



the PULSE

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Upcoming events

- 10 February 2020 – World Pulses Day
- February 2020 – Visit from Australian researchers to project sites. This visit will include workshops and meetings.

From the project leader



Dear Readers,

Welcome to the fifth edition of The Pulse newsletter, which includes number of stories from our stakeholders.

I hope you will enjoy the read.

Dr Ata-ur Rehman
Charles Sturt University



In collaboration with:



Importance of agronomic practices in pulses

By Abdul Naeem Shaikh, Senior Scientist, Dubari Crop Research Institute, Q.A.A.R.I Larkana

Pulses are considered an integral part of Pakistan's economy after cereal and oilseed crops with regard to area, production and economic value. They are also a rich source of energy and protein. In addition, pulses play an important role in improving soil health, long-term fertility and sustainability of the cropping system. They meet up to 80 per cent of nitrogen fixation from air.

Pulse cultivation has been neglected for quite some time in Pakistan. To deal with the demand and supply gap, the Pakistani government launched various programs to demonstrate the productivity and profitability of pulses. It is also working with the collaboration of Australia under the ACIAR Pakistan profitable pulse project (ACIAR pulse project) to enhance the production of pulses, mainly groundnut, chickpea and lentil, and farmers' profitability.

The government is also importing pulses, resulting in higher import bills. Increasing pulse production in order to cope with the country's needs is a great challenge for policy makers, scientists and the farming community.



Seminar on improvement of chickpea productivity and profitability at farm level.

The current productivity of pulses in Pakistan is quite low. The ACIAR pulse project is aiming to improve pulse production and profitability, which would play a vital role in sustainable pulses production in Pakistan. Improved pulse crop production practices and strategies would definitely enlighten the agricultural professionals, policy makers and contact growers, enhancing their awareness and capabilities for sustainable pulse production.

Under the umbrella of this project, farm families and contact growers have built a strong relationship, with both groups aiming to increase per acre production and profitability. Pulse growers have been successfully linked with different non-government organisations (NGOs) and private organisations, working on the procurement of quality seed. These local organisations purchase produce directly from farmers and store seeds for next year. We are encouraging farmers to contribute to this innovative arrangement, which will result in a local seed bank.

Gaps in pulse production

The successful development, dissemination and adoption of improved technologies for small landholders relies on cautious planning and execution of research, and the use of appropriate methodologies in extension. In order to boost Pakistan's pulse production, the main emphasis needs to be on technology development and its adoption by the farming community. There are still many gaps in the technology generated by the research institutions, and what has actually reached the farmers' fields. There is a wide yield gap between demonstration plot yields and farmers' plot yields, mainly due to lack of awareness and technology adoption. These gaps are being filled by following improved agronomic practices.

Improved agronomic practices

1. High yielding varieties and optimum seed rate

Seed requirement varies with cropping system, growing season, test weight and germination percentage of the seed material. The seed rate also varies according to weather conditions and duration of crop growth. In a study, it was revealed that optimum seed rate for higher yield of green gram is 30 kg/ha, groundnut 40 kg/ha and lentil 20-25 kg/ha. For intercropping systems, the seed requirement depends on the proportion of area available to each crop, and in the case of dryland

a slightly higher seed rate is required. In hilly and mountain ecosystems the seed rate for pulses is much higher owing to less soil moisture availability. Under this project, chickpea genotypes like Chattan, Dasht and Bittle 2016 performed best for high-yielding perspective and groundnut genotypes BARI-16 and BARI -11 were rated best genotypes with respect to yield. As for lentil genotypes, Markaz-09 and NIAB Masoor -02 were the best performing varieties for production.

2. Planting time and sowing depth

Time of sowing is the most important non-monetary input which has a significant effect on crop growth, phenological development, pest damage, weed dynamics, and crop productivity. Chickpea and lentil crops are sown in October, however groundnut crop sowing time is mid-April for achieving a high yield. The environmental conditions like temperature, photo-period and moisture availability significantly change with sowing time. Delayed planting restricts vegetative growth, and pod bearing branches decreases biological-nitrogen fixation and also leads to forced maturity. In some cases, mostly in the rainy season, late sown crop remained good for yield. Under rain fed conditions vegetative growth is increased. At the same time, it also increases the incidence of pests, especially pod borer (*Helicoverpa armigera*) in chickpea. Early sown crop easily escaped before the onset of diseases.

3. Nutrient management

Fertiliser management encompasses adding the right amount of nutrients at the right time through an appropriate method in order to minimise nutrient losses. This ensures efficient nutrient-use, enhancing crop productivity and maintaining soil fertility. Pulses require less nitrogen as they are capable of fixing atmospheric nitrogen biologically through Rhizobium bacteria. They do need, however, adequate phosphorus and sulphur for their root proliferation and synthesis of sulphur containing amino acids. Legume nitrogen fixation starts with formation of a nodule.

4. Green manuring of pulses for long-term productivity of soils

Green manuring of pulses usually performs multiple functions, including soil improvement from physicochemical and biological properties, as well as the enhancement of soil microbial biomass and enzymatic activity. In a study it was observed that green manuring improved availability of micronutrients i.e. zinc, iron, manganese and copper to crop plant.

5. Weeds management

The critical period of crop weed competition varies among different pulses, for example it varies from 40–60 days after sowing in rain fed conditions. Unchecked weeds cause 20–90 per cent yield losses in different pulse crops. Integrated weed management (IWM) is basically integration of effective, dependable and workable weed management practices such as cultural, mechanical, chemical and biological that can be used economically by the farmers. To minimise the effect of weeds pre and post emergence, weedicides are used. This practice has been well demonstrated to the farmers at various project sites.

6. Plant protection

Pulses are susceptible to many insect pests and diseases. The losses in yield due to lack of plant protection measures varies from 46–96 per cent depending on the crop and varieties. Integrated pest management (IPM) in pulses refers to the application of an inter-connected set of principles and methods to minimise problems caused by insects, diseases, weeds and other agricultural pests.

Project findings

Maximum pulse yield can be obtained by following the above mentioned practices. After conducting a lot of field activities it became apparent that farmers have both the potential and desire to increase their income, but lack awareness about crop production techniques.

This project proved to be a big opportunity for pulse growers to achieve maximum yield by sowing the best varieties with the support of the ACIAR pulse project. The project is currently conducting trials in all four provinces of Pakistan. These practices are also implemented in our project varietal trials and farmers' plots. Many chickpea, groundnut and lentil varieties were also evaluated for high yield purpose to meet the basic objective of the project by increasing the productivity and

profitability of pulses. Seeds of these promising varieties were provided to the contact farmers.

Different experiments like Rhizobium inoculums, seed rate, use of pre and post emergence weedicides, fungicides, and insecticides are used to get improved crop yield. With the help of this project, farmers have become well aware of crop production technology to get maximum production. Chickpea genotypes like Chattan, Dasht and Bittle 2016 are evaluated for high yielding perspective in different areas of Potohar region and regarding groundnut yielding ability, BARI-16 and BARI -11 were considered best genotypes. Lentil is also a vital pulse crop and its genotypes i.e. Markaz-09 and NIAB Masoor-02 performed best for per acre production.



Contact growers, the real project partners

By Abdul Naeem Shaikh, Senior Scientist, Dubari Crop Research Institute, Q.A.A.R.I Larkana



Mr. Ghulam Shah

Mr. Ghulam Shah, son of Shah Wali, is a progressive farmer from Site 1 of the project: Tamman, Tehsil Talagang, in the Chakwal district.

Ghulam joined the army in 1968 and retired in 1984. He was interested in agriculture from his childhood and worked with his parents in the fields. After retiring from the army Ghulam began agriculture farming including growing pulse crops.

Ghulam's son graduated from Pir Mehr Ali Shah (PMAS) Arid Agriculture University Rawalpindi. Our team contacted him and asked about his father's willingness to work with the pulses project as a contact grower in his area to which he agreed. The project team repeatedly visited Ghulam's property and selected his area for project activities.



Ghulam's crop productivity and profitability has increased due to his involvement with the project. He has suggested extension of the project's activities throughout the Pothwar region.

Unfortunately, the majority of Tamman farmers have still not realised improved profit from their pulse crops due to a lack of awareness about new varieties and the latest crop production technology. They mostly sell their produce/seed as an ungraded mix.



The project team visits Ghulam's field on a fortnightly basis and shares different agronomic practices about the use of improved crop varieties, disease management practices and other crop management issues.

Before this project, Ghulam was unaware of the new crop production technologies and improved high yielding varieties. He believes the project can become successful if good variety pulse seeds are provided to the farmers. Farmers need to be educated about soil fertility, sowing dates, threshing times and storage. Farmers also need to be made aware of insect pests and pulse crop disease management.



Mr. Muhammad Ahsan Hamad

Muhammad Ahsan Hamad, son of Muhammad Shafiq, is our progressive farmer. He belongs to Lani wala, Tehsil Fateh Jang, in the Attock district. He completed his Bachelor of Science (Honours) Agriculture from PMAS Arid Agriculture University Rawalpindi. Muhammad's family has worked in agriculture for generations. After completing his degree he started working on his farm using his newly acquired knowledge.

Being an alumni of the Arid Agriculture University, Muhammad is aware of project activities, and has shown interest in joining the project as a contact grower of pulses. Our project

team visited his area and selected his land for varietal trials and plot sowing. Other inputs like seeds, weedicides, insecticides and fungicides and inoculums were also provided to Muhammad for conducting trials.

Fateh Jang is a rain fed area and, in the past, there were no specific pulse varieties available for this region. However, with the help of this project, farmers are now getting maximum profit from their produce by using improved varieties and adopting new production technologies.

Other farmers are also growing pulses. However, as yet they are not realising high yield as they are using traditional agricultural practices. If they follow the new practices the prospects of achieving maximum yield are very high.

The project team is playing a vital role in the management of farmers pulse crops. They are also spreading awareness among the farmer families about new agricultural techniques to achieve maximum production. All the inputs introduced by this project are new to the area. Concomitantly, the project is also working to ensure long term sustainability by extending project outcomes to maximum number of pulse growing farming communities all over Pakistan. This is being achieved through the collaboration of National Rural Support Program and the private seed production company, Sayban.



On-farm training workshop: integrated pest management in chickpea to improve its productivity and profitability in Thal

By Mr. Niaz Hussain and Dr. Khalid Hussain, Arid Zone Research Institute, Bhakkar

Chickpea is a major winter pulse crop of Thal region in Pakistan. It has high nutritive value with 25.3–28.9 per cent protein content. Low yield of chickpea may cause a shortage of pulses in the country. Thal is a vast area, traditionally used for the production of chickpea which is about 1.0 mha. Thal contributes more than 90 per cent of the chickpea production for the Punjab Province.

Chickpea production has become erratic due to climate change. The major limiting chickpea production constraints are biotic (wilt, root rot, blight, insect pest, weeds etc.) and abiotic (drought, high and low temperature, hot dry winds) stresses (Millan et al. 2006; Upadhyaya et al. 2008) causing wide yield gap.

The chickpea has relatively few insect pests but pod borer, *Helicoverpa*

armigera (Hubner) is the major pest and has great economic impact (Ahmed and Awan, 2013). Environmental conditions during the late vegetative and reproductive growth period (February to Mid-March) are particularly conducive to pod borer development. Grain yield losses due to *H. armigera* are reported up to 37–50 per cent and in severe cases up to 90 per cent (Lal, 1996; Sarwar et al. 2009). It is a great threat to livelihood of farmers and food security for Pakistan.

A significant loss in yield was also observed due to a termite attack in early and late crop stages, plus army worm and stored grain pests. Moreover, major diseases like *Fusarium* wilt and *Ascochyta* blight are also a major threat.

Integrated pest management (IPM) is knowledge intensive and cost effective

technological new intervention to overcome the devastation caused by the diseases and insect pests. IPM is a new concept and more than 95 per cent of farmers are unaware of its principles and components. Therefore, adoption of the IPM package is critical to address the production losses and improve productivity and profitability of chickpea on sustainable basis. IPM benefits need to be promoted on a much larger scale.

In this context, a training workshop was conducted on 14 March 2019 in collaboration with the ACIAR pulse project (CIM/2015/041) at Dera Qasim Mehmood Bhatti, Site-3, Mankera. The main theme of the training workshop was to highlight the IPM package for chickpea in light of current food security and nutrition related challenges in Pakistan. This training workshop would speed up the benefits of this promising technology that is eco-friendly, cost-effective and income augmenting.

Dr. Khalid Hussain, Director Arid Zone Research Institute (AZRI), Bhakkar welcomed the farmers, researchers, university professors, extension workers, market agents and other stakeholders to the workshop. Professor Dr. Asif Ali, Vice Chancellor, Muhammad Nawaz Shareef (MNS) University of Agriculture, Multan participated in the workshop as a chief guest. The training workshop was inaugurated by Dr. Khalid Hussain, Director AZRI, Bhakkar. In his inaugural speech, Dr. Hussain briefed the research activities and achievements of ACIAR pulse project at Site-3, Mankera. He focused on status and prospects of chickpea production in Thal and the use of high quality seed of approved chickpea varieties to improve its productivity in the Thal Zone. He also delivered a comprehensive lecture on the adaptation of risk reduction strategies against agro-climatic constraints.



Farmers' group discussion at Site-3, Mankera

On-farm IPM training workshop, 14 March 2019, Site-3, Mankera



Dr. Azhar Iqbal, Plant Pathologist, Pulses Research Institute, Ayub Agricultural Research Institute, Faisalabad delivered a lecture on the life history of *Ascochyta* blight and *Fusarium* wilt on chickpea, and strategies for its effective management. Mr. Riaz Ahmad, Entomologist, Entomological Research Institute, Ayub Agricultural Research Institute, Faisalabad delivered a lecture on chickpea pod borer prediction and monitoring, and new approaches to its management. He focused on IPM for the effective control of pod borer. He also disseminated the preventive and curative measures of stored grain pests (khapra, dhora etc.) of chickpea as these pests can cause storage losses of up to 10–15 per cent.

Mr. Niaz Hussain, Assistant Research Officer (Pulses), AZRI, Bhakkar, visited the chickpea demonstration plot with workshop participants. He gave a practical demonstration of chickpea latest production technology at the site with the concept 'Seeing is Believing'.

After the field visit, Professor Dr. Asif Ali, Vice Chancellor, MNS University of Agriculture, Multan, paid a vote of thanks to the participants. He said the training workshop was a step towards ensuring food security and a reduction of Pakistan's import bill by boosting the production and profitability of the chickpea crop on sustainable basis.

Speaking as a representative of the farmers, a progressive grower of Hyderabad Thal, Mr. Zafar Mehdi Hayat, admired the efforts of ACIAR pulse project Site-3 team for organising a very informative and needed workshop for the poor chickpea growers of Thal. He advised that the farming community were very appreciative of the project's support.

The workshop was a successful move towards achieving enhanced and sustainable chickpea productivity. In all, 200 farmers, extension workers, university professors and scientists attended the workshop.

Performance of New Edge Microbials (Nodule N) in chickpea paddocks in Pakistan

By Israr Hussain, Project Coordinator, Islamabad, Pakistan

Chickpea, being a leguminous crop, hosts rhizobium bacterium in its roots. This symbiotic relationship provides win-win opportunities for crops, farms and farmers. The beneficial effects of the presence of rhizobium in soil are well established. However, performance of different rhizobia under different agro-ecological conditions may vary.

In this regard, experiments were conducted with groups of collaborative research (GCRs), including family farmers, researchers and extension agents at six locations in four provinces of Pakistan during 2018–19. The locations included climatic conditions from arid (Bhakkar and Karak), to semi-arid (Chakwal and Attock) and humid (Larkana and Jafferabad). The irrigation regime varied from totally rain fed – Bhakkar – to the residual moisture of paddy fields in Sindh and Baluchistan. Soils included the sand dunes of Thal desert (Bhakkar and Karak) to the loams of Pothwar (Attock and Chakwal) and the clays of Sindh and Baluchistan.

The methodology adopted was to conduct a non-replicated simple trial in GCRs at a farmer's field over three treatments. The first treatment included the inoculum Nodule N from New Edge

Microbials in Australia. The second treatment included Biozote inoculum for chickpea from Land Resources Research Institute at National Agricultural Research Center, Islamabad, Pakistan. The third treatment was left untreated as a control with no inoculum.

At Attock, Chakwal and Bhakkar, the chickpea variety 'Bittle 2016' was used for the inoculum trial. In Karak, 'Fakhr e Thal' was used, and at Larkana and Jafferabad, 'DG-98' was used. These varieties are the adapted and recommended varieties for these locations. A one-acre field was divided into three equal parts, with one part of the field for each treatment on all sites. Data was collected at flowering stage and at harvesting stage. 50 Kg DAP per acre was applied as basal dose at each site.

The results revealed that the New Edge Microbial Nodule N chickpea inoculant performed remarkably well at three locations including Bhakkar, Larkana and Jafferabad. These locations represent 90 per cent of the total area of chickpea production in Pakistan. These are the results for the first year's trial. The same will be repeated during the 2019–20 chickpea cropping season at the same six sites.

Sites	Number of active nodules / plant			Seed yield (kg/ha)		
	Nodule N	Biozote	Control	Nodule N	Biozote	Control
Attock	–*	54	14	–	570	520
Chakwal	–	49	18	–	520	475
Bhakkar	68	60	48	1170	1090	880
Karak	46	37	23	2480	2048	1649
Larkana	62	68	43	2170	2140	1990
Jafferabad	–	–	–	2600	2800	2450

(–) Data not received from the sites



Pulses & Mango Festival 2019 at the Centaurus Mall, Islamabad

By Mr. Niaz Hussain and Dr. Khalid Hussain, Arid Zone Research Institute, Bhakkar

A three day Pulses & Mango Festival was organised at The Centaurus Mall, Islamabad from 26–28 July 2019. Stalls of different varieties of organic chickpea along with by-products and mangoes were displayed. The United Arab Emirates Ambassador His Excellency Mr. Hamad Obaid Ibrahim Salim Al-Zaabi and Honourable Minister for Agriculture Punjab Mr. Malik Nauman Ahmad Langrial inaugurated the festival. A number of foreign dignitaries, senior politicians, Pak Gulf Construction Limited (PGCL) President Sardar Tanveer Ilyas Khan, PGCL Senior Vice President Sardar Yasir Ilyas Khan and Muhammad Nawaz Sharif (MNS) University Of Agriculture, Multan Vice Chancellor Prof. Dr Asif Ali were also present at the time of the inauguration ceremony on 26 July 2019. The pulses component of this festival was organised by the MNS University of Agriculture, Multan with the collaboration of Arid Zone Research Institute, Bhakkar, and farming community Site-3 Mankera, Bhakkar, under the Australian Government funded ACIAR pulses project.

Festival aims and objectives

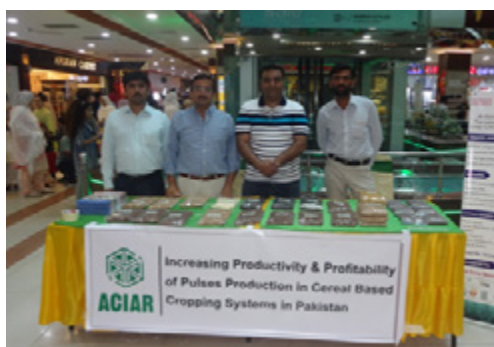
- Link GCR family farmers to a high end market.
- Promote pulses production and related agribusiness.
- Highlight the importance of pulses, especially organic chickpea.
- Enhance the productivity and profitability of pulses in light of current food security in Pakistan.

• Provide opportunities for both growers (profit) and consumers (organic and physically pure products).

• Promote the concept of value addition at farm level.

United Arab Emirates Ambassador Mr. Hamad Obaid Ibrahim Salim Al-Zaabi visited the pulses stall and took immense interest in organic chickpea and its by-products like daal (split chickpea) and flour (basen). Prof. Dr. Asif Ali, Vice Chancellor, MNS University of Agriculture, Multan and Dr. Abid Mehmood, Director General Agriculture

(Research) Ayub Agricultural Research Institute, Faisalabad also visited the pulses stall and encouraged the organisers of this successful event. The festival was also attended by various consumers, agricultural experts, researchers, investors, mill operators, whole sellers, grain processing agents and manufacturers from around the country who expressed great interest in organic chickpea and its byproducts. This kind of opportunity will be very beneficial for growers to enhance and expand their business resulting in maximum outcomes at farm level.



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aciar.gov.au/project/CIM/2015/041

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