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Newsletter of the ACIAR Pakistan profitable pulse project – CIM/2015/041

Issue 4 – July 2019

the PULSE

In this issue

Upcoming events

- Aik Saath Annual Project Review and Planning Meeting
  8–10 July 2019
  Karachi

From the project leader

Welcome again to our respected readers. This time you may find our fourth issue of the newsletter a bit different.

Thank you to our project team members whose incessant efforts have produced some remarkable achievements that this issue is highlighting. In my opinion this will trigger motivation for more Pakistani farmers and entrepreneurs to take pulses seriously to bag profits that may not have envisaged in the past.

Sit back and enjoy reading the newsletter, showcasing the combined efforts of participating farmers and researchers.

Dr Ata-ur Rehman,
Charles Sturt University

In collaboration with:

FGC Functional Grains Centre · Barani · PARC · Sindh Agriculture University · PULSE AUSTRALIA · FarmLink

Potential to enhance pulse production in Larkana

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

Larkana, formerly known as Chandka, situated next to the River Indus, is a historical district of the Sindh province of Pakistan. Fertile land with temperatures ranging from −2°C in winter to 53°C, Larkana is famous for all kind of crops, fruits, and vegetables. The fruits include guava, mangoes, oranges and melons whereas vegetables include carrots, cucumber, onion, cabbage and potatoes. The crops comprises of rice, wheat, sugarcane, barley, canola, mustard, lentil and chickpea. Large scale production of chickpea some 20 to 25 years ago has seen a drastic decline owing to mostly policy driven issues.

The baseline socio economic survey conducted with farm families under the Australian government funded ACIAR pulses project across all the four provinces has identified main issues namely, marketing, seed and weeds hampering the increase in productivity and profitability of pulses in Pakistan. Consequently, research questions were developed and number of experiments on seed rate, pre emergence herbicide, supplementary irrigation, insecticide, fungicide, and rhizobium inoculum were conducted at farm level.

Larkana farm trials.

We have established that the higher seed rate causes more weeds with no significant yield advantage, and that pre emergence herbicide Dual Gold, if applied appropriately can block the emergence of weeds up till 50 days after sowing. Both the interventions have encouraged more and more farm families to adopt such practices.

In March 2019, we conducted a one-day seminar on the improvement of chickpea productivity and profitability at farm level in Larkana area. Attendees at the seminar included: Dr Ata-ur Rehman from Australia; Project Officers Mr Israr Hussain and Mr Abdul Manan; Director of Radio Pakistan, Larkana, Mr Ali Murad Tanwari, along with the radio team; Director of Integrated Pest Management, Mr Abdul Latif Joyo, with his research team; Director of Best Management Practices, Mr Saeed Ahmed Muhammadi, with his research team; Director of Dubari Crop Research Institute, Mr Munsif Ali Kaisrani, with research team; Deputy Director of Agriculture Extension, Larkana District, Mr Ghulam Hussain Shaikh, along with extension department officials, the team of PARC Baluchistan, farm families and other local farmers.

The seminar was conducted under the supervision of Dr Aijaz Ahmed Soomro, Chairman, Agronomy Department at Sindh Agriculture University, Tandojam. The Director of Radio Pakistan, Larkana has since followed up with an invitation to present a one-hour program to promote our project. Many farmers in addition to the farm families have also contacted me to show their interest in our project and have asked us for an invitation to future project activities.

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

Farmer's field days: on farm workshops, field tours and farmer meetings

By Abdul Manan Khan, Project Officer, MNS-UAM, Multan

The project conducted various on-farm experimental trials and research activities at all six sites in the 2018/19 chickpea/lentil cropping season. These activities were implemented by different active local project partners, with the aim of letting various stakeholders visit the crop conditions and farm management. These field days were arranged for insect pest and disease management (IPM), participatory varietal selection, post-harvest management and value-addition of pulse crops.

Farm level workshop for the enhancement of productivity and profitability of chickpea and lentil at Naseerabad-Baluchistan (Site-6) – April 2019

The issues facing the pulse industry were identified by conducting situational analysis at all selected sites. Issues included: no access to quality seed, biotic and abiotic stress, poor agronomic practices, lack of awareness, poor marketing systems, and poor linkages among stakeholders.

The Chakwal, Attock and Karak districts are well known for chickpea and groundnut cultivation under arid conditions. Their proportion of rainfall is relatively high compared to other project sites. Therefore, during Rabi season, chickpea blight, insect pest infestation and higher weed density is observed in the chickpea crop. Similarly, Tikka disease is a potential threat to groundnut grown in Kharif season.

Field days were conducted to realise the importance of proactively controlling insect pest disease and weeds. Precautionary measures and the available options for management of these constraints, without compromising yields, were discussed with farmers. After the field days, project trials were visited by the farmers to see the differences between crops at farmer field and farmer led project trials, with optimised agronomic and IPM practices.

District Bhakkar (Site-3) is in the Thal area, where about 90 per cent of chickpea is grown in arid conditions. Thal zone is a traditional area for chickpea production. It has poor sandy soil and erratic rainfall, with harsh and prolonged drought that causes poor chickpea yields. Ecological conditions during the late vegetative and reproductive stage are conducive to pod borer infestation (35–50 per cent) and wilting.

Kisan Mela (field day to enhance productivity and profitability for groundnut) at Chakwal District (Site-2) – October 2018

Field-training workshops were conducted to enhance productivity and profitability of chickpea, and to strengthen the growers' drought resilience. This will help to create awareness among the region's farming communities, and increase crop yield by reducing risk factors.

Sites 5 and 6 are similar in conditions and growing patterns of chickpea and lentils. The pulse crops are grown here on irrigated land after rice harvesting (Dobari farming). During rice crop, irrigation is done through rice canals and after rice, chickpea is grown on rice moisture. The chickpea crop is irrigated with tube well water or rainfall. Pod borer incursion,

Field day for post-harvest management and storage of chickpea at Karak (Site-4) – April 2019

ascochyta blight and root rot are commonly observed during the season.

This area is known for its maximum per acre chickpea yield compared to all other project sites. Availability of moisture is good, so weed problems are common, requiring high-cost manual eradication. New practices have been introduced in the form of pre-emergence weed control and zero tillage. Field days were also conducted in the last week of March for the improvement of productivity and profitability of chickpea at farm level in Larkana.

Post-harvest management, storage and value addition of groundnut, chickpea and lentils were also discussed with farmers at the time of harvesting at each project site. Our next aim is to train farmers for entrepreneurship by providing training and guidance in seed processing, grading and marketing. Likewise, value addition of these pulse crops at farmer level, which can be sold by either gender at local schools, towns, villages and big city supermarkets.

Field day and farmer meeting to create awareness for effective agronomic practices and IPM at farm level in Larkana (Site-5) – March 2019

Training workshop for the improvement of productivity and profitability at thal region through effective control of pod borer and gram blight at Site-3 – March 2019 (Left)

Ascertaining tolerance to post-emergence herbicides in chickpea and lentil genotypes

By Dr Shahid Riaz Malik, Program Leader and Dr M. Aqeel Sarwar, Scientific Officer, Pulses Program, National Agricultural Research Centre, Islamabad, Pakistan

Chickpea and lentil are two important pulses of Rabi season in Pakistan. By virtue of their ability to fix atmospheric nitrogen, and being rich in vegetable protein, they offer a viable option for crop diversification and nutritional security.

Results of the situational analysis indicated that there are many factors responsible for low productivity of these pulses, however poor crop management, especially weed management, is one of the major biotic constraints to production.

Chickpea and lentil crops are highly affected by weeds during their entire growth period. Most of the weed species grow faster and taller than these crops, inhibiting growth, curtailing sunlight, and ultimately affecting photosynthesis and plant productivity. The critical weed control period in both crops has been reported to be 30–60 days after emergence. Yield loss incurred due to weed competition is estimated to be between 40–87 per cent, depending on the type of weeds and their density.

Shortage of agricultural labourers, coupled with continuously increasing labour costs, has made manual weeding an expensive field operation for any crop in a developing world. Herbicide-tolerant cultivars offer an opportunity of controlling weeds through need-based applications of herbicides thus bringing down the cost of cultivation. In chickpea and lentil, pre-emergence herbicides are commonly used to control weeds emerging soon after germination. Weed germinating after crop emergence still remains a major bottleneck in their production.

Presently in Pakistan there are no lentil and chickpea genotypes that have a tolerance to post-emergence herbicides. This issue, identified in the situational analysis, was converted into a research question. A study was undertaken to identify the sources of resistance to the post-emergence herbicides and effective weed control for improved productivity in these crops.

Studies were conducted at the National Agricultural Research Centre, Islamabad, during Rabi season 2018–19. Experimental material consisted of 50 lentil and 36 chickpea diverse genotypes. These genotypes were evaluated in two experiments for post-emergence herbicide tolerance against five post-emergence herbicides: Carfentrazone-ethyl, Bromoxynil + MCPA, Tribenuron methyl + Metsulfuron-methyl, Fluroxypyr + Aminopyralid and Flumetsulam. Herbicide tolerance score was recorded visually on a 1–5 scale, where

1 = highly tolerant (excellent plant appearance, no burning / chlorosis of leaves),

2 = tolerant (good plant appearance with minor burning / chlorosis of leaves),

3 = moderately tolerant (fair plant appearance with moderate burning / chlorosis of leaves),

4 = sensitive (poor plant appearance with severe burning / chlorosis of leaves), and

5 = highly sensitive (complete burning of leaves leading to plant mortality).

Herbicides	Swine cress (Halon)	Blue pimpernel (Bili booti)	Bur clover (Maina)	Yellow sweet clo-ver (Senji)	Fumitory (Shahtra)
	Percentage of weeds killed				
Flumetsulam	90	90	40	50	00
Carfentrazone-ethyl	50	90	40	20	60
Bromoxynil + MCPA	90	90	85	85	60
Tribenuron methyl + Metsulfuron-methyl	95	95	95	95	80
Fluroxypyr + Ami-nopyralid	95	95	90	90	90

Identification of post-emergence herbicide tolerant genotypes in chickpea and lentil at NARC, Islamabad, Pakistan 2018–19

Weed control in lentil through herbicide Flumetsulam as compared with weedy control

Preliminary results indicated that in lentil, 39 genotypes showed tolerance against Flumetsulam whereas 5 genotypes exhibited tolerance against Carfentrazone-ethyl. Only 2 genotypes were found moderately tolerant to Tribenuron methyl + Metsulfuron-methyl. In chickpea, 30 genotypes were found tolerant against Flumetsulam and 6 genotypes against Carfentrazone herbicides.

The performance of these herbicides was also recorded against the major dominant weed species found in the experimental field. The results are presented in the table below. It was observed that Fluroxypyr + Aminopyralid herbicide efficiently controlled (90–95 per cent) five major weeds followed by Tribenuron methyl + Metsulfuron-methyl with 80–95 per cent control. However, Flumetsulam also provided good control of all weed except fumitory and also suppressed the minor weed species like field bind weed etc.

Concluding the present study, in lentil, 44 genotypes, and in chickpea, 36 genotypes were identified as tolerant against two herbicides: Flumetsulam and Carfentrazone-ethyl. The most effective herbicide in controlling major weeds was Tribenuron methyl + Metsulfuron-methyl, with only 2 lentil genotypes found moderately tolerant for this herbicide. These genotypes can also be used as donors to develop post-emergence herbicide tolerant varieties in chickpea and lentil. Herbicide tolerant varieties will increase 20–30 per cent production of chickpea and lentil in Pakistan.

Lentil genotype tolerant to Tribenuron methyl + Metsulfuron-methyl

Nutritional importance and value addition of pulses seminar

By Dr Anwaar Ahmed, Institute of Food and Nutritional Sciences, PMAS-Arid Agriculture University, Rawalpindi

A seminar on the nutritional importance and value addition of pulses was held in January 2019, by the ACIAR Pulses Project Team of PMAS-Arid Agriculture University, Rawalpindi. Vice-Chancellor Professor Dr Nadeem Akhtar Abbasi chaired the seminar. The speakers included project team members Professor Dr Ataul Mohsin, Dr Shahid Riaz, Dr Anwaar Ahmed and Mr Israr Hussain who highlighted the importance of pulses, and the nutritional and economic benefits of its value addition.

Speakers emphasised the significant gap in Pakistan's pulse yield compared to developed countries. The yield of pulses in Australia, for example, is seven times higher than in Pakistan. The low pulse cultivation rate and yield does not match the average per capita consumption of 6–7 kg. Speakers showed concerns that Pakistan is spending 102 billion rupees annually importing pulses in order to meet requirements. They pointed out salient features of the ACIAR Project to address issues related to pulse production technology, marketing and end-product utilisation. The participants from academia, postgraduate students, researchers, and farming community took a keen interest in the seminar. At the seminar's conclusion, a number of areas were identified for the value addition of pulses, as follows:

- Use of fresh green pulse beans with eye-catching packaging to add value and attract consumers.
- The development of gluten-free baked products, breakfast cereals, bread, pasta, soups, sauces, gravies, snack foods, cereal bars, etc.
- Production of canned pulses that requires processing steps like blanching, soaking, canning and pasteurisation.
- The fortification of bakery goods with pea, bean and chickpea flours create excellent functional foods. The development of snacks (sattu, besan ke laddo, burfi, sweet bars, papads, pakora fried with oil, salt and spices).
- The enrichment of protein derived from pulses in fruit smoothies and vegan protein drinks, noodles, etc.
- The development of quick-cook dehydrated pulses with extrusion technology using high-temperature, quick techniques in which moistened, valuable, starchy, high-quality protein foods are plasticised and cooked, enhancing their sensory attributes.
- The development of high-energy baby food and sports foods. Furthermore, roasting or puffing pulses by subjecting them briefly to high temperatures results in nutritious and wholesome food products.
- Fermented and sprouted pulses can be produced from dry pulses after soaking, followed by storage in high humidity and moderate temperatures, to encourage the process of germination.

Pulses Product Development Competition

By Dr Anwaar Ahmed, Institute of Food and Nutritional Sciences, PMAS Arid Agriculture University, Rawalpindi

On 9 January 2019, an innovative Pulses Product Development Competition was organised by the Institute of Food and Nutritional Sciences, PMAS Arid Agriculture University, Rawalpindi, with the collaboration of Lok Sanjh, an NGO working for the social and economic uplift of farming communities.

The Vice Chancellor Professor Dr Nadeem Akhtar Abbasi launched the competition by cutting the cake prepared with pulses by food technology students. Participants included academics, students, researchers, and farming communities who took a keen interest in the competition. Among the 500 plus participating students, 102 pulses products were exhibited. The students highlighted functional, technological, rheological and thermal properties of pulses which transform into value-added products.

Product stalls were crowded with students, researchers and farmers.

The winning products were:

- chickpea butter
- beans milk drink
- beans milk dessert
- pulses snacks
- garbanzo balls.

Contact us

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

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