

Impact of technological interventions of seed spices through FLDs in TSP area of Pratapgarh-A success story

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Seed spices constitute an important segment of agriculture commodities that play a significant role in Indian economy. Since ancient, India has always been renowned as a land of spices. It account for nearly 50.31 per cent and 21.30 per cent of total area and production, respectively of total spices in the country. Amongst total seed spices, ICAR-NRCSS is working on ten crops viz., coriander, cumin, fenugreek, fennel, ajwain, dill, nigella, anise, celery and caraway and developed a number of technologies for improving quality production and productivity of these crops. In the country, seed spices are mainly growing in the states of Rajasthan, Gujarat, Madhya Pradesh, Uttar Pradesh, Andhra Pradesh and many more states in large and small areas. Rajasthan is the leading state of the country, both in area and production of many seed spices like coriander, cumin, fenugreek etc. In tribal areas of Rajasthan particularly Pratapgarh which comprises of clay soil with high carbon contents, good quality water and other weather parameters are very congenial for higher production of coriander, fenugreek, nigella and ajwain. However, the farmers of this region are still growing many other crops including coriander and fenugreek with local cultivars/varieties and using broadcasting method of sowing and other practices. There is no standard package for seed treatment, irrigation pattern, insect-pests, diseases and weed management for reaping higher yield. In the area, no seed supplying agencies is working to provide quality seed of improved varieties and also lacking in mechanization for seed sowing, weeding, harvesting, threshing and packaging.

A baseline survey of tribal farmers was conducted in tribal belt of Pratapgarh (Rajasthan) during 2013-14 (Table-1). The farmers' selection was made with the help of Krishi Vigyan Kendra (MPUA&T), Pratapgarh as well as few interested farmers were directly selected by NRCSS for FLDs of these crops. All type of large, medium and small size farmers were included in the study. In the preliminary survey and discussion with selected farmers, causes of

low yield of coriander were identified and prioritized. In addition, it was also found that the majority of selected tribal farmers were growing maize and few are growing soybean crop with conventional intercropping operations in *Kharif* season. In *Rabi*, they are mainly growing wheat (particularly small farmers) and also gram, fenugreek and coriander in traditional manner and get very less return. Tribal farmers, particularly small farmers also rearing buffalo, goats 1-4 and poultry and 4-10 in number, respectively for their livelihood (Table 1 and Photo 1-4). Conventional method of coriander as well as other field crops production in tribal area of Pratapgarh district of Rajasthan is responsible for poor yield and low return. Consequently, front line demonstration programmes, trainings and field days are effective tools 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 coriander.

In order to enhance the yield and productivity of seed spices in tribal area, ICAR-National Research Centre on Seed Spices, Tabiji, Ajmer were initiated various extension programmes in the year 2013-14 onward for dissemination of improved production technologies of seed spices to diversify the existing cropping pattern. In the sequence of impact of technological interventions, 53 demonstrations on fenugreek and 35 front line demonstrations on coriander were conducted on farmer's field in three different tribal villages of Arnod block in Pratapgarh district during *Rabi* season of the year 2013-14, 2014-15 and 2015-16. The area under each demonstration was 0.25 ha. All inputs like seeds of fenugreek variety AFG-2 and coriander, variety ACr-1, fertilizers, pesticides etc., were given by ICAR-National Research Centre on Seed Spices, Ajmer for successful raising of crops. The crops were raised with the adoption of recommended package of practices. The follow-up programmes were organised during crop growing period



Local buffalo rearing and intercultural operations in tribal area

and other farmers were advised to see the performance of the improved technologies in their vicinity. All the demonstrations were monitored by the scientists of NRCSS, Ajmer and KVK, Pratapgarh for enhancing crop production. During the cropping season, farmers' trainings were also organized at the study site (Arnod, Pratapgarh) to provide production and protection technologies for coriander and fenugreek cultivation in effective manner.

The data on crop performance, yield and other parameters were recorded by the farmers with help of SMS, KVK, Pratapgarh and Scientists of NRCSS at different period of time. The yield and economics of FLDs and local check is presented in table 2, which reveals that the yield of coriander and fenugreek under FLDs was found higher over local checks during all the years (2013-14 to 2015-16). The coriander yield in demonstration fields was recorded 19.26, 20.11 and 14.10 q ha⁻¹, whereas, fenugreek yield in FLDs was recorded 25.47, 27.94 and 22.60 q ha⁻¹ in the year 2013-14, 2014-15 and 2015-16, respectively. The average yield appreciated in demonstration by 26.26 and 44.06 per cent higher in both crops over farmers' practices with local check. In front line demonstrations on coriander mean net return

(₹ 60950/- ha⁻¹) and benefit cost ratio of 2.87 was recorded which was 35.00 percent higher over local check. Similarly, the net return of ₹ 53308/- ha⁻¹ and benefit cost ratio of 2.48 was recorded in FLDs of fenugreek. The yield enhancement of crops was due to the improved technological interventions applied in FLDs. The cumulative effect of technological intervention for increasing yield over three year is on account of adoption of line sowing technique, optimum nutrient management, weeding before critical stage and plant protection measures for insect-pests and disease management. The year to year variations in cost of cultivation and yield occurred due to the fluctuations in prevailing social, economical and other ecological conditions of that particular region. A comparative study of return between existing cropping pattern and FLDs of coriander var. ACr-1 and fenugreek variety AFG-2 was also conducted in same tribal farmers field (Table 3) in Arnod block of Pratapgarh district. The results showed that farmers are growing maize and soybean in Kharif season, earning net return of ₹ 18000 and ₹ 23400 ha⁻¹ with benefit cost ratio of 2.29 and 1.62, respectively. In Rabi season, wheat, gram and barley are the major growing crops and farmers are getting net return of ₹ 30300, 26500 and 22820 with benefit cost ratio of



Extension activities at KVK and Arnod, Pratapgarh

2.15, 2.32 and 1.83, respectively. It was evident from the data that the cultivation of above crops with farmers practices are giving very less return in comparison to coriander (net return 56121 and B:C ratio 3.09) and fenugreek (net return 41845 and B:C ratio 2.58). The data also revealed that the technology gap ($q\ ha^{-1}$) extension gap ($q\ ha^{-1}$) and technology index (%) which are presented in table 4. The technology gap was ranged from 3.89 to 5.90 with an average of 4.84 $q\ ha^{-1}$ in coriander and it ranged from 1.06 to 5.40 with an average of 3.33 $q\ ha^{-1}$ in fenugreek during the period of study. The technology gap observed may be attributed to dissimilarity in the soil fertility status, agricultural practices and local climatic conditions. Similarly, the extension gap ranged from 3.20 to 3.90 $q\ ha^{-1}$ with an average extension gap of 3.51 $q\ ha^{-1}$ in coriander and it ranged from 5.10 to 10.38 with an average of 7.74 $q\ ha^{-1}$ in fenugreek. It was observed under demonstration plots, which emphasized the need to educate the farmers through various extension means like trainings, 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. In present study, the technology index ranged from 16.21 to 29.50 per cent with an average of 21.82% in coriander and it ranged from 3.65 to 19.28 per cent with an average of 11.70% in fenugreek. The observation, indicates higher scope for further improvement in productivity of both the crops in tribal area of Pratapgarh district of Rajasthan (Table 4). Thus, based on three year study, it is inferred that adoption of improved production technology of coriander and fenugreek in FLDs is highly beneficial for realising higher yield, net return and BCR which is very helpful for diversification of existing cropping system of tribal area of Pratapgarh resulting in upliftment in economic standard of tribal farmers.



Crops view of FLD at Pratapgarh (Rajasthan)

Table 1. Family status of selected farmers in tribal belt in Pratapgarh district of Rajasthan during 2013-14.

Category	Family size		Land holding (ha.)	Animals				Cropping pattern		House type
	Adults	Children		Cow	Buffalo	Goat	Poultry	Kharif	Rabi	
Small farmer	3-5	3-6	<0.5 ha	1-2	-	3-4	5-10	Maize	Wheat Gram	Kachha
Medium farmer	2-4	3-4	0.5-2.5 ha	2-3	11	2-3	4-5	Maize Soybean	Wheat Gram Fenugreek	Kachha or Pucca
Big farmer	2-4	2-4	>2.5 ha	2-3	2-4	1-2	-	Maize Soybean	Wheat Gram Fenugreek Coriander	Pucca

Table 2. Yield and economics of front line demonstrations of seed spices at tribal area of Pratapgarh (Rajasthan).

Year	No. of FLDs	Area in each FLD	Yield (q/ha)		Percent increase over local practices	Gross expenditure		Gross return		Net return		B:C ratio	
			LC	FLD		LC	FLD	LC	FLD	LC	FLD	LC	FLD
A. Crop: Coriander (variety: ACr-1)													
2013-14	05	0.25	16.06	19.26	19.92	29673	31483	72270	86670	43897	55187	2.43	2.75
2014-15	10	0.25	16.67	20.11	20.64	32190	34524	88351	106583	56161	70059	2.74	3.09
2015-16	20	0.25	10.20	14.10	38.23	32945	35596	71400	98700	34904	57604	2.16	2.77
Average			14.31	17.82	26.26	31603	33868	77340	97318	44987	60950	2.44	2.87
B. Crop: Fenugreek (variety: AFg-2)													
2013-14	20	0.25	17.72	25.47	43.73	30465	32600	60905	73930	30440	41330	1.99	2.26
2014-15	10	0.25	17.56	27.94	59.11	33550	35860	57948	92202	24398	56342	1.73	2.57
2015-16	23	0.25	17.50	22.60	29.14	36905	39446	78750	101700	41845	62254	2.13	2.58
Average			17.59	25.34	44.06	33640	35968	65867	89277	32227	53308	1.95	2.48

FLD: Front Line Demonstration; LC: Local Check

Table 3. Comparative study of return between existing cropping pattern and FLDs of coriander (2013-14-2015-16).

Existing crops in Pratapgarh	POP adopted	Production (q ha ⁻¹)	Gross return (₹ ha ⁻¹)	Net return of LP (₹ ha ⁻¹)	Net return of FLDs (₹ ha ⁻¹)	B:C ratio
Maize	Local practices	18.50	31900	18000	-	2.29
Soybean	-do-	11.00	38000	23400	-	1.62
Wheat	-do-	30.00	51000	30300	-	2.15
Gram	-do-	15.00	46500	26500	-	2.32
Barley	-do-	32.10	43520	22820	-	1.83
Coriander	Improved POP	20.11	106583	56151	70059	3.09
Fenugreek	-do-	22.60	101700	41845	62254	2.58

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

Years	Crop & Variety	Potential yield (q ha ⁻¹)	Average yield (q/ha)		Technology gap (q ha ⁻¹)	Extension gap (q ha ⁻¹)	Technology index (%)
			Demo.	Local			
2013-14 to 2015-16	Coriander (ACr-1)	22.67	17.82	14.31	4.85	3.51	21.82
2013-14 to 2015-16	Fenugreek (AFg-2)	28.66	25.34	17.59	3.33	7.74	11.70

Received : April 2019; Revised : June 2019; Accepted : June 2019.