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Impact of Front Line Demonstrations on Yield Enhancement of Cumin: A Case in Arid Zone of Rajasthan

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ABSTRACT

Cumin (*Cuminum cyminum L.*) is a predominantly *rabi* crop of arid zone of Rajasthan. The crop accounts for 32.21 and 18.09 per cent of area and production, respectively, in Rajasthan. However, the average district yield is 7.76 q./ha., which is substantially lower than the national average (12.45 q./ha.). Considerable scope of enhancement in productivity leading to higher production exists, especially in Pali in arid zone, which is earmarked as important Agro Export Zone for cumin in the country. To demonstrate this, 65 Front Line Demonstrations (FLDs) were organized by Krishi Vigyan Kendra (KVK), Central Arid Zone Research Institute (CAZRI), Pali between 2004-05 and 2008-09 at five locations under actual farm situations. The economics and cost benefit ratio of both control and demonstrated plot was worked out. An average net profit of Rs. 92700 was recorded under recommended practices while it was Rs. 64825 under farmers practice. Cost : benefit ratio was 2.02-3.94 under demonstration, while it was 1.49-2.86 under control plots. By conducting FLDs of proven technologies, yield potential and net income from cumin production technology can be enhanced to a great extent with an increase in the income level of the farming community.

Key words: Technology, Impact, FLD, Cost: Benefit ratio, Cumin.

INTRODUCTION

Seed spices are now becoming more popular owing to their profitability, short duration and greater potential to grow in low rainfall areas. They are cultivated mainly in the arid and semi-arid region of North India. The major seed spices crops are cultivated extensively in the state of Rajasthan, Gujarat and to a smaller extent in Madhya Pradesh, Punjab, Haryana, and Maharashtra. Rajasthan and Gujarat contribute more than 82 per cent of the total seed spices production in the country. This belt can, therefore, be called as seed spices bowl of the country. There are great prospects for seed spices development in this region of the country.

Cumin (*Cuminum cyminum L.*) is one of the important ingredients of human diet throughout the world. It is used in large number of processed foods as well as in daily food recipes because of its agreeable flavour and aroma. Cumin is also used in seasoning bakery products such as bread and cake. Besides, it has medicinal importance and is used as a stimulant carminative, stoma-chic, astringent and useful against diarrhoea and dyspepsia. Cumin seeds are also used in number of veterinary medicines. On distillation, the seed yields are about 3 per cent essential oil, which has a characteristic odour and a little bitter taste. The oil of cumin is used in perfumery, for flavoring liquors and cordials. The aromatic odour of cumin seed is due to the presence of cumin aldehyde or cuminal which ranges from 2.5 to 4.0 per cent. Cumin seed contains 11.9 per cent moisture, 18.7 per cent protein, 15.o per cent other extract, 36 per cent carbohydrate, 12 per cent minor matter, 1.08 per cent calcium, 0.49 per cent phosphorus, 3.10 mg per 100 gm. The cumin seed after distillation yield 2.4 per cent volatile oil.

India is the largest producer of cumin seed and it is cultivated on 6.32 lac hectares land with a production of 4.46 thousand tonnes in 2008-09. The cumin seeds were exported to the tune of 14,860 tones valued worth Rs. 12,190 lac during 2008-09 (Directorate of Agriculture, Jaipur 2008-09). The main markets for cumin are Japan, USA, U.K., Canada, Singapore, Saudi Arabia and U.A.E.

Rajasthan has a unique place in seed spices map of country, which produced 4.05 lac tonnes seeds from 4.76 lac ha. area. In arid zone, area and production of cumin covered under different districts were 69.86 thousand ha area and 49.56 thousand tonnes production in Jalore followed by Pali 30.65 thousand ha and 18.96 thousand tonnes production, Jodhpur 22.07 thousand ha and 13.90 thousand tonnes production and Barmer 20.87 thousand ha area and 14.54 thousand tonnes production respectively (Jaitawat, 2006).

The main objective of FLDs is to demonstrate newly released crop production and protection technologies and its management practices in the farmers' fields under different agro-climatic regions/farming situations. While demonstrating the technologies in the farmers field, scientists are required to study the factor contributing higher crop production, field constraints of production

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and thereby generate production data and feedback information. The FLDs are conducted under the close supervision of scientists of the National Agricultural Research System comprising ICAR Institutes, National Research Centers, Project Directorates, Krishi Vigyan Kendras and State Agricultural Universities and their regional research stations (Choudhary, 1999). FLDs are organized in a block of 2 to 5 hectares involving all those farmers whose plots fall in the identified demonstration block. Only critical inputs and trainings are provided from the scheme budget, remaining inputs are supplied by the farmers themselves. The purpose is to be convincing extension functionaries and farmers together about the potentialities of the technologies for further wide-scale diffusion and FLD is used as a source of generating data on factors contributing higher crop yields and constraints of production under a various farming situations.

METHODOLOGY

Krishi Vigyan Kendra, CAZRI, Pali- Marwar has been conducted 65 Front Line Demonstration under real farming situations between 2004-05 and 2008-09 at five different villages, namely Bhagwanpura, Dayalpura, Hingolla Kallan, Sodawas and Bittura Kallan located in different blocks, viz. Sumerpur, Pali, Marwar Junction and Raipur, respectively under KVK, CAZRI operational area. The area under each demonstration was 0.50 ha. Through the survey, farmers meeting and field diagnostic visits during the cropping period, low yields of cumin was conceived due to imbalanced use of nitrogenous fertilizer and indiscriminate practices to manage the wilt disease and aphids (Moyala) on cumin crop. To manage assessed problems, improved and recommended technologies were followed as intervention during the course of FLDs programme.

In case of recommended practices, balanced use of nitrogenous fertilizer and use of suitable fungicide (Mancozeb) and pesticide (Dimethoate 30 EC) as suggested by Loda (2007) and Lal (2005) was sprayed as foliar at 30, 45 and 60 days after sowing. In case of local check (control plots), existing practice being used by farmers, i.e. imbalanced use of N:P:K. fertilizers, particularly lower dose (10 -15 kg./ha) of nitrogen and use of fungicide/pesticide supplied by the local venders like Carbendazim (Bavistin) and Eldrine to manage wilt diseases and aphids was considered. Well before the conduct of demonstrations, training to the farmers of respective villages was imparted with respect to envisaged technological interventions. All other steps like site and farmer selection, layout of demonstration, farmer's participation etc. were followed as suggested by (Singh, 2007). Visits of the farmers and the extension functionaries were organized at demonstration plots to disseminate the message at large. Yield data were collected from control (Farmer's practices) and demonstration plots and cost of cultivation, a net income and cost : benefit ratio were computed and analysed.

RESULTS AND DISCUSSION

The yield performance and economic indicators showed that under demonstration plot, the performance of a cumin yield was substantially higher (Table 1) than that under local check during all the years (2004-05 to 2008-09). The cumin yield under demonstration recorded were 6.80, 9.10, 7.15, 5.11 and 8.76 q/ha during 2004-05, 2005-06, 2006-07, 2007-08 and 2008-09, respectively. Owing to technological intervention was to the tune of 42.56, 61.06, 44.15, 32.73 and 71.76 per cent respectively over the control. The cumulative effect of technological intervention over five years, revealed an average yield of 7.38 q/ha, 50.45 per cent higher over local check. The year-to-year fluctuations in yield and cost of cultivation can be explained on the basis of variations in prevailing social, economical and prevailing micro climatic condition of that particular village. Rao (2005) also opined that depending on identification and use of farming situations, specific interventions may have greater implications in different crops in Front Line Demonstration has amply been documented by Chand (2005), Tiwari and Saxena (2003) and Tiwari *et al.* (2003).

Table 1: Yield performance and economic indicators of Front Line Demonstration of cumin cv. RZ 223.

Year	No. of FLD	Yield q/ha		% Increase over	Gross Expenditure		Gross Return		Net Return		CB Ratio	
		RP	FP	FP	RP	FP	RP	FP	RP	FP	RP	FP
2004-05	10	6.80	4.77	42.56	27600	26000	85000	59625	57400	33625	3.08	2.29
2005-06	15	9.10	5.65	61.06	28800	28000	113750	80125	84950	52125	3.94	2.86
2006-07	15	7.15	4.96	44.15	31200	30280	89375	60000	58175	29720	2.86	1.98
2007-08	10	5.11	3.85	32.73	32600	32100	65875	48125	31275	16025	2.02	1.49
2008-09	15	8.76	5.10	71.76	33270	32666	109500	76250	76230	42980	3.29	2.33

RP, Recommended Practice FP, Farmers Practice CB Ratio, Cost : Benefit Ratio

Economic indicators, *i.e.* gross expenditure, gross returns, net returns and cost : benefit ratios of FLDs revealed that, the net returns from the recommended practices were substantially higher than a control plot, i.e. farmers practice during all the years of demonstration (Table 1). An average net return from recommended

practice was Rs.61,606 in comparison to control plot, i.e. Rs.36,016. On an average Rs.12,275 as additional income is attributed to the technological interventions provided in demonstrations plots, i.e. balanced nutrition and timely, management of wilt disease and cumin aphids.

Economic analysis of the yield performance revealed that cost : benefit ratio of demonstration plots were significantly higher than control plots. The cost : benefit ratio of demonstrated and control plots were 3.08 and 2.29, 3.94 and 2.96, 2.86 and 2.05, 1.96 and 1.49, 3.29 and 2.33 during 2004-05, 2005-06, 2006-07, 2007-08 and 2008-09 respectively. Hence favourable cost : benefit ratios proved the economic viability of the intervention made under demonstration and convinced the farmers on the utility of intervention. Similar findings were reported by Sharma (2003) in moth bean and Gurumukhi and Mishra (2003) in sorghum. The data revealed that the maximum increase in yield observed was during 2008-09, while a maximum cost : benefit ratio of 3.94 was observed during 2005-06. The variation in a cost : benefit ratio during different years may be on account of yield performance and input output cost in that particular year.

CONCLUSION

The results of FLDs showed that the yield of cumin could be increased by 32.73 per cent to 71.76 per cent with the intervention on balanced nutrition coupled with the disease and pest management in the Pali district. A favourable cost : benefit ratio is self explanatory of economic viability of the demonstration and convinced the farmers for adoption of intervention imparted. The technology suitable for enhancing the productivity of cumin crop and calls for conduct of such demonstrations under the transfer of technology programme by KVKs or other transfer of technology centres.

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