



# AIP NEWSLETTER

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

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## Message from the Project Leader

### Greetings from AIP!

I am pleased to share with you the Agricultural Innovation Program (AIP) updates for the quarter that ended on December 31, 2015.

The commissioned projects are picking up pace in the right direction. In less than two years, AIP, in partnership with the national agricultural research system in Pakistan, has identified approximately 50 maize hybrids and Open Pollinated Varieties (OPVs) suitable for further validation and commercial production. During this quarter, the second phase of the volunteer farmer's model (VFM) farms program established four setups in Bahawalnagar district, Punjab Province, to provide farmers with the necessary dairy husbandry and management services for sustainable livestock production. Across 14 districts in three Provinces – namely, Khyber Pakhtunkhwa (KP), Punjab and Balochistan in Pakistan – 278 farmers are growing Zincol, a zinc-rich wheat variety developed by the International Maize and Wheat Improvement Center (CIMMYT), in collaboration with Harvest plus, for demonstration and popularization. AIP also evaluated the New Holland wheat combine along with rice combine Kubota for paddy and grain quality parameters from basmati growing areas in Sheikhpura District of Punjab Province (a detailed comparison is included in this issue). Large-scale adoption of conservation technology among the farming community in the rice-wheat area is being promoted by AIP by supporting local manufacturing in Pakistan of the zero tillage Happy Seeder. A survey carried out during this quarter on the adoption of selected conservation agriculture technologies in Balochistan Province revealed that only zero tillage technology is being adopted, but on a limited scale. The perennial horticulture team managed to strengthen the technical knowledge of 249 Pakistani citrus growers in nursery, orchard and postharvest management. Higher profits are boosting the confidence of vegetable growing communities in Khushab District, Punjab Province,



where AIP introduced new high yielding tomato hybrids including Sahel, Kimia and Savera. Moreover, farmers are adopting the new approach for effective pest management that was introduced by the vegetable team and which includes Kairomone traps.

Laila Fayyaz is one of the AIP scholars enrolled in the Ph.D. program at University of California, Davis. She has been able to adapt to the new environment and is making her best effort to learn and enhance her skills.

E-pakAG is supporting the promotion of ICT tools through knowledge gathering and sharing, and a working paper summarizing the findings has been drafted.

I am fortunate to be supported by a highly effective team; with their hard work and commitment, the ball is rolling. AIP is the result of the combined effort of Pakistan Agricultural Research Council (PARC), the International Livestock Research Institute (ILRI), 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](http://aip.cimmyt.org). Your comments and suggestions are welcome.

Enjoy reading!

**Md. Imtiaz**

Project leader

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## AIP-Livestock

**AIP-Livestock is led by the International Livestock Research Institute (ILRI).**

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

### Dairy Value Chain

#### Phase II of Volunteer Farmers' Model Farms

The second phase of the Volunteer Farmers' Model (VFM) farms program started in October 2015, with the establishment of four farms in Bahawalnagar District, Punjab Province. These VFM farms have been equipped with innovative and necessary dairy husbandry and management requirements. As a spillover effect, neighboring farmers within and/or outside the village are enthusiastically adopting/ practicing cost-effective farm interventions for sustainable livestock production.



#### Free Access to Water and Balanced Feeding Trial in Khawaza Khela, Swat District, KP Province

As a continuation of a previously conducted trial aimed at enhancing livestock production, a comprehensive and detailed farmer participatory dairy production trial was conducted to study breed-specific effects and improvements on Azi Kheil buffalo. This farmer participatory trial was conducted with 11 farmers, each owning 17 buffalo cows. Significant breed-specific effects were quantified during this participatory trial. Following the trial, AIP-Livestock conducted a farmers' awareness program to disseminate results and overall impacts. There was an overwhelming response from livestock farmers in the village and 294 farmers attended the dissemination program. At the close of the program, bags of concentrated feed were awarded to three livestock farmers who obtained the highest production response during this trial.

#### Empowering Women in the Livestock Sector

Women in Pakistan play an important role in livestock farming activities. AIP-Livestock is encouraging women and enabling them to improve their livestock farming skills. It is also engaged in participatory activities with farmers in target areas to demonstrate adoptable solutions to improve livestock productivity by involving women.

In collaboration with the District Livestock Office, Jhang, two women's gatherings were organized on 25 November in the villages of Cheilla and 166/JB to discuss issues/constraints faced by women and their livestock. Dr. Haleema Sadia (Deputy District Livestock Officer) and Dr. Eugen Suhail (VO) actively participated in the discussions. The objective of these gatherings was to empower women to improve their livestock by teaching them better feeding, management and health care practices. Women from both villages showed great interest and actively participated during the sessions.





Ms. Shamshad Bibi, an AIP farmer beneficiary in the water and balanced feeding trial in Chella, was the guest speaker at the 166/JB village session where she shared her experiences. Dr. Haleema Sadia briefed the gathering on the role of women in livestock and urged women to improve their skills in order to benefit more from their livestock and enhance their livelihoods.



### AIP-Livestock Delegation Meets with the Secretary of Agriculture and Formulates a Collaborative Action Plan for the Betterment of Livestock in AJ&K

The AIP-livestock delegation met with Secretary of Agriculture Dr. Shehla Waqar in Azad Jammu and Kashmir (AJ&K) in November 2015, to report on achievements and finalize a future action plan for the betterment of the livestock sector in AJ&K. During this meeting, DG livestock and representatives of the planning commission were also present and assisted in identifying key areas of research and development that are lacking in the livestock sector. AJ&K government officials ensured their full support to implement AIP activities in selected project districts.

### Calf Survey in Punjab and Gilgit-Baltistan

The progress and development of the livestock sector relies mainly on the growth and management of calves in Pakistan. The available literature shows that the overall mortality rate of buffalo calves in Pakistan is 9.4%. The rearing of healthy calves is assured only when appropriate nutrition and management practices are applied, which results in a more productive herd. Calves are a neglected entity in the livestock sector due to high feeding costs and low returns from sale at the weaning age. AIP-livestock engaged in this gray area of research, and in October 2015 collected preliminary/baseline information on management and status of calf rearing. Data on 201 calves from Punjab (Bahawalnagar and Jhang) and 146 calves from Gilgit Baltistan were collected. Major constraints identified were housing, low growth rates, feeding and health care. Based on this information, a detailed and comprehensive action plan is being developed to enhance the supply of replacement stock.



## Small Ruminant Value Chains

### Creating awareness on prevention and control of internal parasites in sheep and goats in Ahmadun, Ziarat, Balochistan Province

Throughout the world, internal parasites are a major animal health constraint, especially in ruminants. Internal parasites lower animal growth and production. Responding to the request of farmers from Ahmadun, Ziarat, AIP-Livestock on 4 November launched a program to show how to prevent and control internal parasites in small ruminants. Farmers were trained on prevention and control (through de-worming) of the major internal parasites in Balochistan Province, as well as the benefits of adopting rotational grazing. After participating in the program, 32 farmers de-wormed 3,616 animals (1,154 sheep and 2,462 goats). The farmers also took part in drenching livestock with an anthelmintic drug as a participatory exercise. All the farmers highly appreciated the activity.

### Improving goat productivity through the introduction of genetically superior bucks in Bahawalpur



In Pakistan, use of genetically inferior bucks and mixing of goat breeds has resulted in lower productivity. In order to overcome this constraint, two pure Beetal (Makichini) bucks were provided to the local community of Chak 93DB, Bahawalpur District, Punjab Province. The selection of superior bucks was ably supported by Prof. M. Sajjad Khan of the University of Agriculture Faisalabad. Five farmers' goat flocks (with 20-30 goats each) were involved in this breeding program. All aspects of the breeding and management strategy (breeding season, supplemental feeding, and record keeping) were explained to them. The breeding of goats was initiated in November 2015 and the first kidding is expected to occur in April 2016.





## Development of model training farms for small ruminants in Dhulli, Chakwal

AIP-Livestock initiated the development of a model training farm for small ruminants in Dhulli, Chakwal, Punjab Province. Five farmers were selected at Chakwal to participate in the development of the farm on a cost-sharing basis. This will provide farmers with an integrated model farm concept for higher productivity, a participatory fodder-rangeland production approach and capacity development on animal breeding protocols.

Two model-cum-training farms were completed at Chakwal. The first farm was inaugurated by Dr. Shahid Rafique (Member

Animal Sciences, PARC) on 24 November 2015 and the second was inaugurated by Dr. Nadeem Amjad (Chairman, PARC) on 6 December 2015. Senior scientists from PARC/NARC were present on both occasions. The team also visited the three model farms under construction, as well as farmers' fields sown with fodder and crops, including cactus. A total of 120 farmers participated in these events. Drs. Shahid Rafique and Ibrahim explained the concept of the model farm and how to enhance the productivity of small ruminants.



## Potential of cactus as an alternative feed source in extreme environments

AIP-Livestock, in partnership with NARC and farmers, is introducing, for the first time, cactus as an alternative feed source for small ruminants in Pakistan. The *Opuntia* plant provides green fodder in dry months, plus water, vitamins, carbohydrates, and calcium that are required in the animal diet. The feeding of cactus to small ruminants was initiated in November 2015 and is being tested along with a balanced concentrate supplement. This provided an alternative feed source to pastoralists to help them overcome the grave feed scarcity in the dry areas of Pakistan.

The farmer participatory trial is being conducted in Dhulli, Chakwal, Punjab Province, with 120 sheep and 120 goats. The experiment is ongoing and the results will be available in mid-2016.



## AIP Livestock introduces VegMeasure® Software for digital vegetation charting technique

On 26-29 October, AIP-Livestock, in partnership with ICARDA, organized a four-day workshop on agro-ecological monitoring of rangelands to enhance the capacity of National Agricultural Research System (NARS) partners.

Dr. Sawsan Hassan, ICARDA-Jordan, conducted the workshop and provided hands-on experience on the VegMeasure® software and the digital vegetation charting technique to monitor vegetation on natural rangelands. This technique will enable the participants to evaluate ecosystem health and long-term sustainability. Thirteen Pakistani participants involved in rangeland management attended the workshop.



## Teaching farmers small ruminant feed formulations for higher productivity

On 14 December 2015, an awareness program on small ruminant feed formulations for farmers was organized at the Feed Mill Animal Sciences Institute, NARC, Islamabad. The program included a demonstration of how to prepare feed for small ruminants, including grinding, mixing and packing. A total of 17

farmers from Dhulli attended the program. A visit to a private feed mill in Islamabad was also arranged as a part of this program. This activity also enabled the farmers to develop linkages with animal nutrition scientists at NARC.

## Feed, fodder and rangeland

### Fodder market survey reveals the role of various actors in improving livestock productivity

The AIP-Livestock team conducted a fodder market survey in rural and peri-urban areas of Punjab (Jhang, Faisalabad, Sahiwal, Bahawalnagar Districts) on 9-16 October 2015. The purpose of the survey was to identify the key players in the fodder market and their role in continuously supplying forages. Information from 87 fodder market agents and suppliers was collected using a structured questionnaire. Fodder producers (6), traders (62) and buyers (19) provided information on the cost of production and the challenges faced by various actors at different fodder marketing stages. A detailed report is under preparation.





## Rangeland activities in Cholistan Desert, Punjab Province

The Cholistan Desert in Punjab Province covers an area of 26,000 km<sup>2</sup> in southern Bahawalpur, extending through the Nara and Thar Deserts of Sindh. The desert has an altitude of about 112 m above sea level. In Din Garh, lesser Cholistan, in November 2015, dry biomass was measured in a protected and unprotected area. The total fresh biomass in the protected and unprotected areas was 1001 and 325 kg ha<sup>-1</sup>, respectively. This exploratory/ preliminary study on plant biomass has provided an insight into the effects of water availability and rangeland management. This study needs multiple years to produce quality data for the improvement of these rangelands.

## Site selection in Balochistan Province for rangeland activities

In Loralai, two sites were visited to initiate rangeland activities. In SarMalk, the community has protected 100 acres for rotational grazing, while in Dergai Saifullah, the community has protected approximately 600 acres. The area has a Mediterranean climate and receives about 250 mm annual rainfall. The dominant plant species in Loralai are perennial shrubs (mainly *Sopha griffithi* and *Haloxylon*) and C4 grasses (mainly *Cymbopogon* and *Cryspogon* spp.), while water channels are occupied by *Saccharum griffithi*. In previous watershed projects, *Acacia modesta* and *Acacia victoria* were planted in water-harvesting structures.

## AIP beneficiaries of Mott grass serve as a fodder bank for other farmers in Cheilla, Jhang

In May 2015, AIP-Livestock distributed Mott grass root slips obtained from NARC to four farmers working a total of 0.5 acres in Cheilla village as a remedy to the fodder scarcity in summer and early winter. Due to the vigorous growth and high biomass production of Mott grass, these AIP beneficiaries are now serving as fodder banks for neighboring farmers in the village. To date, more than 15 additional farmers have benefited from this AIP intervention.

# Cereal 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](mailto:K.D.Joshi@cgiar.org).

## Popularizing biofortified wheat variety Zincol in Pakistan

Zinc deficiency is alarming in Pakistan. According to a study, almost every third child and more than 40 percent of mothers suffer from zinc deficiency (Bhutta et al., 2007). Though the zinc requirement may differ depending on growth period and gender, it is still difficult to fulfill without supplementation due to the lack of food diversity and over-dependence on cereals, which are generally low in zinc (Bouis and Welch, 2010). Biofortified wheat grains can be most effective in places where wheat is the staple food. Zinc-fortified wheat is the best option to overcome this problem (FAO Database, 2005; Seleiman et al., 2010).

Zincol, a new zinc-enriched wheat variety developed by CIMMYT, was evaluated in Pakistan by a large number of national partners in collaboration with HarvestPlus. This variety is currently being approved by the Variety Evaluation Committee (VEC) and will be approved by the Seed Council in the near future. In view of all the benefits this biofortified wheat variety can provide to a community, AIP-Wheat accessed a substantial amount of Zincol seeds and included them in participatory varietal selection (PVS) trials for further validation, as part of Informal Research and Development (IRD) for varietal popularization. The variety has also been included in the informal and formal seed production stream. Currently, 278 farmers are growing Zincol in 14 districts across three provinces, namely KP, Punjab and Balochistan in Pakistan for demonstration and popularization. In informal research and development and mother trials, each beneficiary received 25 kg of Zincol wheat seed, while in the case of seed production, the quantity varied from 50 to 150 kg. During this season, a total of 11,175 kg of Zincol seed were distributed among farmers (Fig. 1).

These activities will lead to the popularization and demonstration of Zincol in farming communities and trigger efforts to make seed available at farmers' doorstep. All these efforts will definitely boost the spread of this new wheat variety in Pakistan. Farmer field days on Zincol seed production are planned to create awareness among farmers. As for formal seed production, CIMMYT provided 100 kg of Zincol seed to Engro Pvt. Limited.

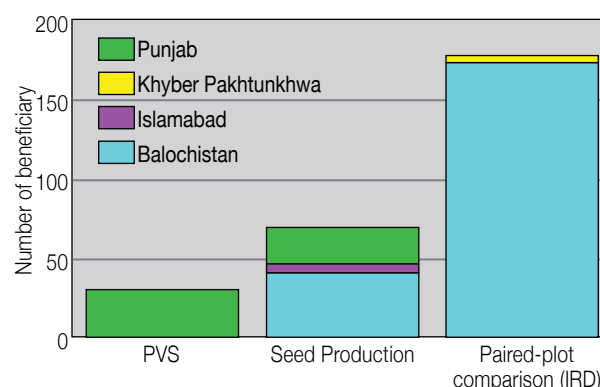


Fig. 1. Number of collaborating farmers using Zincol wheat variety under AIP wheat 2015-16.



Fig. 2. Zincol seed production in a farmer's field, P.D. Khan, Punjab. Photo: Attiq/CIMMYT.

# Maize

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

For feedback and queries, contact Abdurahman Beshir ISSA (CIMMYT-Pakistan): [A.ISSA@cgiar.org](mailto:A.ISSA@cgiar.org).

## Making Way for Affordable Quality Maize Seed in Pakistan



The AIP-Maize team started its field evaluation work in February 2014. They evaluated about 100 trials consisting of more than 1000 maize hybrids and open-pollinated varieties (OPVs) across Pakistan. In less than two years, the national agricultural research system has identified approximately 50 maize hybrids and OPVs suitable for further validation and commercial production.

AIP-Maize is a multi-stakeholder platform consisting of 20 public and private partners who are directly involved in Pakistan's maize evaluation and validation network. The number of stakeholders is expected to increase as the program further expands to include product testing and deployment in different parts of the country.

On 25 November 2015, AIP gathered stakeholders (policymakers, agricultural researchers and scientists, and farmers) to celebrate this achievement at a national maize field day, in partnership with the National Agricultural Research Center (NARC) in Islamabad.

At the event, Federal Minister for National Food Security and Research (MNFS&R), Sikandar Hayat Khan Bosan, applauded CIMMYT's efforts to alleviate the lack of affordable quality maize seed in

Pakistan. He also said "the country is importing a huge amount of hybrid maize seed which contributed to the high input price for the maize growing farmers, particularly those with limited resources. We need to strengthen our local capacity especially in hybrid maize seed production in order to enhance availability, accessibility and affordability of quality seeds to our farmers." He also expressed his appreciation for the role of PARC, CIMMYT and USAID under AIP.

Muhammad Azeem Khan, NARC Director General, said, "We are seeing valuable and precious contributions from the AIP which will help to lessen the dependency on imported hybrid maize seeds."

Seerat Asghar, Federal Secretary MNFS&R, appreciated the role of CIMMYT in strengthening Pakistan's wheat sector. He emphasized the collaboration between Norman Borlaug and national programs on wheat, as such collaborations will enable Pakistani scientists to achieve similar results in maize.

"Pakistan can be taken as CIMMYT's new frontier for maize where impacts are positive, substantial and sustainable," said Abdurrahman Beshir, CIMMYT maize improvement and seed systems specialist. "Such remarkable and fast results are only possible by creating strong collaborations, developing confidence and trust with partners."

Dr. Imtiaz Muhammad, CIMMYT Country Representative and AIP project leader, urged the stakeholders to make an all-out effort to deliver maize varieties and hybrids, particularly to resource-poor farmers.



*Minister Bosan being briefed on Quality Maize Seed introduced by AIP.*

# Rice

**AIP-Rice is led by IRRI.**

For feedback and queries, contact Abdul Rehman (IRRI): [a.rehman@irri.org](mailto:a.rehman@irri.org).

## IRRI evaluated the physical quality parameters of paddy rice harvested by different combine harvesters

One of the main challenges faced by millers and farmers is that combine harvesters cause excessive grain damage and harvest losses, which ultimately affect grain quality. With this in mind, AIP-Rice evaluated the New Holland wheat combine along with rice combine Kubota for paddy and grain quality parameters in basmati growing areas in Sheikhupura District of Punjab Province.

The paddy samples collected from the wheat combines contained many green and immature grains. Grain moisture was above 25 percent and green and immature grains were 81 percent higher than with the Kubota harvester. Paddy also contained a very high percentage of skinned and broken grains, which suggests that the combine harvesters are operating at very high drum speeds. There was also a lot of second cut material, which



*Quality of paddy harvested with a Kubota combine.*



may be caused when harvesting lodged crops; however, this may also suggest that the reel speeds are not being correctly matched to the harvesters' ground speeds. The percentage of shattered grain was also substantially higher when using wheat combines (Table 1). Harvesting losses and grain quality were much better with the Kubota rice harvesters than with the converted New Holland wheat combines.

When tested for physical grain quality parameters, this resulted in less than 50 percent head rice recovery by the wheat combine, which is 24 percent and 21 percent lower than manual and Kubota harvesting, respectively (Table 2). The percentage of broken grain was almost 50% higher, indicating that substantial losses of grain quality occur when using the wheat combine. These results suggest that the quality of combine-harvested paddy that comes into the mill needs to be more closely examined. It is estimated that by adopting new improved harvesters like Kubota, about Rs.3.6 billion from losses in paddy and grain quality could be saved annually.

**Table 1. Comparison of different combines for paddy quality**

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

**Table 2. Grain physical quality characteristics of different harvesting methods\***

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

\*Basmati 515

## Enhancing scientists' rice breeding and varietal evaluation capacity

On 6 October 2015, a workshop on rice breeding and varietal evaluation was organized by AIP-Rice, in partnership with the Rice Research Institute (RRI) at Kaka Shah Kaku. The workshop used the theoretical application of different breeding tools as well as hands-on laboratory and field training to enhance the skills of research scientists and students from nine research organizations across Pakistan.

The workshop was attended by 30 participants, including seven women. Drs. Surapong Sarkarung (Breeder) and Casiana Vera Cruz (Biotechnologist/ Pathologist), scientists from IRRI, imparted the training. Abdul Rehman, IRRI-Pakistan Representative, briefed the participants on AIP activities, particularly the introduction and evaluation of rice germplasm tolerant to various biotic and abiotic stresses. While talking on the objectives of workshop, Surapong shared his experiences and handling of breeding materials, selection of broad-based rice germplasm consisting of "new" plant types, plant selection derived from BC of SB combining bacterial leaf blight (BLB) resistance (Xa4, 5 and 21) with good grain quality and yielding ability, evaluation of IR 6 with sub 1, BLB resistance advanced breeding lines tolerant to abiotic stresses (salinity, drought and heat).

Vera Cruz talked on molecular breeding for biotic stress resistance and shared her experience on the identification and characterization of promising breeding lines for resistance to biotic stresses, particularly of BLB resistant Super Basmati lines.

The hands-on training in the lab consisted mainly of identifying BLB and preparing BLB inoculum, whereas in the field the emphasis was on criteria for selecting promising lines.

The participants found the training quite useful, and benefited the most when handling large populations in the field.



## Strengthening rice farmers' skills through smart practices

On 16 November 2015, in partnership with Engro Fertilizers, AIP-Rice organized an awareness training on handling harvest and postharvest paddy, in Dhahir village, Muridke, Sheikhupura, Punjab Province. The training focused on strengthening the skills of farmers and combine harvester operators, who were 85 in number.

The training emphasized the importance of quality paddy, optimum harvesting time, selection of a good harvester, maintenance of combine/ replacement of kit, farm-level drying and hermetic storage. This intervention will enable farmers to increase their income and improve the quality of rice for local and international markets. This will be achieved by minimizing harvest and postharvest losses, harvesting good quality paddy and earning premium paddy prices on the market. As a result, millers will have quality paddy and high milling recovery.



## Socioeconomics

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

For feedback and queries, contact Akhter Ali (CIMMYT-Pakistan): [a.akhter@cgiar.org](mailto:a.akhter@cgiar.org).

### Assessing the scope of CA Technologies in Balochistan through a survey

CIMMYT, in partnership with Balochistan University of Information Technology, Engineering and Management Sciences (BUIEMS), carried out a survey on the adoption of selected conservation agriculture technologies in Nasirabad and Zafarabad Districts, Balochistan Province. A comprehensive questionnaire was developed for collecting data on zero tillage, laser land leveling and raised bed technology. In total, 100 farmers were interviewed and the findings indicate that in Balochistan Province only zero tillage technology is being adopted on a limited scale.

### Social scientists from Balochistan trained on SPSS and STATA software

On 19-20 November 2015, an orientation workshop on SPSS and STATA was organized by CIMMYT in partnership with Balochistan University of Information Technology, Engineering and Management Sciences (BUIEMS). More than 40 faculty members were trained. **Engr. Ahmed Farooq Bazai**, Vice Chancellor of BUIEMS, during the concluding session expressed his appreciation for CIMMYT's efforts in building the capacity of social scientists from Balochistan on SPSS and STATA software.

## Agronomy

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

For feedback and queries, contact Imtiaz Hussain (CIMMYT-Pakistan): [i.hussain@cgiar.org](mailto:i.hussain@cgiar.org).

### AIP supports local manufacturing of zero tillage Happy Seeder in Pakistan

AIP started manufacturing zero tillage (ZT) Happy Seeders locally with Shareef Engineering, a private manufacturer in Faisalabad, Punjab Province. Given that Shareef Engineering has been producing ZT drills for the farming community since 2010, it was able to develop the first local version of the ZT Happy Seeder within two months.

The new local ZT Happy Seeder was evaluated at Muhammad Rafi's farm in Nanakana Sahib District, Punjab Province. Rafi used this technology to plant wheat on a combine-harvested four-acre



*Pilot testing of the locally manufactured ZT Happy Seeder in a farmer's field in Punjab Province, Pakistan.*



field. Wheat was planted in 1.5 hours/ acre, without burning rice residues, using a ZT Happy Seeder pulled by 85hp and 60hp tractors. This environmentally friendly wheat planting technique will enable farmers to reduce cultivation costs, increase wheat yields and reduce greenhouse gas emissions. Local manufacturing of these planters will increase the adoption of this technology by the farming community in the rice-wheat area.



*Jubilant manufacturer from Punjab Province during evaluation of the locally manufactured ZT Happy Seeder.*

## Vegetables

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

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

### Transferring knowledge on improved vegetable cultivation practices for better quality

On 5-9 October 2015, a video-link training on protected cultivation technologies was held in Pakistan. Twenty-five participants, including progressive farmers, scientists and researchers, received training under this joint venture between AIP and Punjab Agriculture University (PAU), Ludhiana, India. The purpose was to introduce Pakistani vegetable stakeholders to the advances in protected culture in Indian Punjab and their transformation in Pakistan.

Dr. Sharda spoke about the use of protected vegetable culture in India, whereas Mr. Asrar highlighted the situation in Pakistan. Following that, Dr. Sharda comprehensively explained the technology available at PAU, Ludhiana, and its implementation in Pakistan. Focusing on the challenges in protected vegetable cultivation in Pakistan, Dr. Sharda suggested improvements and also explained the importance of drip irrigation in protected vegetable culture, of controlling micro environment and minimizing the use of pesticides. He emphasized the installation of appropriate techniques/ parts and covering material and their role in healthy crop production.

Dr. M. S. Dhaliwal shared PAU recommendations for selecting crop and variety for protected cultivation. He provided details on the available varieties and their characteristics, as well as the research being carried out at PAU.

### Kairomone traps – An effective way to control fruit flies

Fruit flies are a big hindrance to normal fruit growth in gourds and cucurbits. Bitter gourd is highly affected by fruit flies and farmers use the easy method of chemical sprays to control them. Targeting the pest at the right time with the right product saves crops and generates better returns for vegetable growers. Intensive care of vegetables to avoid pests and diseases is the first step in building a proper integrated pest management (IPM) system. There are many ways to monitor and control pests in vegetables and fruits, but the most effective method is a Kairomone trap.



*A Kairomone trap hanging from a sponge gourd vine.*



*A close-up view of trapped insects.*

Kairomone traps are most well-known for controlling moths, butterflies and fruit flies. Keeping in view the importance of pest management for particular insects, AIP-Vegetables distributed Kairomone traps among farmers in the Pothwar area of Punjab Province, providing them with an effective biological control for fruit flies, moths and other insects. The trap, which has holes on both sides, is hung and a small cotton plug with 5-6 drops of

methyl eugenol is put inside. Male insects are attracted into the trap by the artificial chemical, which ultimately gets rid of the insects.

Mr. Saqib Nisar, a vegetable grower from Pothwar region, said, "Kairomone traps are very convenient and remarkable tools for pest management. I have earned more profit with improved quality vegetables."

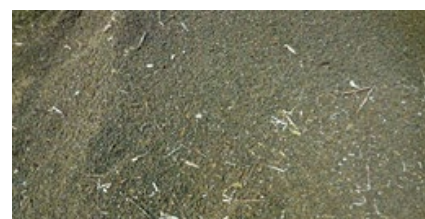
## Swat Green, a new okra variety, increased for seed production in Khyber Pakhtunkhwa, Pakistan

Okra variety Swat Green has been approved for commercial cultivation by the Provincial Seed Council, KP Province, Pakistan. This decision was taken during a high-level meeting between the representatives of Agriculture Research, Agriculture Extension, Federal Seed Certification and Registration Departments and progressive farmers held at the Agricultural Research Institute (ARI) statutory body for the approval of varieties, seeds and plant materials.

Swat Green was developed through conventional breeding in a consecutive variety screening program. This variety has a strong stem, light green foliage and medium fruit size. It outyielded the other varieties included in the trials, given that it produced 12 to 25 tons/ha of fresh yield in regional experiments across the province. Mr. Mazullah Khan, Vegetable Seed Specialist, AIP-Vegetables, is the principal breeder of this variety.

This variety can be recognized due to its green fruits and green, strong and erect foliage in the field. It can be planted at the start of April through to the middle of June to obtain high yield. In the month of April, 18-20 kg seed of this variety was sown on a hectare of land and took six months to maturity. Seed yields of 1600 to 2300 kg/ha were obtained with 75 cm intra-row spacing and 15 cm inter-row spacing.

Because of its thick stems, the variety is strongly resistant to lodging due to wind, which blows regularly in the northern mountain slopes of Malakand Division, Swat, KP Province. Swat Green is vital for research and trade in the Pakistani vegetable seed industry. AIP-Vegetables' value chain has included Swat Green in the list of varieties for seed production.



## High-yielding tomato hybrids lead to higher returns in Katha Saghral

Katha Saghral, Khushab District, located in Punjab Province, Pakistan, is a natural off-season tomato cultivation area. Since 1970, tomato is cultivated there on more than 3000 acres. The mountain range on one side protects the area from frost, providing ideal conditions for farmers to start picking the crop from mid-December until the end of March. Markets across Punjab and KP Provinces offer better prices for the produce in these months.

AIP-Vegetables, in partnership with the Horticulture Research Institute, National Agricultural Research Center, Islamabad, introduced new high yielding tomato hybrids, including Sahel, Kimia, and Savera, along with improved production technologies. The yield and phenotypic characteristics of these hybrids have

enhanced the market value of the crop in Katha and nearby markets. The cultivation of high yielding tomato hybrids is gaining traction among farmers of Katha Saghral. The fact that the hybrids produce twice the yields and higher profits is a real confidence booster throughout the community.

"Over the past one year, I have been growing tomato hybrids Sahel and Savera, the yield is almost doubled which is about 11.4 tons per acre compared to local varieties such as T-1359," said Raja Arshad, a farmer.

"Regular shape and size of the newly introduced hybrids is impressive, and the quality fruit fetches higher returns," said M. Hafeez, a tomato farmer.

## Strengthening the Pakistani vegetable sector through training

From October to December 2015, AIP-Vegetables trained a total of 629 beneficiaries including 470 men and 159 women in 20 capacity building events across Pakistan. The training focused on all three components of AIP-Vegetables – i.e., protected cultivation of vegetables, vegetable value chain and improved mungbean production – in partnership with national partners.



## A glimpse of the training

Photo	Title	National partner	Number of participants	Location
	Improved vegetable production technology for women farmers	Agriculture Department Muzaffarabad Azad Jammu and Kashmir (AJK)	15	Hattian Balan, AJK
	Better Nursery, Better Crop	Institute of Plant Introduction-SARC Karachi, Sindh Province	20	Gul Mohammad Nizamani, Badin, Sindh Province
	Better Nursery, Better Crop	National Tea and High Value Crops Research Institute, Shinkiari, Mansehra, KP Province	23	Shinkiari-Mansehra, KP Province
 	Postharvest management of tomato, chilies and onion	Postharvest Research Center-Ayub Agriculture Research Institute, Faisalabad, Punjab Province	57 (27 women and 30 men)	Chevanda-Faisalabad, Punjab Province
	Value addition of vegetables	Department of Agriculture, Gilgit Baltistan	42 women	Sher Qilla and Oshikh, Gilgit Baltistan
	National Postharvest Workshop	Postharvest Research Center (PHRC)	23	Faisalabad, Punjab Province

## Perennial Horticulture

**AIP-HRD is led by UC Davis.**

For feedback and queries, contact Louise (UC Davis): [lferguson@ucdavis.edu](mailto:lferguson@ucdavis.edu).

### Strengthening the technical knowledge of citrus growers

In November and December 2015, UC Davis, in collaboration with the Citrus Research Institute (CRI) Sargodha, Punjab Province, conducted eight trainings. These trainings have strengthened the technical knowledge of 249 Pakistani citrus growers on nursery, orchard and postharvest management.



Photo courtesy of UC Davis.

*Mr. Ehsan and Mr. Shakil teach growers about postharvest handling of citrus during the 15 December 2016 training.*

Title	Location	Date	No. of participants
Training on citrus nursery, orchard and postharvest management	Chak 4SB Bhalwal, Sargodha	26 November 2015	48 men
Training on citrus orchard and postharvest management	CRI Sargodha	30 November 2015	40 men
Training on citrus crop management	Chak 90 NB, Sargodha	12 December 2015	26 men
Training on citrus nursery, orchard and postharvest management	Chak 85 NB, Sargodha	15 December 2015	31 men
Training on citrus orchard and postharvest management	Chak 104 NB, Sargodha	16 December 2015	23 men
Training on citrus nursery management practices	Chak 709 T. T. Singh	22 December 2015	19 men
Training on value-addition in citrus	Sanat Zar, Sargodha	23 December 2015	43 women
Training on citrus nursery management practices	Chak Moza Anami. T. T. Singh	23 December 2015	19 men

### Increased grape production via improved vineyard management

The UC Davis collaboration with Pir Mehr Ali Shah Arid Agriculture University (AAUR), Rawalpindi, Punjab Province, on Establishment of a Demonstration Model of a Vineyard Trellising System continues to bear fruit. On 26 December 2015, AAUR organized a training session on winter season vineyard management at Wasiq Khan's farm in Attock District. Attended by 18 men farmers, the on-farm demonstration covered various aspects of vineyard management. In a follow-up monitoring survey, 61 percent of participants (N=11) were applying the newly learned management technique of post-pruning spray of lime sulfur on their own farms. The varieties these farmers are growing include King's Ruby, Flame Seedless, Flame Tocase, NARC Black, Sugra, Perlette, Loose Perlette, Vitro Black, Early White, Cardinal, Red Globe and Thompson Seedless.



## Conservation, multiplication and commercialization of indigenous mangoes

UC Davis is cooperating with the University of Agriculture of Faisalabad (UAF) on the Multiplication and Commercialization of New Potential Mango Accessions project. As part of this project, three farmer meetings were held on 20 November 2015 in Kot Addu, Muzaffargarh District, Sindh Province. Farmers were briefed on the objectives and ongoing activities of project. Project flyers were also distributed among the farmers to increase their awareness about the project.

Title	Location	Date	No. of participants
Farmer meeting	Thata gurmani, Moaza Esn wala	20 November 2015	15 men
Farmer meeting	Kasba Gujrat	20 November 2015	8 men
Farmer meeting	Khand fruit orchard, Moaza Esn wala	20 November 2015	8 men

## Group-based Learning for Improving Guava Production in Sindh

In collaboration with the Agriculture Training Institute, UC Davis has established four Farmer Field Training Centers (FFTC) in the district of Naushahro Feroze, Sindh Province. A total of 45 registered growers regularly visit these FFTCs fortnightly to learn production technology together in the designated demonstration plots. The project plans to establish three more FFTCs in Sindh, for a total of seven. As a result of this group-based learning approach, farmers will become organized, learn to cooperate as a community and will solve their production-related issues through group consensus and action.

## AIP-HRD

**AIP-HRD is led by UC Davis.**

For feedback and queries, contact Thomas L. Rost (UC Davis): [tlrost@ucdavis.edu](mailto:tlrost@ucdavis.edu).

### In her own words: A new beginning - learning to lead

Laila Fayyaz, AIP Ph.D. Scholar, University of California- Davis (UCD)

Simply dreaming about the life of those who are constantly advancing, accelerating and excelling in every field is easy for anyone to do. Such individuals become role models for their communities. It is good to appreciate them but what many cannot see is the other side of the picture. Not many people ask how hard it was for them to achieve their targets.

Currently, I am enrolled in one of the top American institutions, the University of California, Davis, a university that excels in agriculture. My journey began in Pakistan, specifically in the picturesque Malakand Dargai, an area close to Swat in Khyber Pakhtunkhwa Province. It is indeed challenging for me to adapt to a new environment and study in an innovative education system. This scholarship for me as a woman is a great honor, as not many girls in Pakistan make it to primary school.

Cali days initially engaged me in a skirmish, learning new routes and at the same time trying to fit in a new world of science and technology. I was struggling with my routes on campus, but to my surprise the people around have been very supportive. Not only have they guided me to learn the routes, some even helped me find my seat in class. I learnt the routes, interacted with new people and made friends.

Davis weather is beautiful and unpredictable. Jackets are always handy in the evening, no matter how warm the day might be. Moreover, conversing in a non-native language 24/7 is a new experience and at the same time funny. Many times at the grocery store, I would ask sellers for one thing and they



AIP Ph.D. scholar Laila Fayyaz working in the lab at UC Davis.

Photo courtesy of UC Davis.

would get me another. Now, I have adapted to the local accent and culture which is allowing me to grow well as a person.

Moreover, the educational system in the U.S. is very high tech. The first quarter was extremely challenging. I was constantly learning the content and adapting to the new teaching and learning style. Quarter system are fast paced, things are quick from assignment submission, receiving grades. The online homework system such as Smartsite and Dropbox is new to me and very interesting. It lets you submit assignments remotely from any point with internet access. I really appreciate the way the students are guided and helped by the professors here. They are very dedicated – so much so, they won't let a student go unless

they make everything clear at their ease. Although I had a hard time in academia, I am now able to understand much more since I have overcome many barriers.

I am living away from my loved ones to learn; sometimes it is really hard but my spirits are uplifted with the thought that my time here benefits my people back home.

As the forefather of Pakistan said,

*"With faith, discipline and selfless devotion to duty, there is nothing worldwide that you cannot achieve."*

—Quaid-e-Azam

I am thankful to the American people for their generous support to enrich me with this knowledge which will enable me to support Pakistani people in a better way.

## E-PakAg

**AIP-HRD is led by UC Davis.**

For feedback and queries, contact Mark Bell (UC Davis): [mark.andrew.bell@gmail.com](mailto:mark.andrew.bell@gmail.com).

### Knowledge gathered, knowledge shared

The public and private sectors in Pakistan are actively engaged in promoting information communication technology (ICT) tools, such as mobile phones, internet and so forth, for farmers. AIP supports these activities through gathering and sharing knowledge. During this quarter, a working paper summarizing the findings of seven consultations on ICT and agriculture has been drafted. The final version will be shared later in the following year with relevant officials and interested stakeholders.

### Effects of education and ICT use on gender relations

The principal investigator (PI) has completed a needs assessment survey in three districts of Punjab (Faisalabad, Okara and Dera Ghazi Khan). A gap analysis will also be conducted. In the initial stages of the project, the PI identified women's interest in poultry. Therefore, the website will be updated to include poultry resources to respond to this interest.



Photo courtesy of UC Davis.

*Dr. Anila visits a school at Chak Mansoor (near Faisalabad) as part of the October 2015 needs assessment survey for the ICT and Gender Project.*

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**Executive Editor:** Genevieve Renard  
**Edited by:** Amina Nasim Khan  
**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: Amina Nasim Khan  
[a.nasim-khan@cgiar.org](mailto:a.nasim-khan@cgiar.org)