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RESPONSE OF NEWLY DEVELOPED FABA BEAN (*VICIA FABA* L.) GENOTYPES UNDER DIFFERENT MANAGEMENT LEVELS

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ABSTRACT

A field experiment was carried out to evaluate the response of five genotypes of faba bean to different management levels during Rabi 2022-23 at Research Farm of MAP Section, Department of Genetics and Plant Breeding, CCS HAU, Hisar at four different levels of fertility-irrigation, viz., control, 0% RDF + one irrigation, 75% RDF + two irrigations, 100% RDF (40N; 20P; 20K) + three irrigations. The five genotypes and four fertigation levels were evaluated with three replications in Split Plot design having plot size 2.1 × 5.0 m^2. The results exhibited that seed grain yield was significantly subjected by faba bean genotypes as well as fertility-irrigation levels. Among the genotypes, HB-15-38 produced highest seed yield of 38.2 q/ha followed by RFB-32, HB 14-31, & RFB-34, respectively. The seed yield was significantly increased with the improvement in the management levels. The seed yield was increased to the tune of 15, 28 and 39 percent with 50% RDF + one irrigation, 75% RDF + two irrigation and RDF + three irrigation, respectively than the control (29.6 q/ha). Interaction effect of treatment combinations was non-significant on seed yield. However, a combination of V_3F_3(HB 15-38 with RDF + three irrigation) resulted the highest seed yield.

Key words: New genotypes, faba bean, fertilizer, irrigation, management, seed yield

In our country, Faba bean or bakla (*Vicia faba* L.) is one of the most potential rabi legume crop. Being a leguminous crop, it is considered very important for crop rotation, as well as green manour crop as has capacity improve soil fertility through atmospheric nitrogen fixatation process (Raiger *et al*., 2021). It is generally cultivated in Bihar, UP, Himanchal Pradesh, UK, Punjab, MP, Karnatka, Chhattisgarh, Odisha, Jharkhand and North Eastern states of India. This crop is mainly cultivated as vegetable, forage, pulse, green manure as well as cover crop (Arya *et al*., 2018). It may act as a source of protein for human beings and animals to ensure food and nutritional security at global level due its high nutritive value due to presence of high lysine, protein, vitamins, minerals and carbohydrates in its seeds. Kumar *et al*. (2019) revealed the faba bean richness in L-dopa, a valuable medine utilized in the treatment of Parkinson's disease. It also acts as neurotic agent, thus helpful in controlling hypertension.

The seeds of faba bean are known as the cheapest source of carbohydrate (51-68%), protein (29.4%) and low in fat content (1.50%). Moreover, according to Koli *et al*., (2022), faba bean seeds, its immature pods and leaves associated with a number of bioactive natural compounds such as phenolics, bioactive peptides, flavonoids, resistant starch, dietary fibers, GABA), L-DOPA etc. These bioactive compounds of faba bean are well known for several types biological activities viz., anticancer (Lima *et al*., 2016), antidiabetic, anti-inflammatory (Arya *et al*., 2023), antihypertensive, antibacterial (Zhang *et al*., 2019), antioxidant (Prabhu and Rajeshwari, 2018), cholesterol-lowering etc. (Kumar *et al*., 2022), anti-malarial (Luzzatto and Arese, 2018), antiviral, antifungal (Arya *et al*., 2023).

After crushing or making the pellets of faba bean seeds, it become very important nutritive additive for several types of domestic birds and animals (Kumar *et al*., 2019; Kumar *et al*., 2023; Arya *et al*., 2023). Therefore, keeping the above discussion in consideration, the newly developed faba bean genotypes were tested under different irrigation and fertilizers levels for the development of new varieties.

MATERIALS AND METHODS

Field experiment was carried out to evaluate the response of four pre-release genotypes of faba bean against check, HFB-2 with different levels of

fertility and irrigation management in Experimental field of MAP Section, Department of Genetics and Plant Breeding, CCS Haryana Agricultural University, Hisar (29° 10' N latitude, 75° 46' E longitude, 215.2m above sea level) during *Rabi* 2022-23. The experimental farm soil texture was sandy loam type, and it have 0.46% organic carbon, 191kg/ha available nitrogen and 14kg/ha phosphorus and 340kg/ha available potassium. Newly developed four genotypes (AVT-II entries) of faba bean (RFB-32, HB 14-31, & RFB-34, HB-15-38) along with check (HFB-2) were tested under four agro-management levels practices, viz., control (check), 0% RDF + one irrigation, 75% RDF + two irrigations, 100% RDF (40N; 20P; 20K) + three irrigations in Split Plot design with three replications having plot size 2.1 × 5.0 m^2. Plant spacing was kept 30cm x 10 cm. The data were recorded on seven characters i.e. plant height (cm), number of branches per plant, number of pods per plant, pod length (m), number of seed per plant, 100 seeds weight (g) and seed yield (q/ha). Data analysis was done by as per Sheoran *et al.* (1998).

RESULTS AND DISCUSSION

The results of present study on faba bean newly developed genotypes under four different agro-management levels (Table 1) revealed that seed yield (q/ha) was influenced significantly by both, genotypes as well as fertility-irrigation levels.

Genotypic performance

The findings of present investigation are depicted in table 1. Out of the four newly developed faba bean genotypes, HB-15-38 produced highest seed yield of 38.20 q/ha followed by RFB-32, HB 14-31, & RFB-34, respectively. In another study, Kumar *et al*. (2023) found HB-15-55 as best seed yielder (35.87q/ha) followed by HB 15-51 (35.07q/ha), HB 15-04 (34.55q/ha), and HB 15-34 (34.30q/ha), respectively. Likewise, among four entries, genotype HB-15-38 was bold seed (35.7g/100seeds) followed by Check, HFB-2 (34.80 g/100seeds), and RFB-34 (34.20 g/100seeds), respectively. Similar finding were also reported by Arya *et al*., 2020, Chaurasia *et al*., 2022, Dahiya *et al*., 2021 Arya *et al*. 2022a,b,c, Arya *et al*., 2023 and Kumar *et al*., 2023.

In present study, maximum height was recorded in genotype HB 14-31 (124.8) followed by RFB-34 (118.8), HB 15-38 (117.3), HFB-2 (check) (112.4), RFB-32 (110.0), respectively. Likewise, maximum number of branches was also observed in HB 14-31 (3.70) followed by RFB-32 (3.50), HB 15-38 (3.20), RFB-34 (3.10), and HFB-2 (check) (3.10),respectively. The number of pods per plants were found maximum in HB 15-38 (24.90) followed by RFB-32 (24.30), HB 14-31 (23.00), RFB-34 (22.10), HFB-2 (check) (21.40), respectively. The pods length was recorded maximum on RFB-32 (4.90 cm) and HFB-2 (check) (4.90 cm) followed by RFB-34 (4.80 cm), HB 14-31 (4.80 cm), HB 15-38 (4.70 cm), respectively. Data revealed that seed yield (q/ha), number of branches/plant, pod length (cm), no. of seeds/pod, & 100 seed weight were not significantly influenced by genotypes. The finding of present investigation were also supported by Arya *et al*., 2020, Chaurasia *et al*., 2022, Dahiya *et al*., 2021, Arya *et al*. 2022a,b,c, Arya *et al*., 2023 and Kumar *et al*., 2023.

Fertility-irrigation management

The seed yield production of genotypes changes with the fertility and irrigation management practices. Therefore, before to release a new genotype for commercial cultivation as a variety, it is compulsory to revise its fertility and irrigation practices so that maximum seed production may possibly be attained. In the present study, seed yield of faba bean was increased significantly with the improvement in the fertility-irrigation management levels. The seed yield was significantly increased with the improvement in the management levels. The seed yield was increased to the tune of 15, 28 and 39 percent with 50% RDF + one irrigation, 75% RDF + two irrigation and RDF + three irrigation, respectively than the control (29.6 q/ha). Similar reports in faba bean were also published by Sutaliya *et al*., (2021) and Kumar *et al*., (2023). Kumar *et al*. (2023) successfully increased seed yield upto 9.15, 18.20 and 29.06 percent with 50% RDF + one irrigation, 75% RDF + two irrigation and RDF + three irrigation, respectively than the control (2763 kg/ha).

Interaction effect

Interaction effect of treatment combinations (genotypes x fertility and irrigation management practices) was found significant on seed yield. It means that the a specific genotype will give better results under the specific fertility-irrigation management practices. Therefore, a combination of

TABLE 1
Response of promising genotypes (AVT-II entries) of Faba bean to different levels of management during 2022-23

S. No.	Treatments	Plant height (cm)	No. of branches/ plant	No. of pods/ plant	Pod length (cm)	No. of seeds/ pod	Seed yield (q/ha)	100-seed weight (g)
A.	**Genotypes (G)**							
	RFB-32	110.00	3.50	24.30	4.90	3.40	36.90	32.00
	HB 15-38	117.30	3.20	24.90	4.70	3.30	38.20	35.70
	RFB-34	118.80	3.10	22.10	4.80	3.40	35.50	34.20
	HB 14-31	124.80	3.70	23.00	4.80	3.40	35.60	32.70
	HFB-2 (check)	112.40	3.10	21.40	4.90	3.20	32.60	34.80
	S. Em±	2.70	0.20	0.50	0.10	0.10	1.70	0.90
	C. D. (P=0.05)	9.10	NS	1.60	NS	NS	NS	NS
B.	**Fertilizer**							
	Control	111.30	3.50	21.80	4.80	3.30	29.60	33.50
	50% RDF + one irrigation	114.50	3.40	22.80	4.60	3.30	34.10	32.00
	75% RDF + two irrigations	117.70	3.40	23.60	4.80	3.50	38.00	34.90
	100%RDF + three irrigations	123.30	3.00	24.50	5.00	3.40	41.30	35.10
	S. Em±	1.10	0.20	0.40	0.10	0.10	0.90	0.80
	C. D. (P=0.05)	3.10	NS	1.20	NS	NS	2.70	NS

genotypes and fertility-irrigation management (HB 15-38 with RDF + three irrigation) reflecting highest seed yield may recommend for commercial cultivation.

CONCLUSION

It concluded that seed yield (q/ha), number of branches/plant, pod length (cm), no. of seeds/pod, & 100 seed weight were not significantly influenced by genotypes and fertility levels. Plant height (cm), no. of pods/plant were significantly influenced by genotypes and fertility levels. The new genotype, HB 15-38 of faba bean yielded maximum seed yield with the application of RDF (40N; 20P; 20K) + three irrigations therefore may recommend for commercial cultivation after testing over time and space.

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