Activities in Pakistan under the Beans with Benefits Project 2015-16

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Mungbean is an important pulse in Pakistan, rich in protein and iron, and its cultivation improves soil fertility by adding nitrogen to support the succeeding crop. Mungbean is considered the hardiest of all pulse crops and grows well in hot and dry climates.

Agriculture in Pakistan

Agriculture is a vital component of Pakistan's economy; it contributes to food security, provides raw materials for industry, and helps in poverty alleviation. This sector contributed 19.8% of the country's GDP and it remains by far the largest employer, absorbing 42.3% of the total labor force. Growth of the agriculture sector is contingent on favorable weather conditions. There is a strong relationship between agriculture and climate—temperature, precipitation, floods and other aspects of weather that affect production, commodity prices, overall growth and other measures of economic development.

Over recent decades, the challenges of national food security and climate change have shifted the global policy focus towards the development of agriculture. The potential of this sector in earning valuable foreign exchange has been realized by tapping the potential of value addition.

Pakistan's agriculture community consists of small farmers who face various limitations in day-to-day farming practices. Yield levels in Pakistan rank in the low to middle range. To develop the capability to provide for the nutritional needs of its population by the year 2030, the government is focusing on improving agricultural productivity by increasing crop yields, and through the systematic application of better inputs and advanced technology to enhance farmers' profitability, improve competitiveness and ensure the environmental sustainability of agriculture.

Why mungbean?

Mungbean is an important pulse in Pakistan. It is grown mainly in southern Punjab and Sindh provinces. Punjab is the major mungbean-growing province and alone accounted for 88% of mungbean area and 85% of total mungbean production. Mungbean is rich in protein (about 24%) and iron (6 mg/100 g dry seeds) and its cultivation improves soil fertility by adding 3040 kg N/ha after the harvest of the crop. The succeeding crop requires about 25% less nitrogen application. Mungbean is considered the hardiest of all pulse crops and grows well in hot and dry climates.

The Beans with Benefits project

The project aims to multiply and characterize mungbean accessions and improved lines from the World Vegetable Center. These lines are in trials at different locations in the main mungbean-growing areas in Pakistan. The desired varieties should have characteristics such as resistance against *Mungbean yellow mosaic virus* and bruchid pests in storage. Short duration and high yielding varieties are the ultimate objectives of the project; these varieties should have high tolerance to heat and perform well in the saline soils of Pakistan. A baseline survey report, establishment of the Mungbean Learning Alliance, and analysis of gender and economic issues will contribute to best mungbean practices in Pakistan.

Beans with Benefits Pakistan has two principal partners: the National Agricultural Research Center (NARC) handles mungbean field trials, seed production, variety development, and socioeconomic studies; the University of Agriculture Faisalabad provides student training and seed inoculation with Rhizobium, Plant Growth Promoting Rhizobacteria (PGPR).

Mungbean Learning Alliance established

The Mungbean Learning Alliance is a network of major stakeholders along Pakistan's mungbean value chain. The alliance serves to enhance the uptake of the project results by the end-users. It involves different stakeholders, including researchers, farmers, millers and traders to promote coordination and arrive at a shared understanding of the problems in mungbean production and how to solve them. Two meetings were conducted, one in 2015 and 2016, while a third is scheduled for December 2016. During these meetings problems are discussed and minutes are shared with all stakeholders and partners.

Learning Alliance Meeting at NARC, 2015

Better access to trait diversity

One goal of the Beans with Benefits project is to ensure breeders have better access to mungbean trait diversity. The 296 mini-core accessions received from the World Vegetable Center in 2015, and 60 more advanced lines received in 2016, are being multiplied and characterized. These lines were sown with the cooperation of the Nuclear Institute for Agriculture and Biology (NIAB), the Arid Zone

Research Institute (AZRI), and farmers at different locations, in addition to NARC's own lines (for comparison). Seed of around 25 promising lines will be selected for further evaluation in mother and baby trials at three different locations. Also, two sets of mother and baby trials of selected bruchid-tolerant lines were sown at NIAB and two other locations (Bhakhar and Haroonabad). Duplicates of all lines are conserved at the Plant Genetic Resources Institute (PGRI) and NARC.

The Beans with Benefits nursery at NARC, Islamabad, where the mini-core collection of 296 lines as well as 60 advanced lines are under evaluation.

Dr. Abbass at NIAB, Faisalabad showing mungbean plots

Baseline study

To address and strengthen the uptake pathway for improved mungbean varieties and technologies, a baseline survey was carried out and the data shared with the World Vegetable Center, Taiwan for publication. Farmers and other stakeholders were surveyed in major traditional mungbean-producing areas in southern Punjab, Potohar Punjab, and Sindh.

Baseline surveys in progress