# EVALUATION OF MOST PROMISING GENOTYPES OF FABA BEAN (*VICIA FABA* L.)UNDER DIFFERENT LEVELS OF AGRO-MANAGEMENT PRACTICES IN HARYANA

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## SUMMARY

Present experiment was conducted at Research Farm Area of MAP Section, Department of Genetics and Plant Breeding, CCS HAU, Hisar during *Rabi* 2021-22 to evaluate seven promising genotypes (AVT-II entries) of Faba bean (HB 15-04, HB 15-14, HB15-21,HB 15-34, HB 15-41, HB 15-51, HB 15-55) along with three checks (Vikrant HFB-1 and HFB-2) at four different levels of agro-management, *viz.,* control, 0% RDF + one irrigation, 75% RDF + two irrigations, 100%RDF (40:20:20) + three irrigations. The genotypes and management levels were tested in Split Plotdesign with three replications having plot size 2.1 × 5.0 m$^2$. The results showed that seed yield was significantly influenced by genotypes and fertility levels. Among the genotypes, HB-15-55 produced higher seed yield of 3587 kg/ha followed by HB 15-51 (3507kg/ha), HB 15-04 (3455 kg/ha), HB 15-34 (3430 kg/ha) and HB 15-41 (3320 kg/ha), respectively. The seed yield was significantly increased with the improvement in the management levels. The seed yield was increased to the tune of 09.15, 18.20 and 29.06 percent with 50% RDF + one irrigation, 75% RDF + two irrigation and 100% RDF + three irrigation, respectively than the control (2763 kg/ha). Interaction effect of treatment combinations was non-significant on seed yield. However, a combination of HB 15-55 with 100% RDF + three irrigations resulted in the highest seed yield.

**Key words:** Promising genotypes, agro-management practices, irrigation, fertilizer, seed yield, faba bean

In India, Faba bean (*Vicia faba* L.) is considered as one of the potential legume. It is mainly *Rabi* season crop and very important for crop rotation, as it fixes atmospheric nitrogen in the soil and help to economize the following crops (Raiger *et al*., 2021). It is grown in Bihar, Uttar Pradesh, Himanchal Pradesh, Punjab, Madhya Pradesh, Karnatka, Chhattisgarh, Odisha, Jharkhand and North Eastern states of India. This crop is widely grown for forage, vegetable, pulse, green manure and as a 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. It is rich in L-dopa, a substance used medically in the treatment of Parkinson's disease. L-dopa is also a neurotic agent, which might help in controlling hypertension (Kumar *et al*., 2019).

The seeds of faba bean are rich source of protein (29.4%) and carbohydrate (51-68%) and low in fat content (1.5%). Moreover, faba bean seeds, green pods as well as leaves also have a wide range of bioactive phytochemical compounds (Koli *et al*., 2022)

including phenolic compounds, bioactive peptides, flavonoids, resistant starch, dietary fibers, GABA), L-DOPA etc. These bio-compounds are responsible for various biological activities like antiviral, antidiabetic,anti-inflammatory, antifungal (Arya *et al*., 2023)anticancer (Lima, *et al*., 2016), antihypertensive, antibacterial (Zhang *et al*. 2019), antioxidant (Prabhu and Rajeshwari, 2018), anti- malarial (Luzzatto and Arese, 2018), cholesterol-lowering etc. (Kumar *et al*., 2022). Faba bean seeds after crushing or pelleting were found as useful nutritive additive for different kinds of domestic animals and birds (Kumar *et al*., 2019; Arya *et al*., 2023).

Therefore, keeping the above facts in view, the elite genotypes of faba bean were evaluated under different levels of irrigation and fertilizers to develop new varieties.

## MATERIALS AND METHODS

Present experiment was conducted at Research Farm Area of MAP Section, Department of Genetics and Plant Breeding, CCS Haryana Agricultural

University, Hisar during *Rabi* 2021-22. The experimental farm area was located at 29°10′ N latitude, 75°46′ E longitude, 215.2m above sea level.The soil at the experimental farm was sandy loam, tested as having organic carbon; 0.46%, available nitrogen; 191 kg/ha and phosphorus; 14 kg/ha and available potassium; 340kg/ha. The seven best promising genotypes (AVT-II entries) of faba bean (HB 15-04, HB 15-14,HB15-21, HB 15-34, HB 15-41, HB 15-51, HB 15-55) along with three checks (HFB-1, HFB-2 and Vikrant) were evaluated under four different levels of agro-management practices, *viz.,* control, 0% RDF + one irrigation, 75% RDF + two irrigations, 100% RDF (40: 20: 20) + three irrigations. The genotypes and management levels were tested in Split Plot design with three replications having plot size 2.1 × 5.0 m$^2$. Plant spacing was kept 30 cm x 10 cm. The observations were recorded for plant height (cm), number of branches per plant, number of pods per plant, number of seed per plant, biological yield (q/ha) and seed yield (q/ha). Statistical analysis was carried out by calculating Critical difference (CD) and Coefficient of variation (CV) as per Sheoran *et al.* (1998). CD was calculated using standard error of difference and t value at error degree of freedom at 5% level of significance, CD = SE (d) t (5%) error degree of freedom.

## RESULTS AND DISCUSSION

The resultson faba bean elite genotypes under different agro-management practices (Table 1) showed that seed yield was significantly influenced by genotypes and fertility levels.

### Genotypes

The results of present study are presented in Table 1. Among the seven genotypes, HB-15-55 produced higher seed yield of **3587** kg/ha followed by HB 15-51 (3507 kg/ha), HB 15-04 (3455 kg/ha), HB 15-34 (3430 kg/ha) and HB 15-41 (3320 kg/ha), respectively. Likewise, among seven genotypes, HB-15-55 produced higher biological yield of 8082 kg/ha followed by HB 15-04 (7997 kg/ha), HB 15-51 (7938 kg/ha), HB 15-34 (7760 kg/ha) and HB 15-41 (7508 kg/ha), respectively. Similar findings were also reported by Arya *et al.*, 2020, Chaurasia *et al.*, 2022, Dahiya *et al.*, 2021, Arya *et al.*, 2022a,b,c and Arya *et al.*, 2023.

Maximum plant height was observed in HB-15-55 (121.6 cm) followed by HB 15-51 (119.7 cm), HB 15-34 (119.2 cm) and HB 15-14 (117.9 cm), respectively. Likewise, maximum number of branches was also observed in HB-15-55(3.1) followed by HB 15-51(3.0), HB 15-34 (2.9),and HB 15-14 (2.9),

TABLE 1

Response of promising genotypes (AVT-II entries) of Faba bean to different levels of management during 2021-22

| S. No. | Treatments | Plant height (cm) | No. of branches/ plant | No. of pods/ plant | No. of Seeds/ pod | Biological yield (kg/ha) | Seed yield (kg/ha) |
|---|---|---|---|---|---|---|---|
| **A.** | **Genotypes (G)** | | | | | | |
| | HB 15-04 | 110.9 | 2.7 | 23.9 | 3.3 | 7997 | 3455 |
| | HB 15-14 | 117.9 | 2.9 | 25.2 | 3.5 | 7162 | 3169 |
| | HB 15-21 | 110.7 | 2.7 | 17.8 | 3.3 | 6774 | 2999 |
| | HB 15-34 | 119.2 | 2.9 | 25.2 | 3.5 | 7760 | 3430 |
| | HB 15-41 | 111.9 | 2.8 | 21.3 | 3.3 | 7508 | 3320 |
| | HB 15-51 | 119.7 | 3.0 | 25.4 | 3.5 | 7938 | 3507 |
| | HB 15-55 | 121.6 | 3.1 | 26.0 | 3.5 | 8082 | 3587 |
| | HFB-1 | 108.6 | 2.6 | 20.3 | 3.3 | 6170 | 2692 |
| | HFB-2 | 111.9 | 2.6 | 21.4 | 3.3 | 6909 | 3015 |
| | Vikrant | 109.5 | 2.5 | 20.5 | 3.0 | 5389 | 2352 |
| | SEm± | 2.5 | 0.1 | 0.8 | 0.0 | 236 | 102 |
| | CD (p=0.05) | 7.0 | 0.3 | 2.4 | 0.1 | 665 | 288 |
| **B.** | **Fertilizer** | | | | | | |
| | Control | 105.3 | 2.5 | 19.7 | 3.2 | 6279 | 2763 |
| | 50% RDF + one irrigation | 110.6 | 2.7 | 22.1 | 3.3 | 6859 | 3016 |
| | 75% RDF + two irrigations | 117.7 | 2.9 | 23.7 | 3.4 | 7432 | 3266 |
| | 100%RDF + three irrigations | 123.1 | 3.0 | 25.2 | 3.5 | 8105 | 3566 |
| | SEm± | 1.6 | 0.1 | 0.5 | 0.0 | 149 | 65 |
| | CD (p=0.05) | 4.4 | 0.2 | 1.5 | 0.1 | 421 | 182 |

respectively. The number of pods per plants were recorded on HB 15-51(26.0) followed by HB 15-51(25.4) and HB 15-34(25.2), respectively. The number of seed per pods were recorded on HB 15-51(3.5), HB 15-51(3.5) and HB 15-34(3.5).The abovefindings were also supported by Arya *et al.*, 2020, Chaurasia *et al.*, 2022, Dahiya *et al.*, 2021 and Arya *et al.*, 2023.

## Agro-management

The production behavior of genotypes/varieties changes with the agro-management practices. Therefore, before to release a genotype as a variety for commercial cultivation, it is mandatory to study its agro-management practices so that maximum production could be achieved. In the present investigation, seed yield was significantly increased with the improvement in the management levels. The seed yield was increased to the tune of 09.15, 18.20 and 29.06 percent with 50% RDF + one irrigation, 75% RDF + two irrigation and 100% RDF + three irrigation, respectively than the control (2763 kg/ha). Similar finding were also reported by Sutaliya *et al.*, 2021.

Interaction effect of treatment combinations was non-significant on seed yield. However, a combination of HB 15-55 with 100% RDF + three irrigations resulted in the highest seed yield. Therefore, HB 15-55 with 100% RDF + three irrigations may be recommended for commercial cultivation.

## CONCLUSION

The faba bean new genotype, HB 15-55 with the application of 100% RDF *i.e.* NPK @ 40: 20: 20 + three irrigations may be recommended for commercial cultivation.

## ACKNOWLEDGEMENTS

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