



# Project impacts

Evidence from CABI's on-the-ground interventions in Pakistan

2020

**KNOWLEDGE FOR LIFE**

## Introduction

This report summarizes the key impacts and activities of our projects which were published as news and blogs on the CABI website (CABI.org) in 2020.

We think it's vitally important to share and communicate the results of this work with our partners, stakeholders and funders. In our experience, there is an important correlation between the success of our projects and sharing their outcomes. By sharing this information, we are able to demonstrate what has worked and learn from the experiences of other partners. Moreover, feedback on this report will also help us to improve how we report on our impact and field successes for our stakeholders and communities.

Generating impact is a critical component of a project's success. Every project has defined key performance indicators where managers and scientific staff are committed to generating positive results from the field. In order to extract and report successes from our projects, an integrated effort by project teams, communication teams, monitoring and evaluation and centre leadership is required. We also recognize that these outputs are an outcome of the efforts of our teams and partners who played a key role to make these activities happen on-the-ground.

## Acknowledgements

We would like to acknowledge the CABI teams working on the following projects who authored and contributed to these blogs and colleagues in the CABI marketing team who helped with the editing: Action on Invasives, Aflatoxin Control in Pakistan, Better Cotton Initiative, Cotton Advocacy for Policy and Seed, Plantwise, Natural Enemies Field Reservoirs, Strengthening Vegetable Value Chain in Pakistan.





## A message from our Senior Regional Director

CABI's centre in Pakistan has worked with our partners to help achieve the UN Sustainable Development Goals (SDGs), with a particular focus on SDG 2, Zero Hunger, and SDG 1, No Poverty, since the SDGs officially came into force in 2016.

It has been long observed that the number of people affected by hunger globally has been slowly rising since 2014 and recently, updates from around the world have made it possible to estimate hunger with greater accuracy.

The recent pandemic has only heightened the problem and there is now more responsibility on the institutions working in agriculture to develop strategies and approaches to improve the livelihoods of affected farming communities. It is therefore so important that we continue to focus on improving our food systems and food security.

Working with our partners, CABI has a valuable role to play in helping to put research into the hands of those who need it and building resilience in our food systems. Our scientists focus on problem solving through research - a principle that remains at the heart of our work. We bring our laboratory knowledge to the field and one of our global accomplishments has been our ability to take a 'systems approach' to crop protection.

Despite the Covid-19 pandemic, project teams have continued to implement field activities efficiently. This blog report features success stories on our project activities and interventions directly from the field in Pakistan, with a focus on invasive species, crop health, value chains and trade, and development communication and extension. Over the next few years, we will continue to generate impact-based interventions which will change the landscape of agriculture for farming communities in the region.

**Dr Babar Ehsan Bajwa**

Senior Regional Director – Asia





# Project impacts

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Dr Sabyan Faris Honey, CABI, and Deborah Hamilton, USDA

January 9, 2020



## Sensitizing maize growers of Punjab on aflatoxin biocontrol to produce quality crops for their communities

Farmers in the Punjab province of Pakistan produce 85% of maize not only for the purpose of helping to ensure local and regional food security but also for export to high end markets. Due to the presence of aflatoxin levels above permissible limits (20ppb) in maize grains, unfortunately local farmers are deprived of the ability to tap the high-end markets.

A major portion of the rejected maize, due to high levels of toxic aflatoxin, is being consumed in the domestic/ industrial market which promotes diseases in humans and animals and causes direct financial losses to the farming communities due to low prices.

To try and address these issues CABI, in collaboration with the **National Agricultural Research Centre** and **Rafhan Maize Products Co. Ltd**, is conducting field trials of biocontrol product AflaPak™ at major maize growing areas of Punjab province. These include Faisalabad, Khanewal, Lodhran, Sialkot, Okara, Pakpattan and Kasur with the aim of providing healthier and improved maize produce, free from harmful aflatoxins.

To strengthen the concept of biological control of aflatoxin for the provision of improved quality maize crop, the project planned to conduct a series of farmer training sessions in the aforementioned selected maize growing areas of Punjab and implemented ten trainings as the first phase.

In total 527 maize growers took part in these training sessions and were educated on the problem of aflatoxin in maize crop, its hazards and implications on human and animal health, the role of aflatoxin in the rejection of maize consignment with financial loss and possible management strategies with special reference to application of AflaPak™ biocontrol.

Farmers were receptive to the concept of introducing a biocontrol product to deal with aflatoxin contamination in their maize crops. They further stressed that upon the commercial availability of AflaPak™ they will be able to claim those pertinent measures to control aflatoxin in their maize crop, which they are currently unable to do so, have been taken.

A group of farmers from District Kasur also shared their thoughts by further adding that AflaPak™ will help them to produce quality maize which will ultimately be accepted by the high-end markets and increase their livelihoods by realising a better price of their improved quality produce. The Aflatoxin Control in Pakistan team will continue to conduct field training sessions for farmers on aflatoxin management with special reference to its biological control.



**Field training sessions for maize growers on the management of aflatoxin through biological control is helping to improve food security and livelihoods in Pakistan**

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 January 10, 2020



## Redistribution of *Zygogramma bicolorata* to control *Parthenium* in Faisalabad

Parthenium weed (***Parthenium hysterophorus***) is a serious problem in wastelands throughout Pakistan and so far, no single method alone has proven effective in its management. Among the various causes of its rapid spread in Pakistan, lack of natural enemies or presence of a natural enemy in a specific part of the country is perhaps the most important one. CABI's **Action on Invasives** (Aoi) programme aims to develop a sustainable management method for parthenium weed in Pakistan.

***Zygogramma bicolorata***, a parthenium-leaf-eating beetle is the only reported biocontrol agent of parthenium in Pakistan and is found feeding on leaves of the weed in various parts of Lahore, Changa Manga, Rawalpindi, Islamabad, and some parts of Khyber Pakhtunkhwa Province. However, at present the population of this beetle is not large enough to control the parthenium weed effectively.

Districts in central Punjab are densely infested with parthenium, and not a single biocontrol agent has been reported as yet on this weed. A team from CABI's office in Pakistan visited the Faisalabad district along with Dr. Ijaz Ashraf, Associate Professor Agri. Extension and Rural Development (and key part of parthenium awareness and management in Pakistan) from the University of Agriculture in Faisalabad (UAF) and surveyed various locations including agricultural lands, wastelands, and canal roads etc. infested with parthenium. They noted that *Zygogramma* had yet not arrived in this part of the province. The Aoi team then collected 2,500 beetles from Islamabad and Chakwal and shifted them to Faisalabad.



Teams from CABI and UAF moved the insects to research fields at the University for the Redistribution of *Z. bicolorata*. Prof. Dr. Muhammad Ashraf (H.I., S.I.) Vice Chancellor, UAF also graced the occasion to redistribute *Z. bicolorata* at selected sites on the university's research farms. The CABI team briefed all involved about the biological control of parthenium using *Z. bicolorata* and highlighted that considerable host range testing has already been done by Australia and South Africa to check the safety of this beetle and declared that it is host-specific to the parthenium. Afterwards, the Vice Chancellor released 2,000 *Z. bicolorata* beetles on parthenium plants along with the CABI team at UAF's research farms. The additional 500 beetles were released at a nearby village in Faisalabad in presence of the Vice Chancellor during a farmer day on awareness and management of parthenium.

After the redistribution of beetles, a seminar on parthenium awareness and management was organized at the CAS auditorium at UAF, where CABI's Deputy Director of Programmes in Pakistan, **Abdul Rehman**, spoke about the Aol programme. The Vice Chancellor appreciated the efforts CABI has made in the development of Pakistan's agriculture, adding that "this is the time to focus on the management of invasive species as they are destroying the native flora," and he also called for further collaboration with CABI in future for solving agricultural problems in Pakistan.



The next phase will take place in two months when teams will visit the sites where the *Z. bicolorata* beetles were distributed to check the survival, dispersal and **diapause** behavior of insects.

**Read more:**

**[Zygogramma bicolorata released at selected sites in Pakistan as biological control of parthenium](#)**

**[Colony of weevils safely in CABI Pakistan quarantine](#)**

**[Action on Invasives short course on classical weed biological control](#)**





 January 15, 2020



## CABI urges key ‘actors’ in the food value and trade chain to attend Pakistan Horti Expo 2020 and help boost exports

CABI is urging a range of key ‘actors’ in the food value and trade chain – including smallholder farmers, processors, wholesalers, distributors, retailers and exporters – to attend the **Pakistan Horti Expo 2020** and help boost the country’s fruit and vegetable exports.

The event, which will take place at the Expo Centre, Lahore, from 22-23 January 2020, is being organised as part of the ‘Establishment of Model Farms’ project initiated by the Government of Punjab’s Agricultural Department.

It is hoped that around 15,000 stakeholders, including 5,000 farmers responsible for growing mangoes, citrus, potatoes, vegetables and other produce, will attend the Expo and help transform Punjab into a melting pot for worldwide exporting of fresh fruits and vegetables. This transformation is being materialised by inviting 35-40 renowned International Chain store buyers of different countries including Ukraine, Germany, Indonesia, Sri Lanka, Bahrain, Qatar, UAE, Maldives and Tajikistan.

The **Model Farms project, implemented by CABI and Metro Group Company, Star Farm Pakistan**, aims to increase exported produce through improved value chains. The Model Farms concept is helping farmers to build greater capacity in areas such as harvest and post-harvest handling of crops and will also see the creation of international certifications for farmers, producers and suppliers to ensure they comply with strict food standards including Sanitary and Phytosanitary (SPS) measures.

**Dr Babar Bajwa**, Regional Director – CABI Central and West Asia, said, “The Model Farms Project is an innovative way in which we can improve the livelihoods of Pakistan’s smallholder farmers through an increase in exports as well as the food security of a nation whose population is currently the sixth highest in the world at 208 million.


“We encourage all actors in the food value and trade chain to come along to the Expo and find out more about the opportunities to get involved in the Model Farm Project and other initiatives which are ultimately aimed at making Pakistan’s fruits and vegetables more attractive to a global market.”

CABI is already active in Pakistan working with partners, including the Sindh Agriculture University, Tandojam, on projects to help strengthen the country’s food value and trade chain. This includes **work to help fight fruit fly and mango hopper pests** that can devastate crops if left unmanaged.

Other examples of CABI’s expertise in food value chains and trade linkages include a **recent collaboration with the Chinese Academy of Agricultural Science (CAAS)** to help Pakistan’s Ministry for National Food Security & Research (MNFS&R) enhance the country’s capacity to increase exports to China and other countries around the world.

The desire here is to enhance research and development – mainly in respect of increasing SPS measures to enhance its exports – as part of the Belt & Road Initiative that aims to improve regional integration, trade and economic growth between Asia, Africa and Europe.



 January 31, 2020



## Engaging women for food security through aflatoxin control in Pakistan

Women constitute 49 percent of Pakistan's population and play an important role in agriculture development. They are not only thought of as labourers, but also play their part as active researchers, extension agents and entrepreneurs.

Under the Aflatoxin Control in Pakistan programme, CABI teamed up with **Rafhan Maize Products Co. Ltd** and the **National Agricultural Research Centre** (NARC) to build capacity for a national system on aflatoxins and its biological control.

In this regard, the team organized five training sessions for technical staff of the **Department of Agriculture Extension Punjab**. Fifteen female extension agents were trained on aflatoxin prevalence records, its deleterious effects on human and animal health and possible management strategies with special reference to biological control approaches.



Female staff involved in laboratory activities at Crop Diseases Research Institute (CDRI), NARC.



Ms Faiza Kanwal, working as an Agriculture Officer said, “Aflatoxin contamination in maize restricts the farmers to sell their produce at low price which leaves them facing financial implications.” She also stated that the adoption of AflaPak™ as a biological control solution will be a viable and effective method to control the toxic fungus in maize crop which in turn will result in improved livelihoods of farmers.

In addition to training sessions, the project has engaged three female members of staff to support scientific work being carried out at the **Crop Diseases Research Institute** (CDRI), NARC. The women are learning scientific protocols to handle live cultures of aflatoxin producing fungi and their biological control agents.



**Women extension agents of the Department of Agriculture Extension Punjab attended training sessions as part of the Aflatoxin Control in Pakistan programme.**

It is anticipated that more women will be actively involved in implementing project activities. Empowering and facilitating women will have a durable positive impact on agriculture productivity and household food which will contribute to the socio-economic development of Pakistan.

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 February 5, 2020



## Sowing the seeds' for organic cotton in Pakistan

CABI, under its Cotton Advocacy for Policy and Seed (CAPAS) Project with funding from the **C&A Foundation**, is making good progress to support the procurement, production and certification of non-GMO cotton seed as well as the development of organic cotton policy in Pakistan.

Staff from **CABI's Central and West Asia** (CWA) Centre have already engaged key partners in government including the Balochistan Agricultural Research Institute (BARI), **Balochistan Agricultural Extension Department, Pakistan Central Cotton Committee** (PCCC) and the **Ministry of National Food Security & Research** (MNFS&R) to contribute to a move towards organic cotton.

Stakeholders have met to discuss the way forward for non-GMO cotton seed development and procurement of different nationally available varieties of the Non-GMO cotton seed for the coming season in Balochistan and farmers have also been identified to take part in the project.

Key organic cotton varieties suitable for Balochistan have been shortlisted, in consultation with cotton scientists, for their potential seed production performance, climate adoption capability, heat and draught resistance level and insect pest resistance.

CABI is going to secure 5000kg of non-GMO cotton seed of the varieties CIM 717, CIM 696, CIM 610, CIM 608 and CIM 554, CRIS 613, CRIS 510, CRIS 129, CRIS 134, CRIS 342 for further multiplication in the field through engagement with organic cotton farmers and the support of cotton research institutes.

The Director of CCRI Multan will facilitate seed germination testing at the centre before procurement of the seed lots. He also will provide seeds of colour cotton varieties which are new and will appeal for use to manufacture clothes for the fashion industry.



**The Director of the Central Cotton Research Institute (CCRI) Sakrand leads a meeting of partners**





#### **Cotton seed**

Currently 150 tonnes of non-GM cotton seed are being procured for the coming sowing season. This will produce 7500 tonnes of organic cotton which will be used for seed extraction for the next sowing season and the process will continue until 50,000 hectares of organic cotton is cultivated.

Under the CAPAS project the aim is to help secure indigenous seed, develop seed business and enhance the skills of organic cotton growers so that they can improve their livelihoods. CABI will also establish plant clinics and NEFRs (Natural Enemy Field Reservoirs) in the project area to help the organic cotton seed growers mitigate pests which threaten their yields.

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Dr. Haq & Dr. Ali (centre) discussing the new invasive threats and their possible biological solutions with training participants.

 February 11, 2020



## Learning about the commercial aspects of biological control to combat pests and new invasive threats in Pakistan

Biological control is a key element of an integrated pest management strategy. Not only is it environmentally safe but it is also important for sustainable crop production. Among various biocontrol methods, increasing the presence of natural enemies is an effective substitute when they are not sufficiently abundant or effective.

In Pakistan, biological control has received a fair amount of research attention and is playing a key role in controlling major insect pests, minimizing the use of pesticides, and conservation of the environment. With help from the government and other agriculture research and development organizations, farmers have learned to manage their pests with limited use of insecticides.

The Directorate of Agriculture Extension, Integrated Pest Management (IPM) in Punjab Province has established 11 Bio-Labs for culturing biocontrol agents for distribution to farmers to apply on their crops, vegetables and orchards.

At the request of Agriculture Extension Department, Punjab Province, a capacity building session for the agriculture staff at Bio-Labs on the commercial aspects of insect bio-control agents to manage the major pests and new invasive threats was organised by CABI Pakistan together with its partners: **Pakistan Agricultural Research Council (PARC)**, National Agricultural Research Centre (NARC), **Institute of Plant & Environmental Protection (IPEP-NARC)**, **Agriculture Poly-technique Institute (API-NARC)** and Directorate Agriculture Extension IPM. The training was designed to support agriculture staff of Punjab to improve their skills for culturing the natural enemies for weeds and insect pests of major crops including invasive pests and new threats.

The training course was run by Dr. Ehsan ul Haq (IPEP-NARC), Dr. Kazam Ali and Abdul Rehman (CABI) in four sessions. In total, 48 took part including 11 Agriculture Officers and 37 Laboratory Assistants.

**Blog continues on page 69...**





The participants were briefed on theoretical and practical knowledge about culturing of natural enemies, as well as the inherently safe, cost effective, target specific, environmentally-friendly success of biocontrol agents, and the ways to initiate a small biocontrol agent industry and its sustainability. Additionally the trainees were also familiarized with culturing of stem boring weevil, *Listronotus setosipennis* a bio-control option for *Parthenium hysterophorus* an invasive weed in Pakistan and other potential invasive threats.

In the closing ceremony training certificates were distributed to the course participants. During his closing remarks Dr. M. Ayub Khan, Member Plant Sciences (PARC) commented that “these kind of training courses are a great success to update the knowledge of agriculture staff on the recent advancements in biological control and I am truly happy that at the end of training course we are able to make trainees aware that biological control can be adopted as a commercial business even on a small scale”.



Chairman (PARC) distributing certificates for successful completion of training course

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 February 19, 2020



## First biological control laboratory created in Pakistan to research poisonous aflatoxins

The first biological control laboratory to research poisonous aflatoxins has been created in Pakistan as part of a collaboration between CABI and the **Crop Diseases Research Institute** (CDRI) at the nation's **National Agricultural Research Centre** (NARC).

The facility, under the **Aflatoxin Control Programme in Pakistan**, aims to ensure the state of food security in the country by validating an eco-friendly biocontrol to diminish poisonous aflatoxins which have the potential to decimate crops such as maize, wheat and rice.

Aflatoxins are a group of toxins produced by certain fungi – **Aspergillus flavus**. These aflatoxins are toxic and can also cause serious health problems for humans and livestock. According to the US **National Cancer Institute**, for example, aflatoxins can lead to an increased risk of liver cancer. Because of the problems within the food chain they consequently affect a country's ability to trade.

Under the public-private partnership programme led by the **United States Department of Agriculture** (USDA) alongside US company **Ingredion** and its subsidiary in Pakistan, **Rafhan Maize Products Co. Ltd**, researchers are currently engaged in the design, implementation and analysis of the performance and efficacy of the biological control product – known locally as AflaPakTM.

CDRI's primary role is to multiply and validate atoxigenic strain on maize crop which is further developed by Rafhan Maize for the use of farmers to control aflatoxin in maize crop.

The biocontrol lab has been established at CDRI with support of USDA to strengthen the research capability of CDRI under the umbrella of the Aflatoxin Control Programme. Dr Atif Jamal, Senior Scientific Officer at CDRI, added that this is first biological control laboratory in Pakistan which will replicate the aflatoxin control research on the pattern of advanced research being done in USA.

CDRI is looking forward to playing its part in capacity developed on national system by providing training to students, researchers and extension agents. They further aim to replicate this AflaPakTM technology to other crops like rice, groundnut and chillies to make them safe from contamination of aflatoxins.

Dr Shahzad Asad, Director of CDRI, said that this project will set a direction to explore the area of aflatoxins and its management through research and development.





**Research is underway at the newly-created biological control research centre for aflatoxins – the first of its kind in Pakistan.**

Dr Sabyan Faris Honey, Project Manager Aflatoxins Control Programme at CABI, added that being lead agency of this project CABI is fully engaging partners like the CDRI to do the novel research on aflatoxin control to ensure food security in the country.

### **Additional information**

#### **Aflatoxin Control Programme**

Find out more about CABI's work on aflatoxin control in Pakistan.

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 February 28, 2020



## Farmers learn advanced nursery raising techniques to strengthen Pakistan's vegetable value chains

Onion and chilli farmers from villages in Pakistan's Sindh province have come together to learn the best practices of vegetable nursery raising as part of the CABI-led **Strengthening Vegetable Value Chains Project** (SVVCP) project funded by the **Australian Centre for International Agriculture Research** (ACIAR).

The farmers from Ibrahim Shah and Khari Mohammad of district Tando Allahyar have relied upon conventional practices to raise onion and chilli nurseries for their own consumption and for sale. However, they have seen their yields suffer from less germination and mixed quality seedlings.

A needs assessment, conducted in Sindh and Punjab where four major vegetables (onion, potato, tomato, chillies) are grown, was carried out as part of the SVVCP project and showed that growing consistently good quantity vegetables remains challenging.

Not only had the farmers from the villages in Tando Allahyar not enjoyed the opportunity to learn improved and advanced nursery raising techniques but they also hesitated to adopt the best practices due to a lack of confidence and fears of failure.



The adoption of better nursery raising techniques is starting to produce results for farmers in Sindh province.



This attitude might be due to farmers' lack of capacity to bear the risk associated with the adoption of new practices and technology, according to the SVVCP Project Executive Dr Babar E. Bajwa and Project Manager Muhammad Asif.

The farmers travelled to the SVVCP project site at Muzaffargarh, Punjab province, to take part in vegetable nursery raising training which was arranged by the **University of Agriculture, Faisalabad** (UAF). Here they had the chance to learn best practices of nursery production from the UAF team as well as other farmers from the province.

The training covered several aspects including preparation of a nursery media from local ingredients; plug tray filling with nursery media, seed sowing in the plug trays and the best practices of seed sowing in raised beds.

The farmers learned these practices and implemented them in their field to raise more productive vegetable nurseries. They achieved an overwhelming response in terms of germination (up to 90%) and healthy seedlings compared to the traditional system where lesser germination (50%-60%) and seedlings of variable health (as shown in picture above) affected their poor yield.

The healthy vegetable nursery will produce healthy vegetable crops with resistance to diseases and insect pests. Ultimately, the farmers, having learnt from the experts and fellow farmers, will produce high yield and quality vegetables that will enhance profitability and improve their livelihoods.

The SVVCP project is not only helping farmers produce healthy and profitable onion, potato, tomato and chili crops but will also primarily enhance the socio-economic conditions of rural poor, particularly women in the Punjab and Sindh provinces.

In Pakistan, 84% of farmers are smallholders who rely on subsistence farming. CABI in Pakistan has been engaged with farmers since 1957 with a mission to increase crops yield, connecting farmers with the market and securing rural livelihoods by sharing environment friendly and audience centred knowledge.

#### **Additional information**

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#### **Strengthening Vegetable Value Chains in Pakistan**

Small scale vegetable farmers in Pakistan encounter a number of issues that compromise their sustainable livelihoods; particularly for women and youth. Find out more how CABI and an alliance of organisations are aiming to improve the livelihoods of rural communities in Sindh and Punjab through strengthening selected horticultural value chains, and promoting sustainable production and marketing opportunities.




**Improved ways of growing onions and chillies are starting to take root.**



**Onion and chilli farmers come together to learn new ways of improving their yields as part of the Strengthening Vegetable Value Chains project.**



 March 4, 2020



## CABI scientists help discover new biological control for noxious parthenium weed in Pakistan

CABI scientists, as part of an international team of researchers, have discovered a new biological control in the fight against the highly noxious and invasive weed **parthenium** (*Parthenium hysterophorus*) in Pakistan.

As outlined in a new paper published in the journal *BioInvasions Records*, the scientists report the first record of the rust species **Puccinia abrupta var. parthenicola** – more commonly known as winter rust – in the Punjab and Khyber Pakhtunkhwa Provinces.

The presence of winter rust marks the second natural enemy, in addition to the leaf-feeding beetle **Zygogramma bicolorata Pallister** (Coleoptera: Chrysomelidae), which could help with the management of parthenium in Pakistan.

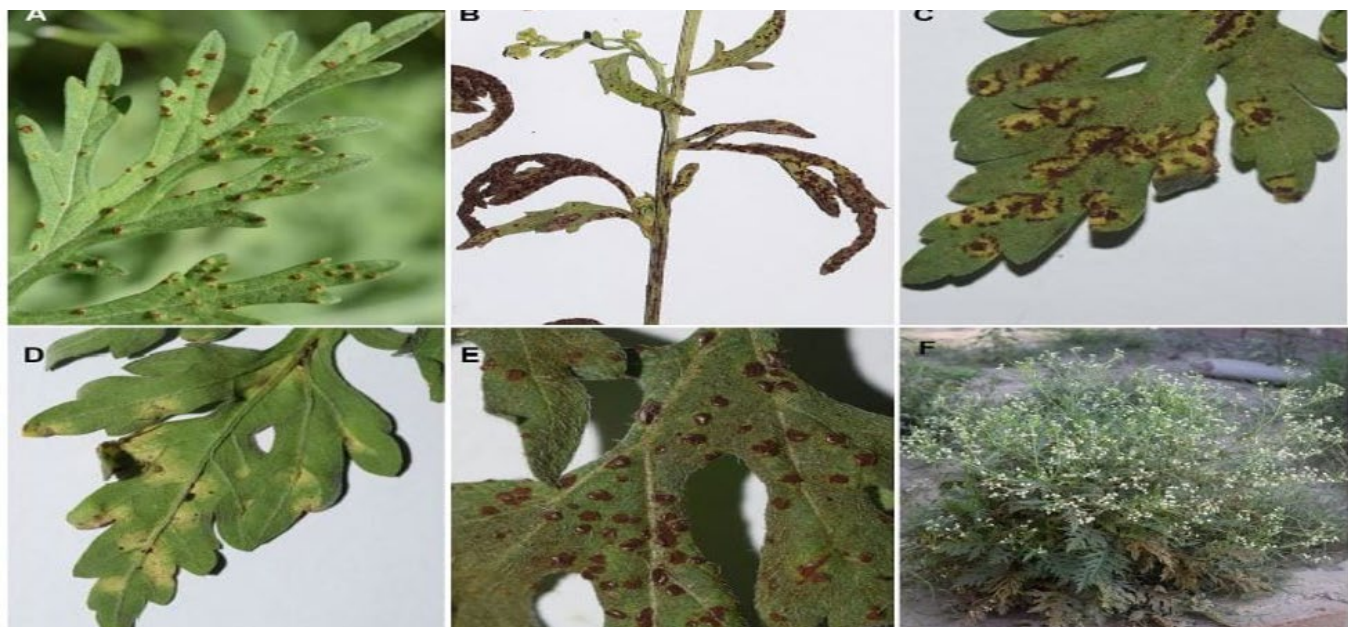
According to the CABI Evidence Note '**Parthenium: Impacts and coping strategies in Central West Asia**', parthenium is an aggressively-spreading weed, now classed as a 'superior weed', which is extremely prolific and capable of producing up to 30,000 seeds per plant.

CABI scientists say parthenium can cause severe allergic reactions in humans and livestock, may harbour malaria-carrying mosquitoes, displace native plant species and reduce pasture carrying capacities by as much as 80% to 90% where in India, for example, the cost of restoring grazing land is around USD 6.7 billion per annum.

The evidence note also highlights that parthenium weed can have a significant impact on crop yields – through direct competition as well as by inhibiting germination of seeds – where, for instance, in Ethiopia sorghum grain yield was reduced from 40 to 97 percent.

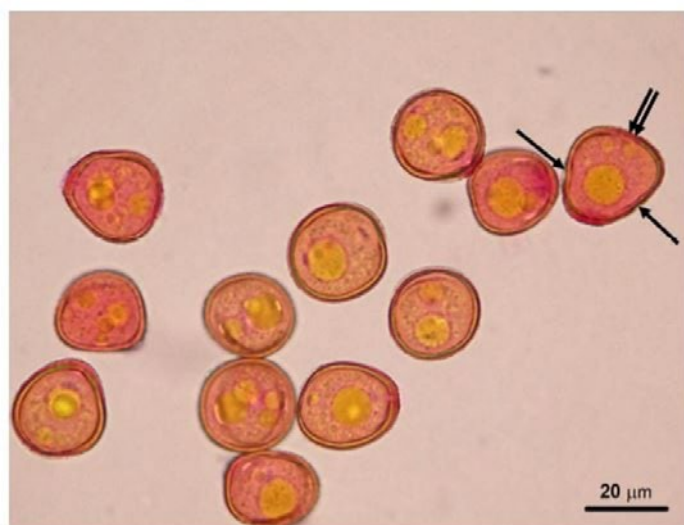
**Blog continues on page 82**





**Young pustules of the rust *Puccinia abrupta* var. *partheniicola* on *Parthenium hysterophorus* (A); rust spreading on top branches and leaves of *P. hysterophorus* (B); infection spreading on upper surface of leaf (C); chlorosis and curling observed on lower surface of leaf (D); close up of rust pustules showing ruptured leaf epidermis (E) Habit of infected hysterophorus (F). Photographs by Iram M. Iqbal.**

The researchers conducted surveys for winter rust covering 65 sites in 19 districts of Punjab and Khyber Pakhtunkhwa. The species was recorded at 21 sites in 8 districts. The most severe attack was found in the northern part of Punjab including Lahore, Attock and Narowal districts, while in Khyber Pakhtunkhwa medium rust infection was recorded only in Manshera district. In other districts rust infection was considered low or absent.



**Microscopic image of urediniospores of *P. abrupta* var. *partheniicola* stained with lacto-fuchsin. Single arrows point to subequatorial germ pores; double arrow points to apical germ pore. Photomicrograph by Harry C. Evans.**

**Dr Philip Weyl**, a co-author on the paper and Research Scientist, Weed Biological Control at CABI, said, “*Parthenium* weed is considered to be a dominant weed species of natural ecosystems and agriculture in Pakistan and is also highly allergic to humans and toxic to livestock.

“Management options in Pakistan are limited and tend to focus on manual removal and the application of herbicides. However, manual removal of the weed without protective clothing is very risky due to contact dermatitis while large-scale control using herbicides is economically and environmentally unsustainable.”

The scientists reveal that while winter rust has previously been introduced deliberately to tackle parthenium in Australia in 1991 it has also appeared unintentionally in China, India, Ethiopia, Kenya, Mauritius, Nepal, South Africa and Tanzania. They believe the rust could have entered Pakistan via India or Nepal.

Lead author Iram M. Iqbal, from the University of the Punjab, said, “While the winter rust may not kill the parthenium it can significantly reduce biomass and seed production, especially when applied at the rosette stage of the weed.

“Furthermore, the suppressive effect of the rust was enhanced in the presence of competitive pasture plants and is likely to maintain its effectiveness under elevated CO<sub>2</sub> concentrations. We believe that the presence of winter rust in Pakistan will aid the management of parthenium weed.”

## Additional information

**Main photo:** scientist examines parthenium weed – credit: Asim Hafeez.

## Full paper reference

Iqbal IM, Ali K, Evans HC, Rehman A, Seier MK, Shabbir A, Weyl P, (2020) The first record of *Puccinia abrupta* var. *partheniicola*, on *Parthenium hysterophorus* an invasive alien plant species in Pakistan. *BioInvasions Records* 9 (in press). DOI: 10.3391/bir.2020.9.1.01

The paper is available as an open access publication in *BioInvasions Records*, a journal of the International Association for Open Knowledge on Invasive Alien Species (INVASIVESNET), and can be found here: <https://doi.org/10.3391/bir.2020.9.1.01>

For more information about INVASIVESNET, please visit their website ([www.invasivesnet.org](http://www.invasivesnet.org)) or contact their Media and Communications Officer at [media@invasivesnet.org](mailto:media@invasivesnet.org).

For **more information on parthenium** see the CABI Evidence Note: '**Parthenium: Impacts and coping strategies in Central West Asia**', 2019.





March 6, 2020



## Women and Parthenium management in Pakistan

Last year, CABI in Pakistan in collaboration with University of Agriculture, Faisalabad (UAF) conducted a series of seminars in rural areas of Pakistan. The aim was to highlight the damages being caused by Parthenium weed to humans, livestock and biodiversity. As part of this, teams ensured inclusiveness of rural women as major stakeholders due to their equal participation in major rural activities from household management to agriculture operations.

Women were reached through seminars, female farmer days, and group meetings. Master trainers, trained by CABI, highlighted the health hazards posed by this toxic weed, which have now reached epidemic proportions. The participants learned about this invasive species through demonstrations and audio-visual aids to teach them how to properly identify it. The response of rural women was very positive as most of them were unaware of the dangerous characteristics of Parthenium although they had been suffering by its harmful nature.

Exclusive sessions were also arranged with key female stakeholders and leaders in the targeted community including Ladies Health Visitors, principles, headmistresses, and teaching staff of junior/high schools and colleges. The aim of holding these sessions was to make sure that these influential community leaders play their important role as change agents creating awareness among the masses of their local communities.

In discussions held with the female farmers, certain issues were raised like generation of alternative methods to hand-weeding/pulling for the disposal of Parthenium. It was also highlighted that in rural communities, the weed is not always viewed negatively as it is believed and even recommended that ingesting it can combat diabetes and joint pain.



Parthenium is playing a lethal and destructive role in not only damaging agriculture but also the natural ecosystem. Parthenium is highly allergenic causing skin and respiratory problems for humans and animals, and consumption by livestock can taint meat. Plus, its high seed count and **allelopathy** means that it spreads quickly and outcompetes native plants. It is a serious and noxious invasive species.

Dr Ijaz Ashraf, Focal Person UAF stated that this participatory approach should be followed in the eradication of Parthenium and women play a vital role in creating awareness among their families and communities.

After extensive surveys, CABI last year published **Parthenium: Impacts and coping strategies in Central West Asia**. The document includes detailed information about the perceptions of Parthenium among communities in Pakistan and CABI's recommendations on the management and control of this noxious weed.

**Find out more about Parthenium**

**Parthenium portal**


**Managing the invasive weed Parthenium**

**Parthenium Weed: Biology, Ecology and Management**

**Raising rural awareness of Parthenium in Pakistan**





 March 12, 2020



## Raising awareness on Parthenium at Pakistan Horti Expo 2020

As part of the '**Establishment of Model Farms**' project initiated by the Government of Punjab's Agricultural Department, a two-day **Pakistan Horti Expo** was held at the Expo Center, Lahore, from 22-23 January 2020. The event urged key 'players' in agricultural value chains including smallholder farmers, processors, wholesalers, distributors, retailers and exporters to help boost the country's fruit and vegetable exports.

Malik Nauman Ahmad Langrial, Minister of Agriculture Punjab inaugurated the Expo and was one of the visitors to the CABI stall; where he was briefed about various ongoing CABI projects being implemented with various local partners. On day one, more than 50 researchers from various research organizations, 300 farmers, over 1000 students from various universities, several exporters, and about 1000 members of the general public visited CABI's stall. Literature of all CABI projects including **Action on Invasives** was distributed to the visitors.

**Mr. Abdul Rehman**, CABI Deputy Director Programme (DDP) briefed the delegates and held series of meetings with national stakeholders regarding Parthenium awareness and management, in addition to providing information about upcoming invasive threats.

During a discussion where the Action on Invasives (AoI) team briefed the media about the menace of Parthenium, emphasis was laid on the threat of parthenium to our biodiversity, crops, and health of humans and livestock. Short snippets from these discussions also aired on national television channels.

On day two of the Expo about 1000 farmers, 120 researchers from various organizations, 40 exporters, 1500 students and 2000 members of the general public visited the AoI stall at the CABI pavilion. They received information about the different stages of Parthenium, its phenology, distribution in Pakistan, harmful effects on crops, animals and humans as well as interactive material via videos were also shown to them for better understanding. The AoI team also discussed possible biological solutions for Parthenium and what CABI has achieved so far for the awareness and management of Parthenium.

Mr. Abdul Rehman DDP CABI stated that these kinds of expos are one of the best platforms to raise community awareness on the negative impact of Parthenium. He further added that through these expos more diverse groups of community will be sensitized about the issue.

**Co-author:** **Abdul Rehman**, Deputy Director Programmes

**Blog contributors:** **Kausar Khan**, Kazam Ali



March 16, 2020



## Cotton industry stakeholders from Punjab familiarized on aflatoxin management through 'green' technology

Aflatoxin contamination in food, feed, and agricultural produce is a matter of concern around the world because of their carcinogenic, metabolic, mutagenic, immunosuppressive, and teratogenic effects. Aflatoxin M1 (AFM1) is the monohydroxylated derivative of aflatoxin B1 (AFB1), developed in the liver of lactating animals during metabolism and further excreted into the raw milk of cattle usually fed with AFB1-contaminated feed.

The **International Agency for Research on Cancer** (IARC) classified AFM1 as a 2B carcinogenic group because it can damage DNA and may cause various types of cancers, cell transformation in mammals, and gene mutations through AFM1 exposure. Raw cotton seeds and cotton seeds cake are being used as a source of protein in livestock as it has proven capacity to enhance the milk production but their use is limited due to heavy contamination with aflatoxins.



Staff members of the Department of Agriculture Extension Punjab (Khanewal, Lodhran and Bahawalpur) and allied agency WWF explore the benefits of biological control interventions at CABI's office in Rawalpindi.



A group comprising of staff members from **Department of Agriculture Extension Punjab** (Khanewal, Lodhran and Bahawalpur) and from an allied agency (WWF) involved in the improvement of cotton industry value chain in Punjab via implementing project, **Better Cotton Initiative** (BCI), paid an exposure visit to **CABI's office in Rawalpindi, Pakistan**.

To sensitize and update the exposure visit of participants; the aflatoxin team organized an awareness session and shared ongoing biological control interventions including AflaPak™, a very first biocontrol product of its kind in Pakistan.

Participants of the exposure visit appraised the efforts of the aflatoxin team on introducing green technology to cope with fungal problems such as aflatoxin and desired to replicate this technology on cotton crop as well for the positive growth of the industry linked with cotton.

#### **Additional information**

##### **Aflatoxin Control Programme**

Find out more about **CABI's work on aflatoxin control in Pakistan**.

**Author:** **Dr Sabyan Faris Honey** – Project Manager

**Contributors:** Dr Hamza Shahbaz Bhatti, **Dr Muzzamil Farooq**, Mr Saqib Ali



 March 26, 2020



## Is parthenium's stem boring weevil safe for release in Pakistan? An update on host range testing

Native to tropical America, **Parthenium hysterophorus**, commonly known as parthenium, has invaded and become a major weed in over 50 countries. Parthenium has covered thousands of hectares of productive and range land in Pakistan. It is an annual herb which effects agriculture, damages biodiversity, affects human and animal health and adversely impacts economic development.

Parthenium has several natural enemies that help to manage this problematic weed in its native range. Among these, the stem-boring weevil, **Listronotus setosipennis**, (Coleoptera: Curculionidae) has already been tested for its safety to economic plants and released to manage parthenium infestations in Australia, Ethiopia, Uganda and South Africa.

In 2019, CABI's **Action on Invasives** programme **established a quarantine laboratory** at its Rawalpindi centre in Pakistan to enhance its capabilities to manage **parthenium weed**. In April 2019, **a colony of 200 adults of L. setosipennis were imported** from **ARC-PPRI**, South Africa. The import of this biological control agent has since strengthened the biological control programme against this noxious weed in Pakistan.

*Listronotus setosipennis* is a nocturnal weevil which lays its eggs in the flowers of parthenium. Newly hatched larvae tunnel into the stem where they continue to feed, eventually exiting at the base of the stem to pupate in the soil. Feeding inside the stem by several larvae kills the seedlings and mature parthenium plants.

The host range testing was initiated at the CABI Pakistan centre in October 2019 to determine the safety of *L. setosipennis* for native and economic plants in the Asteraceae family. No-choice tests for egg laying (reproduction) have been completed for five ornamental plant species so far including: *Cosmos bipinnatus*, *Tagetes erecta*, *Dendranthema indica*, *Calendula officinalis* and *Callistephus chinensis*. No eggs were found on any of these species while on average 238 eggs per parthenium plant were found. The results thus far confirm the narrow host range of this weevil experienced by other researchers in Australia, Ethiopia and South Africa.

During a recent visit to Pakistan for Action on Invasives research activities, CABI's **Dr Philip Weyl**, setup the no-choice test for *Calendula officinalis*, an ornamental plant species that has significant cultural importance in Pakistan.

Dr Weyl commented, "Although more testing is needed, the results so far are very encouraging and I expect that we will submit an application for release of this weevil into Pakistan to the Pakistan Agricultural Research Council in the near future."







March 31, 2020



## AflaPak registration will pave the way to enhance the livelihoods of maize growers in Pakistan

Pakistan has taken the regional lead to mitigate the aflatoxin issue in South Asia. USAID/USDA has joined hands with CAB I to lead this new initiative in collaboration with the **National Agricultural Research Centre (NARC)** and **Rafhan Maize Products Co. Ltd.** This will help to safeguard the health and nutrition of Pakistan people.

To sensitize the stakeholders and government agencies working in agriculture on aflatoxins and its possible biological control through indigenous AflaPakTM, a training workshop, from 10-13 February 2020, was organized in Islamabad where **Dr Michael Braverman**, Manager Biopesticide, Organic and International Capacity Building Programs IR-4 Project, at Rutgers University in the USA, acted as trainer to share his global experience to handle such biocontrol products for aflatoxin mitigation.

During the workshop participants from the Department of Plant Protection, officials from agriculture departments of all the five provinces of Pakistan, academia staff members, agribusinesses and subject experts on aflatoxins, discussed and shared the current mechanisms to register biocontrol products/biopesticides in Pakistan.

The participants also piloted brain storming sessions on avenues to register AflaPakTM in Pakistan to mitigate the aflatoxin issue in South Asia. Dr Braverman also briefed the participants on the data requirements, exemption petitions, forms and procedures and on labelling requirements with special reference to biocontrol product/biopesticides.

Mr Sher Afghan Khan, Additional Secretary, **Ministry of National Food Security & Research** (MNFS&R) in his remarks stated that aflatoxin is one of the main reasons causing stunted growth in children and I congratulate CAB I and its partners on taking a pioneer step to control aflatoxins in maize crop. He also added that the ministry doors are always open for the support required to register AflaPakTM .

Mr Rey Santella, Agricultural Counselor at **USDA**, said that CAB I is one of the fortunate partners of USDA in Pakistan. The main focus of the aflatoxin program is to get AflaPakTM registered – a biocontrol agent which will deal with the threat of aflatoxin. AflaPakTM registration will not only enhance the livelihood of farming communities but also address the issue of food security.

**Dr Babar E. Bajwa**, Regional Director of CAB I, commented: "We have a long-standing history with the USDA, PARC and MNFS&R cooperation. CAB I is always trying to come up with the science which delivers to the mandate of Pakistan and agricultural problems like aflatoxins in maize crop causing export hindrance and food security."

On 10th February 2020; 72 participants, including officials and subject experts from USAID, USDA, NARC, Rafhan Maize Products Co. Ltd., Ministry of National Food Security and Research, academia and allied agribusiness agencies, participated in the inaugural session of the training workshop on registration of biocontrol products/biopesticides in Pakistan. From 11-13 February 2020 this training workshop was further attended by 35 subject experts to learn about the mechanism for AflaPakTM registration.

This training workshop will not only be helpful to define the mechanism for AflaPak™ but also open a new chapter of green technologies registration in Pakistan and can also attract foreign direct investment (FDI) for Pakistan.

### **Additional information**

#### **Aflatoxin Control Programme**

Find out more about **CABI's work on aflatoxin control in Pakistan.**


**Author:** **Dr Sabyan Faris Honey** – Project Manager

**Contributors:** Dr Hamzah Shahbaz Bhatti, Dr Muzammil Farooq, Mr Saqib Ali

**For more information, please contact:** Deborah Hamilton, USDA, 202-720-0335, [Deborah.Hamilton2@usda.gov](mailto:Deborah.Hamilton2@usda.gov)





 April 6, 2020



## CABI Impact Brief showcases successes in capacity building for Better Cotton Initiative

A CABI Study Brief, entitled **‘Improving the safety and quality of cotton production in Pakistan’** shares findings on the impact of a CABI capacity building programme for farmers and farm workers involved in the Better Cotton Initiative (BCI) in two Pakistan districts.

The aim of the partnership between CABI, BCI, Partners in Development and Consultancy (PIDC) as highlighted in the study, is to improve cotton quality and promote practices that are safer for workers’ health and the environment in areas that face a range of potential negative social and environmental effects of intensive cotton production.

Agriculture is central to Pakistan’s economy and cotton is one of the most important crops; it generates the largest export revenue of any crop. In Sindh Sanghar and Mirpurkhas, two key districts in Sindh province, 31% of all cotton in Pakistan is produced. Therefore, cotton production is responsible for employment, income and livelihoods, especially in these districts.

Through the capacity building programme, CABI successfully trained 11,360 farmers on choice of pesticides and alternative practices, 22,252 male farm workers on handling and applying pesticides safely and 16,000 female farm workers on safety, quality and better picking practices during the cotton harvest.

### The seven BCI Key Principles

- BCI Farmers minimise the harmful impact of crop protection practices
- BCI Farmers promote water stewardship
- BCI Farmers care for the health of the soil
- BCI Farmers enhance biodiversity and land use responsibly
- BCI Farmers care and preserve fibre quality
- BCI Farmers promote decent work
- BCI Farmers operate an effective management system

Based on the seven BCI key principles, the study achieved safer use of pesticides by farm workers including proper storage and disposal of pesticide containers; higher adoption of safety measures by female farm workers who pick cotton; improved cotton quality; increased financial benefits to the farmers; increased potential for collective action amongst farmers and increased awareness around decent work conditions.

The study did, however, find that the direct financial impact of improving cotton quality was inadequate as new standards did not translate to higher pay for farm workers – this signifies the need for increased engagement with key value chain actors going forward.

Read the **full brief** to find out more about the impact of training cotton farmers and farm workers in the Better Cotton Initiative.

### **Full paper reference**

Lohano, H.D., Mari, F.M., Stewart, J., Ali, I and Romney, D. (2019). Improving the safety and quality of cotton production in Pakistan. CABI Study Brief 30: Impact. DOI: <https://dx.doi.org/10.1079/CABICOMM-62-8106>


### **Additional information**

**CABI helps Pakistan's cotton industry to reduce losses of around \$350m a year**

**'Sowing the seeds' for better cotton crops: a farmer case study**





 April 14, 2020



## Training of trainers on de-linting of cotton seed to ensure quality of crop

Cotton is a principal cash crop of Pakistan but unfortunately is attacked by number of pests and diseases. When pests take over the crop, production cost of cotton rises and profit is squeezed thus, there is always a competition between farmer and the pest's interest.

To save the crop from being attacked by pests, farmers have tried to practice interventions that may protect their crops and ensure a good yield. Seed de-linting is a practice that has various benefits such as when the inoculum of pests and diseases is destroyed, shriveled and dead seeds are identified, seeds get pest free sphere when planted due to the application of acid on its coat. Usually this is done to save the seed from early attack of pest and good germination. When de-linted seeds are planted, the crop gets a good chance to flourish.

To get this practice implemented in the field, the training of field staff (Field Facilitators, PU Managers and Women Trainers) of CABI's **Better Cotton Initiative** Project at Mir Pur Khas district was conducted. For this training 5 kilograms of cotton seed, 500 millilitres sulfuric acid (10%), wooden peg, shovel and two buckets of water (each containing 100 litres) were used.



De-linting of the cotton seed on a concrete floor.

The activity was carried out on a concrete floor that started with setting a pile of cotton seed and putting half quality (250 ml) sulfuric acid on it. Later the pile was quickly pulverated with the help of shovel and remaining sulfuric acid was added.

When the lint had burnt, the seed was rinsed off with tap water for 4-5 times and then de-linted seeds with original black colour became visible. The field staff observed that once the seed became clear, they were able to identify weak, wrinkled and dead seed from the pile. Field staff realized that the lint of cotton hides the original shape and size of seed and as such it becomes difficult to choose good seed.

Later, it was discussed that the de-linting of seed also supports in easy chemical seed treatment with good results. **Mr Abdul Rehman**, Deputy Director Programmes CABI in Pakistan, viewed that treating cotton seeds (linted) with pesticide is difficult and costly because when seed dressing pesticide is applied, it is absorbed by seeds present on top and pesticide is not mixed well with remaining seeds present down.

Mr Rehman said, "It is better to de-lint the seed first, wash and dry it under shade and then apply seed dressing pesticide on the surface. Hence it is safely assumed that by adopting this method comparatively little quality of pesticide will be used and distribution will be even on all the seeds."

## **Additional information**

### **Author**

Rauf Ahmed Khan Laghari, Project Manager, CABI

### **Did you know?**

- Cotton is Pakistan's largest industrial sector. It has played an important role in the economic development of the country and has remained a key livelihood source for thousands of farmers.
- In Pakistan, the industry is losing around 10–15% of its value through poor production, transport and storage practices.
- Better Cotton is a scalable model for cotton that transforms markets and creates tangible impacts at scale; it reduces pesticide and water use, improves yields and ultimately the livelihoods of farmers.
- CABI has trained more than 22,000 farmers and their 38,000 farm workers on 92,220 hectares to produce the 98,402 metric tonnes of cotton lint through the implementation of the Better Cotton Standard System.

See also the **news story** '**CABI helps Pakistan's cotton industry to reduce losses of around \$350m a year**'

Find out more from the **Study Brief** '**Improving the safety and quality of cotton production in Pakistan**'





April 27, 2020

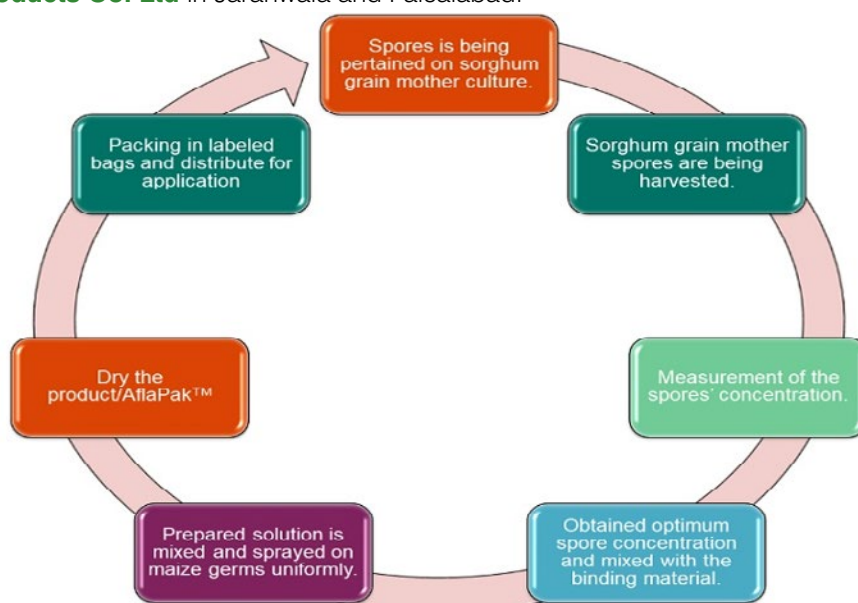


## AflaPak is on its way for maize growers to detain the toxic fungi in spring crop

In Pakistan maize crop of the spring season is more likely to be contaminated with the exposure of aflatoxin due to the favourable conditions; temperature (75.2-109 °F) and of relative humidity (62-99%) during the crop life cycle. To minimize the level of aflatoxin each country/region has its own version of non-toxicogenic strains growing naturally in soils. In Pakistani non-toxicogenic strains are named as AflaPak™.

AflaPak™ is a biological control agent/product for displacing the strains of aflatoxin producing *Aspergillus flavus*. The active ingredient in AflaPak™ is a naturally occurring, nontoxicogenic strain of *A. flavus*. The primary mode of action is by competition of the nontoxicogenic strain of *A. flavus* with the toxigenic strains of *A. flavus*, which displaces aflatoxin producing fungi in treated crops. Currently, the AflaPak™ trial is being conducted on maize crop in Punjab. The objective of these field trials is to evaluate the efficacy of AflaPak™ in the field and its commercialization in Pakistan.

To develop the AflaPak™ multiple steps are being undertaken at the Aflatoxin Biocontrol Laboratory at the Crop Diseases Research Institute within the **National Agricultural Research Centre** (NARC) in Islamabad, as well as at **Rafhan Maize Products Co. Ltd** in Jaranwala and Faisalabad.



The process of AflaPak development

The recommended dose of AflaPak™ is @ 4-5Kg per acre between growth stages V10-V12 and R1 (this is a period from about 14 days before tasseling with 10-12 visible leaf collars present until the onset of active silking) by using broadcast application equipment once in a crop season. This will help the farmers grow safer and healthy food for their communities.

#### **Additional information**

##### **Aflatoxin Control Programme**

Find out more about [CABI's work on aflatoxin control in Pakistan](#).


**Author:** [Dr Sabyan Faris Honey](#) – Project Manager

**Contributors:** Dr Hamza Shahbaz Bhatti, [Dr Muzzamil Farooq](#), Mr Saqib Ali

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 May 12, 2020



## Connecting with food systems: Research, knowledge and eco-environment approaches

Today's world faces immense challenges in food production, making availability, quality, nutrition and affordability the main agenda in many developing countries, writes **Dr Babar E Bajwa**, Regional Director, CABI Central West Asia. Agricultural research has moved on from the task of ensuring availability of food towards attaining a successful food system that is perceived as a source of value to members of society (especially small land owners, women and children) who depend on these systems as their only source of survival.

The regions in which CABI works are mostly dominated by smallholders who have very limited access to resources, are limited in their decision making and have limited inclusion in food systems. In addition to this, environmental conditions and soil (as a basic unit of production) bring new challenges to them. We never thought 50 years ago that we would be dealing with such a complex interface of biotic and abiotic factors (those that are living and non-living parts of the environment), which need a complex, intensive, scientific and, above all, coordinated and interdependent approach in order to be addressed.

Looking at this set of challenges in more detail, one of the main problems that has arisen since the green revolution (the adoption of modern methods and technology) is the intensive use of agro-chemicals, especially plant protection product use, which determines how many chemicals we put into food systems.

It is for this reason, among others, that CABI initiated **Plantwise** – a global programme that works to help farmers lose less of what they grow to plant health problems. Working closely with national agricultural advisory services, we establish and support sustainable networks of plant clinics, run by trained plant doctors (extension workers), where farmers can find practical plant health advice.

The plant clinics are reinforced by the **Plantwise Knowledge Bank**, a gateway to practical online and offline plant health information, including diagnostic resources, best practice pest management advice and plant clinic data analysis for targeted crop protection. Together, these two unique resources are part of the Plantwise integrated approach to strengthening national plant health systems from within by bringing the stakeholders who play a role in delivering knowledge to farmers together in a single approach.

This approach to plant health system development supports the long-term sustainable agricultural production of the country in which it is applied. The stronger the national plant health system, the better equipped the country will be to help farmers provide a safe and sustainable food supply and improve their livelihoods.

One of the main challenges for the Plantwise programme was to ascertain how much ability and resilience was available within food systems to diagnose a plant health problem. Then the programme had to decide how a knowledge-based approach could be developed to transfer the diagnostic and knowledge-based national system within the governments that support the development of resilience within the agriculture departments of countries.

We have spent almost 10 years developing the system. Over this period of time, especially in South Asia, we witnessed an increased appetite for quick fixes in agricultural systems, especially, when we did not consider the typical environment and plant-environment complex – the extension service providers tried to fix plant health issues in a non-holistic approach.

### How modern research connects with problems

It is a very fair topic of discussion to talk about how organizations like the **International Centre for Biosaline Agriculture** (ICBA), CABI and many other institutions, have such an important, valuable and up-hill task in putting research into action and building resilience in systems which can bring a healthy food system.



**Plant doctors in India receive training on biological approaches to crop pest control.**

As an organization, we focus on problem solving through research – a principle that stays at the centre of our work flows. We have been able to bring out laboratory technologies to the field. I describe this as being 'Actionable, Demonstratable and Adaptable' Research. One of our global accomplishments has been our ability to talk about food crop protection as a systematic process, rather than an activity.

### How CABI tries to connect with food systems

What we now see, coming up from the field, is a growing appetite for eco-friendly technologies like bio-control in both pests and micro-organisms. CABI has built a strong scientific pool of these bio-control approaches with more than 6,500 natural enemy collections and a collection of over 30,000 living strains from 142 countries, of which 90% are unique to CABI. It is one of the world's largest genetic resource collections and holds the **UK's National Collection of Fungus Cultures**, which most notably includes Fleming's penicillin-producing isolate.

Our regional centres continue to work together to bring out lab research and trickle it down to farmers in many ways; be it for building the capacity of national extension services, import export agencies, phytosanitary risk management approaches, or using natural enemies field reservoirs for 55,000 cotton farmers or with corporates like Ingredion to support developing atoxigenic strains which make the food healthy and safe. The partnerships are the most important driving factor.

We partner with national and international agencies based on scientific and research strengths. Now I can see how the business systems and markets need to be connected with this kind of approach, as today's farming value chains are longer, they are not 'just' farming or marketing. A lot has been added in between both ends of the chain. The steps we take are small, but aim to connect with both ends of the agricultural value chain so that, overall, the sustainability scale is much higher. Linking science to a smallholder is not easy, but being science backed and building on a knowledge base, these technologies will pave the future of agriculture and food systems.


### Additional information

**Dr Babar E Bajwa** is a postharvest technologist and good agricultural practices expert. He is the Regional Director for Central and West Asia where he has a number of ongoing projects and programmes. He also performs financial and performance management of the organisation, and delivers performance as per various bilateral and multilateral donor commitments.

He has around 20 years of professional experience. This includes, intensive experience as an agribusiness specialist while extensive and diversified experience in areas of food safety, SPS, post-harvest, agribusiness, supply chain development, trade and investment promotion. Dr Bajwa has also worked for developing agricultural markets through trade promotions and bilateral negotiations. His recent experiences include working with federal and provincial governments of various countries, the World Bank, UKAID, ACIAR, GIZ, USDA and USAID. Throughout my career he has made collaborations with various implementing partners in order to mobilise resources.





 May 13, 2020



## Using online workshops to ensure the fight against invasive species continues in Pakistan

As the global COVID-19 pandemic continues, CABI is ensuring that efforts to combat invasive species are continuing. The CABI centre in Pakistan organized a one-day online workshop on the development of Pest Management Decision Guides (PMDGs) and Technical Briefs on the invasive pests: **fall armyworm**, **parthenium weed**, and *Tuta absoluta*.

The workshop was conducted online in early April via Zoom and was attended by officials from the Agriculture Department of Pakistan, representatives from the private pesticide industry, officials from CIMMYT, and academic researchers from several agricultural universities. The workshop was inaugurated by CABI's Regional Director, Dr. Babar E. Bajwa who welcomed all the participants to the workshop and gave an overview of CABI's work. He also spoke about the effects of COVID-19 on food security and CABI's contribution in the field of research.

Sessions on each of the invasive pests were delivered by CABI staff; fall armyworm and parthenium weed by Abdul Rehman (Deputy Director, Programmes) and *T. absoluta* by Dr. Kazam Ali (Biocontrol Research Officer.) Each detailed presentation outlined the identification and management of the pest and then participants also looked over drafts of PMDGs for each in order to decide whether updates were needed. In each case, those involved – researchers and agricultural officials – agreed that updates were indeed required. These will be undertaken by CABI.

Mostly importantly though, in each session, CABI were keen to impress the fact that **early response measurements were vital to tackle invasive threats**. Invasive species have a devastating impact on native biota and are one of the main causes of global biodiversity loss. Invasive plants, animals, insects and microorganisms that establish in environments outside their natural habitat can reproduce rapidly, outcompeting native species for food, water, and space. Species can be introduced deliberately (e.g. fish farming, pet trade, horticulture) or unintentionally (e.g. travel and trade.)

Parthenium weed is already established in Pakistan and **CABI and partners are working hard to manage it** through public awareness and biological control research. Fall armyworm and *T. absoluta* pose a significant threat to Pakistan's agriculture and taking early response measurements against these pests is vital to safeguarding farmers and their crops.

All the participants took a keen interest, asking plenty of questions and taking part in lively discussions. The workshop offered a valuable opportunity for key Pakistani researchers and professionals to gain awareness on the efforts CABI is making on a regional scale for the management of invasive species. By the end of the workshop, there was a marked difference in opinion of most participants that it is time to manage invasive species at the earliest opportunity.

Developing PMDGs at this time is important to ensure that smallholder farmers are still able to get the most up-to-date extension support during the global pandemic. By supporting and facilitating online workshops like this, CABI hopes to ensure that key stakeholders are able to continue this vital work.



May 28, 2020



## Safeguarding poultry and livestock feed from harmful aflatoxins/mycotoxins

Mycotoxins are secondary metabolites produced by molds and fungi in fields and during the storage of grains, feeds and forages. Exposure of mycotoxins occurs more frequently in tropical countries because of high temperature, moisture, and unseasonal rains. Mycotoxins are considered to be soil-borne pathogens. The problems caused by mycotoxicosis tend to fall into three general categories in dairy herds, and each of these problems will have a negative impact on the financial bottom line of a dairy farms.

These include:

- Effects to the reproduction system
- Suppression of the immune system
- Reduction in nutrients available in the feed

Aflatoxin/Mycotoxins contaminated feed hazards are not limited to the dairy industry but also continue to be the centre of significant public health concern as long as people consume contaminated dairy and poultry products. Recent estimates are that more than five billion people worldwide are at risk of chronic exposure to aflatoxins.

The availability and adoption of hybrid corn seed in Pakistan is rapidly driving towards higher yields which also makes corn a major crop which is being utilized by feed mills to meet the demand of poultry and livestock sector in feed stuff. There are more than 165 feed mills for poultry feed in Pakistan with an installed capacity of ten million metric tons of feed. The poultry industry alone utilizes almost 65 percent of the corn production in poultry feed while wet milling consumes about 15 percent. Meanwhile, 10 percent is used to make dairy feed concentrate and the remaining production is used for the human consumption in the form of bread made from the flour and, to a lesser extent, planting seed purposes.

In 2016, **Rafhan Maize Products Co. Ltd**, a local subsidiary of US company **Ingredion Incorporated** which also processes thousands of tons maize every year to produce food ingredients and industrial products, collected maize samples from Punjab province and detected high (>20ppb) levels of aflatoxins in maize while the global standards allow the export and consumption of maize with permissible limits of aflatoxin, i.e. 20ppb.

To help the farming communities and to provide safer food to the people of Pakistan, Rafhan Maize with the support of **United States Department of Agriculture** (USDA) identified the native biocontrol non-toxigenic fungus to outcompete the toxigenic *Aspergillus flavus* to manage aflatoxins on maize crop – with a product that we call AflaPak™. This unique concept of using non-toxigenic strain as biocontrol agent has already been tested and commercialized to manage aflatoxins in 11 different countries of the world including USA and countries in Africa. Currently, an AflaPak™ trial is being conducted on maize crop in Punjab. The objective of these field trials is to evaluate the efficacy of AflaPak™ in the field and its commercialization in Pakistan.



Once this green technology has been widely accepted, adopted and disseminated in Pakistan it will lead to the development of a modern feed industry in the country.

#### **Additional information**

Main image: Farm worker in Depalpur, Okara, filling the bags of dried maize for feed mill supply.

#### **Aflatoxin Control Programme**

Find out more about [CABI's work on aflatoxin control in Pakistan](#).

**Author:** [Dr Sabyan Faris Honey](#) – Project Manager

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June 29, 2020



## ‘A consortium is needed to combat the menace of Parthenium in Pakistan’

CABI in Pakistan, in collaboration with the University of Agriculture Faisalabad (UAF), arranged a seminar on ‘Research–academia linkages on parthenium’ held at New Senate Hall, on 9th June. Addressing the participants, UAF Vice Chancellor Prof. Muhammad Ashraf explained that parthenium is spreading at an alarming rate across the country and there is a clear need for proper research in this area. Unfortunately, no systemic research has been conducted so far on the weed.

Parthenium can produce up to 10,000 seeds, leading to massive outbreaks. Humans who are in contact with the weed can develop allergies, asthmatic reactions, and diseases affecting the eyes and nose. Prof. Ashraf said that parthenium can be managed using a combination of methods, including preventive, cultural biological, manual, mechanical and herbicidal. He stressed the need to develop a national-level consortium on parthenium research. In order to protect plants, animals, and human beings, more research is needed to analyse its hazardous effects, as well as exploring claims of the weed’s medicinal value, to ensure that the most accurate information is shared with communities.

Dr Khalid Mehmood Ch, Director of the Institute of Agricultural Extension, Education and Rural Development, said that last year UAF, in collaboration with CABI, had conducted many awareness-raising sessions on parthenium across the country, especially in villages. He explained the need to look at each and every aspect of the weed in research work, which can be done by engaging master’s degree and PhD-level students.

Dr Ijaz Ashraf from UAF also added that almost every part of parthenium is toxic to humans and animals. He called for collaborative efforts and awareness-raising sessions to help eradicate it. Dr Ashraf and his team had already contacted different universities in the country to begin proper research on the weed, which is known locally as Gaajar booti. Dr Ashraf pointed out that the weed is common along roadsides and canals, in residential areas, and, of course, in agricultural fields etc.

CABI’s Deputy Director Programmes, Abdul Rehman, explained that local research must be carried out on the weed and the ways to eradicate it, including quarantine measures, biological control, etc. He said if an animal eats the weed, it reduces the quality of the milk it can produce, as well as reducing the animal’s weight. Dr Rehman pointed out that parthenium weed is used by people in floral decorations and has frequently been used in bouquets, provoking different diseases.

Parthenium weed is reported to be present everywhere in the country but farmers and the public have a limited awareness of its impact on agricultural productivity, and on human and animal health. Mr Rehman added that parthenium can be managed using a combination of methods, including preventive, herbicidal, biological, manual, and mechanical.

For more information, visit the Parthenium weed portal (<https://www.cabi.org/isc/parthenium>) on CABI’s Invasive Species Compendium.





June 30, 2020



## Onion value chain interventions increase incomes for growers in Sindh province, Pakistan

Mr Quraish and Mr Babar are both members of the Strengthening Vegetable Value Chains in Pakistan (SVWCP) onion farmer's group, from the village Ibrahim Shah in district Tando Allahyar Sindh, who are keen on increasing their yields and sales of their produce.

To do this, SVWCP, funded by **Australian Centre for International Agricultural Research** (ACIAR), has adopted the 'value chain approach' to the sale of onions by exploring opportunities in the onion value chain. The SVWCP research teams proposed interventions to enhance the onion farmers' income, these included improved production, postharvest and marketing practices.

In addition, the interventions included a 21-day pre-harvest irrigation interval, post 13 days of onion curing, new packaging and the adoption of an improvised market channel with lesser intermediaries. The product quality was developed according to the buyer demand which was earlier investigated and an onion consignment was shipped direct to the retailer.

The whole process of onion consignment preparation followed the retailer demands. According to the demand of the retailer, onions of qualities A and B were pooled and filled in plastic net bags (70 kg per bag) and jute bags (100 kg per bag) respectively. A total of 8000 kg including 7000 kg A quality and 1000 kg B quality onion was delivered in Gol Market of Nazimabad, Karachi.



Farmers negotiate with retailer at Karachi market

The success of the SVVCP onion consignment was contributed by a combination of higher yield (8240kg/acre Vs 6989 kg/acre) and improved super quality ratio (88% Vs 64%) compared to a traditional consignment. The consignment success was a win-win situation in which both parties – the farmer (seller) and retailer (buyer) – of consignment earned more than the conventional consignments and both parties are happy and interested to continue the business on the same pattern.

The cost benefit analysis shows that a SVVCP consignment is more beneficial compared to the conventional consignment from a neighbouring farmer. The table below shows that the SVVCP farmer earned more revenue and more margin due to adopting the value chain approach which included improving the quality and marketing strategy for their onion crop.

Description	Traditional Consignment (PKR)	Best Practice Consignment (PKR)	Difference
Production cost	75,916	91,015	+ 15,099
Harvest/postharvest cost	18,048	25,300	+ 7,252
Marketing cost	37,354	26,050	-11,304
Total variable cost	131,318	142,365	+ 11,047 (8%)
Total Revenue	272,580	383,750	+ 111,170 (41%)
Gross Margin/ac	141,262 (52%)	241,385 (63%)	+ 100,123 (41%)

The value chain approach for onion crop requires skilled workers and this creates an opportunity particularly for women. In Sindh province, for example, there are a large number of women involved in agriculture especially in sowing and postharvest activities.

These women are from the labour market and also from the families of the farmers as farming in rural areas is commonly taken as a family business. Besides the increase in farmers earning, the SVVCP onion post harvest activities created job opportunities and also skill enhancement opportunities for both men and women which will benefit the whole onion value chain.

#### **Additional information**


**Authors:** Muhammad Asif, Project Manager, Dr Habat Ullah Asad, Research Officer

**Contributors:** Ms Zohra Sultana, Mr Azeem Hayder

See also the news story '[Project launched to strengthen vegetable value chains in Pakistan](#)' and the blog '[Farmers learn advanced nursery raising techniques to strengthen Pakistan's vegetable value chains.](#)'





 July 6, 2020

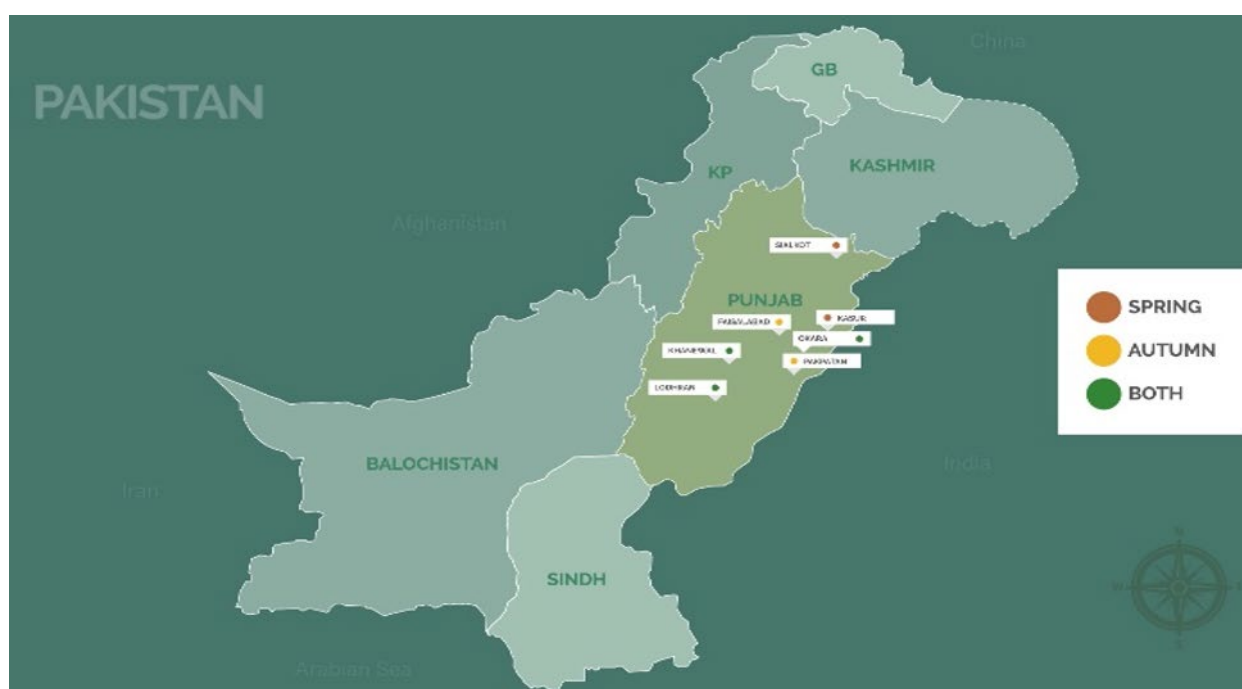


## As a diamond cuts a diamond, ‘good fungus’ will reduce ‘bad fungus’ in maize crop

CABI, along with its partners **Rafhan Maize Products Co. Ltd** and with the support of the National **Agricultural Research Centre** (CDRI, ASI), are busy evaluating the efficacy of AflaPak™ in Pakistan – a biological control agent/product for outcompeting the strains of aflatoxin producing *Aspergillus flavus* in maize.

Currently, field trials of AflaPak™ are being conducted in seven maize growing districts of Punjab province. The purpose of these trials is to compile baseline data for registration and commercialization of the product across the country.

Initially soil samples were collected prior to the application of AflaPak™. These pre-samples will enable scientists to evaluate the soil profile of that particular field. Knowing the exact crop stage is vital for AflaPak™ application and subsequently its success, which is about 14 days before tasselling with 10-12 visible leaf collars present until the onset of active silking.



Map shows geographical coverage of the AlfaPak field trials in Punjab, Pakistan

This product is broadcasted once in a cropping season with a recommended dose of 04-05 Kg per acre to protect the maize from aflatoxin contamination from plot to plate. There are some precautionary measures for the AflaPak™ application which advise wearing full Personal Protective Equipment (PPE), using it only outdoors or in a well-ventilated area, not mixing with fertilizers, insecticides, fungicides or any other pesticide for spreading and not breathing in dust.

Other safety steps include not ingesting the product, eating, drinking or smoking while handling it as well as avoiding it entering the eyes where irritation will occur. Users are also recommended to thoroughly wash their hands with soap and water after it is applied and before eating, drinking or going to the toilet.

AflaPak™ consists of friendly fungi spores which arrive early in the field and start producing its spores before the bad fungus can establish itself in field conditions. Once the friendly fungi are established, they will continue to resist the toxin-producing fungi from contamination of maize grains.

AflaPak™ not only outcompetes bad fungi in field conditions but also has carry over effects and keeps working during harvest, transportation and storage. This prevention of contamination is a huge advantage for farmers as well for the maize processors.

Alongside the application of AflaPak™, other good practices, such as proper drying of crop and good storage conditions, can add more value to the maize crop.

### **Additional information**

Main photo: AflaPak™ is applied to a maize field in Depalpur, Punjab (Credit: CABI).

### **Aflatoxin Control Programme**

Find out more about **CABI's work on aflatoxin control in Pakistan**.

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July 22, 2020

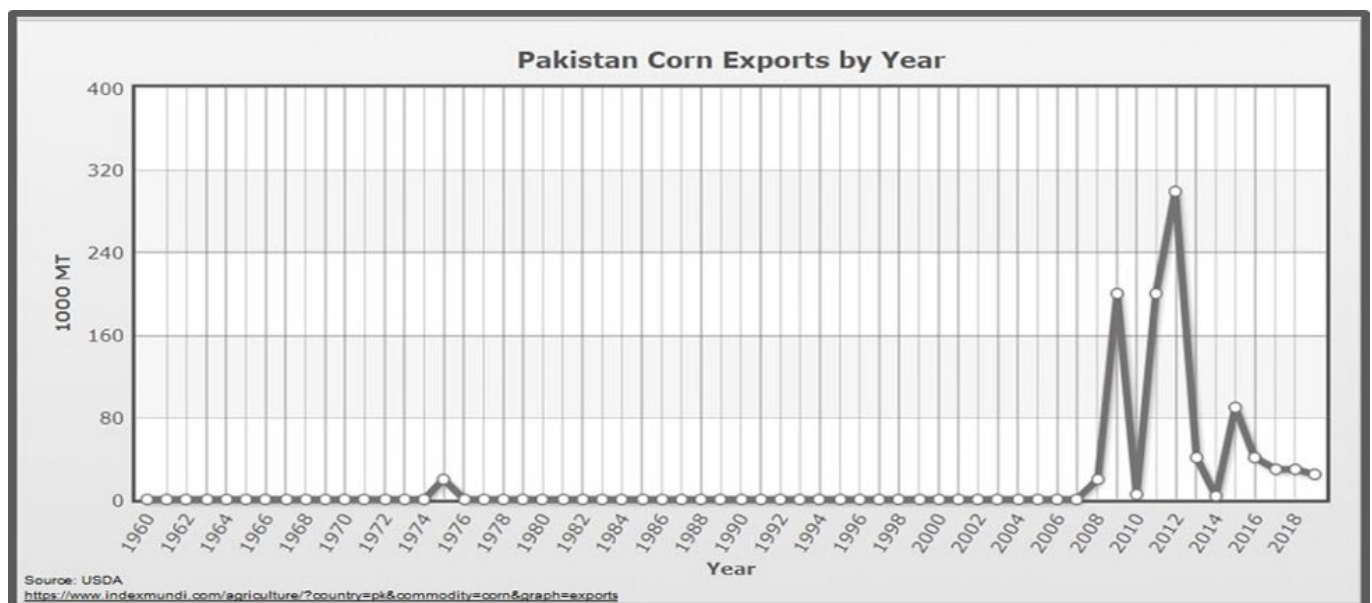


## Aflatoxins: A peril which limits the export of maize crop from Pakistan

The agriculture sector is one of the most climate-sensitive sectors of Pakistan's economy. It responds to temperature, precipitation, soil radiation, etc., which are directly associated with climate change. Rising temperature, uneven distribution of precipitation, floods, droughts, and other climatic disasters have affected human life along with socio-economic sectors of the world.

In Pakistan, maize is one of the important cereal crops which contributes 2.2 percent to the valued added products and 0.4 percent to the GDP. It is grown on an area of 1251 hectares with production of 5901 tonnes. In recent years, some mycotoxins, which we refer as Aflatoxins have been detected in maize crop grown in Pakistan. It has limited the export of Pakistani corn which causes losses in the economic benefit for all the chain actors linked with maize.

On the other hand, its consumption in the domestic market has been increased dramatically as Pakistani feed industry process/mill thousands of tons of maize every year to surge the demand of poultry sector. To address the issue of aflatoxin in maize crop, **USDA** and **USAID** joined hands with **Pakistan Agricultural Research Council (PARC)**, **Rafhan Maize Products Co. Ltd** and CAB International to implement a programme namely '**Aflatoxin Control in Pakistan**' using a cutting-edge USDA biocontrol technology.



This collaboration is hoping to change the landscape of maize crop in Pakistan while opening new windows to adopt and commercialization of biological control programs in Pakistan. This will also help our people to access improved quality food, which will not only lead to better human health, but also increase income of farmers by at least 10%. Moreover, this technology has the potential to reduce aflatoxin levels in about 60% of Pakistan's total maize resulting in a positive impact on trade by improving the export potential.

### **Additional information**

#### **Aflatoxin Control Programme**

Find out more about **CABI's work on aflatoxin control in Pakistan.**

**Author:** **Dr Sabyan Faris Honey** – Project Manager

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July 28, 2020



## Training of organic cotton farmers for seed multiplication

Organic cotton refers to naturally cultivated cotton without the use of any synthetic agricultural chemicals, such as fertilizer or pesticides or transgenic technology, to secure sustainable, ecological and biodynamic agriculture. Organic cotton also promotes and enhances biodiversity and biological cycles and is beneficial to human health and the environment.

There are numerous advantages of including organic products in our daily lives – from organic food to organic clothes. Organic products are part of a worldwide organic agriculture movement which stresses, in respect of farming and processing, that neither involves the use of synthetic or chemical pesticides nor genetically modified or radiated plants. This in turn ensures minimum damage to the environment. To be termed as an 'authentic organic product', the goods must pass a series of tests for certification.

Buying organic clothing is good for the planet's health and personal health. While the organic fiber is free of pesticides and chemical fertilizers, the non-organic fiber is full of such potentially life-threatening chemicals. As per the warnings of the **Environmental Protection Agency**, such chemicals are one of the likely causes of increasing the chances of cancer in an individual. There are other benefits of using organic apparels. One of them is showing kindness to the animal and plant kingdoms.



Cotton farmers receive training on cotton seed multiplication.

The cultivation of GMO cotton seeds is widespread in Pakistan due to a number of reasons. This includes the unavailability of non-GMO cotton seed and a lack of farmer interest in organic cotton. Furthermore, the availability of the non-GM seed on time and in required quantity for growing organic cotton has remained a key factor in discouraging farmers from its use.

Balochistan is one of the natural areas which is free from synthetic chemicals. Virgin lands are more fertile and free from GMO cotton varieties. CABI has targeted to give training to 181 farmers on organic cotton seed multiplication and to promote the area of organic cotton cultivation and long term availability of organic seed throughout the Pakistan. This is in line with its mission to promote sustainable agriculture.

Recently conducted training on organic cotton seed multiplication for organic farmers in Balochistan saw 147 trained. This included 91 farmers from Barkhan and 56 from Lasbella.

#### **Additional information**

**Authors:** Mr Ashfaq Ahmad-Project Manager, Mr Babar Latif Baloch-Policy Officer

**Donor:** **Laudes Foundation**

**Partners:** **Central Cotton Research Institute (CCRI) Sakrand, Pakistan Central Cotton Committee (PCCC)**, Balochistan Agriculture Extension Wing, Balochistan Agriculture Research Institute – BARI, **Federal Seed Certification and Registration Department (FSC&RD)**, **Pakistan Agricultural Research Council (PARC)**, **Ministry of National Food Security & Research (MNFS&R)**

Find out more how **CABI is helping to promote sustainable organic cotton production and supply in Pakistan** from the **project page**.





July 29, 2020



## Conservation of beneficial insects through NEFR installation in cotton crop

Cotton crop is the main source to produce the fiber, cotton seed cake, and for animal feed to support an increase in milk production and oil in good quantities. The sticks of cotton crop also support in burning fires for cooking purpose in the rural areas of Pakistan in places where other resources are not available.

However, this crop is subjected to a huge amount of chemical sprays and farmers expend maximum amounts of money to purchase pesticides for the management and control of insect pests to help ensure a good production of cotton. While farmers have been fighting back with pesticides, this is not sustainable in the long run. Due to the excessive use of pesticides, there are many issues related with human health in addition to the economic losses farmers are suffering through labour charges and the purchasing of expensive pesticides.

To produce pesticide free and organic cotton, it is important to select virgin land. In the light of this condition, CABI launched an initiative to produce organic cotton seed through the Cotton Advocacy for Policy and Seed (CAPAS) project – funded by **Laudes Foundation** – in Baluchistan province of Pakistan. This area was chosen because these lands are free from contamination.

Through this project, and to produce good quality of seed for multiplication, it is important to implement an Integrated Pest Management (IPM) strategy. It is also important to enhance the capacity of farmers regarding pests and beneficial insect identifications and biological control methods. In this regard, CABI arranged a training program in two districts of Baluchistan, Lesbella and Barkhan, where the farmers are growing organic cotton.



Farmers learn about the NEFR technology and the benefits of producing good quality organic cotton with a reduced reliance on chemical pesticide controls.

During a capacity-building program, IPM practices with strong cultural and biological control-based components were promoted among agriculture officers, field assistants, field facilitators and more than 108 organic cotton farmers. Considerable support from national stakeholders, who were excited to increase their capacities in the area of IPM and biological control, was also given.

To promote biological control, training sessions conducted on the Natural Enemies Field Reservoir (NEFR) technology were held. It was shared with that the NEFR is an approach which provides a safe habitat to the already existing natural enemies of the target pest by manipulating the existing environment on the farmer's field.

Details were shared with farmers regarding its infrastructure, required management techniques and how this farmer-based field laboratory can be run successfully. They were also shown pictures of the beneficial insects which will be reared in laboratory as part of the control measures of the harmful insect pests of cotton without use of any pesticides.

Before this, there was tension and stress concerning how organic cotton could be produced without the use of any pesticides and they had no prior knowledge about NEFR technology. The farmers also had little knowledge of biocontrol agents, how safe they are, or how beneficial they can be.

The farmers now feel happy and shared that this simple technology is easy to install, manage at farm level, and will support us to reduce the frequent use of pesticides and save the expenses incurred through their purchase. Through this technology implementation, we are happy and able to produce organic cotton of a very good quality. Furthermore, they are willing to install 25 mini-NEFRs in the area where the organic cotton is growing.

### **Additional information**

**Main image:** Cotton is a major crop of Pakistan after wheat and occupies the largest area in Pakistan compared to other crops (Credit: CABI).

**Authors:** Mr Ashfaque Ahamed-Project Manager, Mr Babar Latif Baloch-Policy Officer

**Donor:** **Laudes Foundation**

**Partners:**

**Central Cotton Research Institute (CCRI) Sakrand**

**Pakistan Central Cotton Committee (PCCC)**

Balochistan Agriculture Extension Wing

Balochistan Agriculture Research Institute – BARI

**Federal Seed Certification and Registration Department (FSC&RD)**

**Pakistan Agricultural Research Council (PARC)**

**Ministry of National Food Security & Research (MNFS&R)**

Find out more how **CABI is helping to promote sustainable organic cotton production and supply in Pakistan** from the **project page**.





September 1, 2020



## Plantwise programme launching in Azad Jammu & Kashmir, Pakistan

Focussing on the main objective and vision of the Department of Agriculture (DOA) Azad Jammu & Kashmir (AJ&K), regular discussions between CABI's Country Coordinator for Plantwise in Pakistan, and the DOA led to a formal agreement which officially endorsed plant clinics in three divisions of AJ&K.

The primary focus of this initiative will be on the demonstration of improved farm practices and providing quality plant health advice and solutions to the farmers. Productivity enhancement of major field crops in the region (maize, wheat, pulses, millets, and forages) through the programme's innovative extension services (Plant Clinics), capacity building of the extension staff; all these objectives will lie under the core responsibilities of the department.

Dr Bashir Butt, the Director General (DoA) expressed his views that Plantwise is so close to the main function of the department: "Of course, this programme is not only helpful in the sustainable management of resources but it also builds the capacity of our staff on the diagnosis of major plant health problems and recommendations regarding most appropriate solutions, leading ultimately to food security and prosperity in the region."

Dr Naeem Aslam, Country Coordinator for Plantwise in Pakistan said, "the Plantwise program will facilitate the department in achieving a skilful, competitive, sustainable, self-reliant, globally acceptable, and market-oriented agriculture in AJ&K, which is the vision of the department as well."





Currently, the DOA mainly provides plant disease and pest control services through plant health/disease investigation and control, the introduction of environmentally-friendly integrated pest management (IPM) approaches for reduction of crop losses caused by pests and diseases of fruits, cereal crops, and vegetables, and technical support in the field of IPM and apiculture, recommending and providing appropriate remedies including pesticides/insecticides for control of various plant pests. All these services will now be supported through Plantwise as the programme is well synchronized with the services offered by the department.

Dr Aslam also explained that the plant clinics have shown their value as a means of reaching farmers who are deprived of access to advisory services and the partners in other provinces are committed to strengthen the clinics as a strategic pillar of the national extension system.

There is a momentum for taking the plant clinics beyond the pilot phase and creating stronger national ownership and commitment. The initiation of the program in AZ&K is a step of the same motive.

### **Find out more about Plantwise in Pakistan**

**Registration of red list chemicals halted in Pakistan thanks to Plantwise**

**Meeting the needs of women farmers in Pakistan**

All photos provided by authors.

### **Acknowledgement**

CABI gratefully acknowledges the financial support of the UK **Department for International Development** (DFID), the **Swiss Agency for Development and Cooperation** (SDC), the **Directorate General for International Cooperation** (DGIS, Netherlands), the **International Fund for Agricultural Development** (IFAD), the **Australian Centre for International Agricultural Research** (ACIAR), and the **Ministry of Agriculture of the People's Republic of China** for the **Plantwise** programme.





September 29, 2020



## The advantage of developing 'linkages' for Better Cotton Initiative in Sindh province, Pakistan

In agriculture, cotton crop plays a vital role in the economy of Pakistan as the **fourth biggest producer in the world** behind China, India and the United States. But cotton yields and livelihoods are at risk from a range of pests such as **Whitefly, Thrips, Cotton Mealybug, Pink Bollworm**, and other sucking and chewing type insects.

To save the product from these insects, the spray machine plays an important role for pesticides. Farmers use manual spray machines which are not applicable as per standard protocols. CABI is taking a lead on promoting the use of and providing these spray machines to provide benefits to its **Better Cotton Initiative (BCI)** farmers.

The agricultural extension department within the **Government of Sindh** is also supporting the poorer farmers of Sanghar district by providing a subsidy to allow the purchase of these electric spray machines thanks to linkages developed with the agri-extension officials by the CABI field team.

In total 28 farmers have benefitted from this scheme and received a pesticide spraying machine on the payment of 33% of the actual cost. The remaining amount was paid by the Government of Sindh.

Mr Jewan Khan is one of the farmers who has benefited from the collaboration. He said, "I used to grow cotton every season but I faced some loss due to peptides. Due to the high cost of the spray machine (Rs 4,500), I couldn't purchase it and I was unable to spray my cotton field as per standard with a manual spray machine. Therefore, I could not save my product from pesticides and couldn't earn the actual cost of the product the same as the others."



**Mr Jewan Khan receives his more precise spraying machine to protect his cotton crop from pests**

Mr Khan added, "Later I came to know that the Deputy Director Agriculture (DDO) Agriculture extension is providing that spray machine to some farmers who meet their criteria but, being a common person, I felt very shy to visit the agriculture department and ask them about their formalities.

"I always thought about applying for this spray machine but could never dare to initiate. Once I discussed this matter with CABI representative Mr Shafi Muhammad (Producer Unit Manager) and Field Facilitator Dilnawaz Talpur, they guided me through the procedure and fully supported me to submit all the documents as per requirement.

"One day I got a call from the agriculture extension office notifying me that I have fulfilled all the requirements and I meet their criteria so I can receive my spray machine from their office. I was so excited to receive that machine. I went to the agriculture office and received that machine in just Rs 1,451 which otherwise costs Rs 4,500 in the market. Now I can spray my product as per standard protocols."

Mr Khan said that he wanted to thank CABI for its role in the Better Cotton Project in Sanghar and that without their support he would not have been able to purchase the spray machine.

"I always had a dream to get this machine but CABI made my dream come true," he said. "Now I can save my product from pesticides and generate more products which will increase my income."





September 30, 2020



## Empowering organic cotton growers through plant clinics in Balochistan

Pakistan is among the top five largest cotton producing countries in the world. Although Punjab and Sindh have remained major cotton producing provinces since 1947, a sharp increase in global demand for organic cotton is offering a great opportunity to Pakistan in general, and Balochistan in particular is set to get maximum benefit due to its vast land area and least contamination from chemical pesticides.

CABI is implementing the **Cotton Advocacy for Policy and Seed (CAPAS) Project** with the financial support of **Laudes Foundation** to help the organic cotton farmers in the Barkhan and Lasbella districts of Balochistan.

The majority of cotton farmers have small land holdings and limited financial resources. CABI has trained officials from the Directorate of Agriculture Extension, Balochistan and field staff from **WWF-Pakistan** as Plantwise plant doctors to provide technical guidance to cotton farmers in identification, diagnosis and recommendation of biological inputs for controlling diseases, pests, and insects.

Up to 40% of major crop production losses occur due to weeds, pests, and diseases. Identification of these cotton diseases and pest attacks, plus timely recommendations from plant doctors, not only help the smallholder cotton farmers to save their cotton crop but plant doctors are also teaching farmers to produce and use biological inputs, which keeps the cotton organic.

In conventional farming, cotton is considered a crop that is highly sensitive to pest attacks. Large quantities of synthetic pesticide are sprayed to keep them under control, which not only cause big financial burdens on smallholder farmers but they also create environmental and health challenges.

This can be effectively mitigated through promoting and protecting organic cotton crop. Plant doctors are trained to use completely different and biological methods to protect cotton crop from pests by establishing a **diverse and balanced farm ecosystem**, in addition to rigorous monitoring of pest populations in organic cotton fields.

CABI has set up 10 **plant clinics** in the Barkhan and Lasbella districts of Balochistan. Plant clinics are used for meeting, identifying, diagnosing and recommending remedies where CABI-trained plant doctors help farmers in controlling and minimizing the economic loss of crops including organic cotton in project and surrounding areas. These plant doctors are contributing not only in protecting cotton crop but extending their services to other crops and farmers not associated with CAPAS project.



The plant doctors are using the **Plantwise Knowledge Bank** for precise identification and recommendations of biological cures for cotton crop. This is helping the poor smallholder farmers of Balochistan to increase their household incomes not only by lessening their crop management expenses but also by increasing their per acre cotton production.

**Find out more:**

**Promoting sustainable organic cotton production and supply in Pakistan**

**Conservation of beneficial insects through NEFR installation in cotton crop**

**Training of organic cotton farmers for seed multiplication**

**‘Sowing the seeds’ for organic cotton in Pakistan**





 October 5, 2020



## Aflatoxin control in Pakistan: A project which will change the landscape of country's maize crop

Aflatoxin, produced by a poisonous fungus, is a serious threat to food security by contaminating many of Pakistan's agricultural products, including cereal grains, chilies, dry fruits, nuts and milk.

Accordingly, Pakistan has taken the regional lead to mitigate the aflatoxin issue in South Asia and CABI has joined hands with the **United States Agency for International Development (USAID)** and the **United States Department of Agriculture (USDA)** to lead this new initiative in collaboration with the **National Agricultural Research Centre (NARC)** and **Rafhan Maize Products Co. Ltd.**

AflaPak™ is a biological control product for displacing the strains of aflatoxin producing *Aspergillus flavus*. The active ingredient in AflaPak™ is a naturally occurring, nontoxigenic strain of *A. flavus*. The primary mode of action is by competition of the nontoxigenic strain of *A. flavus* with the toxigenic strains of *A. flavus*, which displaces aflatoxin producing fungi in treated crops.

AflaPak™ efficacy is being tested in field conditions on maize crop in five major maize growing districts of Punjab province, including; Sialkot, Kasur, Okara, Khanewal and Lodhran.

In this regard, CABI, the **Crop Diseases Research Institute (CDRI)** and Rafhan Maize have completed the field trials of two season (2018-19 & 2019-20) at project sites in selected districts. CDRI's primary role is to multiply and validate atoxigenic strain on maize crop – which is being further developed into a biocontrol product by Rafhan Maize for the use of farmers to control aflatoxin in maize crop. The biocontrol product – AflaPak™ was broadcasted on selected sites by Rafhan Maize to get the product sporulated and leave its impact on the soil.

To further enhance the technical capacity, and to strengthen the research capability of CDRI on aflatoxins, a state-of-the-art and first ever biocontrol laboratory has been established with the financial support of USAID and USDA under the umbrella of the Aflatoxin Control Programme.

This biocontrol laboratory aims to ensure the food security in the country by validating an eco-friendly biocontrol product to diminish poisonous aflatoxins which have the potential to decimate crops such as maize, wheat and rice.

This biocontrol laboratory will not only facilitate research work on aflatoxins but also provide a platform to the scientists and academia members of Pakistan to replicate the aflatoxin control research work on the pattern of advanced research being implemented in USA and Africa.

To learn about the laboratory protocols for aflatoxin control through biocontrol approaches, a group of scientists from Pakistan received a two-week intensive training course from the **Virginia Tech Tidewater Agricultural Research and Extension Centre**, USA, under the **Cochran Fellowship Program**.

The Cochran Fellowship Program training program has benefited the development of Pakistan's agriculture as the participants acted as 'Master Trainers' and extended the trainings to the local stakeholders from the **Department of**

**Agriculture Extension**, Punjab, and from other allied agencies. In the first phase, capacity building sessions were arranged in Faisalabad, Lodhran, Khanewal, Rawalpindi and Sialkot districts.

Participants (133 men and 16 women) were equipped with aflatoxin prevalence records, its deleterious effects on human and animal health and possible management strategies, with special reference to biological control approach.

To strengthen the concept of biological control of aflatoxin for the provision of improved quality maize crop, the project team further conducted a series of farmer trainings in the selected maize growing areas of Punjab province and implemented 10 trainings during the first phase.

In total, 527 maize growers took part in these training sessions and were educated on the problem of aflatoxin in maize crop, its hazards and implications on human and animal health along with the role of aflatoxin in the rejection of maize consignment. Emphasis was placed on the impacts of financial loss and possible management strategies with special reference to application of AflaPakTM biocontrol.

To sensitize the stakeholders and government agencies – including senior officials within the **Ministry of National Food Security & Research** (MNFS&R) and policy makers working in the agriculture sector with aflatoxins and its possible biological control through indigenous AflaPakTM, a four-day training workshop was organized in Islamabad.

Here **Dr Michael Braverman**, Manager Biopesticide, Organic and International Capacity Building Programs, **IR-4 Project**, Rutgers University, USA, acted as a master trainer and shared his global experience to handle the registration process of biocontrol products.

The successful registration of AflaPakTM will lay foundations for adoption and registration of a biocontrol product to manage aflatoxin contamination in crops, initially in maize.

Moreover, this effort will also support regional and global efforts to utilize biocontrol technologies. The endeavours, like Cochran training, are providing a platform where scientists from both the USA and Pakistan will be able to collaborate and work together for a national cause on aflatoxin control for the communities.

#### **Additional information**

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October 20, 2020



## CABI in Pakistan showcases its work on cotton as part of World Cotton Day

CABI in Pakistan took the opportunity to showcase its work on cotton, as part of a special **World Cotton Day** event hosted by the **Central Cotton Research Institute** (CCRI) in Multan, which included details on how it is supporting more than 32,000 cotton farmers, 52,000 cotton farm workers and 500 agriculture extension workers through its projects.

Cotton production in Pakistan is integral to the economic development of the country and is the **fourth largest producer of the crop in the world** after China, India and the USA. The country is largely dependent on the cotton industry and its related textile sector, and the crop has been given a principal status in the country where in **2017 cotton exports were worth more than US \$3billion**.

World Cotton Day was an opportunity for the CCRI to show the positive impact cotton will continue to have in the future and convince the international community to join the celebration and appreciate the advantages of cotton – ranging from its qualities as a natural fiber to the benefits people obtain from its production, transformation, trade and consumption.

It also provided the chance to highlight the challenges faced by the world's cotton economies, as cotton is significant for the least developed, developing and developed economies worldwide. This includes the management of cotton pests and diseases such as **cotton leaf curl disease**, **cotton blue disease** and **cotton boll weevil**.

CABI participated in the event by establishing a pavilion and displayed three cotton projects; the **Better Cotton Initiative** (BCI), the **Cotton Advocacy for Policy and Seed** (CAPAS) project and the **Natural Enemy Field Reservoir** (NEFR). The CABI pavilion consisted of live specimens, key performance indicators (banners), awareness raising material on pest and natural enemies, modules on NEFR and an LED display to show project videos.

The CABI pavilion was visited by Representatives of WWF Pakistan, Representative of Lok Sanjh Foundation, Reeds Pakistan, Mr Zahid Mehmood (Director, CCRI), Dr Shafique (RD, BCI) and Mr Saqib Ali Ateel (Secretary, Agriculture South Punjab) and Mr Hassan Raza CEO, Neelum Seeds Company.

Mr Saqib Ali Ateel also highlighted the importance of cotton – sharing expertise and views for the sustainability of cotton production and strategies to deal with the current issues of the crop.

The men were also briefed that CABI is engaged in the development of the country's first 'national organic cotton policy.' For this purpose, CABI is engaging all provincial and federal stakeholders for the drafting of this policy.

CABI experts also highlighted that climate change and changing consumer preferences – at national and international level – are pushing hard the demand for organic cotton and textile brands are taking great interest in the sustainable production of organic cotton in Pakistan.


**Additional information**

**Main image:** The CABI pavilion manned by staff including Mr Riaz Mahmood – Senior Biological Control Specialist at CABI's Centre for Central and West Asia (CWA) based in Rawalpindi who develop the Natural Enemies Field Reservoir (NEFR) concept for the management of pests on farms.

**Blog authors:** Babar Baloch, Project Manager-CAPAS Project, Noreen Mangrio, Gender cum Comms. Expert, BCI Project





 October 21, 2020



## Registration of biocontrol products for the agricultural sector in Pakistan moves a step closer

CABI, with the financial assistance of the **United States Agency for International Development** (USAID) and the **United States Department of Agriculture, Foreign Agricultural Service** (USDA-FAS), and technical assistance from IR-4 project, is helping Pakistan move a step closer towards the registration of biocontrol products to fight a range of crop pests and diseases which can impact upon the country's agricultural and economic productivity as well as food security.

In cooperation with the **Government of Pakistan's Department of Plant Protection**, IR-4 is working in partnership through CABI to help the country improve the commercial availability of biopesticides as part of a move towards more organic agriculture which can reduce incidences of pesticide contamination in a range of agriproducts such as maize, wheat, rice and cotton.

One example of this is CABI's work with partners, including the **Crop Disease Research Institute** (CDRI), **National Agricultural Research Centre** (NARC), the **Pakistan Agricultural Research Council** (PARC) and **Rafhan Maize Products Co. Ltd**, to **tackle the issue of harmful Aflatoxins in maize** through the biocontrol product locally termed as AflaPakTM .

Aflatoxins are a group of toxins produced by certain fungi – *Aspergillus flavus* – found in crops such as maize and groundnuts. These aflatoxins are toxic and can cause serious health problems for humans and livestock. They can also cause problems within the food chain because they contaminate crops, cause food safety, nutrition and security issues and consequently affect a country's ability to trade.

However, once registered, AflaPakTM will be the first ever registered native biocontrol product of its fungal nature in Pakistan, opening up opportunities for even more green technologies to be adopted in Pakistan.

Pakistan has made significant progress in food production over the last several decades. But, key risk factors such as high population growth, rapid urbanization, low purchasing power, prices fluctuations, irregular food production and inefficient food distribution system have impacted upon the country's food security.

As outlined by the UN World Food Program (WFP) for example, 60% of the Pakistani population face food insecurity and malnutrition. Also, 44% of Pakistani pre-school children suffer from chronic malnutrition and 15% suffer from acute malnutrition.



**Stakeholders gather to discuss the registration of biocontrol products to fight a range of crop pests and diseases which impact upon food security and agricultural productivity in Pakistan.**

The **Government of Pakistan** is focused to ensure the provision of improved quality food with reduced health risks for the betterment of public health and to meet export requirements. To address the challenge of food security, the **Department of Plant Protection (DPP)** of the **Ministry of National Food Security & Research (MNFS&R)** – through its multiple cooperation – is enforcing measures to regulate the pesticide sector in Pakistan.

Nearly 71% of Pakistan's pesticide market is import dependent and the country annually imports approximately 80,000 tons of pesticides. This is set against the context of a global agricultural sector which is moving more towards the use of biopesticides for crop protection – while recognising the benefits for human, animal and environmental sustainability.

In 2019, the **global biopesticides market was valued at about USD \$4.4 billion** but unfortunately the current pesticide regulations available within the DPP accommodate only chemical pesticides. DPP and CABI recognized that current regulations in Pakistan needed an overhaul to allow for native microorganisms like those in AflaPak™. IR-4 has developed a registration guidance document to allow for the registration of microbial and biochemical biopesticides and their commercial availability in Pakistan.

With the development of the organic agricultural sector, consumers will have access to the safer food with better nutritional content and this will also open access to the high-end markets for more Pakistani commodities.

#### **Additional information**

**Main image:** Maize is the third most important cereal in Pakistan after wheat and rice (Credit: Pixabay).

#### **Aflatoxin Control in Pakistan**

Find out more about **CABI's work on aflatoxin control in Pakistan**.

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October 23, 2020



## Pakistan's maize farmers get to grips with mechanized technology aimed at improving productivity

CABI in Pakistan, in coordination with the **Government of Punjab's Agriculture Department**, have given maize farmers a taste of improved productivity thanks to the mechanized technology provided by the 'cob picker'.

Farmers and growers in the region have been getting to grips with the benefits of cob pickers – including harvesting at proper moisture content – as a result of a special program conducted under the Asian Development Bank's project **'Enhancing technology-based agriculture and marketing in rural Punjab.'**

Implemented by CABI, the literacy training – held near a demonstration field – highlighted to farmers how the cob picker could chop and incorporate the maize stalk into the soil to improve fertility and the next crop yield.

The farmers were also given the opportunity to ask questions about the machinery including the costs per acre of renting it as well as issues around the aforementioned stubble management.

**Dr Shakeel Ahmad**, Project Coordinator, said: "Agricultural mechanization plays a strategic role in improving farm production and productivity. One of the reasons of low farm productivity in Pakistan is the non-availability of farm machinery – especially for small farmers. This delays farm operations particularly at sowing and harvesting of the crops."



Farmers learn the benefits of the cob picker during a training and literacy session held by CABI.

During the demonstration of the cob picker, the farmers were very keen to learn about the new technology and overall were very positive about its performance. The other observations of the field team were:

1. The suitable time for cob picking is from 11:00 am up to 5 pm (proper moisture content) because of dew factor.
2. The import of the machine started back in 2018. As machines are new to Pakistan, the operators need capacity building to operate these machines efficiently.
3. The peeling efficiency of the machine is 50%. Few farmers reasoned that variety (Pioneer-4040) of maize accounts for the rate of peeling efficiency. This will be confirmed once we harvest in the pilot sites any other variety in the coming days.

**Dr Babar Bajwa**, Senior Regional Director, CABI-Asia, said, "Pakistan is facing the serious issue of yield gap due to less adoption of innovative technologies and conventional farming ways. Currently, there is a huge gap between our production potential and average yield, therefore, in order to fill the yield gaps, and to foster agricultural productivity, latest technology should be integrated into the agricultural sector.

Mr. Riaz Anjum, Assistant Director Agriculture Extension, Okara viewed that adoption of farm mechanization technologies are vital to achieve better farm output. The Cob picker will assist farmers in completing their maize harvesting activities well in time with high efficiency thus reducing post harvesting losses with better crop yield.

Mr. Sagheer Ahmed, Progressive/Demo farmers also revealed that there is need for the cob picker as farmers are facing a severe issue of labour availability at the time of harvesting.

Therefore, keeping in view the need and interest of the farmers regarding the latest agricultural technologies, more demonstrations will be conducted for maize and other crops in Punjab province.

#### **Additional information**

**Main image:** Farmers learn the benefits of the mechanized cob picker which improves efficiency by 50%.

CABI operates in Pakistan as bonafide research institute in association with Pakistan Agricultural Research Council.

CABI is an intergovernmental organization with UN Treaty.







October 28, 2020



## CABI produces Agricultural Transformation Plan for Pakistan Government to help boost economy by US\$10bn a year

Food value chain experts at CABI have worked alongside the Pakistan Government to produce an **Agricultural Transformation Plan** (ATP) which is aimed at boosting the country's economy by US\$10bn a year and creating millions of new jobs.

Dr Mubarik Ali is team leader of the 'Cluster Development-Based Agriculture Transformation Plan-Vision 2020 Project' where 59% of the initial investment will go towards developing Pakistan's value chain and processing infrastructure.

This will then be followed by investment on planting material to renovate fruit gardens on 33 'agricultural commodity clusters' made up of goods including Carrots, turnips, cherries, chillies, citrus, dates, flowers, Mango, grapes, potatoes and spices etc.

**CABI's Central and West Asia** office in Rawalpindi was commissioned to write the ATP which will convert Pakistan's agriculture from a supply-driven to a demand-oriented sector that can compete in the national and international markets through vertical integration rather than horizontal expansion of value chain activities.

The project, which was led by CABI with support of **Pakistan's Ministry of Planning, Development and Special Initiatives**, has set a target of improving the country's agricultural export value by 10-20% higher than the existing level in consultation with stakeholders.

It will seek to do this by adopting a cluster-based approach. It will focus on farm productivity, harvest and post-harvest losses, trade performance, quality of produce, small-scale processing and farm and value chain operations – at both an institutional and production level.

Linking farmers with markets by strengthening the marketing capacity of Farmers Entrepreneur Groups (FEGs) – such as establishing the collection centres and pack-houses in rural areas, promoting contract farming and establishing information blogs on various production and marketing aspects – will also be key to the project's success.

Currently, losses in Pakistan's agriculture, both in terms of quantity and quality are high ranging from 20-50% mainly because of poor harvest and post-harvest management.

About 5-15% of these losses occur at the harvesting time; aflatoxin infestation is common in many agricultural commodities; high pesticide residue and lack of traceability and certification are emerging issues bothering the traders which reduces the country's chance to compete in national and international markets.

"Lack of investment in value chain development is the main cause of Pakistan's failure to get the world average export price," Dr Ali argues. "Sometimes, failure of Pakistani traders to present the product in a manner which importing country consumers prefer is also a cause. Many domestic consumers also complain about failing to get the desired quality in the domestic market."

**Mr Muhammad Jehanzeb Khan**, Deputy Chairman, Planning Commission of the Pakistan Ministry of Planning, Development & Special Initiatives, has commented, “In many developed and developing countries, the cluster-based development approach has become the basis for the transformation of various sectors of the economy including the agriculture sector.”

“This approach not only improves efficiency of development efforts by enhancing stakeholders’ synergistic collaboration to resolve issues in the value chain in their local contexts, but also helps to gather resources from large number of small investors into the desirable size needed for the cluster development.”

It has been analysed that out of the total 33 commodities where comparable export data is available, 16 commodities have ‘low growth potential in both quantities and values when compared with the respective world averages,’ Dr Ali reports.

Dr Ali suggests that the causes of low or deteriorating export-production ratio root in ‘the poor value chain development of the commodity, inefficient commercial policies and strategies and weak knowledge and link of the traders with international markets.’

“Improving trader’s link with international markets and improving the value chain of agriculture commodities can greatly enhance the export-production ratio of these commodities,” he added.

Mr Zafar Hasan, then Secretary, Ministry of Planning Development and Special Initiatives, quoted in the report, said, “To improve and enhance Pakistan’s competitiveness in the agriculture sector in national and international markets, the need to evaluate the value chain of agricultural commodities in the regional contexts in which these are produced, marketed, processed and traded was long felt.

“I truly hope that the policies, strategies, and interventions suggested in this report will facilitate the federal and provincial governments to chalk out and implement plans for cluster-based transformation of the agriculture sector.”

**Dr Babar Bajwa**, Senior Regional Director, CABI, Asia, said, “This study will serve as a basis to make and implement plans for cluster-based agriculture transformation. I hope the study can help the Pakistan Government make its investment decisions along the value chain of various agriculture commodities and adjust policies at the macro level.”

**Mr Muhammad Jehanzeb Khan**, Deputy Chairman, Planning Commission of the Pakistan Ministry of Planning, Development

### **Additional information**

**Main image:** Female farmers and workers take part in a brainstorming session on how to fight crop pests and diseases and improve their productivity through enhanced phytosanitary measures (Credit: CABI).

### **Full paper reference**

Ali Mubarik. (2020). Cluster-Development Based Agriculture Transformation Plan, In Ali Mubarik. (ed.) (2020) Cluster Development Based Agriculture Transformation Plan Vision-2025. Project No. 131(434)PC/AGR/CDBAT-120/2018. Unpublished Report, Planning Commission of Pakistan, Islamabad, Pakistan and Centre for Agriculture and Biosciences International (CABI), Rawalpindi, Pakistan.

The Agricultural Transformation Plan was developed under Cluster Development based agri. Transformation plan V-2025 (CDBAT) project implemented by CABI and funded by Ministry of Planning, Development and Special Initiatives, Govt. of Pakistan.

**The full document can be found and read [here](#).**

**Find out more about CABI’s work in Pakistan from the centre page [here](#).**





**Zygotogramma bicolorata beetles on parthenium (Photo: Asim Hafeez for CABI)**

 October 28, 2020



## Establishing Parthenium leaf beetle (*Zygotogramma bicolorata*) at new sites in Pakistan

Parthenium weed (***Parthenium hysterophorus***) is an aggressive herbaceous plant native to north-east Mexico and is endemic in America, with no economic importance reported. This invasive weed has spread to over 50 countries, including Pakistan. Parthenium is prolific, yielding thousands of small white flowers each forming five seeds and on reaching maturity results in a huge number of viable seeds on dispersal.

Under its unique global programme, **Action on Invasives**, funded by UK Foreign, Commonwealth & Development Office (**FCDO**) and the Netherlands Directorate General for International Cooperation (**DGIS**), CABI in Pakistan is targeting this invasive weed, using proven successful biological control agents, some of which are already present in Pakistan and imported natural enemies. Action on Invasives champions an environmentally sustainable, cross-sectoral and regional approach to dealing with invasive species.

***Zygotogramma bicolorata*** – also known as the parthenium leaf beetle – is one of the two reported biocontrol options of parthenium already present in Pakistan. There is evidence in other parts of the world (e.g. Australia and India) to suggest that this beetle is damaging and can have some effect on plant densities. Early surveys have shown that the impact of parthenium beetle is localized and its presence only recorded in Northern Punjab, Khyber Pakhtunkhwa provinces, and Kashmir.

Throughout 2018 and 2019 extensive field visits were made to inspect the presence of *Z.bicolorata* across the parthenium range in Pakistan. The field visits found that the beetle was not present in Sindh and most districts of Punjab Province. In light of this, redistribution of the beetle was initiated in parthenium infested areas where it is not yet found.

Initially in October 2018, 950 beetles were released in Sindh on parthenium by CABI staff at two sites in Hyderabad and Tando Allahyar. While additional releases of 3,500 beetles were made during November 2019 at four sites in central and southern Punjab including Arifwala, Renala Khurd, Dhori Ada Multan, and Faisalabad. This was carried out by engaging community organizations and the **Institute of Agricultural Extension, Education and Rural Development** at the University of Agriculture Faisalabad (UAF).



**CABI staff monitoring the diapause break up of *Zygogramma* in Faisalabad (Photo supplied by authors)**

In January and September 2019 and March and June 2020 CABI scientists revisited the beetles release sites in Sindh and districts of Central Punjab respectively, to check the beetle's establishment. Unfortunately, no beetles were recovered at the release sites in Sindh and we assume that establishment was unsuccessful. During June 2020, in districts of central Punjab, CABI scientists found beetles established at University of Agriculture farm in Faisalabad at two sites. Considerable feeding of immature and adult beetles on parthenium leaves was also noted at these sites.

Dr. Ijaz Ashraf (IAEERD – UAF) commented that the establishment of *Zygogramma* beetle at new sites is a real success of CABI and its partners. This will allow the beetle to spread more and help to reduce the parthenium population. Adding that in future more redistribution or releases of *Zygogramma* beetles should be carried out for its further spread and establishment at new sites, which will ultimately help to bring the parthenium infestation to an acceptable level.

Keeping in view the success of establishment of the parthenium leaf beetle at Faisalabad, more releases should be carried during the summer season to areas within the parthenium range with no beetles.

#### **Read more on this topic:**

**Redistribution of *Zygogramma bicolorata* to control Parthenium in Faisalabad**

***Zygogramma bicolorata* released at selected sites in Pakistan as biological control of parthenium**

**Colony of weevils safely in CABI Pakistan quarantine**





December 7, 2020



## Building work starts on Pakistan's first commercial facility to produce a biocontrol product for maize

Rafhan Maize Products Co. Ltd has begun building an AflaPak™ dedicated laboratory and production facility in Faisalabad which will be the first commercial facility in Pakistan for manufacturing a biocontrol product for the country's maize sector.

To address the aflatoxin contamination issue in maize crop, Rafhan Maize field teams are also actively building the capacity of farmers and disseminating the benefits of AflaPak™ to farmers. Once commercially available, the biocontrol product will lead the way in reducing aflatoxin contamination in maize crop.

Aflatoxin/mycotoxin contaminated feeds and maize crops are hazardous not only to animals but also to people who consume contaminated dairy, poultry and maize products. Recent estimates are that more than five billion people worldwide are at risk of chronic exposure to aflatoxins.

**Rafhan Maize Products Co. Ltd**, which is the local subsidiary of US company **Ingredion Incorporated**, processes thousands of tonnes of maize every year to produce high quality food ingredients and industrial products.

In 2016, Rafhan Maize collected maize samples from Punjab province and detected high (>20ppb) levels of aflatoxins in maize. In collaboration with **United States Department of Agriculture (USDA)** – who have expertise in biological control of aflatoxins – Rafhan Maize identified a native biocontrol (non-toxigenic fungus) to outcompete the toxigenic *Aspergillus flavus* to manage aflatoxins on maize crop in Pakistan. This is termed locally as the biocontrol product AflaPak™.

This unique concept of using non-toxigenic strain as a biocontrol agent has already been tested and commercialized to manage aflatoxins in 11 different countries of the world, including USA and countries in Africa, and it is hoped it can soon be produced for use in Pakistan.

**USDA Foreign Agricultural Service (USDA-FAS)** and **CABI** regularly convene a working group meeting with representatives from Rafhan Maize and the **Crop Diseases Research Institute (CDRI)** as well as the **National Agricultural Research Centre (NARC)** to facilitate the experimental trials of AflaPak™ and to commercially register it in Pakistan.



Working group meeting with Rafhan Maize senior management (Credit: CABI).

To strengthen the public-private cooperation, the Aflatoxin Working Group members from the **United States Agency for International Development** (USAID), USDA, CABI and NARC Rafhan team visited the Rafhan production facility in Jaranwala, Faisalabad and met with Chief Executive & Managing Director Rafhan Maize. The objective of this visit was to inform the Rafhan Senior Management about requirements of the production facility now being built for AflaPakTM registration in Pakistan.

#### **Additional information**

**Main image:** Farm worker in Depalpur, Okara, filling the bags of dried maize for feed mill supply (Credit: CABI).

#### **Aflatoxin Control Programme**

Find out more about CABI's work on aflatoxin control in Pakistan.

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December 22, 2020



## CABI trains provincial agriculture departments on biocontrol agents of fall armyworm and parthenium in Pakistan

Under its **Action on Invasives** (Aoi) programme CABI in Pakistan organized two training sessions for rearing biocontrol agents to manage fall armyworm (***Spodoptera frugiperda***) and parthenium (***Parthenium hysterophorus***) in December, 2020.

Participants of the training visited the Biocontrol Control laboratory as well as Quarantine Lab at the CABI-RBC office in Rawalpindi where they learnt practical skills on the rearing methodology of egg and larval parasitoids of fall armyworm and the stem boring weevil of parthenium.

CABI aims to build the capacity of agriculture departments to address the issue of invasive species and to raise awareness among communities for better management practices of invasive species.

Officers and lab assistants from eleven biocontrol labs in Punjab and five biocontrol labs of Khyber Pakhtunkhwa provinces attended the training. In the opening session, participants were briefed on the scope and objectives of Aoi programme. They also learnt about the activities and achievements of the programme over the last three years.

Mr. M. Hamza, Project Assistant, Aoi, CABI gave a detailed presentation on the identification and biology of fall armyworm and parthenium and highlighted the negative impacts of these invasive species.





Mr. Abdul Rehman, Deputy Director Programmes, CABI, comprehensively explained the biology and rearing methodology of fall armyworm plus its indigenously collected egg and larval parasitoid – *Telenomus remus*. While discussing with participants, he elaborated on the rearing techniques of fall armyworm on both natural and artificial diets. Mr Rehman also shared the detailed formulation of the artificial diet as well as modifications that could be made using locally available ingredients.

The participants were also trained on the classical biocontrol of parthenium, using the stem boring weevil, *Listronotus setosipennis*, at CABI's quarantine lab and learnt about the basic host specificity tests of this biocontrol agent



The trainees then had a chance to put their learning into practice by preparing an artificial diet for fall armyworm and culturing of stem boring weevil for parthenium.

After the training, one of the participants said that the capacity building training was need of the hour and helpful to for them to learn new interventions in the field of invasive species and its management.

At the end of training, participants received training material for future learning and certificates.





## Our Partners/Collaborators

We gratefully acknowledge the support for these projects by the following partners and collaborators:

### **MINISTRY OF NATIONAL FOOD SECURITY AND RESEARCH**

- Pakistan Agricultural Research Council
- National Agriculture Research Centre
- Department of Plant Protection

### **DEPARTMENT OF AGRICULTURE PUNJAB**

- Department of Agri. Extension
- Department of Agri. Research
- Department of Plant Protection
- University of Agriculture, Faisalabad
- Arid Agriculture University Rawalpindi

### **PUNJAB RURAL SUPPORT PROGRAMME**

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- Department of Agri. Extension
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- Department of Livestock Extension

### **DEPARTMENT OF AGRICULTURE SINDH**

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- Department of Agri. Research
- Sindh Agri. University Tandojam

### **DEPARTMENT OF AGRICULTURE BALOCHISTAN**

- Department of Agri. Extension
- Department of Agri. Research

### **METRO/STARFARM**

### **RAFHAN MAIZE PRODUCTS CO. LTD**

### **MINISTRY OF PLANNING, DEVELOPMENT & SPECIAL INITIATIVES**

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