



AIP NEWSLETTER

A Newsletter of the Agricultural Innovation Program (AIP) for Pakistan

Volume 3, Issue 2, April-June 2016

Message from the Project Leader

GREETINGS, READERS

I am pleased to share with you the Agricultural Innovation Program (AIP) updates for the quarter that ended on June 30, 2016.

The AIP project made significant achievements during this period. A working paper titled "Information Communication Technology (ICT) in agricultural extension in Pakistan" was launched. The paper highlights a series of opportunities and proposed the way forward to enhance ICT use in agricultural extension. A series of training and field days was organized for citrus and mango growers. Four separate multiplication blocks of ten new mango accessions were established in Faisalabad, Burewala, Toba Tek Singh and Okara sub-campuses of the University of Agriculture Faisalabad (UAF).

Twenty-three drip irrigation systems were installed using a plasticulture tunnel structure at partner institutes and in farmers' fields in the country. Cucumber, tomato, bitter melon and vegetable marrow were transplanted in different locations to analyze the cost effectiveness of the drip irrigation system. The drip systems saved up to 30% water and 34% fertilizer.

In the case of livestock, a small ruminant health camp was organized in Khuzdar District, Balochistan, where an anthelmintic treatment was provided to livestock holders. A total of 10,603 animals belonging to 78 farmers were drenched with anthelmintic (Nilzan Plus). Moveable mesh wall model housing for dairy animals equipped with plastic feed and water troughs was handed over to poor widowed dairy farmers of Bedara village, Swat.

The annual maize working group meeting was held during this period; it was attended by 20 representatives from public and private seed companies to evaluate progress in the deployment of CIMMYT-derived maize products to farmers. A training course on maize breeding program management and statistical data analysis was attended by 40 participants across the country; it will help scientists select varieties suitable to be sown by farmers in Pakistan.

The Socio Economic Program (SEP) component, in partnership with Balochistan Agricultural Research and Development Centre (BARDC) Quetta, organized a two-day training course on SPSS and STATA software in Quetta, Balochistan, for 40 scientists and researchers.

More than 50 wheat farmers engaged in participatory varietal selection trials including paired plot comparisons and village-based seed production using eight new high yielding, disease resistant wheat varieties in Gilgit. The introduction of new high yielding varieties helped to enhance wheat productivity in the target areas.

For mechanized farming, locally modified multi-crop zero-till planters were evaluated at five sites for dry seeding of Basmati rice in Punjab. The use of zero-till planters resulted in plant populations, tillers and grain yields that were 10% higher than when older fluted roller drill machines were used for seeding. Private sector partner Greenland Engineering has manufactured and sold over 30 multi-crop planters to rice growers across Pakistan.

In Punjab, 10 tons of certified Basmati 515 seed were distributed to 2000 farmers for planting on approximately 2000 acres in collaboration with private partner Engro Fertilizers Pvt. Ltd, Lahore, to increase production of quality rice varieties.

In the current period, a total of 20,000 beneficiaries received assistance and of these, 8793 beneficiaries received training on modern management practices.

AIP is the result of the combined efforts of the Pakistan Agriculture Research Council (PARC), the International Livestock Research Institute (ILRI), the International Center for Agricultural Research in the Dry Areas (ICARDA), the International Rice Research Institute (IRRI), the World Vegetable Center (AVRDC), the University of California at Davis, and the International Maize and Wheat Improvement Center (CIMMYT). It is funded by the United States Agency for International Development (USAID). With these national and international partners on board, AIP continues to improve Pakistan's agricultural productivity and economy.

For details on AIP's activities and upcoming events, please visit our website aip.cimmyt.org. Your comments and suggestions are welcome.

Enjoy reading!
Md. Imtiaz

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LIVESTOCK

AIP-Livestock is led by the International Livestock Research Institute (ILRI) in partnership with the International Center for Agricultural Research in the Dry Areas (ICARDA).

For feedback and queries, contact Ibrahim Mohammed (ILRI): m.ibrahim@cgiar.org

Economic Impacts of AIP-Livestock Interventions in Punjab

Livestock-based rural livelihoods have been providing US\$ 992 value addition per household in Pakistan's GDP. The diversification of rural livelihoods in Pakistan's agriculture-led economy has become the most imperative phenomenon under the climate change scenario. Therefore, introducing targeted intervention as a holistic approach is urgently needed to improve/ uplift Pakistan's agriculture-(livestock) led economy. AIP-ILRI have been working on similar grounds in Pakistan since mid-2014. The results reveal that the animal health intervention targeting foot and mouth disease alone saved 9.8 million rupees

(US\$ 978,419) worth of animals/production in Punjab project villages, whereas the establishment of farmer participatory model farms (14) in Punjab helps to recover 1.4 million rupees (US\$ 133,333) in feed wastage annually. The water and balanced feeding intervention provided 6.2 million rupees (US\$ 620,890) in benefits alone in Punjab. Identified constraints and key issues have been effectively addressed through farmer participatory field demonstrations and targeted capacity building on specific issues, which could eventually lead to a change in farmers' mind-set and significantly increase livestock productivity and their livelihoods.

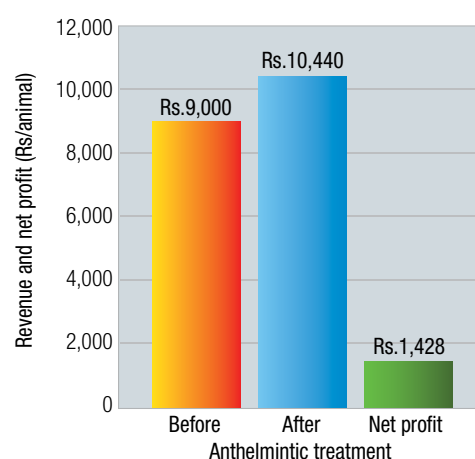


Various livestock interventions in dairy value chain targeted areas of Punjab.

Economic Benefits of Anthelmintic Treatment

Internal parasites are highly prevalent in grazing animals; this lowers their productivity and leads to high economic losses (up to 30%). Raising awareness of the prevention and control of these parasites among farm communities is direly needed for proper productivity. Analyses of faecal samples from sheep and goats in target sites showed that 80% of the animals are infected with seven types of internal parasites.

In May 2016, AIP-Livestock, in collaboration with ICARDA, PARC and the Department of Livestock, Balochistan, organized a small ruminant health camp and provided anthelmintic treatment to livestock holders in Khuzdar District. A total of 10,603 animals (6,353 sheep and 4,250 goats) belonging to 78 farmers were drenched with anthelmintics (Nilzan Plus). The farmers were trained in the proper handling of internal parasitic problems and other major diseases in sheep and goats. The increase in net profit as a result of anthelmintic treatment is Rs. 1,428 per animal. With a total of 10,603 animals treated, a net profit of Rs.15.16 million was generated.



Economic benefits of anthelmintic treatment in small ruminants.



Animal health camps on anthelmintic treatment in District Khuzdar Balochistan.

Early Introduction of Calf Starter to Enhance Growth Rate

The various livestock feed companies are suggesting that livestock farmers must introduce calf starter to their calves at the age of three months, at a recommended dose of 10% of their body weight. AIP-ILRI have been working to improve livestock production and create awareness among livestock farmers that they must fatten their calves to get higher economic returns. A farmer participatory trial was conducted on a total of 39 Cholistani calves (24 male and 15 female) in Ganga Singh village, Bahawalnagar District. The results reveal that the average calf growth rate was 198 g/day during one month of the trial period when only half a kilogram of calf starter was provided to calves after one month of age. Based on these

findings, livestock farmers during the trial easily achieved a weight gain of 11.98 kg in their calves before the recommended three months of age without using the recommended 10% body weight dose of feed.

In terms of profit, every livestock farmer can easily get US\$ 21 during the first 2-3 months of a calf's life. Therefore, introduction of early calf starter feeding can provide more value addition from livestock in GDP of Pakistan. According to statistics, if 30% of farmers adopt this strategy of early feeding of calf starter to their calves, this would yield an additional US\$ 113,079 in value addition of livestock to the economy of Pakistan.



Measuring calf weight during early introduction of calf starter to enhance growth: Ahata Mukhian, District Bahawalnagar.

Female Dairy Farmers Laid the Foundation for a Village-based Ryegrass Seed Enterprise in Danyore Valley, Gilgit-Baltistan District

Ryegrasses are widely grown cool season grasses that are better suited and have greater agronomic potential in

the northern mountainous regions of Pakistan. Since 2015, AIP-ILRI have been working to improve dairy

production through higher biomass production of improved fodder varieties, especially in mountainous areas like Gilgit. Chand Bibi, a female dairy farmer, successfully produced ryegrass seed to lay the foundation stone of a village-based seed enterprise in Danyore Valley through the AIP-ILRI improved fodder variety seed program. Field monitoring and results show that she earned/saved US\$ 479 in biomass production with a meager US\$ 16 investment from AIP-ILRI, which initially provided only one kanal seed. This amount is in addition to 3 kg of ryegrass seed (US\$ 16 per kg) she produced on three quarters of the land she cultivated last year. Last year, the AIP-ILRI seeds program in Gilgit yielded US\$ 3,311 from high biomass production on only 2.5 acres of land. This will help dairy farmers provide highly nutritious feed to their animals and increase milk production (0.5-2.5 L/day/animal).



Rye grass seed produced by female livestock farmer in Danyore District Gilgit.



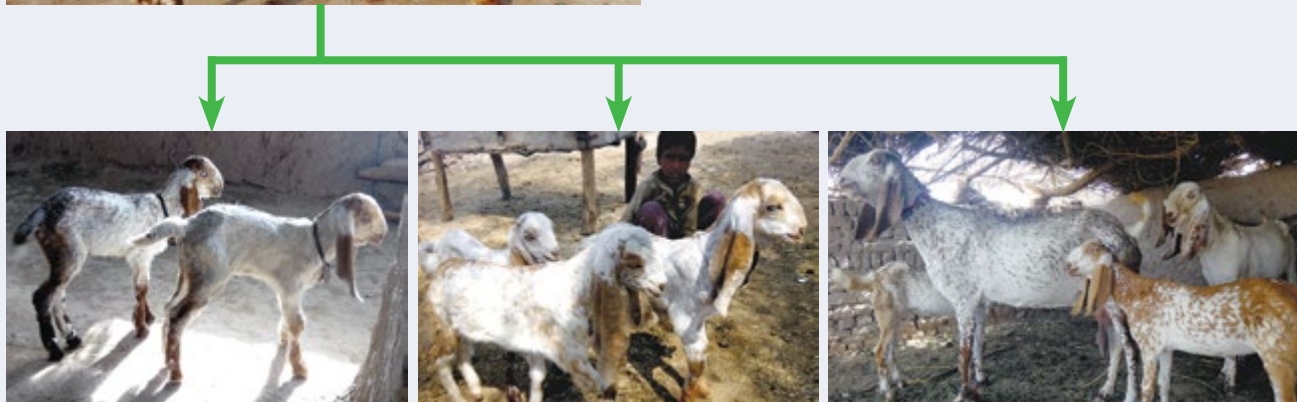
Female farmer explaining about the successes of a village based seed enterprise in Danyore District Gilgit.

Increasing Goat Productivity Through Improved Breeding Bucks in Bahawalpur



In Pakistan, most farmers have mixed goat breeds without clear breeding objectives; thus the expected genetic improvements are rather arbitrary. AIP-Livestock provided two pure Beetal (Makhi-Cheeni) bucks to the local community at Chak 93DB to improve productivity and income from goat production. Five farmers' goat flocks were involved in this breeding exercise.

The breeding strategy (including breeding season, supplemental feeding for breeding stock, keeping a breeding record) and the use of two quality bucks was compared with the use of local mixed Beetal bucks by five farmers (having 20-30 goats each). Breeding was initiated in November 2015 and the kids were born in April 2016. The birth weight of kids sired by quality bucks was higher (2.2 kg) as compared to kids sired by local bucks (1.5 kg). The kidding percentage was higher (84%) in properly managed flocks compared with local practices (78%).



First generation kids from the Makhi-Cheeni Beetal buck.

Potential of Cactus as Drought Feed

Under AIP-Livestock (ILRI-ICARDA), cactus was introduced to farmers in the dry areas of Chakwal, its adaptation was tested and its value as animal feed evaluated. Three supplemental feeds were formulated based on available fodder such as oat, lucerne and spineless cactus, to assess the productivity of small ruminants. The four categories of animals (ewes/does/ lambs/kids) belonging to four farmers were used in a farmer participatory trial. The animals grazed for 5-6 hours daily on rangeland followed by 2 kg/head/day supplemental mixed feed rations including oat, cactus and lucerne in the evening. However, animals in the control group (D) were maintained on 6-8 hours daily grazing only, as per farmers' practice. The trial lasted 60 days. Ewes that were fed oat- and lucerne-based supplemental feed showed similar high live-weight gain (67 g/day) followed by those fed cactus-based supplemental feed (33 g/day). However, the daily live-weight gain (g/day) of kids fed oat- and lucerne-based rations was 100 g, followed by kids fed cactus-based feed. The lambs/kids on grazing only showed lower live-weight gain (33-50 g/day). We concluded that cactus can be used as an alternate feed when other green fodder is not available.



Cactus based feed ration for the improved small ruminants productivity in District Chakwal.

Cereals and Cereal Systems

WHEAT

AIP-Wheat is led by the International Maize and Wheat Improvement Center (CIMMYT).

For feedback and queries, contact Krishna Dev Joshi (CIMMYT-Pakistan): k.d.joshi@cgiar.org

Participatory Varietal selection Can Be an Effective Way of Enhancing Wheat Productivity in Gilgit-Baltistan

- Gilgit-Baltistan lacks wheat varietal diversity because there is no functional wheat breeding and release system in place.
- Participatory varietal selection can be an effective way of strengthening the wheat seed system in Gilgit Baltistan.
- Creating awareness among farmers regarding new wheat varieties and their production technology is vital.

Current wheat production and productivity in Gilgit-Baltistan is unsatisfactory and requires immediate attention. The use of old varieties in the existing cropping system results in poor yields. Small landholdings, poor quality seed and traditional farming practices are challenges that make it difficult to boost wheat production and ultimately improve economic conditions of people in northern areas. In view of all these facts, the International Maize and Wheat Improvement Center (CIMMYT) is making serious efforts to address some of the major issues systematically with the support of three local partners: Aga Khan Rural Support Programme (AKRSP), Mountain Agriculture Research Center and the Department of Agriculture of Gilgit Baltistan.

During the current wheat season, participatory varietal selection (PVS) trials, paired-plot comparisons and village-based seed production trials were conducted with more than 50 farmers using eight new high yielding, disease resistant wheat varieties

in two districts (Ghizer and Nagar) of Gilgit. In June 2016, two field days were organized to create awareness among the farming community regarding the new wheat varieties. The first field day was organized on 4 June at Munapin Union Council involving more than 25 farmers from that area. A PVS trial was planted in collaboration with the Aga Khan Rural Support Programme. Farmers were really amazed to see the performance of the new high yielding wheat varieties in comparison to their own local cultivars. They also visited the seed production plots of the new wheat varieties. Farmers ranked the new varieties according to their preferences; Pakistan-13, Dharabi-11 and Pirsabak-13 were among the wheat varieties they liked best. AIP beneficiary farmers made commitments to their fellow farmers to share the seed of the new wheat varieties after crop harvest.

The second field day was organized at the Mountain Agriculture Research Center (MARC) farm on 5 June 2016 and was attended by 40 farmers. A wheat scientist from MARC, Gilgit, highlighted the importance of utilizing new wheat varieties and their production technology. After the formal lectures, the farmers were taken to the research farm where they were briefed on different new wheat varieties and their production technologies. Farmers were really happy and motivated to see the performance of the new wheat varieties in the field. All the farmers promised to grow the new wheat varieties next year.



Seed production plot of new wheat variety (Pakistan 2013) at Munapion Union Council, Gilgit.

Strengthening the Capacity of Farmers Associated with Rotary Club Nankana Sahib to Accelerate Village-based Seed Production

- To contribute to the sustainability of all AIP Wheat activities, systematic efforts have been made to link farmers with private seed companies.
- Capacity building and exposure visits will play a vital role in informal seed production at the village level.

The project is working on village-level seed production with hundreds of farmers through a number of public and private sector partners. Collaborating farmers were trained on quality seed production and management, seed business and seed provisioning; they will eventually

form business-oriented seed groups in their respective areas. On 6 April 2016, a group of 36 farmers associated with Rotary Club Nakana Sahib were trained to produce quality wheat seed and manage seed quality after harvest, including drying, cleaning, grading, safe storage, packaging, labeling and marketing. Resource persons from Engro Fertilizer Ltd gave comprehensive lectures following the exposure visit to R y D farm. Farmers were also given the opportunity to interact directly with contract growers at Engro, where they saw the practical examples of successful contract farming. Farmers' groups from Nankana Shahib showed keen interest in having contract farming arrangements with Engro Fertilizer Ltd and exploring other mutually beneficial possibilities.



Participants in the farmer field day/exposure visit organized by CIMMYT in collaboration with Engro Fertilizer Ltd.



Practical demonstration of varietal identification for a farmers' group in the field at Engro Fertilizer Ltd R y D farm, Sheikupura.

MAIZE

AIP-Maize is led by the International Maize and Wheat Improvement Center (CIMMYT).

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Pakistan Maize Stakeholders Discuss Progress

The Agricultural Innovation Program (AIP) held its annual maize working group meeting on 10-11 May 2016 with over 20 representatives from public and private seed companies and higher learning institutions in attendance. The working group evaluated partners' progress in deploying CIMMYT-derived maize products to farmers.

"The sharing of valuable parental lines and breeder seeds is one of the invaluable contributions and successes of AIP. This is the best example for sustainable development projects," said Nadeem Amjad, Chairman of the Pakistan Agricultural Research Council, during his opening statement. According to Amjad, CIMMYT hybrids can help "resource-poor maize farmers have affordable maize seeds at their doorstep."

During the meeting, partners talked about the progress of parental seed production in their own fields and about their plans to deliver quality seeds to farmers. They also identified key challenges in Pakistan's maize seed value chain and made recommendations during the group discussion session.

"This was only possible due to the innovations and interventions of AIP that Pakistan's National Agricultural Research Center (NARC) was able to start hybrid seed production of biofortified maize, the first in the history of Pakistan," said NARC Director General Muhammad Azeem Khan in his concluding remarks.

A certificate of appreciation was delivered to NARC for jump-starting hybrid seed production in Pakistan and hosting various national maize events in 2015, as well as to Tara Crop Science (Pvt.) Ltd for hosting the best maize trials evaluated by AIP maize partners during the 2015 traveling maize seminar.



Photo: M.W. Anwar

NARC maize team receiving a certificate of appreciation.



Photo: Amina Nasim Khan/CIMMYT

Participants in the annual AIP maize working group meeting, 10-11 May 2016, Islamabad, Pakistan.

Scientists Trained on Breeding Program Management, Statistical Data Analysis



Photo: Amina Nasim Khan/CIMMYT

Participants in the maize breeding program management and statistical data analysis training course held in Islamabad on 23-27 May 2016.

CIMMYT, in collaboration with Pakistan's National Agricultural Research Center, conducted a training course on maize breeding program management and statistical data analysis on 23-27 May 2016 in Islamabad, Pakistan. The course was attended by nearly 40 participants nominated from agricultural universities and public and private institutions across the country. It was the first of its kind to address breeding program management and introduce current software to analyze phenotypic and genotypic data. This hands-on training will help scientists select varieties suitable for use by Pakistani farmers based on multi-environment datasets.

"Today, crop improvement techniques are getting advanced in each passing day and countries that are investing in cutting-edge science and state-of-the-art technologies not only are self-sufficient, but are leading exporters of their surplus products," said Nadeem Amjad, Chairman of Pakistan's Agricultural Research Council.

Amjad emphasized the need to build the capacity of scientists dedicated to areas such as crop modeling, bioinformatics and advanced agricultural statistical software to modernize and enhance agricultural productivity in Pakistan. He thanked CIMMYT for addressing this need and helping maize and wheat researchers to advance in these areas and improve their work.

"Thanks to this training I analyzed all my data in just two hours. Before this it would have taken me months as I was using less efficient, less user-friendly and very old software. This is a real support from CIMMYT and my tasks are greatly simplified," said Rashad Rashid, representative of Rafhan Maize Products, a private company.

Together with CIMMYT-Pakistan scientists, the training was conducted by Mateo Vargas Hernandez, consultant, and Gregorio Alvarado Beltran, senior data

analyst from CIMMYT's Biometrics and Statistical Unit, who are part of the team that developed the software used during the training.

"Sharing statistical software and training of researchers by the very people who were involved in developing the software makes this training unique," stated Muhammad Azeem Khan, Director General of the National Agricultural Research Center, who closed the ceremony.



Photo: Amina Nasim Khan/CIMMYT

Rabia Akram receiving her certificate for successfully attending the training course.

AGRONOMY

AIP-Agronomy is led by the International Maize and Wheat Improvement Center (CIMMYT).

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AIP Collaborates With Machine Manufacturer to Produce Multicrop Planter in Pakistan

Dry seeding of rice (DSR), a practice that involves growing rice without puddling of soil, can help save up to 25% of the water needed to grow crops and reduces greenhouse gas emissions. However, the old fluted roller drill machines used for DSR do not guarantee uniform plant-to-plant distance and break rice seeds, requiring farmers to purchase more seed than is required.

In 2014, the International Maize and Wheat Improvement Center (CIMMYT) imported a multicrop, zero-till planter from India that has the ability to drill both seed and fertilizer

simultaneously, and maintain an appropriate distance between plants without breaking the seeds.

CIMMYT evaluated locally modified multicrop zero-till planters at five sites for dry seeding of Basmati rice in Punjab during 2014. As a result, these sites produced 10% higher plant populations, tillers and grain yields compared to sites where older fluted roller drill machines were used for seeding. During the current 2016 rice season, Greenland Engineering has manufactured and sold over 30 multicrop planters to rice growers across Pakistan.



Planting rice with the first locally produced multicrop planter in Sheikhpura.



Iqbal Mughal and Irfan Mughal of Greenland Engineering with new multicrop planter in Daska.

Farmers Adopt Wheat Zero-tillage Planting and Ridge Planting in Punjab and KPK Province

CIMMYT, in partnership with national partners, namely, Arid Zone Research Institute Bhakkar, Agriculture Research Institute DI Khan, Miankhal Seeds DI Khan and the National Rural Support Program, disseminated zero-tillage wheat, ridge planting of wheat and laser land-leveling to more than 900 farmers through training, demonstrations and exposure visits in Bhakkar, Mianwali and Khushab Districts in Punjab and DI Khan District in Khyber Pakhtunkhwa Province. Zero-tillage drills and ridgers were provided through community organizations and research institutes to help 186 farmers practice these technologies. After the field day at Pir Ashab, Bhakkar, wheat farmers expected to produce 15% higher wheat yields and 30% savings in water using the ridge planting technique. Ghulam Abbas planted wheat with zero tillage and saved Rs. 5000/acre in cultivation costs.



Ghulam Abbas in his zero-till planted wheat in Bhakkar.

VEGETABLES

AIP-Vegetables is led by the World Vegetable Center (AVRDC).

For feedback and queries, contact Mansab Ali (AVRDC): mansab.ali@worldveg.org

Vegetables Thrive on Drip Irrigation in Pakistan



Healthy tomatoes raised with drip fertigation system at Kallar Syedan, Punjab (Pakistan).



Drip fertigation system under plasti-culture (bamboo tunnel) at Pishin, Balochistan (Pakistan).

To demonstrate and promote the use of simple drip irrigation, 23 drip systems were installed in areas of 250 m² (0.5 Kanal) to 500 m² (1 Kanal) under plasticulture tunnel structures, three at partner institutes (the Agricultural Research Institute, Mingora-Swat; Barani Agriculture Research Institute, Chakwal; and the Agriculture Research Institute, Quetta) and 20 in farmers' fields in Khyber Pakhtunkhwa, Punjab and Balochistan. Forty-five tunnels were selected to compare water and fertilizer use, and observe the differences in crop growth with and without drip irrigation. Ordinary flumes were fixed in tunnels to measure the water applied through furrow irrigation. Five 'Peter engines' to power water pumps were installed; these engines run on petrol and are very cost-effective, as they use 1 liter of petrol every 1.5-2.0 hours. Energy-free drip systems were installed in four locations; these operate by gravity and can be used where a head of more than 5 meters is available.

Cucumber, tomato, bitter gourd and vegetable marrow were transplanted in Swat, Haripur, Islamabad, Bhikki, Chevanda, Noorpur Thal and DI Khan to calculate the amount of water and

fertilizer applied through drip and furrow irrigation systems. During the 2015 growing season, the drip systems saved from 16 to 34% water and 20 to 30% fertilizer compared to conventional practices. The highest water (68%) and fertilizer (92%) savings were achieved in the sandy soils of Noorpur Thal. The drip system allows for more uniform distribution of water and fertilizer, and drip-irrigated crops are more vigorous than crops irrigated with a furrow system.

After the success with drip irrigation last season, several farmers, including Mr. Faisal from Pishin, Mr. Ahsan and Syed Majid from Haripur, and Mr. Javed from Sheikhpura, extended their systems to larger areas. They said drip irrigation uses less water and fertilizer, and reduces their pesticide usage and weeding and hoeing costs. Plans are underway to install more systems in the coming years. Collaborating farmers are delighted with the system's efficiency due to the uniform distribution of water and fertilizer, and the vigorous crop condition as compared to the crop irrigated using the furrow system.

Healthy and Vigorous Cucumber Crop Under Anti-insect Net as Compared to Polythene

The World Vegetable Center under the USAID Agricultural Innovation Program (AIP) introduced anti-insect nets at two different sites in Sheikhpura. The cucumber crop is grown under the nets and drip irrigation. The new system was compared with the old traditional system that includes furrow irrigation and polythene sheets.

A crop of cucumber hybrid (Yousef) was sown at the end of November under anti-insect nets and polythene sheets. Initially in the season there was a clear difference in the crop, as leaf color and size were much better under the anti-insect net than under the polythene sheets. Plants also attained more height and greater leaf size under the anti-insect net than under the polythene sheets. There was also less insect attack and downy mildew disease incidence was very low. At the fruiting stage, node-to-node distance was minimal and the fruit was much healthier. But in mid-season, some wilting of young baby tubes was observed under the anti-insect net. This was controlled by adding more potash to the anti-insect plots. Later in the season, there was a much healthier crop, fruit size, color and plant vigor were much better, and pickings were prolonged under the anti-insect net. A saving of 10-15% in insecticide usage was observed in case of anti-insect net compared to polythene sheet only.



Healthy crop under an anti-insect net early in the season.

A Simple But Comprehensive Vegetable Seed Value Chain (Fresh News)

Pakistan's varied agroclimatic conditions favor production of a wide range of temperate, tropical and subtropical vegetable crops. However, this potential has not been exploited due to a lack of quality vegetable seed at affordable prices. Most seed requirements are met through imports.

To increase national vegetable seed production and supplies at the local level, the USAID/AIP, in which the World Vegetable Center is a partner, initiated a large-scale vegetable seed production program. Five public sector research institutes, two seed companies and a seed growers' association were selected to participate in vegetable value chain activities. In 2014-15, a total of 14,446 kg seed of onion, tomato, chili, okra and peas was obtained from an area of 15.6 hectares. Seed was packed in pouches, cloth and jute bags with USAID/AIP and partners' labels. Varieties were selected according to market choice, consumer preferences and regional suitability.

Based on a single production and marketing cycle, a simple but comprehensive diagram of the seed value chain was developed that encompasses 14 steps from sowing to marketing. Regular field visits with producers and seed companies were essential for the successful completion of this chain.



Pea seeds ready for packing in a 10 kg perforated cloth bag in Gujranwala, Punjab.

Seed marketing was the main hurdle for growers. Mazullah Khan, World Vegetable Center Seed Specialist, suggested the growers invite seed dealers to see the crops in the fields as a way of inspecting the goods before purchase. "This was a successful strategy, as all seed sold at premium prices," said Mazullah. Onion seed sold at US\$ 25-45/kg, depending on the region. "Farmers were extremely

happy with the prices they received," said MianZada, President of the Shuga Seed Growers Association in Bunir, Khyber Pakhtunkhwa. Seed peas sold at US\$ 1.25-1.50/kg and okra seed sold at US\$ 1.50-2.50/kg. Whole chili fruits for seed were sold in the open market in Sindh at US\$ 1.80-2.00/kg. Farmer-to-farmer seed sales were also successful, as Tayyab Ali Shah, a farmer in Tandlianwala, Faisalabad, discovered.



Capacity building is essential for successful vegetable value chains. More than 800 men and women participated in a series of crop management, postharvest handling, seed packing, and marketing training sessions in Gilgit Baltistan, Punjab, Sindh, Khyber Pakhtunkhwa and Balochistan. "To intensify seed production, linkages between all stakeholders in the vegetable value chain should be strengthened and enhanced," said Mansab Ali, AIP Team Leader.

A farmer cleaning okra seed the traditional way in Gujrat, Punjab.

Promoting Healthy Vegetable Seedlings in Pothwar-Punjab (Pakistan)

Plasticulture is gaining importance in Pothwar District, Punjab, Pakistan. To produce a successful vegetable crop under cover, growers must start with healthy seeds and seedlings. Previously, farmers lacked the technical knowledge to set up and manage their own seedling nurseries. When they purchased seedlings from the market, costs were high, quality was poor, and diseases were a common problem. Through AIP awareness and training activities, more farmers are learning to raise their own seedlings. Farmers are encouraged to seek out certified seed and use affordable multi-hole plug trays to develop strong seedling root systems. Using compost as a growth medium produces vigorous, stocky seedlings. Seedling production is widely practiced in Chakri, Kahuta and other areas in Islamabad Capital Territory, and is becoming more popular in other parts of Pakistan. Farmers growing indeterminate tomatoes are also harvesting side shoots to plant in plug trays and raise as seedlings—another source of income.

All field activities were undertaken as part of the Agricultural Innovation Program (AIP) for Pakistan funded by the United States Agency for International Development (USAID) and supported by the International Maize and Wheat Improvement Center (CIMMYT), the Pakistan Agricultural Research Council (PARC) and provincial partners from Punjab, KP, Sindh, Balochistan, AJK and GB.



Tomato seedlings raised in multi-pot trays.



A healthy nursery.

SOCIOECONOMICS

AIP-Socioeconomics is led by the International Maize and Wheat Improvement Center (CIMMYT).

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Social Scientists from Balochistan Trained on SPSS and STATA Software



Research staff from AIP-CIMMYT visiting field station of wheat research institute Faisalabad, Punjab.

CIMMYT, in partnership with Balochistan Agricultural Research and Development Center (BARDC) Quetta, organized a two-day training course on SPSS and STATA software in Quetta, Balochistan, on 24-25 May 2016. More than 40 scientists, researchers, faculty members and extension agents attended the course.

PERENNIAL HORTICULTURE

AIP-Perennial Horticulture is led by the University of California Davis (UC Davis).

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AIP Urged the Citrus Industry to Focus on the Value Chain

Photo courtesy of UC Davis



Mr. Abdul Rehman training citrus growers on the causes of citrus fruit blemish and its prevention.

The University of California Davis (UC Davis) under AIP's commissioned citrus projects is making systematic efforts to improve the citrus value chain. In collaboration with AIP's working partner, the Citrus Research Institute (CRI) Sargodha, UC Davis organized a series of trainings and exposure visits on citrus problems during April-June 2016, with 371 registered citrus growers, nursery men, packinghouse labor, picking labor, domestic women, extension staff, students at women's training institutes and agricultural colleges from Khyber Pakhtunkhwa and Punjab. These efforts convinced 75 growers of Sargodha to practice improved disease control, orchard management and mechanization in citrus orchards in an area of 1097 acres.

Distribution and In-field Evaluation of Potential Mango Accessions

During April-June 2016, AIP supported the establishment of four separate multiplication blocks with 40 plants each of ten new mango accessions (temporarily named KHW-250, KHW-251, RYK-426, RYK-644, RYK-265, MLT-369, MLT-658, MLT-239, MLT-240, MLT 250) at Faisalabad, Burewala, Toba Tek Singh and Okara sub-campuses of the University of Agriculture Faisalabad (UAF). A plant distribution day was organized on 12 April 2016 in Multan in which 150 new mango plants along with published literature related to the management of these potential accessions were distributed among 11 growers from Multan, Muzaffargarh and Vehari. A month later, all the sites were visited to evaluate the in-field performance of the distributed plants. It was pleasing to see that all the ten accessions have adapted well to the actual field conditions. These interventions are expected to prolong the harvest season, widen the market window and uplift the mango industry of Pakistan.



Photo courtesy of UC Davis

Mango multiplication block being sprayed at the University of Agriculture, Faisalabad.

Photo courtesy of UC Davis



Practical training at Demo Pistachio Orchard, Mastung.

AIP Promotes Pistachio that Requires Less Water in Baluchistan, Pakistan's Most Water Scarce Province

In collaboration with the Agriculture Research Institute, Sariah Quetta, UC Davis is working on nursery and orchard production to promote pistachio that requires less water and has high value in Baluchistan. UC Davis is also helping pistachio farmers to organize themselves under the pistachio growers association. During April-June 2016, three farmer days were organized on pistachio chip budding, irrigation scheduling and nutrition management; they were attended by a total of 61 participants. These trainings utilized practical field demonstrations during which participants were given the opportunity to practice the new skills themselves.

Emphasizing Canopy Management for Food Quality Ber Production

Under the project “Canopy management and multiplication of promising ber cultivars” a training program on canopy management of ber trees was held in the multiplication block of the University of Agriculture, Faisalabad. A group of 19 students were trained on managing the canopy of ber trees to reap maximum and quality fruit.



Photo courtesy of UC Davis

AIP Improved Knowledge and Skills of Olive Growers Through Hands-on Training

To address the issues of alternate bearing, less fruiting and low fruit quality of the newly introduced olive crop, two hands-on training courses were organized by the Agriculture Research Institute, Tarnab, Peshawar, during this quarter. Sixty-five olive growers were trained on canopy management and the importance of nutrients for olive trees.

Ber canopy management training at the University of Agriculture, Faisalabad.

Training Farmers on Summer Season Management and Water Conservation in the Vineyard



Photo courtesy of UC Davis

AIP, in collaboration with Pir Mehar Ali Shah Arid Agriculture University, Rawalpindi (PMAS AAUR), managed a practical training on 25 April 2016 at the agricultural extension office, Attock District. Experts from the Department of Horticulture, Plant Pathology, and Entomology PMAS AAUR gave lectures to 40 training participants.

On 22 May, another training course on “Profitable Cultivation of Grapes in Pothohar without Changing Traditional Cropping Systems” was held at Jhangi Saedan, Gujjar Khan, and Rawalpindi. A total of 22 farmers attended this training. The objective was to increase the adoption of a high value grape crop that requires little water and would improve farm incomes in the rainfed Pothohar region.

Training on summer season vineyard management at PMAS, AAUR.

Supporting the Postharvest Fruit Management Initiative

Under AIP's postharvest management initiative, the following events were held:

- Professional training of extension staff on “Postharvest (Mango/ Guava) Fruit Quality Management Technology” on 11-12 April 2016 at ATI (21 participants).
- Training on “Postharvest quality assessment and value addition in horticultural crops” on 23-24 May 2016 at ATI (26 participants).

These events will help train farmers in their respective areas to snowball the impact of these interventions.



Photo courtesy of UC Davis

Hands-on practice during training on fruit quality assessment at ATI Sakrand.

AIP-E-PAK AG

AIP-E-Pak Ag is led by the University of California Davis (UC Davis).

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AIP Launched New Strategy to Boost ICT Solutions for Pakistan's Agriculture

Photo courtesy of UC Davis



Launching ceremony of the ICT working paper at NARC, Islamabad.

On 5 May 2016, AIP-E-Pak Ag presented a working paper titled "Information Communication Technology (ICT) in Agricultural Extension in Pakistan: Findings and Proposed Next Steps." All relevant stakeholders from public and private sector organizations including the Ministry of Food Security and Research, USAID representatives, officials of provincial agriculture departments, AIP primary partners, and development sector representatives from all over Pakistan were invited to attend this event. "We should ensure prosperity at the grass-roots level and come up with solutions of problems faced by farmers," stated Abid Javed, Secretary, Ministry of National Food Security and Research, adding that in this era of technology, use of ICT tools is crucial for improving the efficiency of agricultural development in Pakistan.

In his keynote address, Dr. Mark Andrew Bell, the main author, highlighted the role of ICTs in the development of agriculture particularly in developing countries, while co-author Dr. Babar Shahbaz presented the key findings of research done under the E-Pak Ag project and said that the E-Pak Ag team is all set to extend its activities in different provinces of Pakistan.

Agricultural Innovation Through ICT

A stakeholders' training workshop on the use of ICT in the agriculture sector was organized at Muhammad Nawaz Sharif University of Agriculture, Multan, on 27 April 2016. The participants included Punjab extension field staff, faculty members, students and representatives of private institutions. During the discussion, the participants emphasized that ICT use should be based on realistic needs assessment, demand oriented, easy and accessible, properly monitored and continuously improved based on feedback from the farming community.

Under ICT gender initiative, three training courses were organized on previously identified key topics (poultry, goat and dairy farming, and kitchen gardening) at selected project sites (i.e., Okara, Chakwal, and Faisalabad) with a total of 62 school girls. The girls were taught to use ICT tools like cell phones, tablets and laptops to obtain the needed information.

Agricultural Productivity Improvement Through Nudging

AIP gave a new dimension to Pakistan's agricultural extension by holding a two-day conference aimed at exploring agriculture productivity improvement through nudging on 6-7 May 2016. Organized by UC Davis in partnership with Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi, the conference sought to explore the application of nudging (a technique that influences people towards desirable behavior) to improve agricultural productivity in the context of academic and government policy reforms and the use of ICT. Diverse bodies of practitioners and academics, both national and international, were invited to discuss the possibility of nudging farmers towards higher yields and enhanced productivity.



Photo courtesy of UC Davis

School girls in Mansoor Village, Faisalabad, being trained on ICT use in agriculture.



Conference on agricultural productivity improvement through nudging at PMAS AAUR. Photo courtesy of UC Davis.

HUMAN RESOURCE DEVELOPMENT

AIP-HRD is led by the University of California Davis (UC Davis).

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On the Web, Document and Picture Size Count!

Under AIP's vocational training component, a short training session for 13 participants (AIP primary partners) was organized on 5 May 2016 at NARC Islamabad. Its aim was to train the participants to optimize file size for online uploading of extension materials. It will help primary partners make their extension messages easy for users to retrieve online.

Quality Seeds: Issues and Options

Photo courtesy of UC Davis



Workshop on "Quality Seeds: Issues and Options" at UAF.

On 9-11 May 2016, UC Davis and the International Rice Research Institute (IRRI) under AIP collaboratively organized a three-day workshop titled "Quality Seeds: Issues and Options" in Faisalabad. A total of 32 stakeholders from public and private seed businesses attended the workshop, which included an exposure visit to Pioneer Seeds (an international seed company) and Sohni Dharti (a national seed company). Workshop trainers Dr. Joseph Rickman and Dr. Mark Andrew Bell emphasized the production of quality seeds, since good quality seed can increase yield by 5 to 20%.

Noorani Barkat: Masters Student at Texas A&M

Exactly two years back, I was at the Agriculture University Faisalabad, Pakistan, thinking of how my life would be after I completed my undergraduate studies. In the last semester, I randomly applied for an Agriculture Innovation Program (AIP) scholarship thinking that there was no harm in filling an application and trying. While I was at a youth camp in my hometown Gilgit, a friend called me and told me I had been selected for this scholarship.



Today, I am sitting in College Station, Texas, and writing this. I am Noorani Barkat from Pakistan and I'm working on my Masters in agriculture from Texas A&M University. Studying in the USA is like a dream come true. Getting this fully funded AIP scholarship was one of the best things that ever happened to me. Coming here and entering a completely different world is a beautiful experience. All the courses I have studied so far have given me an in-depth knowledge about how broad the field of agriculture is and how we can help people of the world reduce hunger. Most importantly, the research work I am doing right now is something I will always cherish. My research has brought some amazing changes in my thinking, my work pattern and especially in my personality. Doing research at Texas A&M University means exploring yourself in a different way. The difficulties in research turned out to work in my favor. They are teaching me that you own the research and you own the pain and happiness related to your research. Sometimes I think that the life of a graduate student in the US revolves around research. Research has given me confidence that my ideas can work and each day is a challenge to prove myself.

After getting my Masters degree from Texas A&M, I am determined to go back to Pakistan to contribute my services to the agriculture sector. I want to help farmers and local people by teaching them to minimize postharvest losses. In Pakistan, more than 40% of fruits and vegetables are wasted due to poor postharvest handling. I wish more and more young people from Pakistan could get such opportunities like an AIP scholarship so that they could contribute to society in much better ways.

I have so much to take back to Pakistan once I return from the US — beautiful memories of searching for Pakistani food all over the US, the experience of doing everything on my own, the cultural diversity and many many more beautiful things. I will for sure share my experience with the youth of Pakistan, especially girls, to motivate them by telling them that I have been to the US, and they could be next. I will be returning to Pakistan as a more empowered version of Noorani. I want to thank AIP people, UC Davis, USAID and CIMMYT-Pakistan for being there and guiding me from the first step till today and for believing in me and selecting me for this scholarship from among hundreds of applicants.

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