ASSESSMENT OF FRONTLINE DEMONSTRATION ON YIELD ENHANCEMENT AND ECONOMICS OF CUMIN (GC-4) IN SURENDRANAGAR DISTRICT OF SAURASHTRA REGION OF GUJARAT

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ABSTRACT

Cumin is one of the important and ancient spices. India is the world's largest producer, consumer and exporter of the cumin. It is almost exclusively cultivated in Rajasthan and Gujarat . FLDs are the best course of action to establish the confidence towards the suitability of technology to the specific location, its production performance, overall performance etc to accelerate the adoption of technologies demonstrated under FLDs. The main objective of Front-Line Demonstrations is to demonstrate newly released crop production and protection technologies and its management practices in the farmers' field under different agro-climatic regions and farming situations. KVK Surendranagar has been implemented frontline demonstrations (FLDs) on improved variety of cumin GC-4 with recommended practices covering 60 farmer's fields and 24 ha area in different villages of Surendranagar district from 2013-14 to 2015-16 (20 no. of FLDs in 8 ha area each year for consecutive three years). The results revealed that improved variety of cumin GC-4 with recommended practices recorded significantly higher average grain yield of 753 kg ha-1, which was 11.95% higher than conventional variety with farmers' practice (664 kg ha-1). The overall average extension gap of 78.00 kg ha-1 with technology gap (507 kg ha-1) and technology index (40.6) was recorded. The higher net return of Rs. 64853 ha-1 was obtained under the demonstration fields than farmers' practice (Rs. 56265 ha-1) with additional return of Rs. 8589 ha-1. B: C ratio was also considerably higher in demonstration plot (3.76) than farmer's practice (3.42). Therefore, improved variety of cumin GC-4 with recommended package of practices should be encouraged to adopt in the district for gaining higher yield and profit from cumin cultivation.

Keywords : *frontline demonstration, yield gap, technology gap, extension gap, technology index*

INTRODUCTION

Cumin is one of the important and ancient spices. India is the world's largest producer, consumer and exporter of the cumin. It is almost exclusively cultivated in Rajasthan and Gujarat are leading cumin growing states in India. It is used as powder, medicinal, beverages, cumin sips, organic cumin, oil and oleoresin, besides manifold medicinal uses.

Cumin (*Cuminum cyminum* L.) belonging to family *Apiaceae*, is one the important major seed spice crops and considered to be a remunerative cash crop grown mainly in Rajasthan and Gujarat states of the country. Gujarat is the leading state occupying 373900 hectare area and annual average production of 283302 tones with productivity of 760 kg ha-1 of cumin. Cumin is one of the important spice crops of the state, largely grown in Surendranagar, Banaskantha, Ahmedabad, Porbandar, Rajkot and Jamnagar districts. Surendranagar district contributes area (84590 ha.) and in production (70785 tones) with average productivity of 837 kgha-1 of cumin in Gujarat [1].

Surendranagar is situated in North Saurashtra Agro Climatic Zone of Gujarat representing soil is mostly medium black, shallow to moderately deep and calcareous in nature with temperature range of 11º to 41º C. and receives about 400 mm rainfall. The agricultural technology is not generally accepted by the farmers completely in all respects. As such, there always appears to be a gap between the recommended technology by the scientist and its modified form at the farmers' level. Though farmers are very keen in adopting improved varieties and technology, many of the farmers are still doing the farming with conventional variety and

practices. Farmers are using chemical fertilizers, insecticides; fungicides etc. very indiscriminately and in more quantity in cumin which ultimately reduce their profit due to increased cost of cultivation. In view of the above factors, frontline demonstrations were conducted on farmers' field to adopt improved high yielding variety of cumin (GC-4) with improved package of practices for enhancing productivity of cumin and improving economic gain of the farmers. Keeping in view the present investigation attempts to study the yield gap between front line demonstration trials and farmers' yield, extent of technology adoption and benefit cost ratio.

There are many proven technologies developed by scientist with extreme efforts but unfortunately it does not reach to farming community with adequate pace. Generally there is a time lag between origin of a new ideas and its adoption. There may be some reasons behind this, responsible for insufficient adoption of the same.

To ensure the proper demonstration before the farming community the application of frontier technologies, FLDs are the best course of action to establish the confidence towards the suitability of technology to the specific location, its production performance, overall performance etc to accelerate the adoption of technologies demonstrated under FLDs

Extent of adoption by farmers of district about improved agricultural cultivation practices of cumin production technology are still a big question mark. There is a great need for the adoption of improved agricultural practices of cumin crop by the farmers so that production and income can be raised. Several programme to transfer of the new technologies in the agriculture are in operation throughout the country but the new technology has not yet reached the grass root level, where it can be put into practice.

Front-Line Demonstration is the new concept of field demonstration evolved by the Indian Council of Agricultural Research with the inception of the Technology Mission on Oilseed Crops during mid-eighties. The main objective of Front-Line Demonstrations is to demonstrate newly released crop production and protection technologies and its management practices in the farmers' field under different agro-climatic regions and farming situations.

KVK Surendranagar has been implemented Frontline demonstrations on improved variety of cumin GC-4 with recommended practices were conducted on 60 farmer's fields by covering 24 hectare area in different villages of Surendranagar district during Rabi season of 2013-14 to 2015-16 (20 no. of FLDs in 8 ha area each year for consecutive three years). The results revealed that improved variety of cumin GC-4 with recommended practices recorded significantly higher average grain yield of 753 kg ha-1, which was 11.95% higher than conventional variety with farmers' practice (664 kg ha-1). The overall average extension gap of 78.00 kg ha-1 with technology gap (507 kg ha-1) and technology index (40.6) was recorded. The higher net return of ₹ 64853 ha-1 was obtained under the demonstration fields than farmers' practice (₹ 56265 ha-1) with additional return of ₹ 8589 ha-1. Benefit cost ratio was also considerably higher in demonstration plot (3.76) than farmer's practice (3.42). So, improved variety of cumin GC-4 with recommended package of practices should be encouraged to adopt in Saurashtra region of Gujarat for gaining higher yield and profit from cumin cultivation.

OBJECTIVE

To study the assessment of frontline demonstration on yield enhancement and economics of cumin (GC-4) in surendranagar district of saurashtra region of Gujarat.

METHODOLOGY

The present study was carried out by Krishi Vigyan Kendra, Junagadh Agricultural University, Nana kandhasar-Surendranagar during Rabi season of 2013 to 2015 (3 years). In total 20 demonstrations on 08 hectare area were conducted on farmers' field of different adopted villages of Surendranagar district. Improved variety of Cumin GC-4 was selected for the study and seed of variety GC-4 was given as critical input to each farmer for 0.4 ha. Besides this, recommended package of practices like seed treatment (Mecozeb @ 3 g.kg-1 seed), line sowing (30 cm), recommended NPK (30-15-0 NPK kg ha-1) and recommended plant protection measures were followed in demonstration plots whereas conventional variety with traditional practices was as control. The demonstration farmers were facilitated by KVK scientists in performing field operations like sowing, spraying, weeding, harvesting etc. during the course of training and visits.The extension gap, technology gap and the technology index were worked out as per formulae given by Lal et al (293).

Technology gap = Potential yield – Demonstration yield

Extension gap = Demonstration yield - yield under existing practice

Technology index = {(Potential yield – Demonstration

yield)/ Potential yield} × 100

Additional Return = Demonstration Return – Farmer's Practice Return

Net returns = Total (Gross) Returns – Total Cost of Production

RESULTS AND DISCUSSION

Seed yield

The seed yield was significantly improved in demonstration plot with improved variety GC-4 and recommended practices as compared to conventional variety with farmers' practice in all the three years [Table-1]. The yield recorded under demonstration plot during the year 2013, 2014 and 2015 were 768, 669 and 791 kg ha-1 which was 15.8%, 12.2% and 7.8% higher than the yields under conventional variety and farmers' practice respectively. On the basis average data, it is inferred that the improved and high yielding variety of cumin GC-4 with recommended practices recorded 11.95 percent higher yield (743 kg ha-1) as compared to conventional variety and farmers' practice (664 kg ha-1).

Table 1 : Yield and gap analysis of FLDs on cumin

Year	Area (ha)	Potential Yield (kglha)	Demo Yield (kg/ha)	Farmers Potential (FP kg/ha)	Yield Increase over FP (%)	Ext Gap (Kg/ha)	Tech Gap (kg/ha)	Tech Index (%)
2013-14	8	1250	768	663	15.82	105	482	38.60
2014-15	8	1250	669	596	12.24	73	581	46.50
2015-16	8	1250	791	734	07.78	57	459	36.80
Over All Average	**8**	**1250**	**743**	**664**	**11.95**	**78**	**507**	**40.60**

Gap analysis

Data [Table-1] revealed that an extension gap of 57–105 kg ha-1 was found between demonstrated technology and farmers' practice and on average basis the extension gap was 78.0 kg ha-1. The lowest extension gap (57 kg ha-1) was in the year 2015-16. Such gap might be attributed to adoption of improved technology especially high yielding varieties sown with the help of seed cum fertilizer drill with balanced nutrition and appropriate plant protection measures in demonstrations which resulted in higher grain yield than the traditional farmers' practices. These results are in agreement with the findings of Lal et at (2013) and singh et al (2011).

The study further revealed that there is a wide technology gap among the years. It was highest (581 kg ha-1) in the year 2014-15 while lowest (459 kg ha-1) in the year 2015-16. The average technology gap was (507 kg ha-1). The difference in technology gap in different fields is due to better performance of recommended varieties with recommended practices and more feasibility of recommended technologies during the course of study with the other factors like monitoring by farmers, soil type and fertility status of the fields. Similarly, the technology index for the years in the study was in relevance with technology gap. Higher technology index reflected the inadequate proven technology for transferring to farmers and insufficient extension services for transfer of technology. In this study overall 40.60 per cent technology index was recorded, which varied from 36.8 % (2015-16) to 46.5 % (2014-15).

Table-2 Economic analysis of FLDs on cumin

Year	Cost of Cultivation		Gross Return		Net Return		Additional Return	BRC	
	Demo	FP	Demo	FP	Demo	FP		Demo	FP
2013-14	17565	17200	69080	59643	51515	42443	9072	3.93	3.47
2014-15	26465	26125	83672	74550	57207	48425	8782	3.16	2.85
2015-16	26825	26605	112664	104531	85839	77926	7913	4.20	3.93
Over All Average	**23618.33**	**23310**	**88472**	**79575**	**64853**	**56265**	**8589**	**3.76**	**3.42**

Economic analysis

Economic analysis exhibited that improved variety GC-4 and recommended practices significantly increased the gross and net returns during all the years [Table-2]. On overall average basis, an amount of ₹ 64853 ha-1 was incurred under demonstrations and ₹ 56265 ha-1 under Farmer's practice (FP). An average additional amount of ₹ 8589 ha-1 was incurred under demonstrations than FP. Economic yield as a function of grain yield and sale price were taken into consideration. Maximum additional returns (₹ 9092 ha-1) were obtained during 2013-14. The overall average additional returns of ₹ 8589 ha-1 was obtained under the demonstration fields. The higher additional returns and effective yield obtained under demonstrations could be due to improved variety, scientific proven technology, non-monetary factors, timely operations of crop cultivation and scientific monitoring. The cost benefit ratio of demonstrated and control plots were 3.93 and 3.16, 4.20 and 3.47 and 2.85 and 3.93 during year 2013-14, 2014-15 and 2015-16 respectively with average of 3.76 and 3.42. Hence, favorable cost benefit ratios proved the economic viability of the intervention made under demonstration and convinced the farmers on the utility of intervention. The findings are in confirmation with that reported by Lal et al (2013), Singh et al (2013_ Khajuria et al (2016).

CONCLUSION

From the above results and discussion it can be concluded that improved variety of cumin GC-4 with recommended technologies recorded 11.95 per cent higher yield than the yield under farmers' practice. Front line demonstration programme was effective in changing attitude, skill and knowledge by using improved variety with recommended package of practices of cumin cultivation including adoption. So improved variety of cumin GC-4 with recommended practices like seed treatment (Mencozeb @ 3 g.kg-1 seed), line sowing (30 cm), recommended NPK (30-15-0 NPK kg ha-1) and recommended plant protection measures can be recommended to harvest higher yield and incur higher profit over traditional variety and farmers' practice.

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Received : July 2017 : Accepted : October 2017