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Economic Analysis of Front Line Demonstrations on Cumin: A Case in Arid Zone of Rajasthan

M.K. Choudhary, Dheeraj Singh, M.L. Meena and P.K. Tomar

Krishi Vigyan Kendra, CAZRI, Pali-Marwar 306 401, India

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Abstract: Cumin is a predominantly *rabi* crop in arid zones of Rajasthan. The crop accounts for 32.21 and 18.09% of area and production, respectively, in Rajasthan. The average yield of the crop is 776 kg ha^{-1} in Pali district, which is substantially lower than the national average (1245 kg ha^{-1}). Considerable scope for enhancement in productivity exists, especially in Pali district, which is an important agro export zone for cumin in the country. The paper draws upon the data from 65 Front Line Demonstrations (FLDs) organized by KVK, CAZRI, Pali, between 2005-06 and 2009-10 at five locations under actual farm situations. The economics and cost benefit ratio of both control and demonstration plot was worked out. An average net profit of Rs. 92,700 ha^{-1} was recorded under recommended practices whereas the net profit was Rs. 61,606 ha^{-1} under farmer's practice. The range of cost benefit ratio was 2.02-3.94 under demonstration, while it was 1.49-2.86 under control plots. The results showed that adoption of improved technology can enhance productivity of cumin in arid region while increasing the profitability of cultivation for the farmers.

Key words: Technology, impact, FLD, cost benefit ratio, cumin.

Seed spices are becoming more popular due to their profitability, short duration and greater potential to grow in low rainfall areas. They are cultivated mainly in the arid and semi-arid regions of North India. The major seed spice crops are cultivated extensively in the states of Rajasthan, Gujarat and to a smaller extent in Madhya Pradesh, Punjab, Haryana, and Maharashtra. Rajasthan and Gujarat contribute more than 82% of the total seed spices production in the country. These states 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 is an important ingredient of human diet throughout the world. It is used in large number of processed foods as well as in daily food recepies due to its pleasant flavor and aroma and also used in bakery products such as bread and cake. Besides, it has medicinal value and is used as a stimulant, carminative, stomachic, astringent and useful against diarrhea and dyspepsia. Cumin seeds are also used in number of veterinary medicines.

India is the largest producer of cumin seed and it is cultivated on 6.32 lakh hectares land with a production of 4.46 thousand tons in year 2009-10. The cumin seed was exported to the tune of 14860 tons valued worth Rs. 1219 million during the year 2009-10 (Anonymous, 2009-10). The main markets for cumin are Japan, USA, UK, Canada, Singapore, Saudi Arabia and UAE.

The state of Rajasthan has a unique place in seed spices map of the country with a production of .41 Mt from .48 Mha area. Among the arid zone districts in Rajasthan, Jalor district had the maximum area (69.9 thousand ha) and production (49.6 thousand tons) of seed spices. The area under seed spices/cumin was 30.7, 22.1 and 20.9 thousand ha with a corresponding production of 19.0, 130.0 and 14.5 thousand tons in Pali, Jodhpur and Barmer, respectively.

The main objective of FLDs is to demonstrate newly released crop production and protection technologies and their management practices in the farmers' fields under different agro-climatic regions and farming situations. While demonstrating the technologies in the farmers field, researchers collect information on the factors contributing to higher crop production, field constraints of production and thereby generate feedback information on the demonstrated technologies. FLDs are

*E-mail: cazri_kvkpali@yahoo.co.in

conducted under the close supervision of scientists of the National Agricultural Research System comprising of ICAR Institute, 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 ha 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 convince farmers about the potentialities of the technologies for further wide scale diffusion. FLD are used as a source of generating data on factors contributing higher crop yield and constraints of production under various farming situations.

Materials and Methods

Krishi Vigyan Kendra, CAZRI, Pali-Marwar, conducted 65 FLD under real farming situations between 2005-06 and 2009-10 at five different villages, namely Bhagwanpura, Dayalpura, Hingola Klan, Sodawas and Bittura kalan located in Marwar Junction and Raipur blocks, which fall under its operational area. The area under each demonstration was 0.50 ha. Through surveys, farmers' meetings and field diagnostic visits during the cropping period, imbalanced use of nitrogenous fertilizer and indiscriminate use of plant protection chemicals to manage the wilt disease and aphids (Moyala), were identified as factors for low production. To manage assessed problem, improved and recommended technologies were followed as intervention during the course of FLD programs.

In case of recommended practices, balanced use of nitrogenous fertilizer and use of suitable fungicide (Mancozeb) and pesticide (Dimethoate 30 EC) as suggested by Lal (2005) was applied as foliar spray at 30, 45 and 60 days after sowing. In case of local check (control plots), existing practice being followed by farmers (imbalanced use of N:P:K fertilizers, particularly lower dose of nitrogen (10-15 kg ha^{-1}) and use of fungicide/pesticide supplied by the local vendors) to manage wilt diseases and aphids was considered. Before the start 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 per standard procedure. Visit of the farmers and the extension functionaries were organized at demonstration plots to disseminate the message at large. Yield data were collected from control (framer's practices) and demonstration plots and cost of cultivation, net income and cost benefit ratio were computed and analyzed.

Results and Discussion

The yield performance and economic indicators are presented in Table 1. The data reveal that under demonstration plot, cumin yield was substantially higher than the local check during all the years (2005-06 to 2009-10). The yield enhancement due to technological intervention was to the tune of 42.56, 61.06, 44.15, 32.73 and 71.76% over control. The cumulative effect of technological intervention over five years, revealed an average yield of 738 kg ha^{-1}, which was 50.45% higher than 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 microclimatic condition. Rao (2005) has also opined that depending on identification and use of farming situation,

Table 1. Yield performance and economic indicators of FLD of cumin cv. RZ 223

Year	No. of FLD	Yield kg ha^{-1}		% Increase over	Gross expenditure		Gross return		Net return		CB ratio	
		RP	FP	FP	RP	FP	RP	FP	RP	FP	RP	FP
2005-06	10	680	477	42.56	27600	26000	85000	59625	57400	33625	3.08	2.29
2006-07	15	910	565	61.06	28800	28000	113750	80125	84950	52125	3.94	2.86
2007-08	15	715	496	44.15	31200	30280	89375	60000	58175	29720	2.86	1.98
2008-09	10	511	385	32.73	32600	32100	65875	48125	31275	16025	2.02	1.49
2009-10	15	876	510	71.76	32276	32666	109500	76250	76230	42980	3.29	2.33

RP - Recommended practice, FP - Farmers practice and CB Ratio - Cost-benefit ratio.

specific interventions may have greater implications in different crops in FLD.

Economic indicators i.e. gross expenditure; gross returns, net returns and BC ratio of FLDs are presented in Table 1. The data clearly revealed that, the net returns from the recommended practices were substantially higher than control plot, (farmers practice) during all the years of demonstration. An average net return from recommended practice was observed to be Rs. 61,606 in comparison to control plot i.e. Rs. 34,895. On an average Rs. 12,275 as additional income is attributed to the technological interventions provided in demonstration plots, through balanced nutrition and timely management of wilt disease and cumin aphids.

The cost benefit ratio of demonstrated and control 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 2.86, 2.86 and 1.98, 2.02 and 1.49, 3.29 and 2.33 during 2005-06, 2006-07, 2007-08, 2008-09 and 2009-10, respectively. Hence, favorable 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 variation in cost benefit ratio during different years may be on account of yield performance and input out put cost in that particular year. The results are in agreement with those of Jaitawat (2006), Meena (2011) and Gaikwade *et al.* (2011).

Conclusion

The results of FLDs convincingly brought out that the yield of cumin could be increased by 32.73% to 71.76% with the intervention on balanced nutrition coupled with the disease and pest management in the Pali district. Favorable cost benefit ratio is self explanatory for the economic viability of the technology demonstrated and convinced the farmers for adoption of the technology. The FLD of technologies for enhancing productivity of cumin clearly show the superiority of these technologies. There is a need to spread the awareness about improved technologies through such demonstrations among the farmers. This calls for conduct of similar FLDs under transfer of technology by KVKs and other similar institutions.

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