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FABA BEAN: UNIQUE GERMPLASM EXPLORED AND IDENTIFIED

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ABSTRACT: The germplasm contains promising traits related to yield and yield attributing characters, quality characters and also resistance to various biotic and abiotic stresses. Exploration for collection of germplasm of diverse nature is the quickest and simplest method for acquiring the desired one. 71 accessions of faba bean were collected from Bihar and evaluated. Unique germplasm explored and identified and notable among them are salt resistant lines explored and collected from Vaishali district of Bihar. One germplasm line having four pods per nod and another one bear fruits right from collar region were identified during the course of characterizations and evaluation. These promising and unique accessions will be used by breeders/ crop improvement workers in the country for its evaluation and further utilization in their ongoing/ensuing crop improvement works for strengthening food and nutritional security of country.

Keywords: *Faba bean, germplasm, collection, identification, exploration.*

Faba bean is an important legume consumed throughout the world. The cultivated forms of faba bean are grown in different agroclimatic conditions depending upon the suitability of the accessions to a particular area. However, in general the cultivars (as in most other crops) are susceptible to many biotic and abiotic stresses leading to lower yields of the crop. It becomes imperative to look for resources which can provide resistance to such stresses. This would mean broadening the genetic base of the cultivars which is essential for starting any breeding program for crop improvement. Wild relatives of faba bean, possessing such genes/traits imparting resistance to biotic and abiotic stresses would be ideal for plant breeders (Torres *et al*., 6). Faba bean (*Vicia faba* L.) is also known as broad bean, horse bean, field bean, windsor bean in various languages, in Hindi it is popularly known *Kala Matar* and *Bakala.* It is one of the oldest crops having long tradition of cultivation in old world agriculture. Globally, faba bean (*Vicia faba* L.) is third most important feed grain legume after soybean (*Glycine max*) and pea (*Pisum sativum* L.) with a total production of 4.87 MT and harvested area of 2.63 Mha, as reported by Mihailovic *et al*. (3). Faba bean is seen as an agronomically viable alternative to cereal grains. Faba bean, being a legume, is a nitrogen-fixing plant are capable of fixing atmospheric nitrogen, which results in increased residual soil nitrogen for use by subsequent crops. It is one of the best annual crop which can be used as green manure having potential of fixing free nitrogen (100-350kg N /ha). It can be grown in adverse soil conditions (soil pH). Faba bean are grown during winter in subtropical and warmer temperate climates on water remaining after crops such as maize and sorghum. Though the crop is widely adapted to diverse soil types, and is more tolerant towards acidic as well as saline alkaline soils than most legumes. Being so incredible crop, unfortunately in India it is categorized as minor, underutilized, less utilized, and still not fully exploited crops. It's only because of lack of cultivar. Only two varieties namely "Pusa Sumit" (released in 1998 by IARI) and "Vikrant" (VH-82-1) released in 1999 by HAU, Hisar) have been released at all India level so for. Lack of faba bean improved variety lead to undertake this project to develop new faba bean variety for food and nutritional security of Eastern Region.

Greater insight into the pattern and dynamics of genetic resources of faba bean (*Vicia faba* L.) is needed in order to understanding and establishing the relationship among collected germplasm from Bihar region. Characterization and preliminary evaluation is the one of the important technique which helps in to elucidate the extent and pattern of

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Fig. 1 : Faba bean germplasm being evaluated under field conditions.

agro-morphological as well as molecular diversity in this crop. The diversity assessment of the germplasm available also serves as a tool in devising proper conservation strategies. The 'hot spots' for the diversity can be identified among different landraces to prioritize their conservation. For both *ex-situ* as well as *in-situ* conservation the knowledge of the extent of diversity present is a prerequisite (Bond, 1). Genotyping or germplasm analysis is required for correct placement of the species into the genepools that can be used in breeding programes. *V. faba* does not have a secondary gene pool as its wild relatives are not known and the distantly related *Vicia* species viz. *V. narbonensis, V. hyaeniscyamus, V. galilaea, V. johannis,* and *V. bithynic* constitutes its tertiary gene pool (Zohary and Hopf, 7; Cubero, 2 and Muehlbauer *et al.,* 4). Absence of the secondary gene pool further underscores the importance of phenotypic as well as genotypic diversity assessment of the primary gene pool. Because of this technical difficulties of achieving interspecific crosses with *V. faba,* only natural variability is available to breeders It is necessary to have knowledge of the diversity present in the germplasm to be used in its breeding programmes and its analysis by genotyping and phenotyping will be of great benefit to breeders. It enables them to develop varieties or cultivars suited to different agroclimatic zones or different seasons. Faba bean is susceptible to many pests and pathogens and to different abiotic stresses. The resistant germplasm identified among the germplasm is used for development of resistant varieties.

MATERIALS AND METHODS

Total 71 accessions were collected during the designated exploration. All the accessions, which were collected from this exploration, were planted at main research farm of ICAR Research Complex for Eastern Region for evaluation. November planted crop generally flowers in January- February and complete its lifecycle in the month of March. The field evaluation (Fig.1) was conducted during *Rabi* seasons of 2009-10 and 2010-11. All the accessions were given equal care. Unique germplasm explored and collected and further identified. The unique germplasm having traits of economic importance is described as under :

RESULTS AND DISCUSSION

Salt resistant faba bean line explored

An exploration trip was undertaken to collect available germplasm in the Vaishali District of Bihar to strengthen faba bean germplasm collections. At Chakramdas this salt resistant line (Fig. 2) of faba bean has been explored and collected. Only few plants of faba bean were present on white crusted field. Though this crop was sown as mixed cropped with mustard which is a tolerant to salinity but failed grossly even to germinate under such soil conditions where these plants were surviving enough.

Evaluation and identification of promising traits

In order to efficiently use of faba bean germplasm in breeding program, genetic diversity and main characters were assessed in a collection of 71 faba bean germplasm from Bihar. The result showed that the germplasm resources had high genetic diversity, with a quality (Singh *et al.,* 5). Tow unique germplasm has been identified as mentioned below.

Fig. 2 : Salt resistant faba bean line explored from Vaishali District of Bihar.

Faba bean lines bear's four pods per node:

Total 71 accessions were screened and evaluated for various agro-morphological and yield attributes, seed yield and quality. One line has been identified having four pods per node (Fig. 3). This character is very unique as this is not very commonly seen feature. This trait may be utilized for further faba bean improvement programme.

Fig. 3 : Faba bean accession bearing four pods per node.

Faba bean line bear's pods from collar regions

One line among the other promising lines was found bearing pod right from collar region (Fig 4).

Fig. 4 : Faba bean line bear's pods from collar region.

This trait is very important for improving production potential, as this line recorded 95.5 to 121 g seed yield per plant.

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