Research Note :

IDENTIFICATION OF FABA BEAN (*Vicia faba* L.) LINES SUITABLE FOR RAINFED AND IRRIGATED SITUATION

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Faba bean (*Vicia faba* L.) is one of the oldest crops grown by man and is used as a source of protein in human diet, as fodder and forage crop for animals, and for available nitrogen in the biosphere. It is popularly called as "Bakla" in Hindi heartland. They were introduced to India by Arab traders. The name is derived from Arabic name "Baquila". In spite of its potential, the total area of faba bean cultivation has steadily decreased in many countries over the last century (Mihailovic *et al.,* 3 and Singh and Bhatt, 4). To make faba bean into a perfect candidate for a sustainable agriculture, the crop should be beneficial both to farmers/producers and to users (human and/or animal nutrition). This goal could be achieved through the development of genotypes resistant to diseases and abiotic constraints such as over-wintering ability, frost resistance and drought avoidance, and free of anti-nutritional factors (Cubero, 2, and Singh *et al.,* 5). There are two types of faba bean i.e. large seeded *Vicia faba* major, commonly known as broad bean, and the smaller *Vicia faba* minor, sometimes known as tick or horse bean(Alba and Scippa, 1). In fact, the two types are the same species and are only distinguished on the basis of seed size. Faba bean being such potential crop but it is very unfortunate to say but is reality in India this crop is by and large known as orphan and this crop is still treated as neglected crop, resulted in to limited systematic crop improvement work in past (Singh and Bhatt, 4).

Only few serious attempts has been undertaken to breed out improved cultivar for this crop, hence only two varieties (Pusa Sumeet and Vikrant) are notified till date so far at national level Average potential productivity of both variety is 1.5-3.5 t/ha. In India it is grown as intercrop under irrigated condition with potato, maize, wheat even sole cropping is also done, whereas under rainfed conditions it is grown as sole crop and also as mixed/intercropped with several crops including lentil, linseed, gram etc. (Singh *et al.,* 5 and Singh *et al.,* 6).

Lack of suitable varietal technology is one of the major bottlenecks to adopt this crop. Farmers are bound to cultivate low yielding disease susceptible local landraces. The potentiality of faba bean is around 6.0-7.0 t /ha whereas in India its average productivity is1.5 t/ha and in Bihar it is further low to 1.2 t/ha. Keeping in view the above facts one project was undertaken with an objective to evaluate faba bean germplasm for agro-morphological, physiological and quality traits and development of suitable faba bean varietal technology. Under project B7-1 evaluation of germplasm of faba bean (*Vicia faba* L.). 68 accessions of faba bean were collected during 2005-06 and being evaluating since 2006-07, all together leading to sustainable improvement of land and water productivity. To take lead in world trade we have to come with suitable package and practices of faba bean to improve our production and productivity. With Immediate objectives viz., to evaluate the promising germplasm under multi-location trials, to evaluate the performance of promising germplasm under different environment and to recommend promising lines as variety for different situation. Varietal technology is the tool to provide potential to act upon other technology to improve the production and productivity through efficient agronomic management practices. Keeping in view the above stated fact the multi-location trial was proposed to evaluate the developed and screen promising lines for its suitability to the particular environment. The important characteristic features of the developed lines are as under

Descriptions of developed line 2011215:

This line was developed by adopting selection method due to its added advantage of adaptability of screened and developed variety. Single plant selection method was adopted for further screening and fixing of desired trait. Selection was made from the germplasm collected from Bihar (Singh and Bhatt, 4). The plant height of this line is 70 – 90 cm depending upon soil type, agro-climatic condition
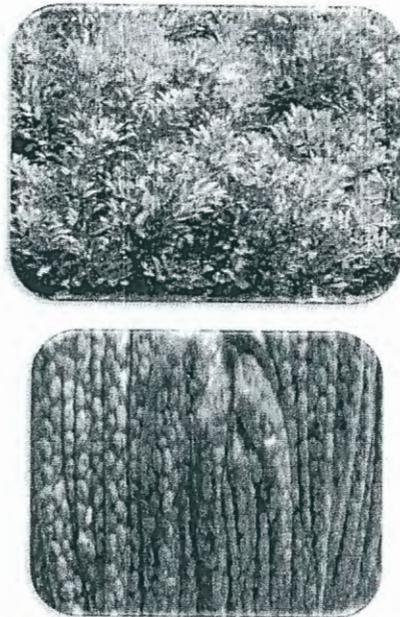
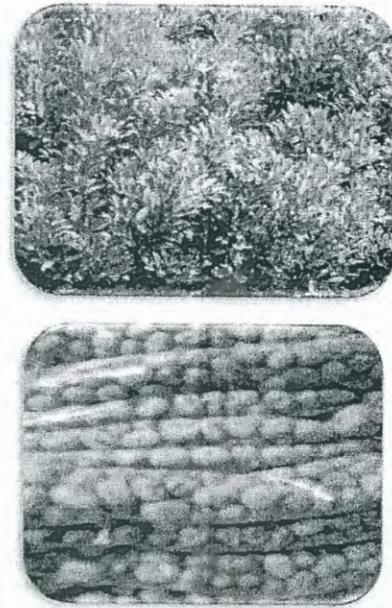Fig. 1 : Plant type and seed character of 2011215.

Fig. 2 : Plant type and seed character of 2011410.

and crop management practices adopted. It is semi spreading types (Fig.1) and matures in 110-115 days. This variety was developed for irrigated and rainfed both conditions. The yield potential of this line under irrigated (5.2 t/ha) and rainfed (4.0 t/ha). The major characteristic feature of this line is given in Table 1. Performance of this line (2011215) was evaluated under multilocation trial (Table 2). Seed yield was recorded 5.38 t/ha under irrigated and 3.94 t/ha in rainfed situation and better than both the national check i.e. Pusa Sumeet (2.68 t/ha.) and Vikrant (2.37 t/ha).

Descriptions of developed line 2011410:

Selection method was also applied to develop this line, obviously due to its added advantage of adaptability of screened and developed variety under particular agro-climatic conditions. Further screening and fixing of desired trait was done through single plant selection method. Selection was made from the germplasm collected from Bihar (Singh and Bhatt, 4). Depending upon agro-climatic condition, soil type and agronomic management practices plant height of this line ranged between 77-105 cm. Stature of plant is bushy types (Fig. 2). Crop matures in 120-125days. This line was developed exclusively for irrigated

conditions. It performs excellent under assured water supplied condition. The yield potential of this line under irrigated is 5.5 to 6.0t/ha. The major characteristic feature of this line is given in Table 1. Performance of this line (2011410) was evaluated under multilocation trial (Table 2). Seed yield was recorded 5.05 t/ha under irrigated environment and better than both the national check i.e. Pusa Sumeet (2.68 t/ha.) and Vikrant (2.37 t/ha).

Good agronomic practices (GAP) for achieving potential production of developed lines

Square planting (keeping 30 cm apart) is advocated for both lines for better utilization of all the resources. Furrow irrigation and raised bed planting (FIRB) is the best management practice to optimize resources utilization. Both the developed lines are very much responsive to added nutrients. To produce faba bean seed @ 5.0 t/h, under sandy loam to clay loam soil condition with normal pH and medium soil fertility status, on an average, it requires N: P: K: S: Zn @ 25:60:40:30:5 kg/ha. It is essential to apply all nutrients as basal application, however for better yield and quality, top dressing of urea at pre-flowering stage after light irrigation may be done. Further foliar application of Zn @ 0.5 per cent and boron 50 ppm will make sure the increased productivity (Singh *et al.*, 7).

Table 1: Important characteristic of developed varieties (accessions).

Sl. No.	Traits	Descriptions of developed varieties (Accessions)	
		2011215	2011410
1.	Plant height	70–90 cm	77-105 cm
2.	Days to maturity	110-115	120-125
3.	Yield potential (t/h)	4.0 to 5.2	5.5 to 6.0
4.	HI	0.61	0.63
5.	1000 grain wt. (g)	235.6	228.9
6.	Leaf area Index (90DAS)	2.03	2.14
7.	Plant type	Semi spreading	Bushy
8.	1st podding height	5 cm	7.5 cm
9.	Recommended for	Irrigated as well as rainfed condition	Irrigated condition

Table 2: Multi location evaluation of developed lines of faba bean.

Location of Evaluation	Performance of faba bean (Seed yield t/ha)				
	Developed lines			Check variety	
	2011215 (Irrigated)	2011215 (Rainfed)	2011410 (Irrigated)	Pusa Sumeet (Irrigated)	Vikrant (Irrigated)
ICAR, Patna	5.53	3.16	5.38	2.91	2.36
ICAR, Ranchi	4.76	2.43	3.1.8	2.26	2.19
IARI, Pusa	6.13	2.29	5.88	2.86	2.51
WALMI, Patna	6.03	4.53	5.18	28.1	2.74
CPRS, Patna	5.23	2.43	4.58	2.91	2.57
KVK Auraiya	5.39	3.34	4.23	2.96	2.28
KVK, Sitamarhi	4.84	2.69	3.82	2.52	1.96
KVK, Buxar	5.11	2.67	3.89	2.17	2.34
Average	5.38	3.94	5.05	2.68	2.37

Rainfed: Irrigation was supplemented at pre flowering stage.

Irrigated: Irrigation (2-4 nos.) has been provided need based *i.e.* (Watering at pre flowering and post podding was must).

Summary :

Single plant selection (SPS) is the one of the best way to identify and purify the desirable traits. Both lines were screened and purified adopting the same technique. 2011215 is identified for rainfed and irrigated environment whereas 2011410 is best suited for irrigated condition. Both the lines were found suitable for Eastern States, viz. Eastern U.P., Bibar and Jharkhand.

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