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Assessment of frontline demonstration technology on fenugreek (*Trigonella foenum-graecum*) in cultivation Jhajjar, Haryana

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Abstract

Frontline demonstrations (FLDs) on fenugreek (*Trigonella foenum-graecum* L.) variety AFg-5 were conducted by Krishi Vigyan Kendra, Jhajjar during 2022–23 and 2023–24 on the fields of ten farmers each year. The demonstrations were carried out with active farmer participation to disseminate improved production technologies aimed at realizing the potential yield of fenugreek. The interventions included the use of a high-yielding variety, seed treatment, recommended fertilizer doses, and other non-monetary inputs. Data were recorded on plant height (cm), number of branches /plant, pest incidence (%), and seed yield (q/ha) and compared with the farmers' existing practices. The improved variety AFg-5 produced higher seed yields of 15.90 q/ha and 17.20 q/ha during 2022–23 and 2023–24, respectively, as compared to the local variety. The demonstrations revealed a mean extension gap of 2.0 q/ha, a technology gap of 3.45 q/ha and a technology index of 17.25%. The improved technology also resulted in better economic returns, recording a higher benefit–cost ratio (2.89) compared to the local check (2.59). Overall, the FLDs demonstrated a positive and significant impact of the improved technology on fenugreek seed yield and profitability over traditional practices.

Key words: Economics, Seed yield and Technology dissemination, Frontline demonstrations

Fenugreek (*Trigonella foenum-graecum* L.) is one of the important seed spice crop and oldest medicinal plant originated in Central Asia since approximately 4000 BC (Aher *et al.,* 2016). India is the major producer and consumer of fenugreek in the world with an area of 1,45,366 ha with production 2,28,649 tons seed per annum. In India, Rajasthan, Madhya Pradesh, Maharashtra, Gujarat, Punjab, Haryana, West Bengal, Uttar Pradesh and Uttarakhand are the major fenugreek producing states. In Haryana, fenugreek crop area is 1555 ha and seed production 3010 tons per year. Indian spices have high reputation in the international market because of their peculiar quality (Parewa *et al.*, 2020). The productivity of fenugreek remains very low, primarily due to limited awareness among farmers. The interventions of frontline Demonstrations (FLDs) at farmers' fields can play a crucial role in bridging this gap (Dashora *et al.*, 2020; Jethava *et al.*, 2024; Nehra and Malik, 2024; Rolaniya *et al.*, 2025). Therefore, to motivate farmers to adopt improved technologies for enhancing the productivity and profitability of fenugreek cultivation.

MATERIALS AND METHODS

The Front Line Demonstrations (FLDs) were conducted during 2022–23 and 2023–24 with the participation of 10 farmers each year. The demonstrations were laid out over an area of 2.50 ha, while an adjacent 2.50 ha area under farmers' practice served as the control for comparison. Farmers were randomly selected based on surveys conducted by KVK Jhajjar, Haryana. The FLDs were implemented using the improved fenugreek variety AFg-5, with seeds treated using Carbendazim 50% WP @ 2.0 g/kg seed + *Trichoderma viride* @ 10 g/kg seed. The recommended dose of fertilizers (NPK @ 25:50:0 kg/ha) was applied, and other improved production practices—like seed rate of 20 kg/ha, sowing in first week of November, line sowing at 30 cm × 10 cm spacing, and manual weeding at 50 DAS, were followed. These interventions were compared with the farmers' traditional practices under irrigated conditions to assess their effectiveness in enhancing the productivity and profitability.

Data on growth, yield and yield traits, expenditure incurred by the farmer and expenditure of demonstration plots were collected and analyzed. Gross income was calculated based on local market prices of fenugreek and net income by subtracting the total cost of cultivation from gross income. The benefit: cost ratio was computed by dividing gross returns by the variable cost. The per cent incidence of pests was calculated by the formula used by Vinay *et al.* (2023). To estimate the technology gap, extension gap and technology index, the following formulae were used as suggested by Lal *et al.* (2017) and Samui *et al.* (2000).

RESULTS AND DISCUSSION

The cumulative effect of demonstrated package over two years revealed that the tallest plant (54.44 cm)

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$$\text{Pest incidence (\%)} = \frac{\text{Number of damaged plants}}{\text{Total number of plants observed}} \times 100$$

$$\text{\% increase in yield} = \frac{\text{Demonstration yield - Farmers yield}}{\text{Farmers yield}} \times 100$$

Extension Gap = Demonstration yield (Di) – Farmers yield (Fi)

Technology Gap = Potential yield (Pi) – Demonstration yield (Di)

$$\text{Technology index} = \frac{\text{Potential yield – Demonstration yield}}{\text{Potential yield}} \times 100$$

was observed in AFg-5 as compared to farmer's practice (48.02 cm). The average number of branches/ plant was maximum (5.62) in AFg-5 compared to local variety (5.23). Minimum pest incidence (13.20%) were reported in demonstration whereas maximum in the check variety (36.30%). The total seed yield per hectare under the front line demonstrated obtained 15.90 and 17.20 q/ha, while 14.10 and 15.0 q/ha in farmers practice during 2022-23 and 2023-24, respectively (Table 1). The effects of technological particulars over two years revealed that the higher average total seed yield (16.55 q/ha) were recorded in the demo as compared to control (15.55 q/ha). Similarly, the total yield per hectare of fenugreek increased by 13.72% over the yield obtained in farmer's practice. The year-to-year fluctuations in growth, seed yield and cost of cultivation can be explained based on variations in the existing social, economic, soil, climatic and microclimatic conditions of the location. Bhati *et al.* (2017) recorded fenugreek yield was found to be substantially higher than that under local check during all the years. The findings of Dashora *et al.* (2020) clearly indicated that yield of fenugreek can be significantly increased through the adoption of recommended production technologies.

The seed was sold ₹ 62/ kg and ₹ 65/kg during 2023 & 2024, respectively. The net returns of demonstration plot were significantly higher than farmer's practice during both the years (Fig. 1). Higher average gross returns (₹ 105190 /ha) of FLDs were recorded as compared to the farmer's practice (₹ 92460 /ha). Similarly, higher

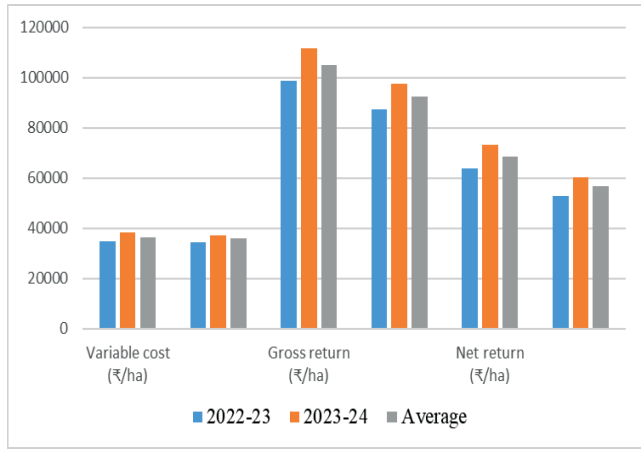

Fig. 1. Economics of technological components of fenugreek

average net returns (₹ 68695 /ha) of the demonstration were recorded as compared to farmer's practice (₹ 56660 /ha). The benefit: cost ratio for cultivation of AFg-5 was recorded at 2.85 and 2.92 during 2022–23 and 2023–24, respectively, while for local variety, it was 2.54 and 2.63 during the corresponding years. Similar findings were reported by Dashora *et al.* (2020) Meena and Singh (2021) reported that adoption of improved production technologies in fenugreek resulted in a higher benefit: cost ratio, ranging from 2.6 to 3.6 with an average of 3.2, as compared to the local checks (2.5) cultivated by farmers.

Extension gaps of 1.80 and 2.20 q/ha was observed during 2022-23 and 2023-24, respectively (Table 1.) The gap might be accredited to adoption of latest production technologies, especially high yielding varieties with balanced fertilizers and appropriate plant protection measures. The technology gap was lowest (2.80 q/ha) and the highest (4.10 q/ha) during 2023-24 and 2022-23, respectively. The average technology gap was 3.45 q/ha. It may be due to climatic conditions, soil fertility, recommended varieties and recommended technologies. On the basis of two years front line demonstration program, overall 17.3% technology index was recorded, which was the highest (20.5%) during 2022-23 and lowest (14.0%) during study of 2023-24. As a result, it clearly shows the success of scientific interventions. This awareness and

Table 1: Vegetative growth, yield, yield attributes, and technological gap analysis of fenugreek

Year	Plant height (cm)		No. of branches/ plant		Pest incidence (%)		Seed yield (q/ ha)		% increase over FP	Potential yield (q/ ha)	Extension gap (q/ ha)	Technology gap (q/ ha)	Technology index (%)
	Demo	FP	Demo	FP	Demo	FP	Demo	FP					
2022-23	53.68	48.45	5.48	5.07	14.60	39.20	15.90	14.10	12.77	20	1.80	4.10	20.5
2023-24	55.20	47.60	5.77	5.40	11.80	33.40	17.20	15.0	14.67	20	2.20	2.80	14.0
Average	54.44	48.02	5.62	5.23	13.20	36.30	16.55	14.55	13.72	20	2.0	3.45	17.25

adoption of improved varieties with package of practices increased the yield performance of fenugreek variety AFg-5. These findings are in the conformity with the results by Lal *et al.* (2017); Meena and Singh (2021) and Chaudhary *et al.* (2022).

CONCLUSION

There it can be concluded that yield gap and economic analysis between traditional practices and improved production technology can be reduced by organized front line demonstration at farmer's fields. The FLDs made a positive and significant impact on fenugreek yield as compared to the local varieties. The low yielding local varieties would be replaced due to FLDs in adopted villages.

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