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# AIP NEWSLETTER

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

Volume 3, Issue 3, July-September 2016

## Message from the Project Leader

### Greetings from AIP!

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

During this quarter, AIP's livestock component identified the serious need for production and housing systems in mountainous Pakistan, particularly under harsh weather conditions. Because animals are kept in closed shelters, especially in winter, harmful gas emissions need to be monitored. AIP introduced improved a cost-effective mobile mesh wall housing system (20 units) to monitor gas emission levels in both traditional and improved housing, and ascertain their harmful impacts on human and animal health, and livestock productivity. Also, improved and nutritious maize silage for livestock was introduced among dairy farmers, which increased milk production per animal per day by 0.9 liters, leading to higher farm-gate milk prices.

Noodle and pasta consumption is increasing in the country; high yielding durum wheat lines suitable for making these products were identified by screening a range of new durum wheat germplasm required for the release of new durum wheat varieties and to encourage durum wheat cultivation in the country. To improve wheat productivity, awareness campaigns were launched and informal community-based capacity-building sessions prioritizing the participation of women were conducted. The capacity building focused on crop management, post-harvest technology, durum wheat production and utilization, wheat rust management strategies, quality seed production, postharvest handling and safe storage of seeds and grains.

Efforts to disseminate protein-enriched hybrid maize seed are leading to high yields across Pakistan, which is very encouraging for farmers; they are not only enjoying the great taste but ensuring that the crop has a bright future in the country.

Innovative agronomy interventions that are considerably low-cost and farmer-friendly were introduced in Khyber Pakhtunkhwa (KP). For example, a local private seed company joined

hands with AIP to produce and distribute push-row planters that allow smallholder farmers to optimize plant populations in less time, compared to manual planting. AIP also told the farmers that it would support distribution of 100 planters among KP farmers to help maximize yields during the season.

During this quarter, women were trained in postharvest processing of vegetables, and tunnel farming of tomato, cucumber and mung bean.

Economic empowerment as a result of successful maize and wheat interventions and innovations, good agronomic practices and the adoption of new technologies by farmers was assessed through surveys at the household level in several districts of Punjab, Khyber Pakhtunkhwa and Azad Kashmir. Data were analyzed and the impact on people's lives, particularly smallholders, at the grass-root level was documented.

Perennial horticultural practices led to improved commercialization of fruits and nuts. Under E-Pak Ag, the use of ICT and smart communication equipment by female farmers and students in agricultural and dairy programs was introduced.

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 (UC 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.

Your comments and suggestions are welcome.

Best regards and enjoy reading.

**Md. Imtiaz**

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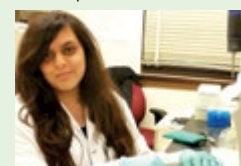
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## Livestock

### Innovative mobile mesh-wall animal housing introduced in the hilly terrain of Swat District, Khyber Pakhtunkhwa

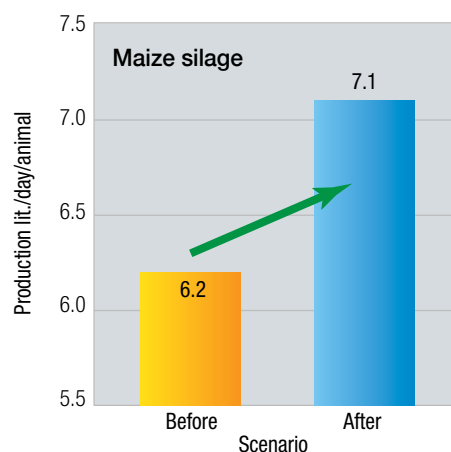
After several assessment surveys and studies, AIP-Livestock found that intensive production and housing systems in hilly terrain are unique compared to other production systems. In those systems, humans share their houses, which are completely closed, with their animals, especially in winter. Therefore, the gas emissions from livestock are hazardous to both human and animal health. AIP-Livestock installed 20 mobile mesh-wall housing units in September 19, 2016, in the Khawaza Khela area of Swat District. Scientific studies are planned to monitor gas (ammonia and methane) emission levels in both traditional and improved housing, and ascertain their harmful impacts on human and animal health, and livestock productivity.



A disabled dairy farmer admires his new livestock enclosure.

### Introducing maize silage for Azi-Kheil buffaloes in Swat, Khyber Pakhtunkhwa

AIP-Livestock has been working on alternative feeding regimes, including the introduction of maize silage during periods when fodder is scarce. In August 2016, a farmer-participatory trial was conducted with 18 lactating Azi-Kheil female buffaloes belonging to 15 dairy farmers. The results reveal that, on average, increases of 0.90 L/day of milk were recorded under the silage feeding regime. These average increases were also noticeable in dairy farmers' daily income, as they received higher farm gate milk prices.



Discussion with farmers on the 'Talking Pictures' tool.

### Development of the Talking Picture tool to optimize feed utilization by dairy farmers

As follow-up to the Feed Assessment Tool (FEAST) for NARS and academia launched in 2015, AIP is focusing on developing a pictorial tool (Talking Pictures) for the benefit of dairy farmers, who will use it to ascertain the productivity of their dairy animals. The tool is strategically designed to optimize the efficient utilization of feed resources under traditional and improved farming systems, and especially by subsistence livestock farmers. In September 24-30, 2016, ILRI scientist Dr. Ben Lukuyu, together with AIP-ILRI staff, visited several AIP-Livestock villages and conducted participatory appraisals with livestock herders to finalize the Talking Picture tool for Pakistan.



## Structural analysis of fodder markets in Hyderabad and Matyari Districts in Sindh

A strong marketing structure and readily available fodder market channels ensure an ample and consistent supply of fodder to subsistence livestock herders. In August 2016, AIP-Livestock conducted a structural analysis of the fodder markets in Hyderabad and Matyari Districts with 25 fodder traders in several localities. The results reveal that small-to-medium level traders earn 17% per mound (40 kg) of fodder and sell 40-50 mounds per day at 160 rupees per mound. Large traders sell

200-250 mounds of fodder (about 80% chopped fodder) to nearby urban dairies at a fixed rate (locally called 'baandh') for 15 days. This mechanism usually controls price volatility but adversely affects small-to-medium level traders, as their market share is minimal. There is need for a proper marketing infrastructure and a price-setting mechanism based on quality fodder products to bridge the gap between the profit margins of medium- and large-level fodder market traders.



Interviewing a fodder trader in his shop.



A fodder shop.

## Pre-testing of adoption census survey in Bahawalnagar District

AIP-ILRI initiated the process for piloting adoption surveys across Pakistan. The AIP-ILRI team has already pre-tested this survey for further refinements and mutated towards realistic manners. On August 24-30, 2016, ILRI scientist Dr. Nils Teufel visited Pakistan and, together with the AIP-Livestock team, devised an action plan for implementing the proposed survey in more than 50 project villages. This census survey set the platform for obtaining exact adoption figures for each technology and conducting an initial internal assessment of farmers' responses to AIP-ILRI's technology-promoting activities.



Pre-testing of adoption census survey tool.

## Feed and fodder quality assessment using the mobile AgriNIR analyzer

AIP-Livestock has been working to improve and promote highly nutritious animal feeds by assessing and evaluating feed resources in Pakistan. Analyzing plant material for silage, as well as forage samples and ingredients using traditional methods is time consuming and delays the production process. Therefore, feed producers usually do not have samples analyzed because this ultimately results in compromising the product quality (silage or concentrates).

AgriNIR is a portable NIR analyzer of forage and grain that in seconds analyzes/quantifies the percentage of moisture (dry matter), ash, starch, crude protein, ADF (acid detergent fiber), NDF (neutral detergent fiber), and crude fat present in the plant material.



The AgriNIR analyzer.

AIP-Livestock, in collaboration with private partners (Rafiq Agrico), introduced the first AgriNIR analyzer and started analyzing maize plants before ensiling, as well as silage samples. AIP-Livestock is planning to conduct silage quality assessment analyses to develop silage quality datasets to help ensure product quality based on various parameters.



Using AgriNIR to analyse maize silage samples.

## Performance of Rhodes grass in Punjab and Sindh

AIP-Livestock, in collaboration with ICARDA, established Rhodes grass on 2 ha in Chak No. 54, Bahawalpur (Punjab) and 3.5 ha in Kunri village (Sindh) in June 2016. After one month, a one-meter quadrat was used to measure the biomass and found that the Rhode grass produced 6 tons per ha. The performance of animals that feed on Rhodes grass at these sites needs to be evaluated.

### Supplementation strategy for fattening lambs and kids

AIP-Livestock, in collaboration with ICARDA, conducted sheep/goat fattening trials in Loralai, Baluchistan. A total of 60 male lambs and 30 male kids were selected from three farmers' flocks at Darghai Saifullah, Loralai. The lambs/kids were divided into three equal groups, i.e., groups A, B and C. All the lambs/kids were allowed to graze daily for 6-8 hours in nearby areas. In the evening, the lambs/kids in group A were fed commercial concentrate (source I), and those in group B were fed commercial concentrate (source II); group C was the control (no concentrate).



A Rhodes grass plantation in Bahawalpur.



feeding). From June 13 to September 1, 2016, the concentrate feed was offered @ 500 g/head daily. Live-weight data were recorded at 15-day intervals. The lambs/kids in group A showed the highest mean live-weight gain (15-17 kg), followed by group B (12-16 kg). Lambs/kids in the control group gained only 5-6 kg of live-weight over the 80-day period.

A similar trial was conducted in Umerkot, Sindh, with three farmers' flocks including 30 goat kids to demonstrate the advantage of supplemental feed in fattening operations. The treatments (concentrate feed source I – group A, source II – group B, and no supplements – group C) were applied, and all the kids were allowed to graze daily in the nearby

area for 6-8 hours. The supplemental feeding was given @ 500 g/head daily during the period from July 15 to September 9, 2016. The kids in group B showed higher live-weight gain (10.22 kg), followed by group A (7.5 kg), while kids in the control group (C) gained only 3.77 kg live weight over the 60-day period.



A Rhodes grass plantation in Sindh.

## Recognizing the role of female livestock farmers in desert ecologies of Pakistan

On 27th August, 2016, AIP-Livestock, in collaboration with the University of Agriculture, Faisalabad, and Khawateen Welfare Council (Women's Welfare Council), Bahawalpur, organized a maiden "Khawateen Goat Show" to show appreciation and recognize the role of women in the livestock sector in improving rural livelihoods in the desert ecologies of Pakistan. More than 700 female livestock smallholders (including 182 female smallholders from Bahawalnagar District and AIP-Livestock project dairy sites) attended this historic event, which set new trends in the agro-based economy of Pakistan and involved important stakeholders of society. The show was a first drop of rain in the desert ecologies of Pakistan for it highlighted the significant role played by women in strengthening the mainstay of Pakistan's rural economy. Trophies and cash prizes were awarded to the women who reared the best male and female goats, and also the best goat kids.



Khawateen Goat Show: women farmers presenting goats at event.



## Application of ultrasonography in small and large ruminants

AIP-Livestock, in collaboration with ICARDA and the University of Veterinary and Animal Sciences (UVAS), Lahore, conducted a four-day training course on “Field Application of Ultrasonography in Small and Large Ruminants” on August 8-11, 2016, at UVAS. Twenty veterinarians from all the provinces and administrative states of Pakistan were trained on the theoretical and practical aspects of utilizing ultrasound in small and large ruminants. The participants also received hands-on training on identifying the various stages of the reproductive cycle and pregnancy, normal genital organs and foetuses, pathological conditions during pregnancy and precautionary measures for accurate ultrasound reporting.

After the ultrasonography training at UVAS Lahore, AIP-Livestock, in collaboration with ICARDA, conducted a special four-day (August 16-19, 2016) ultrasonography training course at NARC Islamabad. Dr. Mourad Rekik, a scientist from ICARDA, conducted the training, which focused on field application of ultrasonography for diagnosing pregnancy to improve fertility in small ruminants and set the framework for introducing ultrasound-based pregnancy diagnosis in AIP project sites in Chakwal and Bahawalpur. The field training was



Ultrasonography training at UVAS.

conducted with the flocks in two model farms set up at the project site in Chakwal. Trainees received hands-on training and practiced on portable ultrasound devices fitted with both sectorial probes for trans-abdominal pregnancy diagnosis and linear probes for trans-rectal use.



Hands-on field training on the use of ultrasonography.



## Artificial insemination in goats



Training on Artificial Insemination in goats.

In 2014, AIP-Livestock, together with the University of Agriculture Faisalabad, took the initiative to introduce artificial insemination (AI) in goats in Pakistan with the objective of maintaining the purity of valuable, highly productive goat breeds such as beetal, Makhi Cheeni, Nachi, etc. Since then, 1771 people have been trained on AI in goats (1519 government and private practitioners and 252 final year veterinary students); however, more than 80% of the beneficiaries of this activity live in KP.

Due to repeated requests from the provincial livestock departments of Baluchistan, AJ&K, GB and Sindh, in August (22-24), AIP-Livestock, in collaboration with the Reproduction and Breeding Program (NARC) and staff from the Livestock and Dairy Department (KP), conducted a 3-day training course at NARC Islamabad for 30 participants (field veterinarians, livestock assistants and private AI technicians from all provinces). Beetal goat semen from the semen production unit at Harichand farm (which is a spin-off of an AIP initiative on AI in goats) was used at this training. The participants were also trained on the use of ultrasonography for detecting pregnancy. The AI goat training manual and the Nachi judging and selection manual produced by the project were used as training materials.



## Development of “Model cum Training Farms for Small Ruminants” linked to the value chain

AIP-Livestock, in collaboration with ICARDA, established three ‘Model cum Training Farms for Small Ruminants’ at a new project site in Umerkot, Sindh. One farm was inaugurated by the Technical Advisor of the Chief Minister, Sindh, on September 5, 2016. Federal and provincial government departments and institutions along with 50 livestock farmers participated in this

inauguration event. The overall objectives of AIP-Livestock and the model farm concept were discussed and shared with the participants. The PARC Chairman also gave a brief speech on AIP-Livestock and PARC joint efforts for uplifting the farming community in Pakistan. All the stakeholders highly appreciated the model farming concept launched by AIP-Livestock in Sindh.



A linking event for a model farm in Kunri, Sindh.

## Model Farm at 54 DB, Bahawalpur

Two small ruminant model farms were completed and inaugurated at 54 DB, Bahawalpur, on August 9, 2016. About 60 organizational representatives and farmers attended the event, including representatives from the Punjab Livestock Department, Islamia University Bahawalpur, ICI and the Corporate Group. The participants were briefed on the concept of the model farm and its benefits.



Inauguration of a model farm in Bahawalpur.

## Dissemination of AIP-Livestock research at an international seminar

A total of 6 research papers based on AIP-Livestock experiments and experiences were presented at the TASP-2016 conference held in Thailand on July 26-29, 2016. TASP published these papers in the proceedings (volume I and II) available at [www.tasp2016.com](http://www.tasp2016.com).



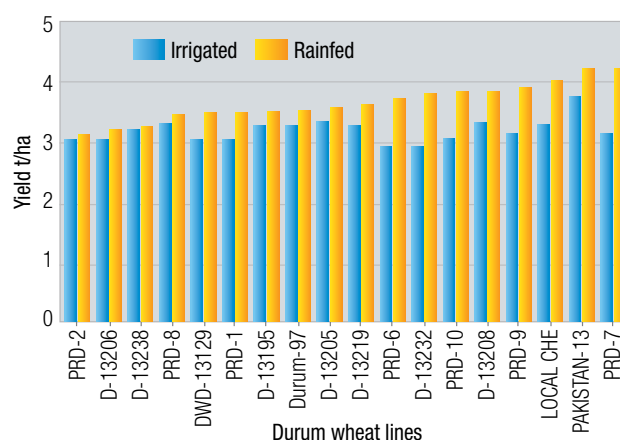
# Wheat

## Identifying durum wheat lines for Pakistan

National Uniform Durum Wheat Yield Trial at Barani Agricultural Research Institute, Chakwal.



To identify high yielding, disease resistant and acceptable durum wheat varieties, national partners in Pakistan evaluated 15 new durum wheat lines and compared them to one durum wheat check, one bread wheat line and a local check variety. The coordinated yield trial, an initiative of AIP's wheat component called the Durum Wheat National Uniform Yield Trial (DWNUYT), was conducted in 4 rainfed and 5 irrigated locations across Pakistan. In rainfed sites, PRD-7 produced significantly higher yields than the durum wheat check variety. In addition, durum wheat lines PRD-9, D-13208, PRD-10, D-13232 and PRD-6 were at a par with Durum-97 (Figure 1). Yield performance of PRD-6 was consistent during both years of testing. While higher yielding durum wheat lines are identified by screening a range of new durum wheat germplasm, currently available durum wheat varieties can be used to encourage durum wheat cultivation in the country.



Yield performance of durum wheat lines in irrigated and rainfed environments over three check varieties evaluated in Durum Wheat National Uniform Yield Trial (DWNUYT).

## Improving wheat productivity in Pakistan through capacity building

To improve wheat productivity, farmers' skills and capacities in various aspects of wheat cultivation were developed by creating awareness and demand for new wheat seed varieties in the villages. Informal community-based capacity building was given priority to ensure women's participation in such events.

Capacity building of 4,181 participants including researchers, students, seed company staff and seed growers will help improve overall wheat productivity. The capacity building focused on the following themes: (i) crop management; (ii) crop management and post-harvest technology; (iii) durum wheat production and utilization; (iv) wheat rust management strategies (seminar); (v) quality seed production, post-harvest handling and safe seed and grain storage; (vii) advanced Excel skills; and (viii) exposure visits and farmers' field days. Community-based hands-on training, exposure visits and farmers' field days focused on developing the capacity of seed growers and other wheat farmers.



Community-based hands-on training, exposure visits and Farmers' Field Days-focused for developing capacity of seed growers and other wheat farmers.



# Maize

## Taking biofortified maize to farmers

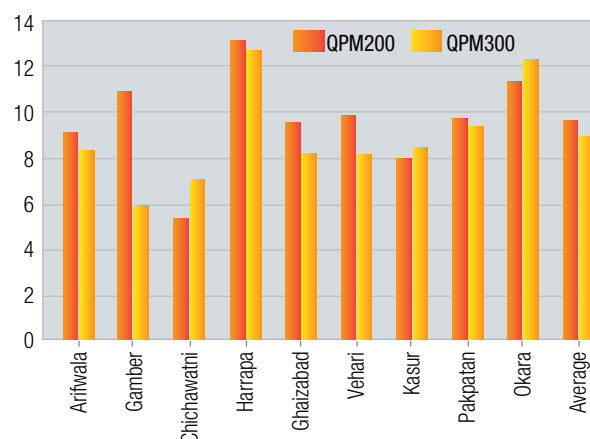
In Pakistan, nearly half of the children under the age of five are affected by stunting, vitamin A deficiency and other malnutrition problems. Biofortification of food crops is the most convenient, accessible and affordable way of combatting these problems as compared to industrial fortification or pharmaceutical supplementations. Under the AIP program, CIMMYT is testing biofortified maize varieties in Pakistan.

Earlier this year, two hybrids of protein-enriched maize (known as Quality Protein Maize or QPM) were launched by the maize program of the National Agricultural Research Center. Demonstration seeds of the hybrids were distributed to farmers



in KPK, Punjab, and AJK. The performance of the hybrids in farmers' fields was encouraging and farmers are expressing their interest. The comments below are from farmers in Punjab:

In addition to protein, AIP is also testing maize hybrids enriched with vitamin A and zinc. These hybrids will be allocated and further tested in farmers' fields in 2017.



Grain yield performance ( $t\ ha^{-1}$ ) of two QPM hybrids in Punjab.  
 Source: Drawn from the data supplied by Tara Crop Sciences Pvt.



A QPM farmer Malik Muhammad Nawaz.  
 Area: Zain Pur, Behra Sargodha (Photo: A. Beshir).



QPM cobs and field evaluation by stakeholders at a farmer demo plot in Rawalakot, AJK (Photo M. Ashraf).

## Enhancing public-private partnerships

Currently 21 public and private partners (11 private and 10 public) are working together under AIP-maize and sharing the performance data of various maize varieties being tested across the country. In addition, they are hosting demonstration plots and sharing valuable information across the maize seed value chain. Here is a good example of public-private collaboration: four private AIP partners (ICI-Pakistan, Jullundur Private Limited Co., Tara Crop Sciences Pvt and Rafhan Maize Products Pvt) hosted demonstration plots to promote two QPM hybrids (QPHM 200 and QPHM300) sourced from NARC. The companies used their innovation platforms to distribute seed of the new hybrids. A total of 24 demo plots were conducted under this collaboration. The companies have a list of progressive farmers and satellite stations where they gather stakeholders to demonstrate new products and services and get feedback from their stakeholders. This collaboration has helped NARC to reach many farmers in far-flung places in Punjab and enhance its networking with the private sector to explore future market channels. In addition, awareness of the NARC maize program will increase as farmers and other stakeholders get a chance to see NARC's research products. The private sector will benefit from this joint activity in the following ways:

- They will keep bringing new technologies to members of their innovation platforms



Joint AIP maize field evaluation at Ali Akbar Group Plc research farm at Buhwana, Chiniot (Punjab).

- They will be able to compare their product(s) against new ones
- The collaboration will create a way to obtain licenses for their products, if the performance of the new hybrids is convincing
- They will prove their goodwill and corporate responsibility to their clientele by promoting public products
- They will strengthen their networking with the public sector and the surrounding community to build trust and a good reputation

Similarly, three public institutions (MMRI-Yousafwal, University of Agriculture

Peshawar, Department of Agriculture, AJK) also joined hands with NARC to promote the new QPM hybrids in their jurisdictions during the reporting period.

The diverse partnership involved in evaluating maize varieties also included major value chain actors such as research institutions, seed companies, the wet milling industry, and farmers and farmers' institutions, among others. Bringing all relevant public and private stakeholders together in one platform will not only enhance partnership but also further cement collaborations in a win-win approach which is vital for the continuity of the project outcomes.

## Agronomy

### Push row planters distributed among smallholder maize farmers in Khyber Pakhtunkhwa Province, Pakistan

CIMMYT imported push row planters from Nepal and evaluated them in collaboration with national partners in Mardan, Nowshera and Peshawar on more than 50 farms during 2015-16. Compared with manual planting, planting maize with push row planters reduced planting costs and time, improved plant populations and increased yield. Petal Seeds, a local company in KP Province, joined hands with CIMMYT to produce and distribute the planter on a cost-sharing basis. Ameer Sani, a local manufacturer from Takhat Bhai Mardan, manufactured 30 push row planters that were distributed among smallholder maize farmers in KP Province at a gathering held in Mardan on July 21. On that occasion, Iqbal Hussain, Director General, Agriculture Extension KP, appreciated the efforts of USAID and CIMMYT and told farmers that sharing push row planters for maize planting in a village would help to maximize its benefit among the farming community. Dr. Muhammad Imtiaz, AIP Project Leader, informed farmers that AIP would support the distribution of 100 planters among KP farmers during the season.



Farmers with push row planters in Mardan.



## National partners collaborated to disseminate improved production techniques in Pakistan

AIP-Agronomy, in collaboration with 23 national partners, disseminated conservation agriculture techniques such as zero tillage wheat, ridge planting of wheat, new seeders like zero-till happy seeders, push row planters, multicrop zero-till planters and nutrient management techniques to more than 7,500 farmers through 1,000 on-farm demonstrations, distribution of 92 planters, 22 trainings and 78 farmer days in the project area. This was shared during the two-day AIP-Agronomy annual meeting 2016 that was jointly organized by CIMMYT and PARC under USAID's Agricultural Innovation Program (AIP) for Pakistan in Islamabad, Pakistan, on August 02-03, 2016. Dr. Nadeem Amjad, Chairman of the Pakistan Agricultural Research Council (PARC), inaugurated the meeting and appreciated CIMMYT and national



Participants of AIP Agronomy Annual Meeting-2016 with Chairman PARC in Islamabad.

partners' efforts aimed at developing and disseminating crop management techniques to the country's farming community. The meeting was attended by 60 agriculture professionals from provincial and federal research institutes,

agriculture extension, universities, private companies and international research centers who shared progress on AIP's agronomy activities and discussed implementation-related issues and future activities.

## National partners trained to use leaf color chart in rice



Leaf Color Chart use in rice crop training at RRI Kala Shah Kaku, Sheikhupura (Punjab).

A leaf color chart (LCC) and site-specific nitrogen management techniques help farmers to apply nitrogenous fertilizer according to the demand of the rice crop. On-farm demonstrations in previous years have shown that farmers are able to obtain similar rice yields by saving 26 kg of urea per acre in comparison with the general recommendation.

A training session on the use of LCC for N management in rice was organized at the Rice Research Institute, Kala Shah Kaku, on July 18, 2016. During the event, 20 master trainers from national partners, namely, RRI-KSK, Engro Fertilizers, Adaptive Research Farms Gujranwala and Sheikhupura and WRI-Faisalabad, were trained through technical presentations, discussions and field demonstrations. During the rice season, master trainers distributed 800 LCC among rice growers and trained in Faisalabad, Gujranwala, Sheikhupura, and MB Din Districts.

## Vegetables

### Technologies to improve mungbean production

Bhakkar and Layyah Districts are two of the four main traditional mungbean producing districts of Punjab, accounting for 70-80% of Pakistan's production. To demonstrate mungbean production with improved interventions, integrated pest management training sessions followed by field days were held on 3-4 August 2016 in Jamal Chhapri village (Layyah) and 50/TDA village (Bhakkar). More than 200 participants attended and were keenly interested in adopting the interventions introduced. Demonstration plots were planted in lines using seed treated with Rhizobium + PSB (Phosphorus Solubilizing Bacteria) before sowing—a new approach in the area, where untreated mungbean seed is typically broadcast. The judicious use of herbicides for weed control and of chemical desiccants before harvesting was discussed. The WorldVeg team and scientists from project partner Arid Zone Research Institute (AZRI), Bhakkar, presented control measures for insects/diseases along with other improved agronomic practices.



Farmer and facilitators discussed thrips damage to flowering mungbean during a field day held at Jamal Chhapri, Layyah (Punjab).

## Women learn postharvest processing methods

Thirty-three women learned how to reduce losses during storage of onions and tomatoes through better handling methods and curing techniques during a one-day workshop on “Postharvest management and value addition of tomato and onion” organized by the World Vegetable Center and the Agricultural Research Institute (South), DI Khan, on 2 August 2016. Ms. Mahrukh,

farmer field school facilitator, UN Food and Agriculture Organization, and WorldVeg Research Associate Ms. Faiza facilitated the training event. Ms. Farah Noreen, from Radio Pakistan, DI Khan, recorded the event for broadcast. Most participants had limited knowledge about handling and processing tomatoes and onions. They learned how to prepare tomato paste, sun-dried onions, and

onion preserved in vinegar sauce using ingredients readily available at home, such as spices (garam masala, cinnamon, cloves, red chili, salt and sugar) rather than chemicals. WorldVeg has successfully trained more than 200 women farmers in postharvest management and value addition in DI Khan, Swat, Gilgit, and Faisalabad.



A happy farmer with self-made tomato ketchup produced during a training session on tomato and onion processing at Himmat, DI Khan.



Participants and the course facilitator from the postharvest processing course.

## Tunnels for producing tomato and cucumber

On July 21, 2016, WorldVeg Pakistan, in collaboration with the Directorate of Vegetable Seed Production, Agriculture Research Institute Quetta-Balochistan, conducted a one-day on-farm training session for 34 farmers on tunnel management for tomato and cucumber at Khanozai, Pishin District, Balochistan. Water is scarce in Balochistan; farmers pump water from wells 100-300 meters deep, yet increasingly experience shortages. Tunnel farming with drip irrigation provides multiple benefits: farmers can produce more high quality vegetables on smaller plots of land, and use less water, fertilizer and pesticides in the process. WorldVeg and the Directorate of Vegetable Seed Production have established, through AIP, 15 tunnels in the uplands of Balochistan. Host farmer Faisal Adnan can attest to the tunnels' value – he obtained more than 5 tons of cucumber by the end of September 2016. Mastung farmer Sher Zaman shared his tunnel farming experience.



Farmers with DG Agri Research & World Veg team at Khanozai district, Pishin, Balochistan.

## Success in mungbean harvesting



A wheat combine is adapted to harvest mungbean.

Numerous farmers in Pakistan plant mungbean under different cultivation systems according to geographical spread, and they need an efficient method to harvest their mung crop. A wheat-fallow system works from August to October. Over the past two years, with a little tinkering and fine-tuning, the AIP agricultural engineer along with the AIP team transformed a combine harvester and demonstrated the technology to farmers and local farm service providers. As a result, combine drivers are modifying their machines and enjoying extra money by providing harvesting services to mungbean growers. About 7,500 hectares of mungbean were harvested by combine in Bhakkar, Layyah, and Chakwal in 2016, relieving farmers of manual labor, avoiding potential yield losses, reducing production costs, and saving time.



## Thresher and tools for producing onion seed



Onion seed thresher and tools handed over to Shuga seed village association.



Demonstration of onion seed threshing to Shuga seed village farmers.

Shuga Seed Village farmers received an improved onion seed thresher and field implements to strengthen their seed production activities during a ceremony at the village on August 16, 2016. Farmers, representatives from agricultural research and extension from Swat and Magnus Kahl International Pvt. Ltd, and media attended the event. Dr. Abdur Rauf from

the Agricultural Research Institute (ARI)-Mingora welcomed the participants. Mian Zada, President of Shuga Seed Village, expressed thanks to WorldVeg for providing the thresher and other field implements. "This will save our farmers' money and time, which will be spent on seed production and managing other crops," he said. WorldVeg Vegetable

Seed Specialist Mazullah Khan and Pakistan Team Leader Dr. Mansab Ali expressed their views to Shuga farmers and provided mother bulbs, seed, and other inputs; they hope to see farmers increase their production capacity and expand into producing seed of other crops such as okra.

## On-farm and on-station training

On September 01, 2016, 23 farmers from Chevanda-Faisalabad participated in a one-day training session on off-season vegetable production under plasti-culture at Malik Sharif Farm hosted by WorldVeg and the Vegetable Research Institute (AARI), Faisalabad. The training, led by Muhammad Iqbal, AARI Vegetable Expert, and Anam Fatima, WorldVeg Research Associate, covered subjects such as healthy vegetable seedling production, compost making, seedbed preparation, artificial methods of seed germination, and preparation of household bio-pesticides. New innovations such as the use of insect nets, kairomones, yellow sticky traps and other methods to control pests like fruit flies, whiteflies, aphids, jassids, thrips and armyworms were introduced. In addition, 26 farmers from the Pothwar region learned about best practices for protected vegetable cultivation during a two-day course (September 6-7, 2016) at NARC, Islamabad. Ms. Huma Abbas, Research Associate, WorldVeg, facilitated the course with resource persons from the NARC Vegetable Section. The training covered tunnel farming, pest and disease control, and healthy seedling

production. One master trainer farmer demonstrated the use of a seedling planter to the participants, which intrigued the farmers and heightened their interest in new technologies for successful farming.



Farmers learn how to make compost at NARC, Islamabad.



Yellow sticky traps in the nursery of Malik Shaif Farm, Chevanda-Gojra.



Participants of training on "Production Technologies for Protected Cultivation of Vegetables."

## Socioeconomics

### Tracking success: Follow-up surveys

AIP-SEP initiated follow-up surveys regarding different interventions of maize, wheat and conservation agriculture technologies. Detailed comprehensive questionnaires were designed to carry out the survey and currently data are being analyzed and reports are being written.

AIP-SEP is currently carrying out surveys on the following topics:

1. Zero tillage technology adoption in various cropping systems: Farmers' and manufacturers' perceptions.
2. Impact of access to improved maize seed among rural households in KPK and Punjab.
3. Evaluation of agronomic performance and adoption implications of QPM hybrids among smallholders in AJK and KPK.
4. Follow-up survey to identify preferences, uptake and outcomes of AIP wheat activities conducted across various districts of Pakistan.
5. Impact of laser land-leveling technology adoption on household income and food security in Pakistan.

## Perennial Horticulture

### Rejuvenation of an old unproductive pistachio orchard: A success story

As a result of the continued efforts by AIP-Horticulturist over one year, the 40 year-old pistachio orchard at ARI Quetta has been completely rejuvenated. Through the application of AIP-recommended good agricultural practices, the neglected non-fruiting trees are now normal fruiting trees. When harvested in August 2016, the orchard produced 7-8 kg of pistachios per tree, which is three times the 2-3 kg yield of the previous year. Additionally, the previously budded exotic scions (Kerman and Peter) have sprouted and successfully adapted to local climatic conditions on 20 trees in the orchard. This orchard block will not only serve as a demonstration site for teaching good agricultural practices but will also be used to commercialize known exotic high yielding pistachio varieties in the province.



A fruiting pistachio tree after rejuvenation at ARI Quetta.

Photo courtesy of UC Davis

### Commercializing new mango accessions in Punjab



On September 24, 2016, under the mango multiplication project of AIP-Perennial Horticulture, UC Davis, in collaboration with working partner University of Agriculture, Faisalabad (UAF), held a plant distribution session at Mango Research Institute (MRI) Multan. A total of 600 plants (300 plants each from Multan's two project-assisted nurseries) of 10 new potential mango accessions were distributed among 43 farmers from Rahim Yar Khan, Okara, Muzaffargarh, Vehari and Multan. This effort is intended to increase farmers' income by prolonging the harvest season and widening the market window for the mango growers of Pakistan.

Prof. Dr. Asif Ali, Vice Chancellor MNS UAF, distributes mango plants to growers of Punjab. Photo courtesy of UC Davis.

### Guava growers improve their farming practices through participatory training

Using the participatory approach of Farmer Field Schools (FFS), AIP-Perennial Horticulture held farmer field training centers (FFTCs) at four demonstration sites in Naushahro Feroze, Sindh, on a fortnightly basis throughout the previous quarter. Based upon an agro-ecological system analysis of the demo sites, a

total of 52 registered guava growers were trained on the identified topics, i.e., nutrition management, irrigation scheduling and disease control. The farmers were provided complete technical support and some material support to apply the science-based good agricultural practices in their own orchards.



## Training farmers on vineyard management during the monsoon season and the Benefits of Intercropping

During July-August, 2016, UC Davis, in collaboration with working partner Pir Mehar Ali Shah Arid Agriculture University Rawalpindi (PMAS AAUR), held three field days in project-assisted demonstration vineyards in Attock, Chakwal and Islamabad. A total of 66 grape growers were trained and successfully persuaded to implement the improved practices in their own vineyards, which enhanced the quality of production, increased land and water use efficiency, and resulted in greater returns from their farm enterprises.

Photo courtesy of UC Davis



Participants of Farmers Field Day on Vineyard Management at Izhar Farm, Talagang, Chakwal.

## Olive harvest and postharvest handling for superior quality oil production



Photo courtesy of UC Davis

A harvesting demonstration for olives at the Olive Model Farm in Sangbhatti, Mardan.

On September 22, 2016, UC Davis, in collaboration with Agriculture Research Institute (ARI), Peshawar, organized a field day with 50 olive farmers at the Olive Model Farm, Sangbhatti, Mardan. The aim of the field day was to raise awareness among olive farmers on how harvest timing and postharvest handling impact the quality of olive oil.

## AIP-E-Pak Ag

### Training women to use ICT in agriculture: The Dairy Herd Health Program

During August 2016, under the gender-specific intervention of AIP-E-Pak Ag with Pir Mehar Ali Shah Arid Agriculture University Rawalpindi (PMAS AAUR), three workshops were held to empower 65 school girls and domestic women on the use of ICT to help them find solutions to agricultural problems in general, as part of the "Dairy Herd Health Program." The participants were shown interactive videos on the topic and then given the assignment to look for web-available information related to the assigned dairy herd health problem using smartphones, tablets and laptops.



Photo courtesy of UC Davis

School girls from Village Mansooran, Faisalabad, trained on the Dairy Herd Health Program on August 18, 2016.

# Human Resource Development

## Training a new generation of agricultural scientists

From July 11-14, AIP's Human Resource Component and UC Davis organized a four-day conference for AIP scholars on the UC Davis campus in California, USA. Fourteen scholars (9 M.Sc. and 5 Ph.D. students, 6 men and 8 women) presented their research and participated in two days of discussion that were followed by a campus tour as well as visits to historical sites in Sacramento and nearby areas. In addition to student presentations, Dr. Muhammad Imtiaz, AIP Chief of Party CIMMYT, Dr. Helene Dillard, Dean, UCD-CAES, Dr. Ermias Kebeab, Associate Vice Provost, UCD-Global Affairs, and Dr. James Hill, PI for AIP-UC Davis, also spoke at the event. The purpose of this conference was for the students to report on their progress and share their research and experiences being away from home. They also discussed the challenges they may face in completing their degrees on time. In general, the students had a pleasant experience in the United States and spoke of the many friends and different cultures they have come to know. They are unanimous in thanking the American people for this great opportunity.



Thomas L. Rost welcomes the participants in AIP Scholars Conference at UC Davis, July 11, 2016.  
Photo courtesy of UC Davis.



Photo courtesy of UC Davis.

### “AIP gave me the opportunity to fulfill my dreams”

**Bazgha Zia, AIP M.Sc. Scholar, Purdue University, USA**

I was born and raised in a peaceful and historical city of Pakistan and completed my education at the best educational institutes of Pakistan but still the quest for the best never ended for me.

Getting selected as an AIP-HRD scholar through the Agricultural innovation program by CIMMYT and USAID came as an opportunity to me to fulfill my dreams for higher study at one of the world's best universities. Getting through all the process of getting selected and obtaining a visa was not easy but with the efforts and support of CIMMYT and USAID I managed to sail through all the process, reach USA and start my Master's degree at the Department of Horticulture and

Landscape Architecture at Purdue University, Indiana.

Purdue University was a good choice for pursuing a master's degree because it has a wide range of courses, good and helpful professors, and very good research facilities. The beginning of 1st semester marked the beginning of an era of hard work that was going to last for 2 years. To carry out research work along with courses filled with quizzes, assignments, daily tasks, online submissions and exams was a real studious job. Despite the exhausting nature of course work and research work, I still enjoy my study at Purdue University because of the helpful nature of professors and the co-workers, which makes a difference to US studies when I compare it with my studies in Pakistan. My research work focuses on analysing some genome editing techniques

targeting few genes that have some effect on the plant growth and developmental characteristics of tomato. This project involves learning a number of latest techniques that are adding to my level of expertise and exposure.

To be an AIP-HRD scholar at Purdue University Indiana has enhanced my international exposure and filled my personality with confidence, professional experience and also increased my knowledge of science, agriculture and innovation. I am confident that on my return to Pakistan I will be able to add to Pakistan's agriculture through the techniques and studies I have learned so far during my Master's studies in the USA.

I am really thankful to the supportive team of CIMMYT and USAID who went through all the hurdles with me and provided me the opportunity to study and learn at Purdue University.

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**Executive Editor:** Genevieve Renard

**Edited by:** Bianca Beks and Kashif Syed

**Reviewed by:** Dr. Md. Imtiaz

**Layout/Design:** Eliot Sánchez Pineda

#### Contact Us:

CIMMYT - Pakistan Office

CSI Building, NARC, Park Road Islamabad, Pakistan

**Phone:** +92 51 925 55 22-24

**Fax:** +92 51 925 54 34

**Website:** [www.cimmyt.org](http://www.cimmyt.org)

**For AIP newsletter:** Shamim Akhtar  
([s.akhtar@cgiar.org](mailto:s.akhtar@cgiar.org))