

Assessment of front line demonstrations on yield enhancement of fenugreek under TSP area in pratapgarh district of Rajasthan

G. Lal¹, R. S. Mehta¹, R. S. Meena¹, N. K. Meena¹ and M. L. Choudhary²

¹ICAR-National Research Centre on Seed Spices, Tabiji, Ajmer

²Krishi Vigyan Kendra, Dungarpur-314001, Rajasthan

Abstract

Front line demonstrations on yield enhancement of fenugreek variety AFg-2 were conducted by ICAR-NRCSS, Ajmer at tribal area of Pratapgarh district of Rajasthan in Rabi season of 2013-14, 2014-15 and 2015-16. In the demonstration fields, seed of improved variety (AFg-2), along with all improved practices of seed spices production were applied. The yield of 25.47, 27.94 and 22.60 q ha⁻¹ were recorded under demonstration fields and 17.72, 17.56 and 17.50 q ha⁻¹ were recorded under farmers' practices during three consecutive years, respectively. The yield appreciation 43.73, 59.11 and 29.14 per cent were recorded in demonstration fields due to technical interventions. Farmers also earned additional net return of Rs. 10890/-, 31944/- and 20409/- per hectare with 2.26, 2.57 and 2.58 benefit cost (B: C) ratio through FLDs with complete package of practices. The extension gap was ranged from 5.10 q ha⁻¹ to 10.38 q ha⁻¹ during the study period. The technology gap which is the difference between potential yield and yield of demonstration plots was ranged from 0.56 q ha⁻¹ to 5.90 q ha⁻¹ during the period of study. The technology index was varied from 1.96 percent to 17.89 per cent. Therefore, the front line demonstration programme was an effective tool for yield enhancement of fenugreek in tribal farmers and also changing knowledge, attitude and skill of farmers.

Key words : Fenugreek demonstrations, gap analysis, productivity and profitability, TSP area, Pratapgarh

Introduction

Fenugreek (*Trigonella foenum-graecum* L.) is an important, low volume high value seed spice crop growing in almost throughout the country. More than 80 per cent area and production of India is contributed by Rajasthan state alone as fenugreek is fairly tolerant to salinity which makes it suitable for cultivation in major parts of the state. The crop has immense medicinal value for diabetic patients and also has a good source of vitamins, protein and essential oil. The yield of fenugreek crop is adversely affected by incidence of downy and powdery mildew and blight diseases and aphid infestation. The fenugreek can be cultivated in all types of soils but well drained sandy loam and medium loam soils are suitable for the crop. The farmers in tribal area of Pratapgarh are growing fenugreek since long back using local or farmers varieties with broadcasting method of seed sowing or somehow in mixed farming with *Hordeum vulgare* and chickpea. There is no standard package for seed treatment, irrigation pattern, insect-pests, diseases and weed management for getting higher yield. There are no seed supplying agencies in the area to provide quality seed of improved varieties and also lacking in mechanization for seed

sowing, weeding, harvesting, threshing and packaging. Therefore, front line demonstration programme was an effective tool for increasing the productivity of crop and changing knowledge, attitude and skill of farmers. This created greater awareness and motivation among farmers to adopt improved practices of fenugreek. The main objective of FLDs is to demonstrate newly released crop variety, production and protection technologies and its management practices in the farmer's field under different agro-climatic regions and farming situations. While demonstrating the technologies at the farmer's fields, the scientists are required to study the factors constraints of production and there by generate production data and feedback in formation. Although, several factors and conditions are responsible for the existence of such yield gaps but the nature and extent of adoption of the improved technology is primarily concerned with such gaps and has direct bearing on the farmers production output. Keeping these points in view, such study was conducted at tribal area of Arnod Tehsil in Pratapgarh district of Rajasthan to examine some important aspects related to the utilization of the recommended fenugreek production technology. These

aspects include farmer's adoption of improved practice of seed spices production particularly fenugreek.

Materials and methods

A study on impact assessment of front line demonstrations (FLDs) of fenugreek variety AFG-2 developed and released by ICAR-NRCSS, Ajmer was carried out on farmers' field at tribal belt of Arnod Tehsil in Pratapgarh district of Rajasthan. For this study, farmers' selection was made with the help Krishi Vigyan Kendra (MPUA&T), Pratapgarh as well as few interested farmers were directly selected by NRCSS. All type of large, medium and small size farmers were included in the study. Through preliminary survey and discussion with selected farmers, causes of low yield of fenugreek were identified and prioritized. Based on the major causes, technological interventions were finalized. A total of 53 FLDs (20 FLDs in 2013-14, 10 FLDs in 2014-15 and 23 FLDs in 2015-16) were conducted on farmer's field during *Rabi* season for three consecutive years 2013-14, 2014-15 & 2015-16 by ICAR- National Research Centre on Seed Spices, Tabiji, Ajmer. A total of 13.25 hectare area was covered under all demonstrations for three years, contributing 0.25 hectare area in individual demonstration. The main objective of FLDs is to demonstrate newly released crop variety, production and protection technologies and its management practices in the farmer's field under different agro-climatic regions and farming situations. Through the front line demonstration programme, economic feasibility of technology transfer and adoption was also evaluated.

The crop was sown from 4th week of October to 2nd week of November 2014 of every year. The whole package approach demonstrated to farmers through front line demonstrations including the component such as selection of variety, per hectare seed rate, seed treatment, weed management and irrigation methods, fertilizers and plant protection measures. During the cropping period, systematic supervision was done by the scientists of

ICAR-NRCSS, Ajmer as well as KVK (MPUA&T), Pratapgarh. The yield data of fenugreek (variety AFG-2) was recorded both for FLDs as well as local cultivar with farmers' practices. The yield appreciation was calculated for individual FLDs as well as a whole and percentage of yield increase was calculated. The generated data were utilized for calculating the technology gap, extension gap and technology index using the following formulae:

Technology gap : Potential yield - Improved yield (Demonstration)

Extension gap : Improved yield (Demonstration) - Farmers yield

Technology index (%) = $\frac{\text{Technology gap}}{\text{Potential yield}} \times 100$

Result and discussion

Results of 53 front line demonstrations, which were conducted at tribal belt of Arnod Tehsil in Pratapgarh district of southern Rajasthan during 2013-14 to 2015-16 under 13.25 hectare areas. The data on yield and yield enhancement over local checks and other correlated factors are presented in Table 2-4, are described under below mentioned heads.

Divergence between improved and farmers' practices

The differences in adoption of front line demonstrations (improved practices) and local farmers practices (local check) of fenugreek production technologies were measured as per recommended package of practices in which the major differences was observed regarding high yield variety (HYVs), seed rate, seed treatment and balance use of fertilizers (Table 1). These included the cultivation practices under FLDs viz, use of improved and recommended varieties AFG-2 in three consecutive years. Seed rate was kept @ 20kg ha⁻¹, seed treatment with *Carbendazim* @ 2 g kg⁻¹ and *Trichoderma* @ 4-6 g kg⁻¹ seed with fungicide for control of soil borne diseases. Under farmers practice, farmers used their own seed or the seeds of local variety at higher seed rate and without

Table 1. Difference between demonstration package & farmers practices of fenugreek in *Rabi* season

S. No.	Particular practice	Demonstration package	Farmers practices
1.	Variety	AFg. 2	Local
2.	Seed rate	20 kg/ha ⁻¹	25-30 kg/ha ⁻¹
3.	Seed treatment	Carbendazim @ 2 g/kg seed + Trichoderma @ 4 g/kg seed	Not applied
4.	Sowing method	Line sowing	Local (Broad casting)
5.	Fertilizer Doses	25 : 20 : 20 (N : P : K kg/ha)	Less or more quantity without knowledge
6.	Plant protection measures	Need based spray of insecticide & fungicides	No use of insecticides & pesticides

seed treatment. These differences in the packages of practices were in line with the findings of Choudhary and Kantwa, (2014), Ahmad *et al.*, (2012), Singh & Varshney (2010), Verma *et al.*, (2010), Jingar *et al.*, (2006), Khan and Chouhan (2005), Tomar *et al.*, (2003), Tiwari, *et al.*, (2003) and Veerasamy *et al.*, (2003).

The production performance of fenugreek

The results of yield performance was obtained during three years (2013-14 to 2015-16) are presented in the Table 2, revealed that the average yield 25.47 q ha⁻¹ of fenugreek variety AFg-2 was recorded under demonstration field, which was 43.73 per cent higher than local check with farmers’ practices (yield 17.72 q ha⁻¹) during 2013-14. Similarly, the average yield 27.94 q ha⁻¹ of fenugreek variety AFg-2 was obtained in demonstration field and 17.56 q ha⁻¹ yield was received in local variety, hence the enhancement of yield in FLDs was 59.11 per cent higher over local check during 2014-15. In the year 2015-16, the average yield of fenugreek (AFg-2) under demonstration plots was 22.60 q ha⁻¹ and the yield of 17.50 q ha⁻¹ was received in local check with farmers practice, hence the yield appreciation of 29.14% was recorded in FLDs over local check in Tribal belt of Pratapgarh district. On an overall basis, tribal farmers of Pratapgarh were taken 7.75 q ha⁻¹ higher yield with 44.06 per cent yield appreciation through adoption of scientific cultivation of fenugreek in the form of FLD provided by NRCSS. However, the variation in yield from location to location accounted for varying climatic condition and variation in agricultural practices adopted. The results indicated that the front line demonstrations have given a good impact over the seed spices farming community as they were motivated by new agricultural technologies applied through front line demonstrations. These effects in the demonstration packages were in line with the findings of Choudhary and Kantwa (2014), Raj *et al.*, (2013), Singh and Varshney (2010), Verma *et al.*, (2010) and Veerasamy *et al.*, (2003).

The economic performance of fenugreek

The cost of cultivation (Rs ha⁻¹), gross return (Rs ha⁻¹), net return (Rs ha⁻¹), additional return (%), increase in net

return (%), B: C ratio of FLD plots (improved practice) and local check (Farmers practice) are presented in Table 3. It was found that net return (Rs ha⁻¹) was higher in all the years for FLD plots as compared to local checks. It was obtained as 41330, 56342 and 62254 Rs ha⁻¹ in the years 2013-14, 2014-15 and 2015-16, respectively. The B: C ratio was also higher in the case of FLDs plot as compared to local check in all three years. The highest B: C ratio (2.58) was observed in the year 2015-16 and lowest B: C ratio (2.26) was observed in years 2013-14 for FLD plots. This may be due to higher yields obtained under improved technologies compared to local check (farmer’s practices). The above findings are in conformity with the findings of Balai, *et al.*, (2014), Singh, *et al.*, (2014), Choudhary and Kantwa, (2014), Rajiv and Singh (2014), Balai, *et al.*, (2013), Raj, *et al.*, (2013) and Singh *et al.*, (2011).

Yield and gap analysis

The data revealed that the technology gap (q ha⁻¹) extension gap (q ha⁻¹) and technology index (%) are presented in table 4. The extension gap was ranged from 5.10 to 10.38 q ha⁻¹ during the period of study. Average extension gap (7.74 q ha⁻¹) was observed under demonstration plots, which emphasized the need to educate the farmers through various extension means like FLDs, on farm trials, field days and method of demonstrations for adoption of improved agricultural technologies to revert the trend of extension gap. More and more use of latest seed spices production technologies with high yielding variety will subsequently change this alarming trend of galloping extension gap. The new technologies will eventually lead to the farmers to discontinue the old technology and adopt new technologies. This finding is in corroboration with the finding of Singh, *et al.*, (2014), Choudhary and Kantwa (2014), Rajiv and Singh (2014), Balai *et al.* (2013), Raj *et al.*, (2013), Singh *et al.*, (2011) and Hiremath and Nagaraju (2010). The technology gap which is the difference between potential yield and yield of demonstration plots was between 0.56 to 5.90 q ha⁻¹ during the study period.

Table 2. Yield performance fenugreek variety AFg-2 in FLDs Programme

Year	Number of demonstrations	Area under demonstrations	Average yield (q ha ⁻¹)		Yield appreciation (%) over farmers practice
			Demo. practice	Farmer practice	
2013-14	20	5.00	25.47	17.72	43.73
2014-15	10	2.50	27.94	17.56	59.11
2015-16	23	5.75	22.60	17.50	29.14
Total	53	13.25	25.34 (Av.)	17.59 (Av.)	44.06 (Av.)

On an average, technology gap 3.16 q ha⁻¹ was observed under three years of FLDs programme. The technology gap observed may be attributed to dissimilarity in the soil fertility status, agricultural practices and local climatic conditions. This finding is in corroboration with the findings of Raj *et al.*, (2013). The technology index showed the feasibility of evolved technology at farmer's field in a particular region. In present study, the technology index was ranged from 1.96 to 17.89 per cent indicates of higher scope for further improvement in productivity of fenugreek in tribal area of Pratapgarh district of Rajasthan.

Conclusion

The productivity of fenugreek under FLDs over traditional practice of fenugreek cultivation created greater awareness among farmers and also motivated the other farmers to adopt such appropriate production technology for getting higher yield in the tribal area of Pratapgarh district of Rajasthan. The selection of specific technology like improved varieties, seed rate, seed treatment, seed

inoculation, balanced use of fertilizer and plant protection measures were undertaken in a proper way. It is concluded that the front line demonstrations programme was an effective tool for increasing the productivity of crops and changing knowledge, attitude and skill of farmers. Overall 29.14 to 59.11 per cent (2013-14 to 2015-16) yield appreciation in FLDs was recorded over farmers practice (traditional). These demonstrations also built the relationship & confidence between farmers and scientists.

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Table 3. Economic analysis of Rabi fenugreek in Pratapgarh district, Rajasthan

S. No	Particulars	Years of study		
		2013-14	2014-15	2015-16
1.	Production cost			
	Improved practice	32600	35860	39446
	Farmers practice	30465	33550	36905
2.	Additional cost over FP	2135	2310	2541
3.	Gross return			
	Improved practice	73930	92202	101700
	Farmers practice	60905	57948	78750
4.	Net return			
	Improved practice	41330	56342	62254
	Farmers practice	30440	24398	41845
5.	B:C ratio			
	Improved practice	2.26	2.57	2.58
	Farmers practice	1.99	1.73	2.13
6.	Additional return	10890	31944	20409
7.	Increase in net return (%)	35.77	130.93	48.77
8.	B:C ratio of additional input demonstration	5.10	13.82	8.03

IP - Improved practice; FP - Farmers practice

Table 4. Yield and gap analysis of Rabi fenugreek in Pratapgarh district, Rajasthan

Years	Crop & Variety	Potential yield (q ha ⁻¹)	Average yield (q ha ⁻¹)		Technology gap (q ha ⁻¹)	Extension gap (q ha ⁻¹)	Technology index (%)
			Demo.	Local			
2013-14	Fenugreek (AFg-2)	28.5	25.47	17.72	3.03	7.75	10.63
2014-15	Fenugreek (AFg-2)	28.5	27.94	17.56	0.56	10.38	1.96
2015-16	Fenugreek (AFg-2)	28.5	22.60	17.50	5.90	5.10	17.89

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