareef engineering Faisalabad, Punjab. Shareef engineering were able to develop first local version of ZTHS that was evaluated at Muhammad Rafi's farm in Nanakana Sahib District of Punjab province. Wheat planting was done in 1.5 hours/ acre, without burning of rice residue, using ZT happy seeder with 85hp and 60hp tractor. This environment friendly technique of wheat planting enables the farmers to reduce cultivation cost, increase wheat yield and reduce greenhouse gas emission. Local manufacturing of these planters is a step forward to increased adoption of this technology among farming community of rice-wheat area.

Figure 49 Locally modified ZTHS in Nankana Sahib, Punjab

b. In autumn 2015, locally manufactured prototype of MC (multi crop) planter was evaluated at 5 sites in Sheikhupura district for direst seeding of rice (DSR). Because of zero breakage of seed, rice plant population was 10 percent higher with MC planter in comparison with DSR drill that resulted in higher tillers and better paddy yield. Greenland Engineering has planned for manufacturing of these planters in Daska Sialkot that would be used by farmers for rice DSR in coming autumn season 2016.

6.2.2 Demonstration of New CA planter at farmer fields

Figure 50 Emergence in ZTHS planted wheat in Sheikhupura

During November – December 2015, national partners facilitated 92 farmers in rice – wheat area of the Punjab and that resulted in planting of wheat with 8 ZTHS including one locally manufactured on 650 acres in districts of Faisalabad, Gujranwala, Nankana Sahib, Sialkot and Sheikhupura. In Faisalabad and Sheikhupura districts, service providers facilitated willing farmers in planting of wheat with ZTHS in combined harvested rice residue. The technology has helped to reduce 5 tillage operations to 1 and reduced cost of cultivation in the tune of RS 12000 / ha.

National partners were instrumental in planting of wheat on 27 sites with MC bed planter in districts of Bahawalpur, Lodhran, Faisalabad, Vehari, Nowshera and Shaheed Benazir Abad districts. During spring 2016, maize was also planted on 05 sites with MC bed planter in OKara, Vehari and Sahiwal. Farmer plots planted with MC bed planter in Nowshera and Faisalabad districts had at par yield in comparison with farmer practice. A service provides in Faisalabad used bed planter on 20 fellow farmer fields on rental basis and maize yield was 4.4 – 8.2 t /ha on these plots. Bed planting of maize demonstrated at farmer field in Nowshera, Mardan and Peshawar has at par yield (3.84 t/ha) in comparison with farmer practice and helped farmers in saving of irrigation and advantage of mechanized planting.

Figure 51 Farmer in ZTHS planted wheat field in Nankana Sahib

Figure 52 Maize planted with MC bed planter in Sahiwal

Maize planting with small push row planter was done in KP on 14 sites and results showed that there were better plant population, fertilizer and seed applied in one operation, saving in labor time for

planting and grain yield was at par with hand planting (4.1 t/ha). Farmer Jalees Ahmed briefed more than 100 smallholder maize farmer in Mardan on benefits of this small planter. CIMMYT has initiated the local modification of small push row planter that would be evaluated and available to farmers in autumn season.

Figure 53 Farmer field day on push row planter in Nowshera

6.2.3 Training of Stakeholders on New Seeders

In November 2015, CIMMYT in collaboration with national partners organized four trainings on operation and use of ZTHS for wheat planting in district of Sheikhupura, and Faisalabad. These training created awareness among 121 farmers and trained operators, service providers and support staff of national partners for smooth planting operation of ZTHS for wheat planting in heavy rice residue. Training on use of multicrop bed planter for planting of various crops like mung, maize and wheat was organized at Agronomic Research Institute that was attended by 11 participants including agriculture professionals and operators.

6.2.4 Evaluation of Conservation Agriculture-Based Crop Management Techniques Methods in Different Cropping Systems:

After completion of one cropping system cycle (first year), field trials are in progress at five sites in rice-wheat, maize-wheat, cotton-wheat and rain fed wheat cropping systems in partnership with national partners namely ARS Bahawalpur, BARI Chakwal, RRI Kala Shah Kaku, WRI-Faisalabad and CCRI Pirsabak Nowshera. During second year, results would help to validate techniques, improve understanding about effects of new techniques in cropping system perspective. After the harvest oF autumn crop, finding are as under:

Figure 54 Training on ZTHS in RRI, KSK, Sheikhupura

1. **Evaluation of Different Planting Methods/Techniques in Cotton-Wheat System at ARS Bahawalpur, Punjab:** Because of flexibility in maintaining plant to plant distance and number of seed in each hole, 90 percent emergence was observed in hand planted cotton on raised beds / ridges and seed yield in comparison with 70 percent with drill and mechanized bed planted cotton.

2. **Effect of Planting Techniques on the Productivity of Different Rain-Fed Cropping Systems at BARI Chakwal, Punjab:** Summer crop mung bean had higher seed yield than soybean on Zero tillage and conventional tillage in comparison with bed planting. Wheat planting was also earlier after mung in comparison with soybean.

3. **Evaluation Of Different Residue Management and Planting Techniques Under Heavy Residue Environment Of Rice-Wheat Cropping System at RRI KSK, Sheikhupura, Punjab:** After first year rice – wheat cycle, direct seeded rice (DSR) followed by ZTHS wheat in residue had highest system productivity of 7.11 t/ha in comparison with other planting system. Basmati Rice yields were higher with transplanted rice in comparison with DSR. Wheat plant populations were higher in plots planted with ZTHS in residue in comparison with conventional planting.

4. **Effect of Planting Techniques such as ZT, Bed Planting and Farmers' Practice on The Productivity of Irrigated Maize-Wheat Cropping System at CCRI Nowshera District of KP Province: M**aize yield with bed planting was at par in comparison farmer practice of hand planting. In case of wheat, plant population was higher with zero tillage in comparison with bed and conventional planting.

5. **Evaluation of Double No-Till of DSR and ZT Wheat in a Low Residue Environment of Rice-Wheat System at WRI Faisalabad, Punjab:** In autumn 2015, paddy yield with direct seeding (DSR) was at par with transplanted rice with no significant differences. Growth of ZT wheat after DSR was better in comparison with wheat with farmer practice after transplanted rice.

6. **Evaluation of mung – wheat cropping system in rianfed area of KP:** After the first season, mung bean yield of 0.8, 1.25 and 1.38 tonnes / ha was observed in conventional tillage, zero tillage and raised beds. This has resulted in additional crop in comparison with fallow – wheat system.

6.3 Nutrient Management

A total of 169 demonstrations on nutrient management that included split application of urea in rain fed wheat, NE (Nutrient Expert) validation for irrigated wheat crop, GS (Green Seeker) use for N management in wheat and use of Bio power in wheat has been planted in the project area. These would help to promote balanced fertilizer management in farming community and improve farm productivity.

6.3.1 Fertilizer management demonstrations for wheat

a. Fertilizer management in Rain fed wheat: In collaboration with BARI Chakwal and NRSP farmer field demonstrations on fertilizer application in wheat planted on 16 sites in districts of Chakwal, Attock and Nowshera. Previous results showed that that application of recommended fertilizer (80 Kg N and 58 Kg P/ ha) at planting and split application of urea at first shower can increase wheat grain yield up to 63% in comparison with farmer practice.

b. Use of bio power in wheat; Bio Power consist of powdered, pre-sterilized carrier material (Filtermud) and a consortia of beneficial bacteria that can help save 20% fertilizer and improve 5-10% yield. Two bags of BioPower per acre applied as water suspension on wheat seeds just before sowing. Bio power evaluation initiated on 33 farmer sites in Swabi and Faisalabad districts.

6.3.2 Evaluation and demonstration of NE for wheat with NRSP and other national partners

Nutrient Expert is DSS for site specific nutrient management (SSNM) in wheat and maize. Keeping in view the last year results, validation trials of NE for irrigated wheat has been planted on 80 farmer fields in the districts of Bahawalpur, Bhakkar, Faisalabad, Layyah, Sargodha, Lodhran and Sheikhupura in Punjab, Nowshera, Swabi and DI Khan districts in the province of KP and Mitari, Shaheed Benazir Abad, Hyderabad and Umerkot in Sindh province. Previous results showed that NE recommendation promotes balance use of fertilizer for wheat and results in saving of RS. 6000 / ha for farmers.

6.3.3 Use of Green seeker for N management in wheat

Green Seeker for N management is SSNM technique for wheat that help farmers to apply urea according to crop response and improve wheat grain yield. During this wheat season, GS for N management is being validated and demonstrated at farmer field on 43 locations in districts of Bahawalpur, Bhakkar, Faisalabad, Lodhran, Nowshera, Peshawar, Sheikhupura, Swabi and Shaheed Benaziarabad. Previous year results suggested that farmer could save 50 Kg N / ha with the application of this technique.

Figure 55 Green seeker for N management in wheat

6.3.4 Dissemination of LCC use in rice crop in rice-wheat area

Leaf color chart, SSNM technique, help farmers to apply Nitrogenous fertilizer according to demand of rice crop. LCC was demonstrated on 30 farmer fields in districts of Gujranwala, Sheikhupura and Faisalabad in rice –wheat area of the Punjab. Results from these on farm demonstration showed that there were no reduction in in rice yield with the saving of 26 Kg urea per acre (65 Kg urea per hectare). After 2 years of demonstrations at farmer field in collaboration with RRI – KSK, Engro fertilizers and AR farms Punjab, LCC techniques would be disseminated to farmer on larger scale

during autumn – 2016. IP agronomy in collaboration with RRI, KSK has initiated efforts on the local production of LCC charts for rice crop.

Figure 56 Dissemination of LCC use in rice crop in rice-wheat area

7 Cereal and Cereal Systems– Socioeconomics

7.1 Current Status of the CA Technologies and Nutrient Management in Baluchistan

A detailed survey regarding CA technologies and nutrient management was carried out in the Baluchistan province. The objective of the survey was to collect information regarding status of CA technologies in Balochistan province. The data was collected from three districts of Baluchistan i.e. Nasirabad, Jaffarabad and Sohbat Pur. In total about 100 farmers were interviewed. District wise about 40 farmers were interviewed from Nasirabad, 36 from Jaffarabad and 24 farmers from the Sohbat Pur districts. The study primarily focused on the status of CA technologies like Zero tillage drill (ZT drill), Happy Seeder, Bed Planter, Ridger, and Laser leveler along with micro nutrients application, reduced tillage, Direct Seeding of Rice (DSR), crops' residue management and adaptation to climate change.

Figure 57 Interviewing Farmers in the Balochistan Province

The survey findings indicated less ownership of farm machinery like MB plough, planker, cultivator were owned by only 15 percent of the farmers while rotavator, ZT drill, ridger, thresher, reaper were owned by only 3 percent of the farmers. Combine harvester, and bed planter was not owned by any farmer of the area.

In the study area none of the farmers have adopted raised bed as well as ridge planting technologies mainly due to lack of awareness among the farmers as well as non-availability of bed planter in the area. Only 7 percent of farmers reported the ownership of ZT drill and the adoption of the zero tillage was also very less as shown in figure 26.

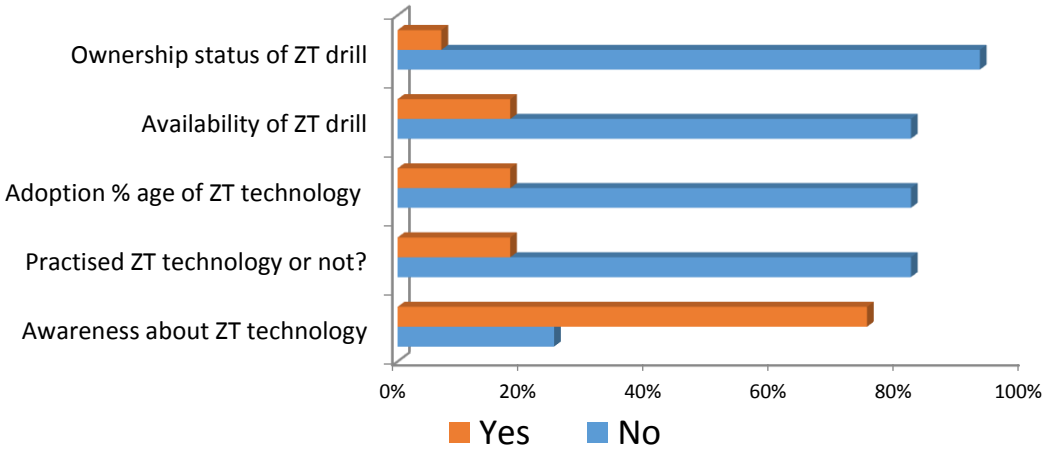

Figure 58 Farmer's perceptions on adoption of ZT technology

As illustrated in figure 3, there exists difference between the two methods of cultivation but the yield is almost the same. Farmers reported that ZT method is cost affective and more profitable than the traditional method.

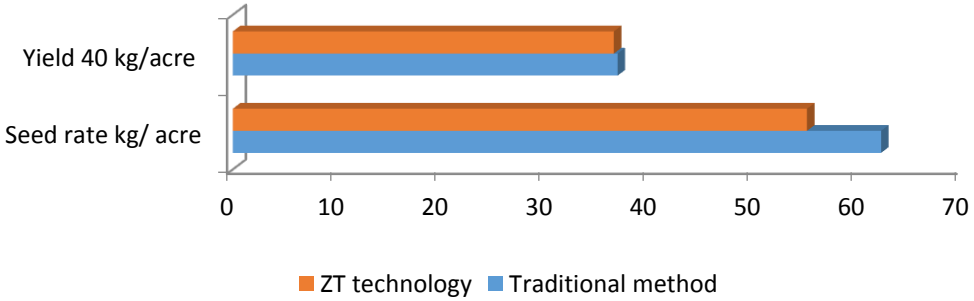

Figure 59 Comparison in seed rate and yield of wheat cultivated with ZT technology and traditional methods

The direct rice sowing (DRS) technology is practiced by less than one percent of the farmers in Baluchistan province and adoption percentage is less due to high weeds infestation, less yields and poor germination.

The farmers' response regarding fertilizers availability, quality and affordability are presented in Table 13. Majority of the farmers i.e. 89 percent reported that fertilizers are available at the time of application. About 48 percent of the farmers were purchasing on credit (mainly non-institutional/informal credit from inputs dealers for one crop season). About 55 percent farmers were unable to afford fertilizers due to higher prices and lack of capital.

Table 13 Farmers' perceptions on fertilizer availability, application, and quality						
Description	Nasirabad		Jaffarabad		Sohbat pur	
	No	Yes	No	Yes	No	Yes
Fertilizers availability at time of Application	5	32	0	35	0	22
Mode of fertilizer purchase	21	17	16	19	8	14
Application of recommended doses of fertilizers	26	14	9	26	15	10
FYM availability?	33	7	35	0	21	4
FYM application?	39	1	35	0	24	1
Fertilizer affordability	23	14	19	16	13	9
Timely application of fertilizers	4	33	4	31	4	21
Price difference when purchased on cash and credit	1	39	0	35	0	25
If yes, amount charged on credit (average percentage)	18.31		26.01		20.64	
Detection of nutrient deficiency from crop color	19	21	17	18	21	13
Satisfaction from the fertilizer quality	12	28	7	28	4	21
Nearby availability of fertilizer	18	22	14	21	6	19

Source: Survey 2015

7.2 Maize Based Livelihood in the Hilly Areas of Pakistan

The study was carried out in the Gilgit-Baltistan province of Pakistan. The data was collected from all the districts of Gilgit-Baltistan i.e. Gilgit, Hunza Nagar, Ghizer, Diamer and Skardu. A detailed comprehensive questionnaire was prepared for data collection. Information on number of household and farm level characteristics was collected. In total information was collected from 100 farmers.

The average land holding was about 30 kanals (approximately 3.80 acres) per household; as the Himalayan region is hilly about half of the land holdings (15 acres) was operational land holding and the rest was waste land. About 60% of the households regarded their soil fertility as good. Information on the road access indicates that only 13% of the households have road access and the average distance to the road was about 0.89 kilometres. The time taken to access the road was about eight minutes. Information on family composition indicated that the joint family system is prevalent in the Himalayas. The survey findings indicated less land holding in the area as well less institutional support like access to extension services as well as credit facility. The farmers were using the traditional maize varieties and the access to seed is major issue. The hybrids are yet to be introduced in the area. The average yield of the open pollinated (OP) maize varieties is less than 1 tons per hectare indicating the huge potential for improvement.

7.3 Capacity Building

Arranged SPSS and STATA trainings in collaboration with BUITEMS Quetta and Comsats Lahore. In total trained about 115 social scientists and faculty members regarding the use of SPSS and STATA software.

Figure 60 Training on orientation to STATA and SPSS at BUITEMS and Comsats

7.4 Perennial Horticulture

During this reporting period, a total of 1618 beneficiaries (180 females) were reached through 46 trainings, workshops, field days, farmer meetings and seminars. These efforts have significantly helped in achieving the objective of bringing innovation in agriculture for all major fruit crops with a considerable spread over the four provinces of Pakistan. The other key achievements over the period (January-March, 2016) are given below:

- Total 34 demo plots of 5 fruit commodities have been established (Grapes 4, citrus 15, Mango 4 at UAF sub campus, Guava 7 and Pistachio 4). 28 out of 34 demo plots are at farmer properties. The citrus (160 registered growers in Sargodha) and guava (105 registered growers in Larkana, Naushero Feroze and Hyderabad) site are being visited on fortnightly basis.
- 13 sites in Multan and Vehari were visited for evaluating the survival percentage of distributed mango plants. Survival is more than 60%.
- Two new pistachio varieties (Kerman and Peter) have been introduced in Baluchistan.
- 800 Ber plants have been distributed among the growers of Punjab, Sindh and Baluchistan on March 02, 2016.
- Ever first olive oil taste panel in Pakistan was organized on March 22, 2016 by UCD at ARI Tarnab, Peshawar.
- Six pack houses in Sargodha (1 big Citrus Asia enterprises with 5 small namely Subhan Kinno Factory, Sajawal Enterprises, Al Arshad Kinno Factory, Al Qamar Kinno Factory and Abdullah Enterprises) have been linked to CRI Sargodha for technical assistance in post-harvest management of citrus.
- Six professional women institutes of Sargodha (namely Sanatzar Industrial Home, Agri In service Training Institute, Vocational Training Institute, Dar ul Falah, Govt Vocational Training Institute for Women, and Kashana) have been connected to CRI Sargodha under the value addition project of citrus.
- The teaching of course on “Harvest and Postharvest Management of Summer Fruits and Vegetables” (with 104 students including 10 women) was successfully commenced in Agriculture Training Institute (ATI), Sakrand.
- First pistachio model nursery has been started at ARI Quetta while one private nursery has been connected to the research institute for technical assistance.

8 HUMAN RESOURCE DEVELOPMENT

8.1 Graduate studies

All 14 AIP scholars are presently attending classes and doing their research projects in US Land Grant Universities. One MS student is expected to finish her degree by September 2016. Remaining eight MS students will be graduating in January 2017, while all the Ph.D. scholars are expected to complete their doctorate degree by March 2019 (Table 14).

Table 14 Expected graduating dates of AIP scholars

Student name	University	Start Date	End Date	Degree
Abbasi, Juliya	UC Davis	26-03-15	01-03-19	PhD
Barkat, Noorani	TAMU	20-01-15	01-01-17	MS
Fayyaz, Laila	UC Davis	26-03-15	01-03-15	PhD
Habibullah	U Missouri	20-01-15	01-01-17	MS
Khan, Ismail	Mississippi State U	04-06-15	01-06-17	MS
Khan, Muhammad Ehsan	WSU	12-01-15	01-01-19	PhD
Manan, Fazal	UMN	01-05-15	01-05-17	MS
Naqeebullah	Mississippi State U	12-01-15	01-01-19	PhD
Noshad, Salma Bibi	TAMU	20-01-15	01-01-17	MS
Rauf, Yahya	U MINN	20-01-15	01-01-19	PhD
Solangi, Maria Amir	U MASS	01-09-14	01-09-16	MS
Ullah, Marwa Zafar	UC Davis	26-03-15	01-03-17	MS
Zahra, Sabahat	TAMU	20-01-15	01-01-17	MS
Zia, Bazgha	Purdue	01-05-15	20-05-17	MS

8.2 Vocational Training

Four workshops and one symposium was organized under the vocational training component for a total of 210 participants including 162 men and 48 women trainees (Table 15).

Table 15 Vocational training event detail				
Title of Event	Duration in Days	Participants		Evaluation rating
		M	**F**	
Scientific Writing Workshop at AAUR, Rawalpindi	1	18	16	5/5
symposium on "Rural Advisory Services in Pakistan in the Scenario of Information Communication Technologies (ICTS)" at University of Sargodha	1	76	12	N/A
Holding Effective seminars, Engaging the Audience at UAF	1	43	7	4.9/5
Running Effective Workshops in Islamabad	2	16	9	4.95/5
Proposal Writing at NARC, Islamabad	1	9	4	N/A

8.3 E-PakAg

The major objective of e-Pak Ag is to engage national partners in a collaborative effort to identify how ICT can better contribute to the information needs of farmers. As such, efforts include careful assessment of how the information is validated, developed, packaged and delivered. Findings have identified that a major need within e-Pak Ag is to help partners identify better ways to package and present their information so that it results in action by the target groups. Related to these methodology questions, extension and training materials from all the primary AIP partners namely ILRI, IRRI, CIMMYT, AVRDC, UC Davis, and PARC are regularly uploaded to the e-Pak Ag website. In addition, e-Pak Ag has two primary implementation partners namely UAF and AAUR with village-level activities. At UAF, the focus is more broadly ICT and Ag Extension, while AAUR is looking at ICT and gender access.

Under these two activities, a total of 260 beneficiaries were reached through two workshop and one national ICT conference.

Other e-Pak Ag achievements include:

- AIP E-Pak Ag working paper has been shared with a wide range stakeholders throughout the country. A national release event is planned for May 2016.
- Website statistics show over 2,000 users in the reporting period. This on-line activity equates to more than 3,000 hours of time spent reviewing materials, (Fig. 61).

Figure 59 Online activity statistics

- In addition to the website, selected presentations have been loaded on Slide Share (http://epakag.ucdavis.edu/), over 6,000 views till date.
- Seven students including four at UAF and three at AAUR have been implementing E-Pak Ag studies on aspects of ICT in agriculture – ranging from website access and suitability for farmers accessibility.
- A needs assessment survey has been completed in 6 districts of Punjab province including Chakwal, Okara, Faisalabad, Dera Ghazi Khan, Rawalpindi and Multan.

8.4 COMPETITIVE GRANTS SYSTEM

The establishment of boards in the provinces and the execution of competitive grant system under those boards has been a challenge for the primary partners PARC. The main bottle neck is the requirement of legislation at the provincial assembly's level and the frequent change in the government official at the agriculture ministry's level. The provinces are in the favor of competitive grant system, however, want to have a flexible system which facilitate the researchers to execute research projects. AIP transferred the first tranche of funding (USD 818,611) to PARC for the establishment of board and competitive grant system through the government of Pakistan channel (assignment account). This system is not allowing the use of fund and till to-date PARC being a primary partner unable to utilize the allocated fund. Additionally, the government system also not allowing them to run competitive projects

without fulfill the assignment account requirements; this assignment account requirements are to make first expense and then claim reimbursement where none of the project investigator could make advance spending. CIMMYT is working with PARC to find ways for implementing competitive grant systems in the provinces and find the way forward to spend the fund received. A meeting was held by Dr. Md. Imtiaz, Country Representative CIMMYT, Pakistan with Dr. Nadeem Amjad Chairman PARC, Dr Md. Azeem Khan, DG NARC and PARC AIP focal person at NARC executive room on April 22, with the objective to devise mechanism for funds utilization already transferred to PARC and discuss future strategy for funds utilization.

Discussion Points:

Dr. Imtiaz provided a brief overview of the AIP partners' funding under AIP. He said that closing date of the AIP project as per contract is March 7 2017 and payment of year 1 and 2 is already released to primary partners including PARC. Project closing date is approaching, we need to discuss competitive grant system (CGS) funding, establishment of provincial boards issue and way forward. We have to agree on mechanism which could be adopted to utilize the existing funds. In addition a plan would be developed for utilization of remaining funds by PARC. AIP released USD 818,611/- to PARC. PARC has already allocated provincial budget to respective boards/provinces.

As Dr. M. Ashfaque is involved from beginning of the project, he briefed the meeting participants on the grant proposals received so far by PARC under the CGS. He added, that from Punjab, Khyber Pakhtunkhwa, Balochistan and Sindh provinces, 207, 89, 49 and 5 proposals were received, respectively. For Sindh province, call for proposals will be re-advertised to receive more number of proposals. PARB evaluated the proposals, and in 1st round, 93 proposals were shortlisted. On the request of AIP Secretariat, PARC, PARB further evaluated the shortlisted proposals on scale of 0 to 10 and share the list with AIP Secretariat. AIP COP and the then Focal Person, AIP decided to consider the proposals with more than 5 score out of 10. Now, 25 proposals will be considered for final approval. For KP 49 proposals were sent to the Interim Committee on 25th May 2015 but so far the committee has not shared any information regarding shortlisted proposals for consideration under CGS. Chief Secretary, Balochistan and Secretary, Balochsitan were requested time and again for constitution of Interim Committee but Balochsitan response is still awaited.

Dr. M. Ashfaque shared that PARB has already opened an assignment account with reference to Ministry of Finance (Budget Wing) notified minutes on 5th August 2015. .

DG, NARC shared the progress on PM's directives on Expanding Agricultural Production Base in Pakistan and informed that after thorough consultation with provinces, a draft document has been prepared that also includes provincial board's establishment but it will take time as legislation from provincial assemblies is required. Special efforts would be done to develop mechanism for utilization of funds.

It was also agreed that consensus should be developed at province level and there is a need to discuss with provincial secretaries and DGs in each province to ensure the utilization of funds. Dr. Imtiaz also requested DG to nominate staff for the coordination at PARC level AIP related activities for speedy implementation of the project.

Chairman, PARC also joined the meeting and said that they will look into the matter and will assess the whole situation after discussion with Finance Division, PARC.

Action Points:

1. Dr. Azeem nominated two focal persons for coordination on the AIP project. These focal person includes Dr. Pervez Khaliq Minhas, Sr. Director Planning & Research Monitoring Cell (PRMC) NARC and Dr. M. Ashfaque, TSO to Chairman, PARC/ Senior Scientific Officer. Both will coordinate in future with AIP while DG NARC will deal with matters

involving strategic decisions. Dr. Pervez Khaliq will deal with daily basis correspondence.

2. Dr. Azeem will have individual visits to provinces for further discussion on this matter.
3. Dr. Azeem Khan along with Dr. Md. Imtiaz, Dr. Pervez Khaliq and Dr. M. Ashfaque will have meeting with Secretary Agriculture KP. He will be briefed on the AIP funding and other issues. After having meeting with secretary, then DGs of each province will be involved and the matter will be further discussed.
4. Dr.Azeem Khan said that letter would be drafted today (April 22, 2016) and send to Director Finance PARC regrading release of funds to Punjab which is already approved and discuss the model for funding projects received from other provinces.

9 Personal Management

Four positions National Research Scientist were advertised through the CIMMYT web-portal and interviews were held in November 2015. Of the four selected, only three took charge in January 2016. A dairy associate resigned in January 2016. One of the maize research associate resigned from CIMMYT during the reporting period. Research associate CIMMYT Yousafwala office has relocated to Islamabad. The replacement of research associate for Yousafwala office is in process. Ms. Asma Shahzadi took charge as an M&E office in AIP-UC Davis office Pakistan.

Commissioned projects under AIP perennial horticulture have also created jobs for 15 individuals, including 3 women, from Sargodha, Faisalabad, Rawalpindi, Okara and Toba Tek Singh to perform project activities at farm and research stations.

Two AVRDC Pakistan staff members; Mr. Sheeraz Ahmad (Training Expert/Ag Extensionist) and Mr. Mazhar Hussain (Socio economist) attended the one month training modules on "Vegetables: From Seed to Table and Beyond"and "Sustainable Development" at the AVRDC East & South Asia offices in Kasetsart University, Thailand from September to November, 2015. Mr. Umer Farooq, Office Junior/ boy left the AVRDC-Pakistan Office in January 20, 2016.

10 LESSONS LEARNED

The following are the major lesson learned during the reporting period:

- Importance of quality maize seed production and maintenance of parental lines.
- Enhancing the capacity of NARS in monitoring nutritional quality of biofortified maize.
- The need to engage CBOs in seed production and dissemination particularly in GB region and Balochistan province.

Maize planting with MC bed planter has not gained much acceptance in hybrid maize growing area of Punjab from the farmers with the reason being variability in plant to plant distance with MC planter planted maize and availability of cheap labor for hand planting.

CA technologies can be disseminated through collaboration with service providers and this was experienced in Jaffarabad and Faisalabad area. In the remaining target area of the project, focus would be on provision of planters to service providers.

The funding cycle and the project initiation cycles must be timed appropriately in order to achieve the expected goals, keeping in mind the agricultural seasons of the specific crops.

We continue to see that participants enjoy courses more and learn better when training sessions engage them – i.e., when instructors actively involve participants in activities throughout the workshop. The very high evaluation scores and written comments support the benefits of such adult-learning oriented workshops. It was in response to these findings that a workshop on "how to give an engaging workshop" was held during the current reporting period.

The series of workshops across the country have highlighted:

1) Lots of technical information already exists, although it is not always based on farmer needs
2) There is a need for greater coordination between those producing technologies and with those delivering information,

3) There is a continuing need to deliver farmer- focused information that responds to farmers' needs and interests.
4) Information packaging - delivering information that is easily understood and applied (both in terms of language and educational level) remains a major need.
5) There is a need to build in feedback mechanisms within the information supply system.

10.1 EXTERNAL FACTORS

Getting visa for resource persons coming from outside of Pakistan remains as a hurdle to conduct planned trainings by AIP.

The delay in project payments has jeopardized the continued ability of AVRDC to pre-fund its continuing project activities and there is a great danger that AVRDC activities will have to cease. The over-all cut in AIP funding will have implications to achieve mission indicators and set targets for reaching to beneficiaries.

Machinery for combine harvesting may not be available at the time of harvesting as contractors prepare it for rice harvesting by changing the sieve.

10.2 RISKS

Tunnel farming is new for the growers of Swat, so regular trainings are required to minimize risk of major loss of production. Some of the farmers in Punjab province are reluctant to intercrop mungbean with sugarcane which requires capacity building regarding earthing-up process of sugarcane at the time of mungbean growth. Onion and Okra are cross pollinated crops and a challenge for seed producing farmers.

10.3 CONTRIBUTION TO USAID GENDER OBJECTIVES

In November 2015, two activities were conducted on dairy cattle feeding and management for 79 women from poorer households including widows in villages namely Chella and 166 JB of Jhang district in Punjab province.

AIP maize is evaluating widely protein and vitamin enriched maize varieties in Pakistan. In Kharif 2015, the evaluation included zinc enriched maize. Apart from their grain yield advantage these germplasms will provide protein and other crucial micronutrients with particular importance to women and children to mitigate malnutrition and attendant diseases. The various AIP maize activities also created job opportunities for women. A particular example is at JPL where 25-30 women have been assigned to follow up AIP and other maize trails at the seed farm at Arifwala.

Figure 602 Rural women working at JPL seed farm (this picture was taken in Dec. 2015 while they were harvesting AIP maize trails)

These rural women will benefit from the additional income they are getting by working at Seed Company which is near to their village.
All aspects of the project continue to be mindful of the gender dynamics in the Pakistan context and make concerted efforts to ensure women's participation in appropriate and meaningful ways. In light of gender considerations, the ICT in Extension element with AAUR was added to look at gender and ICT in Ag Extension.
Efforts are underway to increase the participation of women in dissemination of activities. During first quarter of the reporting period, a total of 37 women participated in trainings organized on dissemination improved techniques.
A total of 278 women farmers/ field workers have been trained on pre and post-harvest management of vegetables (Appendix 2) in this quarter. 128 women from Faisalabad, Gojra, Bahawalpur, and Khushab are involved in sowing and picking activities of protected vegetables. 40 women farmers and field workers were involved in the mungbean postharvest training. Four trainings in Gilgit-Baltistan have increased the skills of 71 women vegetable growers on vegetable production and management

10.4 ENVIRONMENTAL COMPLIANCES

Most of CIMMYT's maize germplasm are climate smart varieties which can best perform under stress environments. CIMMYT's germplasm which are tolerant to heat and water stress will benefit farmers in water scarce environments. In addition, CIMMYT materials which are under evaluation in Pakistan are developed through conventional breeding techniques, hence, they don't need additional inputs or extra environmental/biosafety care as compared to germplasm developed through non-conventional ways.
Improved techniques under AIP agronomy are mostly resource conserving and focus on reducing burning of residue, reduced tillage, water saving and fertilizer saving and contributing towards better environment.
Insect nets and black plastic mulching sheets have been introduced to reduce the use of pesticides. Yellow sticky traps and Kairomone traps have been introduced to reduce pesticide usage. Also field workers have been trained on protective measures during pesticide spraying to take protective measures during pesticide spraying.

11 MONITORING AND EVALUATION

AIP annual work developed for year 4 of the project under the Mission Strategic Framework. To maximize the effectiveness of the work plan a number of meetings were held with implementing partners, information were mustered and pondered advertently. Furthermore, USAID feedback was incorporated and final version submitted to USAID. A robust and rigorous monitoring was carried out in different project areas and reports prepared to ensure that activities are on track and in line with the monitoring plan. Gaps were identified and strategies were developed and reinforced to overcome those gaps. Output indicators were monitored rigorously and fortified that the partners make discernible achievements. The strategies have been contributing to MSF outcome indicators and ultimately EGA (Table 16). Finally, USAID working group meeting was attended in which training on excel was received.

Progress on output indicators during the reporting period is given in the table below:

Table 16: Progress on output indicators during the reporting period	
Indicator	**Beneficiaries**
Number of farmers linked with/benefiting from agriculture extension services through scaled up extension system	5232
Number of improved production and agriculture management technologies/practices transferred/made available to farmers	74
Number of demonstration plots/farms/trials established for farmers' awareness on improved agriculture technology and management practices	9181
Number of farmers received information on improved agricultural management practices through demonstrations/field days/trials	24395
Number of farmers and others getting assistance (sperm,) ruminants up take and , seed villages, seed partners, new seed varieties/cultivars/rootstock of cereal, horticultural and agronomic crops transferred to farmers) supported/established to disseminate seed of improved high yielding varieties.	15396
Number of farmers linked with input/service providers for improved production services/inputs	661
Number of farmers using E-Pak Ag webpage for acquiring information on agriculture related information	2000
Number of new breeding lines/cultivars/rootstock of cereal and horticulture crops at development stage	1110
Number of partnerships developed with input suppliers/companies for development of production inputs/services (PPR vaccine, Semen, new varieties)	43
Number of value chain assessments carried out to identify value chain constraints and opportunities (best bet interventions)	7
Number of training events arranged for interventions under different value chains	108
Number of farmers linked with public/private business development service providers (Input supply facilities, industries) through established partnerships	365
Number of farmer selling products (cereals, vegetables, fruits, milk and small ruminants) value added , production cost decreased a as a result of Project interventions	883
Number of workshops carried out to disseminate new and improved agricultural	89

products	
Number of new/improved products identified and disseminated through value chain interventions	29
Number of training events arranged on concepts of value chain and value chain assessment/analysis	7
Number of entities (including national scientists, academics, value chain actors etc.) received training on concepts of value chain	51
Number of tools designed and utilized for carrying out value chain assessment	12
Number of training events arranged in agriculture production and management (livestock, cereals and horticulture) on skill improvement of farmers, NARS scientists, extension workers and others	116

12 COMMUNICATIONS

The branding and making guidelines for AIP were followed strictly to ensure the visibility of USAID. During this reporting period, AIPs' Communications proactively highlighted the AIP's interventions using the following mediums (details in apex 3)

- AIP-newsletter (quarterly): http://aip.cimmyt.org/newsletter/
- Social media (Flickr, facebook, twitter, blog) using hashtag #AgriInnovaiton
- Landing page http://aip.cimmyt.org
- Publications
- CIMMYT's Blog and e-newsletter
- Events
- Electronic and print media
- Radio shows

13 APPENDICES

13.1 Appendix 1 Details regarding farmer field days conducted during October 2015 – March 2016 (Agronomy)

S. No	Hosting partner	Event title	Location	Date	Participants (No)
1	DAR Balochistan	Field day on Zero tillage wheat	Chakar Mari, Usta Muhammad, Jaffarabad	25.02.2016	31
2	ARI, Jaffarabad-PARC	Field day on Zero tillage wheat	Gandakaha, Jaffarabad	26.02.2016	272
3	MFSC, Peshawar - KP	Laser land Leveling	Kohat	03.03.2016	95
4	CCRI, Nowshera – KP	Bed planting of maize	Katlang, Mardan	07.10.2015	93
5	CCRI, Nowshera – KP	Maize planting with small push row planter	Pirsabak, Nowshera	14.10.2015	103
6	Miankhel DIK	Zero tillage wheat planting	Miankhel DI Khan	16.03.2016	93
7	ARI, DI Khan	Ridge planting and Zero till wheat	Maapal, Kotla Saidan, DI Khan	17.03.2016	111
8	CCRI, Nowshera – KP	Field day on AIP Agronomy trials	Zarra Maina, Nowshera	24.03.2016	107
9	CCRI, Nowshera – KP	Field day on bed planting and zero tillage wheat	CCRI, Pirsabak, Nowshera	25.02.2016	107
10	NRSP	Fertilizer management in wheat	Swabi	25.03.2016	34
11	NRSP	Fertilizer management in wheat	Swabi	29.03.2016	39
12	WRI, Faisalabad	ZTHS planted wheat	Manawala, Sheikhupura	09.03.2016	107
13	WRI, Faisalabad	Bed planting of maize - Field day	Faisalabad	14.10.2015	88
14	ARF - Gujranwala	Ridge sowing of wheat	Uddhowali , Badhomalhi, District Narowal	17.03.2016	115
15	ARF - Sheikhupura	ZTHS planted wheat	Tibbi Humbo, Sheikhupura	21.03.2016	121
16	RRI KSK	ZTHS planted wheat	RRI KSK	21.03.2016	65
17	ARS, Bahawalpur	Field day on CA techniques	ARS, Bahawalpur	21.03.2016	120
18	ARF - Sheikhupura	ZTHS planted wheat ridge sowing	Adaptive Research Farm, Sheikhupura	25.03.2016	120
19	ARS, Bahawalpur	Field day on bed planting and ridge planting of wheat	Haji Nasim Farm Sama satta, Bahawalpur	27.03.2016	96
20	ARF - Gujranwala	ZTHS planted wheat	Village Checherwali Tehsil & District Sialkot	28.03.2016	40
21	ARS, Bahawalpur	Field day on bed planting and ridge planting of wheat	Arshad farm, Dera Izat, Bahawalpur	28.03.2016	88
22	ARF - Gujranwala	ZTHS planted wheat	Sahjokay, Tehsil Sambrial District Sialkot	29.03.2016	110

23	AR Farm Sheikhupura	ZTHS planted wheat	Chak Sheikhum, Muridkey, Sheikhupura	30.03.2016	102
24	AZRI, Bhakkar	ZT and Ridge sowing wheat	AZRI, Bhakkar	30.03.2016	75
25	ARS, Bahawalpur	Field day on bed planting and ridge planting of wheat	Ch Ghafar, Hotwala, Bahawalpur	30.03.2016	110
26	WRI, Sakrand	Ridge sowing of wheat	Bhitshah, Matiari	03.03.2016	101
27	AZRI, Umerkot	Ridge sowing of wheat	Haider Farm, Umerkot	10.03.2016	102
28	WRI, Sakrand	Ridge sowing of wheat	Hala, Matiari	12.03.2016	125
29	NSTHRI,PARC Thatta	Zero tillage wheat planting	Khwaja Farm Thatta	16.03.2016	60
30	WRI, Sakrand	Ridge sowing & bed planting of wheat	WRIS Sakrand	21.03.2016	80

13.2 Appendix 2 Capacity Building- Vegetable Component (Oct 2015-Mar, 2016)

A) Trainings

S #	Title	Topics Covered	Date	Venue	Collaboration	No. of Participants		
						Men	Women	Total
1	Understanding the opportunities for protected cultivation technologies in Pakistan	The use of protected cultivation systems and strategies in Pakistan & India and its mutual sharing for learning & development	Oct 5-9, 2015	Regency Hotel, Islamabad	India Office	22	6	28
2	Postharvest training for mungbean to reduce storage losses	Tools and techniques used for storage of mungbean to reduce postharvest lossess	6-Oct	Larkana	QAARI, Larkana	31	0	31
3	Onion seed crop management	Seed production technology and management	12-Oct	Janglot, GB	Mountain Agriculture Research Council, GB	23	3	26
4	Sowing and Care/Handling of Vegetables under PCV	offseason vegetable production and tunnel management	20-Oct	Malik Sharif Farm, Chevanda	Entomological Research Institute, AARI, Faisalabad	0	23	23
5	Healthy vegetable seedling production	Importance of Compost for Healthy Nursery Raising & Methods for the preparation of making Compost, multipot trays and varieties /hybrids	28-Oct	DI Khan	ARI (S) DI Khan	36	2	38
6	Healthy Vegetable Seedling Production	Importance of Compost for Healthy Nursery Raising & Methods for the preparation of making Compost, multipot trays and varieties /hybrids	28-Oct	Hattain, Muzaffarabad	Department of Agriculture, AJK	0	17	17
7	Healthy vegetable seedling production	Importance of Compost for Healthy Nursery Raising & Methods for the preparation of making Compost, multipot trays and varieties /hybrids	29-Oct	ARI Mingora	ARI Mingora	33	0	33
8	Value addition of vegetables	Preparation of different products of tomato. Practical demonstration of tomato home made products like, tomato paste, ketup, dried tomato and pickle.	29-Oct	Sher Qilla	Department of Agriculture, Gilgit Baltistan	0	20	20
9	Training on postharvest management of mungbean	Tools and techniques used for storage of mungbean to reduce postharvest lossess	3-Nov	NARC, Islamabad	Pulses Program NARC, Islamabad	23	0	23
10	Cultivation of off season vegetables in tunnels, IPM and tunnel	cultivation of off-season vegetables in tunnel and tunnel management, IPM and tunnel management	5-Nov	Sheikhupura	VRI-Faisalabad & Ag Ext Sheikhupura	35	0	35

	management in foggy days	in foggy days						
11	Postharvest training for mungbean to reduce storage losses	Tools and techniques used for storage of mungbean to reduce postharvest lossess	17-Nov	Darya Khan, Bhakkar	AZRI, Bhakkar	39	20	59
12	Cultivation of off season vegetables	Cultivation of off-season vegetables and tunnel management, IPM , Drip Irrigation and fertigation system	25-26 Nov	NARC, Islamabad	DHRD, NARC, Islamabd	24	3	27
13	Tomato and Onion value addition and postharvet technologies	Preparation of different products of tomato and onion. Practical demonstration of tomato home made products like, tomato paste, ketup, dried tomato and pickle. Onion drying and post harvest management	2-Dec	GGHS, Sabzal road, Quetta	ARI, Quetta	0	26	26
14	Post harvest management of tomato and onion	Preparation of different products of tomato and onion. Practical demonstration of tomato home made products like, tomato paste, ketup, dried tomato and pickle. Onion drying and post harvest management	8-Dec	Toha Mehram Khan, Talagang, Chakwal	PHRC, ARI Faisalabad	23	0	23
15	Cultivation of off season vegetables in tunnels, IPM and tunnel management in foggy days	Cultivation of off-season vegetables in tunnel and tunnel management, IPM and tunnel management in foggy days	10-Dec	Farooq Abad, Sheikhupura	VRI-Faisalabad & Ag Ext Sheikhupura	28	0	28
16	Healthy Vegetable Seedling Production	Importance of Compost for Healthy Nursery Raising & Methods for the preparation of making Compost, multipot trays and varieties /hybrids	10-Dec	Agri Extension office, Mingora Swat	Agriculture Extension Department Swat	18	0	18
17	Value addition of vegetables	Preparation of different products of tomato. Practical demonstration of tomato home made products like, tomato paste, ketup, dried tomato and pickle.	15-Dec	Oshikhandas, Gilgit	Department of Agriculture, Gilgit Baltistan	0	22	22
18	Off-season vegetable production & Integrated pest management	1-Innovative protective cultivation for off-season vegetable production 2-Compositing, nursery production, cultural practices, crop management in tunnel, harvesting, grading & packing 3-Insect pest and disease of vegetables and their	6-Jan	SVDP office, Katha Saghral	HRI, NARC Islamabad and SVDP.	15	0	15

		control (Practical)						
19	Off-season vegetable production & Integrated pest management	1-Innovative protective cultivation for off-season vegetable production 2-Compositing, nursery production, cultural practices, crop management in tunnel, harvesting, grading & packing 3-Insect pest and disease of vegetables and their control (Practical)	7-Jan	SVDP office, Noorpur Thal	HRI, NARC Islamabad and SVDP.	13	0	13
20	Post harvest management of mungbean	Vigor germination, quality seed production, post harvest technology and tools/techniques used for storage of mungbean to reduce postharvest lossess	12-Jan	Layyah	AZRI, Bhakkar	58	19	77
21	Integrated Pest Management (IPM) for offseason vegetables	Cultivation of off-season vegetables in tunnel and tunnel management and IPM	13-Jan	Himmat, DI Khan	ARI DI Khan	34	1	35
22	TOT on IPM for mungbean for scientists and working partners of IMP	Insect, pest and diseases of mungbean and its IPM	3-4 Feb	AARI, Faisalabad	Pulses Program AARI, Faisalabad	24	4	28
23	Off-season vegetable production & Integrated pest management	1-Innovative protective cultivation for off-season vegetable production 2-Compositing, nursery production, cultural practices, crop management in tunnel, harvesting, grading & packing 3-Insect pest and disease of vegetables and their control (Practical)	10-Feb	Bahawalpur	AZRI, Bahawalpur	25	0	25
24	Postharvest management of onion and tomato	Preparation of different products of tomato and onion. Practical demonstration of tomato home made products like, tomato paste, ketup, dried tomato and pickle. Onion drying and post harvest management	11-Feb	Katha Sagral	PHRC, ARI Faisalabad	14	0	14
25	Offseason vegetable production through IPM	Protective cultivation for off-season vegetable production, Insect pest and disease of vegetables and their	22-Feb	Shinkiari, Mansehra	NTHRI, Mansehra	0	17	17

		control						
26	Healthy Vegetable Seedling Production	Importance of Compost for Healthy Nursery Raising & Methods for the preparation of making Compost, multipot trays and varieties /hybrids	23-Feb	Komikot, AJK	Department of Agriculture, AJK	20	0	20
27	Offseason vegetable production	Offseason vegetable production, healthy vegetable nursery raising and compost making	24-Feb	Malamjaba, Swat	Agriculture Extension Department Swat	55	0	55
28	Onion seed crop management	Onion seed production technology, maintaining genetic purity of SWAT-1 (Onion Variety), through extensive rouging off-type plants and tackling diseased plants on time through IPM	25-Feb	Shuga, Buner	ARI, Mingora Swat	38	0	38
29	Tomato production through better IPM techniques	Improved and healthy tomato nursery production, production technology, insect, pest, diseases and IPM and seed extraction.	2-Mar	Thatta	NSTHRI, Thatta	25	3	28
30	Awareness about heath hazards of insecticides to women workers and its precatunary measures	Introduction of pesticide, awareness about toxic effects of chemicals, practical demonstration for precausionary measures and safe use of spray and its desposal	3-Mar	Chak 12 BC Bhawalpur	AZRI, Bhawalpur	0	24	24
31	Three days TOT on "Pre and Post-harvest handling and Improved Technologies of offseason vegetable production	Management practices of off season vegetable production, producing healthy vegetable seedling production, compost making, seed-bed preparation, artificial methods of seed germination, preparation of bio-pesticide at house hold level and preparation of tomato paste and mix vegetable pickle	15-17 March	Hunza, GB	Agriculture Extension Department GB	0	36	36
Total						**656**	**246**	**902**

B) Workshop / Seminar/Meetings

S #	Title	Topics Covered	Date	Venue	Collaboration	No. of Participants		
						Men	Women	Total
1	Provincial Workshop	Workshop on postharvest and value addition	5-Oct	Thatta	NSTHRI, Thatta	15	0	15

2	Planning & Review Meeting	Annual Workplan Meeting on Improved Mungbean Production	14-Oct	AVRDC Office, Islamabad	IMP working partners	8	0	8
3	Planning & Review Meeting	Annual Workplan Meeting on Protected Cultivation of Vegetables	15-Oct	AVRDC Office, Islamabad	VVC working partners	17	1	18
4	Planning & Review Meeting	Annual Workplan Meeting on Vegetable Value Chains	16-Oct	AVRDC Office, Islamabad	PCV working partners	8	0	8
5	Meeting with rural community on onion production	Commercial farming techniques and production technology	29-Oct	Hattian	Department of Agriculture	1	17	18
6	One day seminar on Off Season Vegetable Production	Off Season Vegetable Production, Tunnel management, structure, Drip irrigation system and fertigation, cost of production and econimics	4-Jan	ARI, Quetta	ARI Quetta	164	10	174
7	Running effective Workshops	Planning and executing effective workshops. Practically designing an effective workshop and its delivery	18-19 Jan 2016	Islamabad	UC Davis	3	3	6
8	Proposal Writing refresher meeting	Planning, designing and writing grant proposals	1/28/2016	NARC Islamabad	UC Davis	2	1	3
9	Awareness gathering on mungbean as a catch crop in rice-wheat cropping system	Introducing innovation, production technology and multi-directional benefits of growing mungbean as a catch crop in rice-wheat cropping system of Larkana	2/16/2016	QARI Larkana	QARI Larkana	28	0	28
10	Awareness gathering on mungbean intercropping with citrus	Introducing innovation, production technology and multi-directional benefits of intercropping mungbean with citrus	3/3/2016	Sargodah	CRI Sargodah	99	0	99
Total						**345**	**32**	**377**

C) Farmers Gathering/Field Day/Exposure Visits

S #	Title	Topics Covered	Date	Venue	Collaboration	No. of Participants		
						Men	Women	Total
1	Mungbean cultivation in Pothwar region	Importance & production technology in wheat-fallow cropping system	1-Oct	Chakwal	Pulses Program, NARC	120	0	120
2	Exposure Visits of vegetable growers of Swat to NARC, VRI Faisalabad and tunnel farmers of Chevanda and Sheikhupura	Protected cultivation for more profit and production, experience sharing and technology adoption.	26 to 29 Januray, 2016	ICT, Faisalabad & Sheikhupura	ARI Mingora	16	0	16

3	Exposure Visits of vegetable growers of DI Khan to VRI Faisalabad and tunnel farmers of Chevanda and Sheikhupura	Protected cultivation for more profit and production, experience sharing and technology adoption.	1 to 4 February, 2016	Faisalabad & Sheikhupura	ARI DI Khan	13	0	13
						0	0	0
Total						**149**	**0**	149
Grand Total						**1150**	**278**	**1428**

13.3 Appendix 3 Communications

AIP quarterly newsletter Apr-Jun 2015	AIP	Publication	External promotion	Nov-15	English
AIP quarterly newsletter Jul-Sep 2015	AIP	Publication	External promotion	Jan-16	English
AIP quarterly newsletter Oct-Dec 2015	AIP	Publication	External promotion	May-16	English
USAID Weekly Radio Show "Aap, Hum aur Behtar Zindagi" on FM-101	AIP	Radio	External promotion	December 17, 2015	Urdu
USAID Weekly Radio Show "Aap, Hum aur Behtar Zindagi" on FM-101	AIP-Agronomy	Radio	External promotion	December 31, 2015	Urdu/ English
USAID Weekly Radio Show "Aap, Hum aur Behtar Zindagi" on FM-101	AIP-Vegetables	Radio	External promotion	January 17, 2015	Urdu
USAID Weekly Radio Show "Aap, Hum aur Behtar Zindagi" on FM-101	AIP-Livestock	Radio	External promotion	February 25, 2015	Urdu/ English
USAID Weekly Radio Show "Aap, Hum aur Behtar Zindagi" on FM-101	AIP-Maize	Radio	External promotion	February 11, 2016	Urdu
CIMMYT Maize Varieties in High Demand in Pakistan CIMMYT's *Informa ;1959*	AIP-Maize	CIMMYT Informa	Internal	December 7-11, 2015	English
Building Biotic Resilience in Pakistan's Maize Fields CIMMYT 's Informa; *1960*	AIP-Maize	CIMMYT Informa	Internal	December 14-18, 2015	English
Laser leveling bolstered in Pakistan: http://blog.cimmyt.org/laser-leveling-bolstered-in-pakistan/	AIP-Agronomy	CIMMYT Blog	External promotion	March 10, 2016	English
Small Farmers Sow Maize with a Push Row Planter in Khyber Pakhtunkhwa Province, Pakistan: http://blog.cimmyt.org/small-farmers-sow-maize-with-a-push-row-planter-in-khyber-pukhtunkhwa-province-pakistan/	AIP-Agronomy	CIMMYT Blog	External promotion	November 5, 2015	English

CIMMYT Supports the Adoption of the Zero-Tillage Happy Seeder in Pakistan http://inside.cimmyt.org/Informa%20Repository/Informa%2030%20November%20-%2004%20December%202015.pdf	AIP-Agronomy	CIMMYT Blog	External promotion		English
Innovative Extension Services & ICTs for Agricultural and Rural Development	AIP-Perennial Horticulture	Publication	External promotion	January 2016	English
Radio talks (02) mentioned AIP perennial horticulture activities at CRI with Punjab information cell for public awareness	AIP-Perennial Horticulture	Radio	Radio	January 2016	Urdu/Punjabi
Brochures/ info pages/ booklets (07)	AIP-Perennial Horticulture	Publication	External promotion	Oct 2015-Mar 2016	English/ Urdu
A detailed Radio program “ShehrNama" on the Importance & role of healthy vegetable seedlings & compost in vegetable production. Sunrise FM 96	AIP-Vegetables	Radio	External promotion	Oct 28,2015.	Urdu
A radio talk on the importance & role of healthy vegetable seedlings & compost in vegetable production DI Khan	AIP-Vegetables	Radio	External promotion	Oct 31, 2015	Pashto
Talk on IPM for off-season vegetables given by Mr. Abdul Majeed Khan, Director ARI (S), DI Khan; Mr. Sheeraz Ahmad Training Expert, AVRDC Pakistan, Islamabad; Dr. Mamoon Agriculture Gomal University, DIKhan and training participants	AIP-Vegetables	Radio	External promotion	Jan 13, 2016.	Urdu/ English
Talk on Vegetable seed production activities in Sindh under AIP FM-88, Mirpurkhas	AIP-Vegetables	Radio	External promotion	March 03, 2016	Urdu
Training on Importance & role of healthy vegetable seedlings & compost in vegetable production Meezan-e-Adal, DI Khan.	AIP-Vegetables	Newspaper	External promotion	Oct 29, 2015	Urdu
Training on Importance & role of healthy vegetable seedlings & compost in vegetable	AIP-Vegetables	Newspaper	External promotion	Oct 30, 2015	

production" Sada-e-Haq, DI Khan					
Postharvest management of mungbean at Bhakkar, published in Daily Jang	AIP-Vegetables	Newspaper	External promotion	Nov 19, 2015	Urdu
Postharvest management of mungbean Daily Express	AIP-Vegetables	Newspaper	External promotion	Nov 19, 2015	Urdu
Postharvest management of mungbean Daily Sachai	AIP-Vegetables	Newspaper	External promotion	Nov 19, 2015	Urdu
IPM for off-season vegetables Meezan-e-Adal, DI Khan	AIP-Vegetables	Newspaper	External promotion	Jan 14, 2016	Urdu
IPM for off-season vegetables KhanSada-e-Haq, DI Khan on	AIP-Vegetables	Newspaper	External promotion	Jan 15, 2016	Urdu
Postharvest management of mungbean to reduce postharvest losses at Layyah Jang	AIP-Vegetables	Newspaper	External promotion	Jan 18, 2016	Urdu
Postharvest management of mungbean to reduce postharvest losses at Layyah Insaf	AIP-Vegetables	Newspaper	External promotion	Jan 18, 2016	Urdu
Postharvest management of mungbean to reduce postharvest losses at Layyah Bhakkar Times	AIP-Vegetables	Newspaper	External promotion	Jan 18, 2016	Urdu
Awareness gathering on mungbean as a catch crop in rice-wheat cropping system" held at Larkana, Sindh, "Pakistan Observer"	AIP-Vegetables	Newspaper	External promotion	Feb 18, 2016	Sindhi
Awareness gathering on mungbean as a catch crop in rice-wheat cropping system" held at Larkana, Sindh, published in Sindh Mehran,.	AIP-Vegetables	Newspaper	External promotion	Feb 18, 2016	Sindhi
Awareness gathering on mungbean as a catch crop in rice-wheat cropping system" held at Larkana, Sindh, Hilal e Pakistan	AIP-Vegetables	Newspaper	External promotion	Feb 18, 2016	Sindhi
Awareness gathering on mungbean as a catch crop in rice-wheat cropping system" held at Larkana, Sindh, Daily Times Karachi	AIP-Vegetables	Newspaper	External promotion	Feb 18, 2016	Sindhi

News of "Shuga seed village declaration and onion seed crop management" training Hum awam	AIP-Vegetables	Newspaper	External promotion	Feb 26, 2016	Urdu
News of "Shuga seed village declaration and onion seed crop management" training Chand	AIP-Vegetables	Newspaper	External promotion	Feb 26, 2016	Urdu
News of "Shuga seed village declaration and onion seed crop management" training Jang	AIP-Vegetables	Newspaper	External promotion	Feb 26, 2016	Urdu
News of "Shuga seed village declaration and onion seed crop management" training Morning-Post	AIP-Vegetables	Newspaper	External promotion	Feb 26, 2016	Urdu
Awareness gathering on mungbean intercropping with citrus" held at CRI, Sargodha Tijarat	AIP-Vegetables	Newspaper	External promotion	March 4, 2016	Urdu
Awareness gathering on mungbean intercropping with citrus" held at CRI, Sargodha Dunya	AIP-Vegetables	Newspaper	External promotion	March 4, 2016	Urdu
Awareness gathering on mungbean intercropping with citrus" held at CRI, Sargodha "Jang"	AIP-Vegetables	Newspaper	External promotion	March 4, 2016	Urdu
Awareness gathering on mungbean intercropping with citrus" held at CRI, Sargodha Nai Baat	AIP-Vegetables	Newspaper	External promotion	March 4, 2016	Urdu
Awareness gathering on mungbean intercropping with citrus" held at CRI, Sargodha Rafaqat	AIP-Vegetables	Newspaper	External promotion	March 4, 2016	Urdu
Awareness gathering on mungbean intercropping with citrus" held at CRI, Sargodha Wafaq	AIP-Vegetables	Newspaper	External promotion	March 4, 2016	Urdu
Awareness gathering on mungbean intercropping with citrus" held at CRI, Sargodha Aarzo	AIP-Vegetables	Newspaper	External promotion	March 4, 2016	Urdu
Pre and postharvest handling and improved technologies of off-season vegetable production held at Aliabad-Hunza, GB. K2	AIP-Vegetables	Newspaper	External promotion	March 18, 2016	Urdu
Pre and postharvest handling	AIP-Vegetables	Newspaper	External	March	Urdu

and improved technologies of off-season vegetable production held at Aliabad-Hunza, GB. Ausaaf			promotion	18, 2016	
Pre and postharvest handling and improved technologies of off-season vegetable production held at Aliabad-Hunza, GB. Muhasib	AIP-Vegetables	Newspaper	External promotion	March 18, 2016	Urdu
Pre and postharvest handling and improved technologies of off-season vegetable production held at Aliabad-Hunza, GB. Sada-e-Gilgit	AIP-Vegetables	Newspaper	External promotion	March 18, 2016	Urdu
Training on "Importance & role of healthy vegetable seedlings & compost in vegetable production. Meezan-e-Adal, DI Khan	AIP-Vegetables	Newspaper	External promotion	Oct 29, 2015	Urdu
Importance & role of healthy vegetable seedlings & compost in vegetable production Sada-e-Haq, DI Khan	AIP-Vegetables	Newspaper	External promotion	Oct 30, 2015	Urdu
AIP Roundup: Grow more, live better • Improving vegetable production skills • Better nurseries, better crops • Postharvest practices for value addition National postharvest workshop	AIP-Vegetables	AVRDC Fresh	Internal	Oct 30, 2015	English
Intercrop for a bumper crop Vol# 09	AIP-Vegetables	AVRDC Fresh	Internal	October 16, 2015	English
Protected cultivation crosses borders Vol# 10	AIP-Vegetables	AVRDC Fresh	Internal	November 06, 2015	English
Tomato hybrids doubling yields in Katha Saghral, Pakistan Vol# 10	AIP-Vegetables	AVRDC Fresh	Internal	November 06, 2015	English
USAID team tours AVRDC's work in Pakistan Vol# 12	AIP-Vegetables	AVRDC Fresh	Internal	December 31, 2015	English
Helping farmers produce onion seed Vol# 02	AIP-Vegetables	AVRDC Fresh	Internal	March 11, 2016	English
Intercrop for a bumper crop Vol# 02	AIP-Vegetables	AVRDC Fresh	Internal	March 11, 2016	English

13.4 Appendix 4 Events and meetings held during the reporting period (October 01, 2015 to March 31, 2016)

Meeting Name	Date	Purpose	Person Responsible	Venue (City/Province)	Partners	Brief Outcome, including # of beneficiaries (male and female)
Under 7 of the citrus projects, 25 trainings/workshop/field days on various aspects of citrus value chain and good management practices were organized	Reporting period	Capacity Building & Technical Assistance	Dr. Louise Ferguson	Sargodha and Toba Tek Singh	CRI, Citrus growers, Nursery men and Domestic females	1035 people (938 males and 97 females) participated in these events
Under Ber project, 2 trainings and one farmers day on plant distribution was organized	Reporting period	Capacity Building & Technical Assistance	Dr. Louise Ferguson	Faisalabad	UAF, Farmers, Researchers, food scientists and students	225 people (158 males and 67 females) participated in these events
Under 2 of the Mango projects, 5 farmer meeting were organized on mango orchard management	Reporting period	Capacity Building & Technical Assistance	Dr. Louise Ferguson	Muzaffargarh, Multan and Vehari	UAF and Mango farmers,	43 male mango farmers participated in these farmer meetings
Under Olive projects, 1 growers panel on taste test of olive oil was organized	Reporting period	Capacity Building	Dr. Louise Ferguson	Peshawar	ARI Peshawar, Farmers and food scientists	30 people (28 males and 2 females) participated in this event
Under Pistachio project, 1 training on establishment of pistachio nursery was organized	Reporting period	Capacity Building & Technical Assistance	Dr. Louise Ferguson	Quetta	ARI Quetta, Growers, and Nursery farmers	25 males participated in this training
Under Post-harvest facility project, 3 trainings were	Reporting period	Capacity Building &	Dr. Louise Ferguson	Faisalabad, Sakrand	ATI Sakrand, UAF,	146 people (132 males and 14

organized and one post-harvest course was taught		Technical Assistance			Extension workers and students.	females) participated in these events
Under Grape projects, 8 trainings were organized on vineyard management and water conservation models.	Reporting period	Capacity Building & Technical Assistance	Dr. Louise Ferguson	Islamabad and Rawalpindi	AAUR, Growers and researchers	114 males participated in these trainings
International Conference on "Innovative Extension Services & ICT for Agricultural and Rural Development" at University of Agriculture Faisalabad	Reporting period	Capacity Building	Dr. Mark Bell	Faisalabad	Professors	204(79 Male 125 Female) Participants Participate in this training
Under vocational training component, 7 training/workshops were organized	Reporting period	Capacity Building	Dr. Mark Bell	Faisalabad, Islamabad, Sargodha and Rawalpindi	Students, professors and researchers	470 (241 Male 229 Female) Participants Participate in this training

13.5 Appendix 5 Meetings Planned for Next Semi-Annual Period (April 1, 2016-September 30, 2016)

S #	Meeting Name	Date	Purpose	Person Responsible	Venue	Partners	Brief Outcome
	Under 22 of the perennial horticulture projects, 50 trainings/field days/workshops/exposure visits on good nursery, orchard and post-harvest management of citrus, guava, ber, mango, pistachio , grapes and olives have been planned	Next reporting period	Capacity building and technical assistance	Dr. Louise Ferguson	Selected districts of Punjab, Sindh, KPK and Baluchistan	UC Davis, Cimmyt, USAID, CRI Sargodha, UAF, AAUR, ATI Sakrand, ARI Quetta, ARI Peshawar, growers and domestic females	
8	Under 2 of the E-Pak Ag projects, 7 trainings and workshops on ICT use and extension have been planned	Next reporting period	Capacity Building	Dr. Mark Bell	Multan, Rawalpindi, Peshawar, Islamabad and Faisalabad	Agricultural Officers, Faculty Members and Private Sector	
9	Under Vocational training component, 3 trainings(1 each on R-software, seed and developing extension messages) have been planned	Next reporting period	Capacity Building	Dr. Mark Bell	Islamabad and Faisalabad	Students, teachers, researchers and extension workers	
10	Under Graduate studies program, AIP Scholars conference would be hold in USA	Next reporting period	Progress review	Dr. Thomas L. Rost	USA	AIP Scholars	

13.6 Appendix 6 International travel (October 01, 2015- March 31, 2016)

Name	Date	Place/destination	Purpose	Brief Outcome
Dr. Mark Bell	January 10-21, 2016	Islamabad, Pakistan	To attend the ICT Conference and review the e-Pak Ag progress	Conference was attended and progress of the projects was reviewed
Tom L Rost	January 27-Feburary5, 2016	Islamabad, Pakistan	To update about AIP scholars	Update were given to USAID, CIMMYT and PARC
Dr. Louise Ferguson	February 22- March 5 2016	Islamabad, Pakistan	To review the ongoing Projects	Progress was reviewed.

13.7 Appendix 7 List of sub-grants for Ongoing Projects (Amount, Recipient, Purpose)

S. No.	Organization	Number of Projects	Amount Allocated	Expected Outcome
1	Arid Agriculture University, Rawalpindi	4	UD$ 70,040	Adoption of good vineyard management practices by growers Increased use of ICT by school girls Improved post-harvest practices of stone fruits
2	Agriculture Research Institute, Peshawar	2	UD$ 20,000	Adoption of good orchard and post-harvest management of olives by concerned growers
3	Agriculture Research Institute , Quetta	4	UD$ 40,000	Adoption of good nursery, orchard and post-harvest management of pistachio by concerned growers
4	Agriculture Training Institute, Sakrand	2	UD$ 42,604	Adoption of good orchard and post-harvest management of guava by concerned growers Improvement in post-harvest handling of guava and mango
5	Citrus Research Institute, Sargodha	7	UD$ 124,353	Adoption of good nursery, orchard and post-harvest management of citrus by concerned growers
6	University of Agriculture, Faisalabad	5	UD$ 114,714	Commercialization of new mango accessions in the field, distribution and canopy management of ber, improved post-harvest technologies, and increased use of ICT by extension workers

13.8 Appendix 8 List of farmers distributed seed of Basmati-515, DSR and AWD

Sr.	Beneficiary Name	Contact Number	Village (if rural)	District	Assistance 1	Assistance 2	Land Under Assistance (Acres)
1	M. Ferooz	0345-6973904	Chak # 15	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	2
2	Perveez Iqbal	0301-6864243	Ratowal	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	1.5
3	Zahid Imran	0345-6973904	Chak # 15	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	1.5
4	Umar Hayat	0345-5765368	Dhoni Kalah	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	2
5	Khizar Hayat	0302-3383851	Gojra	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	1
6	Ghulam M.	0345-4621163	Dhoni Kalah	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	2
7	Shahid Iqbal	0343-6837258	Khutiala Sheikhan	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	1.5
8	M. Irfan	0346-8518370	Jajaur	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	2
9	Khizar Hayat	0346-8518370	Rukin	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	2
10	M. Rafi	0345-6863286	Chot Kalah	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	1.5
11	Sana Ullah	0345-5766227	Dhoni Khurd	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	9
12	Imtiaz Ahmed	0342-0624961	Dhoni Khurd	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	2
13	Imtiaz Ahmed	0342-0624961	Chot Kalah	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	1
14	Zaka Ullah	0346-6499862	Dhoni Kalah	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	1.5
15	Abdul Zafar	0345-847983	Bhikhi Sharif	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	1
16	Umar Hayat	0345-5765368	Chot Kalah	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	2
17	Shokat Javed	0347-4860761	Dhoni Kalah	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	2
18	Auragzab	0345-5753366	Burj Agra	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	20
19	M. Naveed	0346-4698966	Chot Kalah	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	2
20	Haji Tawakal	0345-8586787	Dhoni Kalah	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	4
21	M. Arif	0344-6195510	Chot Kalah	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	2
22	Ghulam Mustafa	0344-6195510	Chot Kalah	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	4
23	Nasir Iqbal	0333-6799307	Mayani	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	1
24	M. Anwar	0333-6799307	Mayani	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	2
25	M. Arshad	0345-6790355	Mayani	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	2
26	Ali Bahadur	0345-6790355	Mayani	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	1

27	Tanveer Ahmed	0345-5755054	Ahala	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	2
28	Shan Ali	0300-7756300	Burj Agra	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	7
29	M. Zaman	0345-5790178	Bhakho	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	3
30	Khawar Hayat	0300-7747646	Makywal	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	2
31	Akhtar Javed	0344-8415810	Madhry	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	3
32	Azmat Ullah	0323-6903878	Kadhar	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	4
33	Fiaz Ahmed	0344-6541910	Khutiala Sheikhan	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	4
34	Shahid Imran	0346-6487500	Khutiala Sheikhan	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	3
35	Shahzad Ahmed	0342-8420756	Mianwal	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	2
36	Aftab Ahmed	0342-8420756	Mianwal	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	1
37	Mohsin Iqbal	0342-4646768	Nain Ranjha	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	2
38	Mohaib Hassan	0345-5791902	Ghogha wali	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	1
39	Nazim Abbas	0345-5791902	Ghogha wali	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	3
40	Ghulam Hussain	0345-6973904	Chak # 15	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	1
41	M. Irfan	0345-7744472	Rukin	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	3
42	Azhar Ali	0346-5810027	Dhoni Kalah	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	1
43	Safdar Iqbal	0345-6657160	Bahowal	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	1
44	Nazir Ahmed	0345-5794599	Jajaur	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	1
45	M. Nasir	0346-6492533	Khutiala Sheikhan	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	1
46	Umar Hayat	0342-7530345	Pandowal	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	1
47	Auragzab	0300-7752798	Pandowal	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	1
48	Tawakal Mahmood	0345-8586787	Dhoni Kalah	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	2
49	M. Yaar	0345-5797097	Rukin	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	3
50	Atif Riaz	0345-5797097	Rukin	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	3
51	M. Saqib	0345-5797097	Rukin	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	3
52	Nazar M.	0342-6653474	Rukin	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	1
53	Shahzad Ahmed	0300-7749030	Rukin	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	3
54	M. Nawaz	0300-7749030	Rukin	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	3
55	Khan Baig	0345-7744472	Rukin	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	1
56	Sana Ullah	0342-8621888	Dhok Murad	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	17
57	Sakandar Hayat	0300-7749030	Rukin	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	3

58	Abdulla Khan	0342-6251747	Khutiala Sheikhan	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	5
59	Shahbaz Ahmed	0347-7440842	Khutiala Sheikhan	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	4
60	Mirza Khan	0346-8633806	Dhoni Khurd	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	2
61	Ghulam Abbas	0345-5791905	Ghogha wali	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	4
62	Kazam Ali	0345-1414989	Ghogha wali	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	3
63	M. Amir	0321-5467720	Makywal	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	2
64	Riaz Ahmed	0345-6657160	Bosal	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	1
65	Ghulam Abbas	0301-6865396	Madhry	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	4
66	Mukhtar Ahmed	0300-7754299	Mianwal	Mandi Bahuddin	Basmati 515 Seed	Dry Seeding of Rice	5
67	Abdul Rehman	0302-6488994	Wahndo	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	5
68	Zulfiqar	0302-6488994	Wahndo	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	2
69	Abdul Jabar	0343-6113233	Wahndo	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	4
70	Wajahat Sohail	0345-6252838	Wahndo	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	2
71	M Amir	0302-6435937	Wahndo	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	1.5
72	M Bashir	0333-8171845	Wahndo	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	3
73	Zubair Iqbal	0345-6629235	Wahndo	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	3
74	M Habib	0302-6488994	Wahndo	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	1
75	Abdul Wajid	0315-4400257	Wahndo	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	1
76	Anwal Ali	0302-6481876	Wahndo	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	3
77	Abdul Majid	0312-7840196	Wahndo	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	3
78	Abu Bakar	0310-6282188	Wahndo	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	1
79	Fahid Rehman	0345-6252838	Wahndo	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	2.5
80	Salamat Ali	0334-3637385	Wahndo	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	1
81	Usman Sandhu	0300-7551268	Thatha Chaun	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	4
82	M Saeed	0300-7551268	Thatha Chaun	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	5
83	Qasir Pervaiz	0300-7551268	Thatha Chaun	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	4
84	M Ishfaq	0331-4873218	Thatha Chaun	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	1
85	Nazir Ahmad	0334-4196266	Thatha Gulab Singh	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	5
86	M. Asghar	0334-4196266	Thatha Gulab Singh	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	5
87	Zahid Iqbal	0344-1261628	Thatha Gulab Singh	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	4
88	Shahid Iqbal	0344-1261628	Thatha Gulab Singh	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	1

89	Eid Ali	0344-1261628	Thatha Gulab Singh	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	1
90	Qamar Ali	0334-4196266	Thatha Gulab Singh	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	2
91	Alam Mughal	0345-6252858	Bopar Sharif	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	5
92	Zulfiqar	0345-6252858	Bopar Sharif	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	5
93	M. Younas	0345-6252858	Bopar Sharif	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	2
94	M Arshad	0345-6252858	Bopar Sharif	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	1
95	Abdul Qadar	0345-6252858	Bopar Sharif	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	1
96	Naveed Bahadur	0346-4757189	Natt Kalan	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	1
97	M Yousaf	0346-4757189	Natt Kalan	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	4
98	Shamshad Ali	0331-4873218	Natt Kalan	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	3
99	Usman Butt	0333-8171845	Natt Kalan	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	3
100	Liaqat Ali	0333-8171845	Natt Kalan	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	2
101	Abdul Ghafar	0302-6481876	Chack Ram Das	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	5
102	M Ishfaq	0302-6481876	Chack Ram Das	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	1
103	Anjum Bashir	0302-6626257	Eminabad	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	10
104	M Ishfaq	0302-6626257	Eminabad	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	7
105	Sohail Ahmad	0302-6626257	Eminabad	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	5
106	M Shahbaz	0302-6626257	Eminabad	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	1
107	M Iqbal	0302-6626257	Eminabad	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	5
108	Rana M Zeeshan	0302-6626257	Eminabad	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	1
109	M Afzal	0300-6414859	Kotli Nawab	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	6
110	M Iqbal	0300-6414859	Kotli Nawab	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	2
111	Rana Nazir	0300-6414859	Kotli Nawab	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	4
112	Khuram Iqbal	0300-6414859	Kotli Nawab	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	1
113	Khalid Mehmood	0300-6414859	Kotli Nawab	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	5
114	M Nazim	0313-0486632	Hameed Pur Khurd	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	4
115	M Ashraf	0313-0486632	Hameed Pur Khurd	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	3
116	M Asghar	0331-4056116	Hameed Pur Khurd	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	4
117	M Sohail	0331-4056116	Hameed Pur Khurd	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	8
118	Ali Mohammad	0300-7141090	Hameed Pur Kalan	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	5
119	Ali Ahmad	0300-7141090	Hameed Pur Kalan	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	4

120	M Hanif	0300-7141090	Hameed Pur Kalan	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	3
121	Iqbal Khan	0314-4772700	Dharam Kot	Sialkot	Basmati 515 Seed	Dry Seeding of Rice	1
122	M Pervaiz	0334-4196266	Dharam Kot	Sialkot	Basmati 515 Seed	Dry Seeding of Rice	1
123	M Iqbal	0344-1211628	Dharam Kot	Sialkot	Basmati 515 Seed	Dry Seeding of Rice	3
124	Faqeer M	0345-6252858	Dharam Kot	Sialkot	Basmati 515 Seed	Dry Seeding of Rice	1
125	Abdul Gafar	0314-4772700	Dharam Kot	Sialkot	Basmati 515 Seed	Dry Seeding of Rice	3
126	M Ramzan	0302-6626257	Kotli Noshera	Sialkot	Basmati 515 Seed	Dry Seeding of Rice	4
127	Rana Farman	0300-6414859	Kotli Noshera	Sialkot	Basmati 515 Seed	Dry Seeding of Rice	1
128	M Khursheed	0314-4772700	Kotli Noshera	Sialkot	Basmati 515 Seed	Dry Seeding of Rice	1
129	M Boota	0313-0486632	Kotli Noshera	Sialkot	Basmati 515 Seed	Dry Seeding of Rice	4
130	Ajab Khan	0314-4772700	Noikey	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	1
131	Rafaqat Ali	0314-4772700	Noikey	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	1
132	Ghulam Rasool	0308-6411498	Pello Wali	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	1
133	M Irshad	0300-5305027	Chak Rehan	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	1
134	M.ARSHAD	0342-6501441	QILA MIAN SING	Gujrawala	Basmati 515 Seed	Dry Seeding of Rice	4
135	M.JAMEEL	0346-6905310	MRALI WALA	Gujrawala	Basmati 515 Seed	Dry Seeding of Rice	11
136	M.ASHFAQ	0301-6600280	DHILO PASHA	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	4
137	AORANG ZAIB	0300-7495429	BOPRA KLAN	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	18
138	M.FIAZ	0345-6597099	BOPRA KLAN	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	7
139	M.RAFEEQ	0346-5643578	BOPRA KLAN	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	4
140	M.ASLAM	0321-6453271	BOPRA KLAN	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	8
141	SHOAIB AHAMMAD	0333-8108193	NAWA PIND	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	17
142	M. IDREES	0346-6658624	MRALI WALA	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	12
143	ZUBAIR AHAMMAD	0346-6513791	BOPRA KLAN	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	16
144	MAHBOOB UL HAQ	0301-3728656	KOT SHAH MUHAMMAD	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	4
145	ABDUL RASHEED	0343-1616115	MRALI WALA	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	12
146	M.BILAL	0333-8125146	AADO RAY	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	3
147	LUQMAN SAJID	0301-6420201	BOPRA KHURD	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	9
148	M.NAWAZ	0346-1864364	QILA DEDAR SINGH	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	9
149	M.ARIF	0347-7337722	QILA DEDAR SINGH	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	9
15	NAWAZ VIRK	0306-	BOPRA KLAN	Gujranwala	Basmati 515	Dry Seeding of Rice	8

0		2643538			Seed		
151	ABDUL RAUF	0336-0742990	THAKAR KAY	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	6
152	GHULAM RASOOL	0347-0600826	HAGGER	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	8
153	MIAN JAVEED	0305-9200355	KOT ASAISH	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	3
154	MOHSIN CHATHA	0343-4199828	DHARGAHI WALA	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	2
155	HAJI YAQOOB	0307-7200349	QILA MIAN SING	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	2
156	MAQBOOL CHEEMA	0344-6085019	AMIN PUR KLAN	Gujranwala	Basmati 515 Seed	Dry Seeding of Rice	3
157	M. Mushtaq	0301-6648089	48- Virkan - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
158	Liaqat Ali	0321-9439542	48- Virkan - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
159	Abdul Hameed	0347-4497909	48- Virkan - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
160	Abdul Mubeen	0333-4801278	Khairupur Malian -SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
161	M. Ishaq	0346-7423095	Dera Balam - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
162	M.Munir	0315-4967608	Dera Balam - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
163	M.Mehboob	0306-4576156	Saranwala -SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
164	Malik Rasheed	0300-4815263	Khanna Labbana-SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
165	Mushtaq Ahmad	0308-6905116	Khanna Labbana - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
166	M. Mansha	0307-4080984	Seikham - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
167	M. Asif	0322-5761421	Pakka Dera - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
168	M.Siddique	0321-7992585	Pakka Dera - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
169	Fayyaz Bhatti	0301-4951009	Pakka Dera - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
170	Mubashir Zahir	0333-4027864	Pakka Dera - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
171	M.Arshad	0301-8282781	Dera Balam - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
172	M.Ramzan	0341-7726545	Dera Arian - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	2
173	Shaukat Ali	0322-5755738	Saranwala -SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	3
174	Nazir Ahmad	0300-4356261	Deorhiwala - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
175	M.Yusaf	0333-4476432	Saranwala -SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	3
176	Sardar Muhammad	0303-0657112	Saranwala -SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
177	Maqsood Ahmad	0345-6347429	Saranwala -SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
178	Fermaish Ali	0306-4532923	Khanna Labbana - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
179	Malik Zaigham	0300-9420317	Maddar - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	2
180	M.Nawaz	0300-4008305	Baigpur - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	4

181	Ch. Ahmad Farooq	0345-6286055	Adhian - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	3
182	Ghulshad Nabi	0300-4299551	Mouza Dahir - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	20
183	Abul Rehman	0322-5403541	Aallu Dahir - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	2
184	Syed Mubarak Shah	0300-8440060	Mubarakabad - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
185	Major Yasin	0321-9435575	Narang - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	3
186	Shamoon	0322-4982044	Army Farm Baidian - LHR	Lahore	Basmati 515 Seed	Dry Seeding of Rice and AWD	20
187	Aashiq Hussain	0300-8598196	Noshera Virkan - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
188	M.Hafeez	0300-7869651	Mukta - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
189	M.Ashraf	0300-4368631	Dera Balam - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
190	M.Afzal	0345-8884628	Seikham - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
191	M.Aslam	0308-8684669	Ali Nagar- SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
192	Ghulam Dastgir	0321-7000019	Tatley Manjan - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
193	Dilder Khan	0305-4036773	Tatley Manjan - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
194	Khalil Sandhu	0322-8635483	Tatley Manjan - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
195	Attaullah Seikhu	0345-4393907	Seikham - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
196	Babar Ali	0346-6388927	Seikham - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
197	Lala Ishaq	0300-4292235	Pakka Dera - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
198	Ghulam Mustafa	0300-6481398	48-Virkan - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
199	Zakir Shah	0301-4673915	Seikham - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
200	Abdul Ghani	0300-4605654	Qilla Bhattian - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
201	M.Irfan	0300-4544217	Machine Da Dera - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
202	Asad Shah	0300-8406835	Kathiala - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
203	Munir Ahmad	0301-4266572	Chak=32 - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
204	M.Yaqub	0333-4359004	Joyanwala - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
205	Allah Rakha	0322-2039276	Joyanwala - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
206	Munir Ahmad	0301-4675633	Saranwala -SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
207	Haroon Shaukat	0302-8285171	Kalla Virkan - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
208	Mohabat Ali Dogar	0300-4281290	Moujun ki Mallain - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
209	Abdul Sattar	0344-8059425	Chak Bath - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
210	M.Ibrahim	0344-8059425	Chak Bath - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
211	M.Farooq		Mallian Kallan - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1

212	Ghulam Murtaza	0300-4917652	Khairupur Malian -SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
213	Tanvir Pannu	0301-8408030	Khairupur Malian -SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
214	Iftekhar Ahmad	0344-2076879	Dera Abdullah - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
215	Hidayat Ali	0343-8444964	Gopi Rai - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
216	M.Siddique	0343-8444964	Gopi Rai - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
217	M.Mansha	0333-4785491	Phillu Devta - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
218	Abdul Rasheed	0334-4022157	Phillu Devta - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
219	Hafiz Shaukat	0333-4512160	Phillu Devta - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
220	Farzand Ali	0301-4996585	Ladhe ki Mallian - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
221	M.Riaz	0301-4504437	Baira Virkan -SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
222	M.Waqas	0300-4009213	Baira Virkan -SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
223	M.Akbar	0313-4723299	Saranwala -SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
224	Haji Yasin	3007747646	Jahangir Pura - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
225	Mushtaq Ahmad	0313-4747114	Dera Balam - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
226	Abdul Rauf	0333-4476432	Saranwala -SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
227	M.Sajjad Ahmad	0300-4213801	Khokher Ki Mallian - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
228	Rana Khalid	0300-4423206	Chicun Ki Mallian - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
229	M.Rafiq But	0303-4478767	Siddam - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
230	Allah Ditta	0301-4467170	Gargana - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
231	Fajir Ali	0342-4235299	Qilla Bawrey - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
232	M.Idrees	0333-4717537	Baigpur - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
233	M.Fayyaz Manj	0333-3630371	Tatley Manjan - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
234	Shahid Idrees	0345-6296607	Haveli Hanjranwan - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
235	Tahir Mahmood	0301-4778102	Chak Seikham - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
236	Shaukat Ali	0324-4441017	Kalla Virkan - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
237	Inayat Ali	0301-4036018	Leel - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
238	Sikandar Ali	0301-4036018	Leel - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
239	Amanullah	0301-4051012	Chak Sanatha - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
240	M.Akram	0306-7095482	Chak Sanatha - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
241	M.Aslam	0300-5173959	Mallian Kallan - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
242	Zahid Ali	0301-5177959	Mallian Kallan - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1

243	Rana Waheed	0333-4184786	Mirza Virkan - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
244	Amjad Bhatti	0331-8836136	Tatley Manjan - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
245	M.Aslam	0342-4506375	Maddar - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
246	Rafaqat Ali	0322-7195087	Dheer de Dogran - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
247	M.Aslam	0342-4570749	Jwar Chab - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
248	M.Arif	0334-4046097	Pakka Dera - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
249	Asif Dogar	0300-8093399	Gholan ki Mallian - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
250	Haji Siddique	0307-6816076	Kathiala - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
251	M.Akram	0300-4598823	Khushal Pura -SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
252	Abrar Punnu	0300-9410010	Chak=33 - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
253	Zulfiqar	0334-4046097	Chohe Wali - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
254	Saadulah	0300-0200836	Naukrian - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	2
255	M.Abbas	0322-8516972	Chachuke - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
256	Kashif Ali	0345-7200750	Chachuke - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice and AWD	1
257	Mr advocate	0300-6539410	Nankana	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
258	Mudasar Ali	0300-8882605	Nankana	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
259	Dr Farooq Chatta	0321-4667765	Muridkae	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	2
260	Sajid Awan	0301-8497994	Farooqa Abad	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	2
261	Sharafat ali	0308-8360998	Farooqa Abad	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	2
262	Sanaullah	0345-6300264	Kakar gill	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
263	Ch Arshad	03014600204	Mananwala	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
264	Ch Azhar	03440448244	Kotli Kartana	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
265	Ali Raza Gill	03324429588	Narang - SKP	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
266	Waqas Ahmad Khan	0332-4039253	Aroky	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
267	M Rizwan	0344-8460094	Laluphuman	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
268	Tayyeb Ali	0302-4082364	Rasala	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
269	Rana Tariq	0342-7860453	Ranise	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
270	Adeel Ashraf	0301-4401945	Farooqabad	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	2
271	Abdul Jabbar	0343-7918844	Manawala	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
272	Soail Abbas	0300-4316940	Peerkot	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
27	Maqsood	0346-	Saryawala	Sheikhupur	Basmati 515	Dry Seeding of Rice	1

3	Ahmad	2094024		a	Seed		
274	M Rafiq	0322-7526345	Saryawala	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
275	Afraz-ul-Hasan	0301-6880252	Kot Sarwarr	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
276	Shahzad Ali Bhatti	0301-6635649	Kot Sarwarr	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
277	Zaigum Abbas	0300-8854932	Kot Sarwarr	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
278	Saifullah		Kot Sarwarr	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
279	M.Nawaz		Kot Sarwarr	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
280	Ch Altaf	0302-2800911	Kot Sarwarr	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
281	Amdad Hussain	0300-8017744	Kot Sarwarr	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
282	Malik Gulam Abbas	0343-1482857	Kot Sarwarr	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
283	M ali Bhatti		Kot Sarwarr	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
284	Shah nawaz		Kot Sarwarr	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
285	Ray Gulam Abbas	0345-6960960	Chah Anoon	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
286	Roy M .Ali		Chah Anoon	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
287	Roy M Aslam		Chah Anoon	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
288	Ch Ahsan Ullah	0340-6797672	Mona Maika	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
289	Ch Nusrat Abbas	0346-6371403	Mona Maika	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
290	Ch Amjad Ali		nava Manika	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
291	Basharat Ali		Waldan sakian	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
292	M iqbal Cheema		Nali Mohal	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
293	Haji Sajid Hussain		Mania wala	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
294	Talib Hussain		Sookhi k Mandi	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
295	Ijaz Ahmad		Chontra	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
296	Roy Basharat		Nathen	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
297	Zahid Hussain		Chapan wali	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
298	Roy Muzammil Hussain		Audoki	Sheikhupura	Basmati 515 Seed	Dry Seeding of Rice	1
299	Ch Ahsan Bhatti		Khatrani		Basmati 515 Seed		202
300	Allah Dad	0301-4563402	Roshan pur	Khanewal	Basmati 515 Seed		
301	Mian Muhammad tariq	0333-6232249	Abdulhakim	Khanewal	Basmati 515 Seed		
302	M ilyas	0306-7833233	Pull Mustafa abad	Khanewal	Basmati 515 Seed		

303	Umar Hyat	0336-6050164	Roshan pur	Khanewal	Basmati 515 Seed		
304	M.Liaqat	0300-9630315	Basti Kalan wali	Khanewal	Basmati 515 Seed		
305	M Shafi Chaudhary	0307-7650378	Nabi Pur	Khanewal	Basmati 515 Seed		
306	M Iqbal	0334-7888011	Roshan pur	Khanewal	Basmati 515 Seed		
307	Tahir hussain	0302-6518198	Roshan pur	Khanewal	Basmati 515 Seed		
308	Ghulam Mushtaq	0333-6221859	Al Hakeem	Khanewal	Basmati 515 Seed		
309	Maqbool hussain	0334-6827280	Chack 9/A/B R	Khanewal	Basmati 515 Seed		
310	Muhammad Zaman	0306-7338355	Chack 9/B R	Khanewal	Basmati 515 Seed		
311	Muhammad Arif Shafi	0303-6492270	Kaser Town	Khanewal	Basmati 515 Seed		
312	Arif-u-zaman	0300-7895788	Thiraja wala	Khanewal	Basmati 515 Seed		
313	Ch Arshad	0333-6227476	Basti Mehmat Pura	Khanewal	Basmati 515 Seed		
314	Mumtaz Hussain	0301-4166607	Abdul Hakeem	Khanewal	Basmati 515 Seed		

13.9 Appendix 9 DSR ACTIVITY AROUND IRPC-2015

Sr #	Name	Adress	Contact No.	Area (Acres)		VARIETIES				CULTURAL PRACTICES			SOWING TECHNIQUES	
					Super Fine	PK-386	PS-2	S.B	B-515	Date of Sowing	Seed rate	Lazer Land Levelling	DSR Drill/Multi Seeder	DSR BC
1	Abdul Rehman	Aallu Dahir - SKP	0322-5603541	20	0	20	0	0	0	MAY, 20	13 Kg/acre	Yes	0	20
2	Abdul Rehman	Aallu Dahir - SKP	0322-5603541	20	0	20	0	0	0	MAY, 25	13 Kg/acre	YES	0	20
3	Akhlaq Ahmad	Aallu Dahir - SKP	0308-6113388	5	0	5	0	0	0	MAY, 25	13Kg/acre	Yes	0	5
4	Aashiq Hussain	Noshehra - GJW	0300-8598196	2	0	2	0	0	0	MAY, 25	13Kg/acre	Yes	0	2
5	M.Nawaz	Baigpur - GJW	0300-4008305	20	0	20	0	0	0	MAY, 25	13Kg/acre	Yes	0	20
6	Major Yaseen	Miani - SKP	0345-9437575	8	8	0	0	0	0	MAY, 25	13Kg/acre	Yes	8	0
7	Major Yaseen	Miani - SKP	0345-9437575	12	0	12	0	0	0	MAY, 29	13Kg/acre	Yes	0	12
8	Major Yaseen	Miani - SKP	0345-9437575	10	0	10	0	0	0	JUNE,05	14Kg/acre	Yes	10	0
9	Major Yaseen	Miani - SKP	0345-9437575	10	0	10	0	0	0	JUNE,06	14Kg/acre	Yes	10	0
10	Malik Zaigham	Maddar - SKP	0300-9420317	8	0	8	0	0	0	MAY, 29	13Kg/acre	Yes	0	8
11	Fayyaz Bhatti	Pakka Dera - SKP	0301-4951009	3	0	0	0	0	3	JUNE,09	13Kg/acre	Yes	0	3
12	M.Ramzan	Dera Arian - SKP	0341-7726545	1	0	0	0	0	1	JUNE,09	13Kg/acre	Yes	0	1
13	Zulfeqar Ali	Marh Bhunghun - SKP	0300-9476298	2	0	0	2	0	0	JUNE,08	13Kg/acre	Yes	0	2
14	Ch. Ahmad Farooq	Adhian - SKP	0345-6280055	6	0	0	6	0	0	JUNE,06	13Kg/acre	Yes	0	6
15	Maqsood Ahmad	Saranwala - SKP	0345-6347429	2	0	0	0	0	2	JUNE, 16	13Kg/acre	No	0	2
16	M.Nazeer	Deorhiwala - SKP	0300-4356261	1	0	0	0	0	1	JUNE, 16	13Kg/acre	No	0	1
17	Army Farm	Baidian - LHR	0322-4982044	11	0	0	0	0	11	JUNE, 16	13Kg/acre	Yes	10	1
18	M.Nawaz	Baigpur - GJW	0300-4008305	10	0	10								

13.10 Appendix 10 COLLABORATIVE DSR ACTIVITY (IRRI & ENGRO) AROUND IRPC-2015

S #	Name	Address	Area (Acres)	VARIETIES					SOWING TECHNIQUES		YIELD (Maunds/Acre)		Remarks
				Super Fine	PK-386	PS-2	S.B	B-515	DSR Drill/ Multi Seeder	DSR BC	DSR Drill/ Multi Seeder	DSR BC	
1	Abdul Rehman	Aallu Dahir - SKP	40	0	40	0	0	0	0	40	0	59	
2	Abdul Rehman	Aallu Dahir - SKP	5	0	0	0	0	5	0	5	0	51	
3	Akhlaq Ahmad	Aallu Dahir - SKP	5	0	5	0	0	0	0	5	0	46	
4	Aashiq Hussain	Noshehra - GJW	2	0	2	0	0	0	0	2	0	47	
5	M.Nawaz	Baigpur - GJW	55	0	55	0	0	0	0	55	0	49	
6	Major Yaseen	Miani - SKP	8	0	0	0	0	8	8	0	25	0	Delay in Weeds Control
10	Malik Zaigham	Maddar - SKP	8	0	8	0	0	0	0	8	0	38	
11	Fayyaz Bhatti	Pakka Dera - SKP	3	0	0	0	0	3	0	3	0	43	
12	M.Ramzan	Dera Arian - SKP	1	0	0	0	0	1	1	0	43	0	Drill with Multi seeder
13	Zulfeqar Ali	Marh Bhunghun - SKP	2	0	0	2	0	0	0	2	0	50	
14	Ch. Ahmad Farooq	Adhian - SKP	6	0	0	0	0	6	0	6	0	46	
15	Ch. Tajamul Gujjar	Saran - Kala Khati - SKP	1	0	0	0	0	1	0	1	0	25	Delay in Weeds Control
16	Ch. Qalb - e- Husnain	Chak Deedo - Kala Khatai	1	0	0	0	0	1	0	1	0	35	
17	Shahbaz Sheikh	Manawala - Narang - SKP	1	0	0	0	0	1	0	1	0	41	
18	Ch. Amir Basra	Gharyal Kalan - Narang	4	0	0	0	0	4	0	4	0	42	
19	Maqsood Ahmad	Saranwala - SKP	2	0	0	0	0	2	0	2	0	43	
20	M.Nazeer	Deorhiwala - SKP	3	0	0	0	0	3	0	3	0	38	
21	Army Farm	Baidian - LHR	90	0	0	0	0	90	90	0	10	0	Delay in Weeds Control
26	Malik Zaigham	Maddar - SKP	4	0	0	0	0	4	0	4	0	48	
31	M.Nawaz	Baigpur - GJW	10	0	0	10	0	0	0	10	0	49	
32	Chand Dahir	Chak Dahir - MDK	6	0	0	0	0	6	6	0	52	0	Drill with Multiseeder
3	Chand	Chak Dahir -	12	0	0	0	0	6	0	12	49	0	

3	Dahir	MDK											
37	Abdul Rauf	Saranwala - SKP	2	0	0	0	0	2	0	2	0	46	
40	Asif Ali	Tapiala - MDK- SKP	20	0	0	0	20	0	0	20	0	38	
41	Asif Ali	Tapiala - MDK- SKP	25	0	0	0	0	25	0	25	0	42	
47	Sardar Muhammad	Saranwala - SKP	1	0	0	0	0	1	1	0	48	0	Drill with Multiseeder
48	Dr. Farooq Chatha	Poorab - SKP	5	0	0	0	0	5	5	0	42	0	
49	RRI/KSK	KSK	10	0	0	0	10	0	10	0	50	0	Drill with Multiseeder
52	Sardar Muhammad	Saranwala - SKP	1	0	0	0	0	1	0	1	0	48	
53	Sagheer Virak	Jandiala - SKP	7	0	0	0	0	7	0	7	0	37	
54	Imran Dogar	Kathianwala - SKP	2	0	0	0	0	2	0	2	0	36	
55	M.Sarwar	Wara Imam Din - Nankana	3	0	0	0	3	0	0	3	0	10	Delaye in Weeds Control
56	Sanaullah	Jabran - SKP	1	0	0	0	0	1	0	1	0	41	
57	Adeel Ashraf	Frooqabad - SKP	1	0	0	0	0	1	0	1	0	52	
58	M. Rafique	Seryawala - SKP	1	0	0	0	0	1	0	1	0	40	
59	Abdul Jabbar	Manawala - SKP	2	0	0	0	0	2	0	2	0	43	
60	M.Rizwan	Lalu Phuman - SKP	3	0	0	0	0	3	0	3	0	51	
61	Rana Sohail	Peer Kot - SKP	2	0	0	0	0	2	0	2	0	43	
62	Waqsa Khan	Arokay - SKP	1	0	0	0	0	1	0	1	0	40	
63	M.Arif	Risala - SKP	1	0	0	0	1	0	0	1	0	38	
64	Mudassar Hussain	Bahawal Kot - Nankana	2	0	0	0	0	2	0	2	0	42	
65	Muhammad Arshad	Dera Balam	2	0	0	0	0	2	2	0	40	0	
			361	**0**	**110**	**12**	**34**	**199**	**123**	**238**			

13.11 Appendix 11 the detail of farm productivity trials in different provinces

Province	District	Tehsil	Village	Dates From To	No. of Farms	No of animals
Punjab	Bahawalnagar	Bahawalnagar	NoorSar	26-11 to 20-12	15	41
			New Noor Sar	26-11 to 20-12	19	35
			Wali Kot	26-11 to 20-12	18	26
			Nihalka	26-11 to 20-12	19	50
			Ganga Sing	26-11 to 20-12	21	50
			Nanak Chand	26-11 to 20-12	23	57
			Amin Kot	26-11 to 20-12	16	37
			Megha Mukhian	26-11 to 20-12	19	46
		Haroonabad	66/4R	26-11 to 20-12	20	46
			61/4R	26-11 to 20-12	21	40
			68/4R	26-11 to 20-12	21	38
			70/4R	26-11 to 20-12	20	35
KPK	Swat		Baidara	23-11 to 19-12	22	48
			Kozkaly	23-11 to 19-12	20	42
			SherPalam	23-11 to 19-12	20	49
			Shakdara	23-11 to 19-12	20	56
	Mardan	Takht Bhai	Pirano Qillay	01-01 to 30-01	9	21
Sindh	Hyderabad	HYD Rural	Musa Khatian	14-2 to 6-3	7	22
	Matiari	MAT Rural	Taj M Laghari	17-3 to 6-4	7	27
AJ&K	Muzaffarabad	Muzaffarabad	Mujhoi	12-2 to 9-3	20	21
			Malsi	27-2 to 23-3	12	12
Total					**369**	**799**

13.12 Appendix 12 Detail of seed distribution and its plantation

Province	District	Tehsil	Month	Seed Type	No. of Farms	Cultivated area (ha)
AJ&K	Muzaffarabad	Muzaffarabad	17-Nov.-16	Rye Grass	10	1.14
				Shaftal	3	0.15
Sindh	Hyderabad	Hyderabad	28-Nov.-16	Rye Grass	4	0.40
	Matiari	Matiari	3-DEC-16	Rye Grass	1	0.20
Gilgit Baltistan	Gilgit	Gilgit	21-Nov.-16	Rye Grass	29	2.33
KPK	Mingora	Khawaza Khela	10-NOV-16	Rye Grass	6	0.60
Punjab	Bahawal Nagar	Bahawal Nagar	5-March-16	Mott Grass	12	2.78
		Bahawal Nagar Haroon Abad	Nov.-15	Berseem	8	0.79
		Bahawal Nagar Haroon Abad		Lucerne	7	0.70
		Bahawal Nagar Haroon Abad		Rye Grass	1	0.10
	Jhang	Jhang	Dec.-15	Rye grass	9	0.70
		Jhang	Dec.-15	Rye grass	6	0.35
	Chakwal	Talagang		Alfalfa	8	1.28
	Chakwal	Chakwal		Alfalfa	1	0.350
	Bahawalpur	Mandi Yazman			14	2.98