

# AGRICULTURAL INNOVATION PROGRAM (AIP) FOR PAKISTAN

## Maize Semi-Annual Report April-Sept, 2017



Submitted October 2017

AIP-maize is a public-private partnership to enhance Pakistan's maize sector through market-oriented and science led innovations. It is led by the International Maize and Wheat Improvement Center (CIMMYT) in collaboration with Pakistan Agricultural Research Council (PARC) under the financial support of the United States Agency for International Development (USAID).

# **AGRICULTURAL INNOVATION PROGRAM (AIP) FOR PAKISTAN**

SEMI ANNUAL REPORT FOR THE MAIZE COMPONENT

APRIL - SEPTEMBER 2017

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# **Agricultural Innovation Program (AIP) for Pakistan Semi-annual Report for the AIP-maize component**

## **1. Technical and work plan update**

### **1.1. Summary**

AIP-maize is a collaboration work between public and private institutions in Pakistan aimed to enhance the availability, affordability and accessibility of maize seeds and varieties particularly by the smallholder farmers. AIP-maize currently works with 22 public and private partners across 37 districts in all provinces of Pakistan including Gilgit Baltistan (GB) and Azad Jammu & Kashmir (AJK). The program focuses on the evaluation and validation of diverse maize products sourced from international maize breeding hubs to fast track the deployment of best-bet products in Pakistan. So far 52 finished maize products have been allocated to both public and private institutions and more than 5000 kg of the parental seeds of these hybrids and open pollinated varieties produced in Pakistan. AIP maize works on the introduction and/or development of climate resilient maize germplasm; introduction and/or development of biofortified maize; development and/or introduction of maize tolerant to biotic stresses and enhancing the maize seed sector of Pakistan. In general, improving the capacity of national programs across the maize seed value chain is the centerpiece of AIP-maize.

During the reporting period partners able to produce more than three thousand kilogram of parental seeds. In addition, partners able to validate the adaptability of 88 maize products for the diverse maize growing environments of Pakistan. These selected products included biofortified maize, heat stress tolerant hybrids, drought stress tolerant germplasms and diverse maturity group of white and yellow maize hybrids. The first time in Pakistan, the seed production of three biofortified maize hybrids started in this period which ensures continued provision of source seed for further seed multiplication and scale up.

As part of maize products promotion and facilitation of linkages among stakeholders, AIP hosted the first ever national maize exhibition in Pakistan which was inaugurated by H.E Sikandar Hayat Khan Bosan, Federal Minister for Ministry of National Food Security and Research. More than 220 participants including but not limited to policy makers, scientists, seed companies, food and feed processors, higher learning institutions, local and international research and development institutions, farmers among others attended the three days national event. Furthermore, AIP organized a national maize travelling seminar where stakeholders visited the different maize trail stations and various innovation platforms. The exposure was a valuable opportunity for experience sharing and lessons learning among the

different value chain actors. A total of 50 maize professionals drawn from twenty eight public and private institutions attended in the two phases of the travelling seminar which is termed by the participants as “a mobile school”. The program also tested eleven types of maize trials consists of 542 new products during the spring 2017 season.

This semiannual report covers the period from April 1, 2017 to September 30, 2017 and includes a detailed summary and major results and outcomes as well as noteworthy operational achievements that contributed to the overall success of AIP.

## 1.2. Semi-annual highlights

In the reporting period AIP-maize achieved the following results against its outcome targets:

- **8, 295 people benefitted** by getting access to improved agricultural practices and technologies. The benefit came through the use of stress tolerant and high yielding maize varieties distributed under AIP.
- **1185 rural households benefitted** from USG assisted sources by using climate resilient maize varieties distributed during spring and Kharif seasons 2017.
- **592.5 ha under improved technologies and management practices<sup>1</sup>**, including over 180 ha under stress tolerant maize products which are climate adaptation technologies to help farmers adapt to changing climatic conditions. The extra early maturing white kernel maize varieties introduced under AIP proved to withstand water stress condition and partners able to produce these varieties in less than 5 irrigation per crop cycle unlike the common 10-12 irrigation requirement for most of existing maize varieties in Pakistan.
- **\$799, 887 in farm-level incremental gross sales** from the sale of maize grain at \$225 ton<sup>-1</sup>. The net incremental sale of \$214,000 enable per farmer sales to increase from a baseline of \$170 to \$450, resulting in incremental sales of \$280 per farmer: this calculation is based on the assumption that the maize farmers can harvest and sale at least 6 t ha<sup>-1</sup> by the use of AIP introduced and promoted maize technologies that will allow them to have a 50% yield increase than the national average. The total AIP-maize expenditure during the period for the sub grantees was \$112,000 which is an indication for the nearly 10-to-1 return on investment and an increasing commercial orientation among AIP-maize farmers and stakeholders.
- **22 SMEs, including farmers, received business development services** from USG assisted sources under the AIP program. Among these, AIP strengthened the research and development capacity of 12 private sector seed companies who are able to identify market ready maize hybrids to add

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<sup>1</sup> One ton of maize seed is enough to cover 50 hectares (ha) and each household (HH) plants an average of 10 kg for 0.5 ha. Estimated beneficiaries will be No. of HH x average family size (taken as seven for this report).

to their product portfolio. These SMEs are also giving training to farmers on quality seed production, technology adoption and business development who are linked as contract growers and demo farmers.

- **318 farmers and researchers received training on skill development** through on-job training maize exhibition, travelling seminars and visits to public and private partners' sites.
- **AIP-maize staff facilitated linkages among 12 seed companies and 10 public sector institutions** and five seed companies extended their services to farmers in GB, AJK, Balochistan and near the tribal areas of KPK through varietal demonstration and seed distribution.
- AIP-maize **leveraged more than \$60,000** through partnership with University of Agriculture Faisalabad for the development of locally adapted maize inbred lines by including the use of double haploid techniques. These leveraged funding expected to increase as partners are trying to secure more funding particularly from PARB for similar and other activities.
- **A total 63 seed producers and farmers applied improved technologies or management practices;** most of the beneficiaries were involved in hosting varietal demonstration and new maize trials.
- **A total of 26 tons of improved seed** was produced by the partners during the reporting period and over 50% of the seed has been distributed during spring and Kharif 2017.
- **AIP partners also identified 88 new maize products including 20 biofortified maize (two Kernel zinc enriched, 12 PVA and six QPM) and 18 heat stress tolerant maize hybrids.** In addition, AIP partners are using AIP allocated inbred lines as a breeding stock and using them in combination with other inbred lines to look for any further genetic gains. There are more than 30 hybrid combinations in the evaluation process.

### 1.3. Major activities/events in relation to commissioned projects

#### 1.3.1. Development or introduction of climate resilient maize

During the reporting period the following climate resilient maize trials have been harvested and across location data were collected from most of the sites:

- A total of **108 yellow kernel** climate resilient maize hybrids sourced from CIMMYT Mexico and Colombia
- A total of **352 white kernel** climate resilient maize hybrids sourced from CIMMYT Mexico and Zimbabwe
- Heat stress tolerant hybrids consisting of **20 entries including four local checks** were tested on nine sites in Pakistan. The germplasm were accessed from the Heat Tolerant Maize for Asia (HTMA) project, another USAID's project implemented in four South Asian countries Viz: Pakistan, Bangladesh, Nepal and India. This effort targets to deploy best performing heat stress tolerant maize hybrids from the HTMA project in Pakistan and create synergies among the two USAID's funded projects (HTMA and AIP).

The above list of Spring 2017 trials were grouped under 70 sets (Table 1) and evaluated and harvested in the different trial sites located in all provinces and territories of Pakistan. Out of the tested entries partners selected 24 white, 15 yellow and 10 heat stresses tolerant hybrids for product allocation and further seed scale up.

**Table 1: summary of climate resilient maize trials conducted during Spring 2017**

No	Trial Name/code	Trial description	No of entries	No. of reps	No. of sets	Remark/Seed source
1	02-16TTWCWN	Advanced three way cross white hybrids	36	3	4	CIMMYT Mexico
2	03-16TTWCYN	Advanced three way cross yellow hybrids	36	3	3	CIMMYT Mexico
3	16TLXTWN	Intermediate maturing single cross white hybrids	72	2	8	CIMMYT Mexico
4	16TLXTYN	Intermediate maturing single cross yellow hybrids	72	2	4	CIMMYT Mexico
5	16TSCTWCYN	Elite single and three way cross yellow hybrids	28	3	1	CIMMYT Mexico
6	EHYB16/17	Early/extra early maturing white hybrids	55	3	11	Widely adapted stress tolerant germplasm with tropical and temp. introgressions from CIMMYT Zimbabwe
7	IHYB16/17	Intermediate maturing white hybrids	64	3	13	Widely adapted stress tolerant germplasm with tropical and temp. introgressions from CIMMYT Zimbabwe
8	LHYB16/17	Late maturing white hybrids	55	3	13	Widely adapted stress tolerant germplasm with tropical and temp. introgressions from CIMMYT Zimbabwe
9	SXHT17	New single cross white kernel hybrids	42	2	6	Widely adapted single cross white hybrids from CIMMYT Zimbabwe
10	MLT-HTMA	Heat stress tolerant hybrids	20	2	9	CIMMYT-India
Total			480		72	



Figure 1 Seed bed preparation and maize planting spacing at MMRI



Figure 2 AIP maize field evaluation at ICI research farm Sahiwal, Kh-2017

**Table 2: AIP-maize partners participated in the evaluation of spring maize trials (2017)**

No	Partner name	Province	Ownership	No. of trials
1	Jullundur Private Limited (JPL)	Punjab	Private	5
2	Four Brothers Group (4B)	„	Private	2
3	Ali Akbar Group Pvt (AAG)	“	Private	1
4	ICI-Pakistan (ICI)	“	Private	5
5	Tara Crop Sciences Pvt (TCS)	“	Private	3
6	Kanzo Quality Seeds Pvt (KQS)	“	Private	2
7	Sohni Dharti International Pvt (SDI)	“	Private	5
8	Hi Sell Seeds Pvt (HiSS)	„	Private	2
9	Maxim International	“	Private	2
10	Maize and Millet Research Institute (MMRI)	Punjab	Public	5
11	Cereal Crops Research Institute (CCRI)	KPK	Public	7
12	National Agricultural Research Institute (NARC)	ICT	Public	7
13	University of Agriculture, Faisalabad (UAF)	Punjab	Public	2
14	University of Agriculture, Peshawar (UAP)	KPK	Public	1
15	Muhammad Nawaz Sharif Univ. of Agriculture	Punjab	Public	1

The trials listed above also included biofortified maize varieties which will be discussed in the next section.

### **1.3.1.1. Evaluation of heat stress tolerant maize hybrids**

Climate change poses a serious threat for future crop production. Climate change related weather extremes are being experienced by farmers in Pakistan leading to yield loss and changing of traditional farming practices. It is estimated that by 2050 major crop yields and the food production capacity of South Asia will decrease significantly – by 17 percent for maize – due to climate change-induced heat and water stress. Hence, to develop maize germplasm that can withstand higher temperatures (up to 45° c during flowering), CIMMYT is testing heat stress tolerant maize hybrids in Asia under the HTMA project where Pakistan is among the four South Asian countries included in the project.

Under the AIP program, partners are also testing heat stress tolerant maize hybrids sourced from CIMMYT-Asia maize breeding program in Hyderabad. As a result AIP partners identified ten heat stress tolerant hybrids and requested for further testing and deployment in Pakistan.

**Table 3: List of heat stress tolerant maize hybrids sourced from CIMMYT Asia hybrid maize breeding program (Hyderabad, India), Spring, 2017**

No	Name	No	Name
1	CAH1521	11	ZH15381
2	ZH141592	12	ZH138088
3	ZH15445	13	VH12333
4	ZH169	14	VH12337
5	Sib	15	CAH151
6	ZH1621	16	CAH153
7	ZH15374	17	Check 1
8	ZH1622	18	Check 2
9	ZH15379	19	Check 3
10	ZH15383	20	Check 4

The following heat stress tolerant hybrids have been selected by AIP partners for allocation:

Hybrid code	Hybrid code
CAH153	ZH138088
CAH151	ZH1621
CAH1521	ZH 169
VH12337	VH12333
ZH15379	ZH15381

**Table 4: AIP-maize trials distributed for “Kharif-2017” planting**

No	Trial Name/code	Trial description	No of entries	No. of reps	No. of sets	Remark/Seed source
1	16TTWCWN	Advanced three way cross white hybrids	36	3	2	CIMMYT Mexico
2	17CHTPROA	Provitamin A enriched yellow maize hybrids	25	2	2	Biofortified maize from CIMMYT Mexico
3	17EIHYBY	New set of single cross yellow hybrids adapted to subtropical environment (early to intermediate maturity)	30	2	2	CIMMYT Mexico
4	16TLXTWN	Intermediate maturing single cross white hybrids	72	2	2	CIMMYT Mexico
5	EHYB17	Early/extra early maturing white hybrids	50	3	4	Widely adapted stress tolerant germplasm with tropical and temp. introgressions from CIMMYT Zimbabwe
6	IHYB17	Intermediate maturing white hybrids	50	3	5	Widely adapted stress tolerant germplasm with tropical and temp. introgressions from CIMMYT Zimbabwe
7	LHYB17	Late maturing white hybrids	36	3	6	Widely adapted stress tolerant germplasm with tropical and temp. introgressions from CIMMYT Zimbabwe
Total			299		23	

### **1.3.2. Development or introduction of biofortified maize**

#### **1.3.2.1. Pro-vitamin A enriched hybrid maize in Pakistan**

In Pakistan, malnutrition is endemic. Children, in particular, are severely affected, with nearly half of all children in Pakistan being chronically undernourished. Chronic malnutrition commonly leads to impaired growth and development particularly in children. Pakistan ranks among the highest countries in the world for vitamin A and zinc deficiencies, which affect cognition and can lead to otherwise preventable blindness. To reduce this deplorable trend, AIP introduced biofortified maize products to Pakistan and partners identified well adapted hybrids for further seed scale up and distribution.

Earlier this year, AIP allocated three pro vitamin A (PVA) enriched maize hybrids to the University of Agriculture Faisalabad, making Pakistan the first south Asian country to receive these products. The seed increase of the parental lines as well as the hybrids is in progress currently at UAF to expedite the process of hybrids registration and large scale seed production. Apart from the higher carotenoid content, the grain yields of these hybrids are remarkably high with a record of up to 12 t ha<sup>-1</sup> from the various testing stations in Pakistan. In addition to the support from AIP, UAF is also contributing its own resources to harness the benefits of these hybrids and eventually reduce vitamin A deficiency. *“We will engage the private sector and other value chain actors to fast track the deployment of these hybrids in the target areas”* says Muhammad Aslam, assistant Professor and leading this activity at UAF, while thanking AIP-CIMMYT for this invaluable and very timely support.

Apart from UAF, a number of public and private partners have expressed interest in the commercialization of provitamin A and zinc enhanced maize products. During the reporting period partners also identified and requested the allocation of 20 biofortified maize products including two Kernel Zinc enriched, 12 PVA and six QPM hybrids. The seed production of the two QPM hybrids which were released earlier this year also continued during the reporting period.

However, it is important to enhance synergies among stakeholders and mobilize resources and required expertise to scale up the seed production and dissemination of these biofortified maize products to consolidate the gains under AIP and to curb the abysmal trend of Pakistan’s hidden hunger.

**Table 5: list of biofortified maize hybrids evaluation in Pakistan  
(Spring and Kharif, 2017)**

<b>No</b>	<b>Trial Name/code</b>	<b>Trial description</b>	<b>No of entries</b>	<b>No. of sets</b>
1	16CHTPROA	Provitamin A enriched yellow maize hybrids	42	2
2	15AEIRHPVA	New set of ProA hybrids adapted to lowland tropics	10	1
3	ADVQPM17esp	New white kernel Quality Protein Maize hybrids	40	5



Figure 3 parental seed increase of PVA hybrids at UAF



Figure 4 AIP maize evaluation at UAF, Kharif-2017

### **1.3.3. Development or introduction of biotic stress tolerant maize**

#### **1.3.3.1. Status of maize stem borer mass rearing facility**

Maize stem borer (*Chilo partellus*) is a destructive insect pest of maize in Pakistan. Yield losses because of this pest are estimated to reach 10-40% and in some severe incidences up to 60% losses have been reported. Application of insecticides is one of the practices mostly used by resource-rich farmers. However, cash-trapped small scale farmers have to face the yield losses unless they apply cultural practices which vary from place to place. The other alternative, perhaps the better option, is the use of tolerant varieties. Maize germplasms that have inherent resistance/tolerance to maize stem borer not only save farmers money from the lower use of pesticides, but also help to have a greener agriculture by reducing greenhouse gas emissions.

Identification of host-plant resistance in maize is part of the commissioned projects under the Agricultural Innovation Program (AIP) for Pakistan. Under AIP, stem borer resistance maize varieties sourced from the International Institute of Tropical Agriculture (IITA) are being screened to identify varieties best adapted to Pakistan's maize growing ecology. To accelerate this screening process, it was necessary to have a stem borer mass rearing facility where larvae could be produced in mass and thereafter released in maize varieties as a form of artificial infestation. The lab is currently screening maize germplasms sourced from IITA and in this second season testing data regarding, survival of plants, dead hearts and intensity of damage appeared on leaves of survived plants will be recorded two weeks after artificial infestation. The result from this trial will enable to identify stable and best performing entries.



Figure 5 Maize stem borer mass rearing Lab at IPMP-NARC

### **1.3.3.2. Promotion of hermetic storage technologies (metal silo) to reduce post-harvest losses and aflatoxin contamination**

Traditional storage practices in developing countries cannot guarantee protection against major storage pests of staple food crops like maize, leading to 20-30% grain losses, particularly due to post-harvest insect pests and grain pathogens. Apart from causing quantitative losses, pests in stored grain are also linked to aflatoxin contamination and poisoning. Mycotoxin contamination (especially aflatoxin and fumonisin produced by *Aspergillus flavus* and *Fusarium verticillioides* Sacc Nirenberg, respectively) makes grain unsafe for food and animal feed, thus adversely impacting food and feed safety. Consumption of high doses of aflatoxin leads to aflatoxicosis that can result in acute illness and death, usually through liver cirrhosis. To address this problem, a metal silo was developed as a valid option and proven effective in protecting stored grains from attack by storage insect pests. Metal silo is airtight; it therefore, eliminates oxygen inside, killing any insect pest that may be inside. It also completely locks out any pest or pathogen that may invade the grains inside. CIMMYT and its partners have been promoting this technology particularly in Africa. But the use of metal silo is also popular in Latin America and Asia leading to enhanced income opportunities to small holder farmers. *(Tadele et al, 2010. The metal silo: An effective grain storage technology for reducing post-harvest insect and pathogen losses in maize while improving smallholder farmers' food security in developing countries)*

In Pakistan aflatoxin contamination of maize is very common mainly due to poor drying and storage condition of maize. Although similar structures are available for the storage of wheat in rural areas, air tight metal silos for storage of maize are not common. In addition farmers awareness level on hermetic storage techniques is low. Hence, AIP is promoting the hermetic storage techniques in collaboration with NARC-Integrated pest management program (IPMP). The collaboration also includes training of farmers on the proper use of metal silos. During the reporting period prototype of different capacity of metal bins have been produced. Based on the ideal size and collaboration with the private sector, mass production of these storage will be continued.



Figure 6 display of different size metal bins prepared by NARC-IPMP for farmers distribution



Figure 7 a metal silo with 1 ton storage capacity

### 1.3.4. Enhancing the Maize Seed Sector

#### 1.3.4.1. Seed micro increase for the newly introduced maize varieties

One of the major activities conducted during the reporting period was the start of seed micro increase of the parental lines/breeder seeds of the new maize hybrids and OPVs distributed to partners under AIP. During the reporting period nine AIP maize partners (JPL, ICI, AAG, PSC- private ; NARC, MMRI, CCRI, ARI-GB, ARI-Quetta- public) have produced the below list of pre basic and parental seeds (Table 13).

**Table 13: Breeder seed and inbred lines produced under the AIP maize during Kharif 2016**

<b>OPV/Hybrid/Parent seeds</b>	<b>Amount of seed produced (Kg)</b>
TP1219	200
TP1220	113
TP1217	190
ZM 309	200
ZM401	100
CZP132011	300
CZP132001	440
TP1221	130
QPHM200	20
Various parental seeds	1318
<b>Total seed produced</b>	<b>3011</b>

These seeds will be utilized for demonstration and further seed multiplication and hybrid formation. In addition to this 23 tons of certified seeds of locally developed maize varieties, where AIP assisted in their demonstration and popularization to farmers.

#### **1.3.4.2. Public private partnership under AIP Maize**

Currently AIP partners reached 22 consisting of 12 private and ten public institutions working on maize research for development in Pakistan. All these partners actively participate under the AIP's maize variety evaluation and validation network which includes sharing of performance data of different trials. In addition five private seed companies and two public research institutions extended their services to AJK, GB and Balochistan provinces as well as to the tribal areas through the partnership and linkages created under AIP.

#### **1.3.4.3. Maize travelling seminar**

AIP maize in collaboration with PARC organized national maize traveling seminar from 22-26 May 2017 and 24-25 July 2017. The seminar brought together a total of 35 participants from private and public seed sectors in Pakistan to enhance maize production and productivity in order to meet current demand and plan for future needs. The seminar, hosted by the International Maize and Wheat Improvement Center (CIMMYT) in collaboration with Pakistan Agricultural Research Council (PARC), facilitated discussion around the demand for maize in Pakistan, which has experienced rapid growth in the last thirty years largely due to its demand for feed and food as a result of rapid population growth.

During the traveling seminar- that was held for seven days in two phases- participants evaluated the performance of different CIMMYT maize products at the project's partner research center, located in the Punjab province which is the hub of Pakistan's yellow maize production and the major source of poultry feed, a robust industry growing 8-10% annually. Participants also visited Khyber Pakhtun Khwa province where white maize is the dominant dietary staple. During the visit stakeholders were able to better understand the dynamics of major maize producing areas and future production trends, various crop management technologies, adoption and utilization patterns, production constraints and dissemination of maize-based technologies.

Concluding the seminar, Dr. Yusuf Zafar, Chairman of Pakistan Research Council highly commends CIMMYT for creating multi-stakeholder collaborations and actions towards increasing the production and productivity of maize in Pakistan. He pressed the private sector to take the lead in the production and dissemination of the new maize products shared under the AIP program. CIMMYT's Country Representative Muhammad Imtiaz called upon the private sector to continue to strive to meet the project's goals of a self-sufficient maize seed sector after the project ends.



Figure 8 Maize travelling seminar phase I-at MMRI



Figure 9 Concluding session of maize travelling seminar

#### **1.3.4.4. National maize workshop**

The International Maize and Wheat Improvement Center (CIMMYT) in collaboration with Pakistan Agricultural Research Council organized annual maize workshop in Pakistan under the theme “Innovative Maize Research for Nutritional Security and Improved Livelihoods” held from 11-13 April 2017 in Islamabad. It was organized under the USAID-supported Agricultural Innovation Program (AIP) for Pakistan.

A total of 220 participants drawn from major maize stakeholders and value chain actors in Pakistan attended the workshop. Twenty public and private companies working on maize displayed their products and services in a maize exhibition organized alongside the workshop.

Opening the workshop Sikandar Hayat Khan Bosan, Federal Minister for National Food Security and Research says “lack of affordable quality seed is one of the bottlenecks of our agricultural sector. We need to strengthen our local capacity especially in hybrid maize seed production in order to enhance availability and affordability of quality maize seeds to our farmers.” Minister Bosan also acknowledges the exemplary work of CIMMYT under AIP in helping and revitalizing Pakistan’s maize sector. “I have also conveyed the appreciation of my government for this invaluable contribution during my visit to CIMMYT headquarters in Mexico last September.” referring to his address during CIMMYT 50<sup>th</sup> year celebration in 2016.

USAID Deputy Mission Director Julie Chen appreciated the activities of AIP, particularly the sharing of CIMMYT maize products to partners. She remarked that, “with these new maize varieties we have more available, accessible, and affordable climate-resilient and nutrient-enriched maize for local seed companies and public research institutions.” In her address Chen also remembered U.S.-Pakistan cooperation in the field of wheat productivity dating back to the 1960s that led Pakistan to be self-sufficient.

Yusuf Zafar, chairman-PARC expressed his appreciation for USAID and urged stakeholders to benefit from the intervention and innovations of AIP. While delivering vote of thanks, Director General of National Agricultural Research Center (NARC), Muhammad Azeem Khan says “I cannot thank CIMMYT enough for the remarkable job doing in Pakistan since the time of Nobel Laureate, Norman Borlaug in relation to wheat crop. CIMMYT’s role in empowering institutions and fostering ownership and leadership of projects by local partners is the key for CIMMYT’s positive accomplishments for decades.

The hard work and sustained interventions from the CIMMYT side has once again culminated in another success story, this time in maize.”

During the three days workshop a total of 48 speakers delivered their presentations on various topics related to maize breeding and genetics, quality seed production, maize agronomy and extension, maize utilization and policy among others. Progressive maize farmers from Punjab and Khyber Pakhtunkhwa provinces and from the territories of Azad Jammu and Kashmir shared their experiences indicating the diverse interests and priorities of maize farmers in their respective areas. Twenty two public and private institutions who are currently working under the AIP-maize network were among the participants who shared their annual progress and lessons learnt under AIP. The AIP partners also shared the amount of seed produced from the CIMMYT derived maize products.

Based on the workshop evaluation, 88% of the participants rated the topics covered as very good and excellent. While the remaining participants rated them as good. Among the participants, 76% rated the maize exhibition and the official workshop inauguration as excellent and very good while 24% rated the opening ceremony as good. In addition, 81% of the participants appreciated the timeliness of the workshop while 88% endorsed Islamabad as an ideal place for the workshop. It was announced during the workshop that the presentations and other proceedings of the workshop will be compiled and shared to participants and the general public. Certificate of appreciation and mementos were distributed to various stakeholders during the workshop. The event gets wider local and international media coverage.

Here are the few links for further read [The Nation](#); [Associated Press](#); [Business Recorder](#); [USAID](#).



Figure 100 Minister Bosan cutting the Ribbon of the NMW (Photos: Syed Kashif/CIMMYT)



Figure 11 Visit of exhibition by guests



Figure 12 Julie Chen, USAID's Deputy Mission Director discussing about maize during exhibition



Figure 13 Visit of stalls by the general public



Figure 14 Maize exhibition during NMW of Pakistan 2017



Figure 15 Opening speech by Hon. Sikandar Hayat Khan Bosan, Federal Minister for National Food Security and Research



Figure 16 Partial view of Participants of NMW



Figure 17 Dr Beshir addressing the audience about the progress of AIP maize



Figure 18 Mementos award ceremony



Figure 19 certificate of appreciation handed over to UAF

## **2. PERSONNEL/MANAGEMENT UPDATE**

The probation period of one research associate at CIMMYT-Yousafwala office has been completed and staff is now working on permanent basis.

## **3. LESSONS LEARNED**

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

- Kharif season is more preferred than spring season for seed production due to the thermal heat that affects pollen shading and viability during spring season.
- The importance of seed production and parental lines maintenance training.
- The importance of hermetic storage and importance of the maize stem borer mass rearing facility for the national uniformity trials.

## **4. EXTERNAL FACTORS**

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

## **5. RISKS**

Security risks particularly in Sindh and Balochistan remains a concern.

## **6. CONTRIBUTIONS TO USAID GENDER OBJECTIVES**

AIP maize is evaluating protein and vitamin A enriched maize varieties in Pakistan. In kharif 2016, the evaluation included Zn enriched maize varieties. Apart from their grain yield advantage these germplasms will provide protein and other crucial micronutrients with particular importance to women and children to mitigate malnutrition and attendant diseases. In this regard three ProA enriched maize hybrids have been allocated to University of Agriculture Faisalabad for commercial production. These hybrids, once approved by the national system, believed to increase the availability of low cost biofortified foods in the market which in turn contributes for the nutritional wellbeing of women and other disadvantaged communities. The various AIP maize activities also created job opportunities for women during the reporting period. A total of 17 female students from various Universities got practical training in relation to maize. The AIP-maize activities are being conducted across the whole provinces of Pakistan which can be taken as an inclusive partnership.



## 7. ENVIRONMENTAL COMPLIANCE

Most of CIMMYT's maize germplasm are climate smart varieties which can best perform under stress environments. CIMMYT's germplasm which are tolerant to heat and water stress will benefit farmers in water scarce environments. In addition, CIMMYT materials which are under evaluation in Pakistan are developed through conventional breeding techniques, hence, they don't need additional inputs or extra environmental/biosafety care as compared to germplasms developed through non-conventional ways.

In agriculture, nitrous oxide is emitted when people add nitrogen to the soil through the use of synthetic fertilizers and it is volatilized into the atmosphere. The impact of one pound of nitrous oxide is 300 times as potent as one pound of carbon dioxide. AIP is evaluating nitrogen efficient maize to reduce the need for fertilizer. The target is to reduce the use of chemical nitrogen fertilizers by 75% and to get a comparable grain yield with well fertilized soils. For instance, if the current nitrogen application is 200 kg per ha, these varieties are expected to perform well with the application of only 40-50 kg per ha. These varieties will not only save farmers money, but could potentially significantly reduce greenhouse gas emissions. Similarly, varieties included under the stem borer tolerant trials will have significant environmental impact by avoiding or reducing chemical pesticides. Based on field evaluation partners identified best adapted low nitrogen stress and stem borer tolerant maize varieties. The identified varieties will be allocated to partners under the AIP program for registration, further seed scale up and dissemination.

## 8. COMMUNICATIONS

Under AIP maize due emphasis has been given to communicate the project activities to local and international stakeholders following the communication guidelines of USAID. The following mediums were utilized to communicate the AIP maize activities:

- AIP-newsletter
- CIMMYT News (<http://www.cimmyt.org/water-saving-maize-holds-potential-to-boost-farmer-resilience-to-climate-change-in-pakistan/>)
- CIMMYT News (<http://www.cimmyt.org/radio-broadcast-highlights-maize-improvement-in-pakistan/>)

- CIMMYT News (<http://www.cimmyt.org/pakistan-releases-first-quality-protein-maize-varieties/>)
- <http://leadpakistan.com.pk/news/first-maize-stem-borer-mass-rearing-lab-in-pakistan-inaugrated/>
- SeedQuest News about the release of QPM:  
[http://www.seedquest.com/news.php?type=news&id\\_article=85685&id\\_region=&id\\_category=&id\\_crop=](http://www.seedquest.com/news.php?type=news&id_article=85685&id_region=&id_category=&id_crop=)
- APAARI news about the release of QPM in Pakistan : <http://www.apaari.org/network/new-nutrition-knowledge-bank.html>

## Annexure -1

### Monthly/ Quarterly/ Semi Annual/ Annual Report

#### 1. Events Calendar for Meeting Held

S. No	Meeting Name	Date	Purpose	Person Responsible	Venue	Partners	Brief Outcome
1	Meeting with USAID new program leader	20 Oct. 2016	Introductory meeting and project update	Dr. M. Imtiaz	NARC/CSI committee room	AIP primary partners	Updates on the progress of AIP and discussion on further improvement
2	Meeting with NARC and PARC management	21 Oct. 2016	To discuss on the inauguration of maize stem borer mass rearing lab	Dr. M. Azeem Khan and Dr. Nadeem Amjad	DG NARC office	NARC maize program	Discuss on the inauguration program of the maize stem borer lab
3	Inauguration of maize stem borer mass rearing facility	25 Oct 2016	Launching ceremony	Maize improvement and Seed System specialist	NARC	NARC-IPMP and AIP partners and relevant stakeholders from public and private sector	The first maize stem borer mass rearing facility launched in Pakistan
4	Meeting with Prof. Dr. Iqrar Ahmad Khan Vice chancellor of UAF	16 Nov 2016	To discuss on the allocation of provitamin A hybrids	Maize improvement and Seed System specialist	VC office UAF	UAF maize program	Discuss on the delivery mechanism of PVA hybrids
5	Field visit to central and southern Punjab	16-19 Nov 2016	Field evaluation of AIP maize activities	Maize improvement and Seed System specialist	AIP partners sites in central and southern Punjab	Public and private AIP maize partners	Detailed field evaluation of kharif trials
6	Meeting with HQ finance and HR team	28 Nov 2016	To discuss financial and admin issues	Dennis, Jean F and Kicks	NARC/CSI committee room	CIMMYT Pakistan staff	Explanation about finance and admin issues
7	PhD thesis defense	17 Jan 2017	To attend a thesis defense of a PhD student attached with AIP maize	Maize improvement and Seed System specialist	UAF	Post graduate students and co-promoters	Student presented his work in relation to PVA hybrids provided under AIP
8	Meeting with Cereal coordinator of PARC	2 Feb 2017	To discuss coordination issues of AIP maize activities	Dr. M. Imtiaz, Dr. M. Yousuf and Dr. Beshir	CIMMYT, CCR office		Understanding created on the roles of AIP maize activities and the cereal coordination office of PARC
9	Interview	20 Feb 2017	To recruit RA for agronomy position	CIMMYT Pakistan recruitment committee	CIMMYT office ISB		Short listed candidates

<b>S. No.</b>	<b>Meeting Name</b>	<b>Date</b>	<b>Purpose</b>	<b>Person Responsible</b>	<b>Venue</b>	<b>Partners</b>	<b>Brief Outcome</b>
10	National maize workshop organization meeting	24 Feb. 2017	Discussion with PARC member plant sciences and cereal coordinator on the organization of the national maize event	Maize improvement and Seed System specialist	PARC member PSD office	NARC maize program	Discuss on dates, chief guests and program details
11	Pre-event meeting on the organization of national maize workshop	27 Feb 2017	To develop working matrix and share of responsibilities in the organization of the event	Maize improvement and Seed System specialist	CIMMYT office	Organizing committee	Discuss logistics and shared responsibilities
12	Meeting with Dr. Hans Braun	6 March 2017	AIP project updates	Dr. M. Imtiaz and Dr. Hans Braun	NARC/CSI committee room	CIMMYT staff	Discussion on project progress and way forward
13	Meeting with NARC administration	29 March 2017	To arrange venue and all the necessary preparations for the national maize workshop	Maize improvement and Seed System specialist	NARC admin office	NARC maize program	NARC agreed to host the event with the necessary logistics support

## 2. Meetings Planned for Next month, Semi-Annual Period

<b>S. No</b>	<b>Meeting Name</b>	<b>Date</b>	<b>Purpose</b>	<b>Person Responsible</b>	<b>Venue</b>	<b>Partners</b>	<b>Expected Outcome</b>
1	National maize workshop of Pakistan	11-13 April 2017	To review annual progress	AIP maize	Islamabad	AIP maize partners	Partners and value chain actors will discuss about the progress of AIP maize and will share their activities in relation to maize development and deployment in Pakistan
2	AIP maize travelling seminar	20-24 May 2017	Field evaluation of AIP maize activities	AIP maize	Farmers and partners sites in Punjab and KPK	PARC	Experience sharing among partners and further strengthen public and private partnership