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Popularization of coriander production technologies through front line demonstrations in Hadauti region of Rajasthan

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Abstract

Frontline demonstrations on coriander were conducted by Krishi Vigyan Kendra, Anta-Baran, Rajasthan. Twenty six percent average increase in yield over local check was observed. Benefit cost ratio was higher (IBCR 3.30) under demonstration as compared to control plots during all five years of study. It was found that the level of knowledge of beneficiary farmers regarding different improved coriander production technologies was higher than non-beneficiary ranging from 3.33 mean percent score of time of sowing to 12.85 MPS of fertilizer application. Overall non- significant difference was found in knowledge level of beneficiary and non beneficiary farmers. The difference in extent of adoption level between beneficiary and non- beneficiary farmers was ranging from MPS 2.66 to 19.71. Highest and significant difference was observed in adoption of seed treatment (MPS 19.71) followed by weed management (MPS 18.45), plant protection measures (MPS 15.09), fertilizer application (MPS 14.29), and seed rate & spacing (MPS 12.32), respectively. The overall difference in extent of adoption level between beneficiary and non- beneficiary respondents was MPS 11.30 which was statistically significant. The study also revealed that stem gall disease of coriander, non-availability of improved and quality seed, low market price during produce harvest and lack of grading and storage facilities were important constraints in adoption of coriander production technology as perceived by both categories of the respondents.

Key words : Adoption, coriander production technology, constraints, frontline demonstration, yield performance

Introduction

Coriander (*Coriandrum sativum)* or *dhaniya* is an indispensible spice in Indian as well as in all other cuisines. There is no distinct evidence on its place of origin but it is believed to be a native of southern Europe. Although it is widely cultivated all over the world for its green leaves, seed production is largely concentrated in India. It is mainly cultivated as a rabi crop in India as it requires cool climate during growth and warm dry climate during seed maturity. It is cultivated across the country, though production is concentrated in Rajasthan, Madhya Pradesh, Assam, Gujarat and Andhra Pradesh. India is the largest producer and consumer of coriander seed. Coriander production has increased significantly in the past decade. Coriander is grown as seed spices purpose in rabi season and leafy vegetable purpose in summer and rainy season in Baran district of Rajasthan. The coriander is sold in market with nick name of '*haroti dhania'.* The bold seed size is the prime liking of the district farmers. Baran district of Rajasthan is famous for coriander cultivation account for 52781 ha land during the year 2014-15 and highest acreage of 85432 ha covered in the year 2011-12. The production and productivity of coriander was drastically reduced (7.0 q ha^{-1}) during the year 2013-14 and 2014-15 due to the severe incidence of stem gall disease in commercial cultivated varieties Rcr 436 and CS 6. In winter season about 40-45 days were fogginess and lacking of sunshine during the year 2013-14 and 2014-15.

Frontline demonstration is one of the most important and powerful tools of extension because, in general farmers are driven by the perception that '*learning by doing'* and *'Seeing is believing'*. The field demonstrations conducted under the close supervision of scientists of the National Agriculture Research System is called front line demonstrations because the technologies are demonstrated for the first time by the scientists themselves before being fed in to the main extension system of the State Department of Agriculture. 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. While demonstrating the technologies in the farmers' field, the scientist are required to study the factors contributing higher crop production, field constraints of production and thereby generate production data and feedback information. Realizing the importance of FLDs in transfer of latest technologies, Krishi Vigyan Kendra, Anta-Baran

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have regularly been conducting FLDs on coriander at farmers field in different villages of Baran district of Rajasthan with the objective of convincing farmers and extension functionaries together about the production potentialities of production technologies for further wide scale diffusion. Keeping in view it was thought that impact of FLDs conducting by KVK, Anta-Baran was to be assessed.

Materials and methods

The frontline demonstrations were conducted by several institutes or organizations in Rajasthan but due to paucity of time and proximity, study was confined to FLDs conducted by KVK in Baran district of Rajasthan. The yield and economic performance of frontline demonstrations, the data on output were collected from FLDs as well as local plots and finally the grain yield, cost of cultivation, net returns with the benefit cost ratio was worked out. For the purpose of investigation, ten villages of Baran district, where FLDs were conducted during preceding five years were selected. A sample of 100 respondents was taken comprising 50 beneficiary and 50 non-beneficiary farmers. For selection of beneficiary farmers, a list of farmers where FLDs on coriander were conducted during Rabi 2010-11 to 2014-15 was prepared and taking equal representation, five beneficiary farmers from each of the selected villages making fifty respondents were selected randomly. For the other half of samples (50 non- beneficiary farmers) were selected randomly from the locally adjacent to KVK, where FLDs were not conducted by any institute or organizations. The data were collected through personal contacts with the help of well structured interview schedule. The gathered data were processed, tabulated, classified and analyzed in terms of mean percent score and ranks in the light of objectives of the study. More than 10 percent difference between beneficiary and non-beneficiary farmers' was considered as significant difference.

Results and discussions

Yield performance

During rabi 2010-11 to 2014-15, result of coriander frontline demonstrations conducted at farmer's field revealed that there was 14.27 to 89.56 percent increase in yield over local check. Table 1 showed that average yield in demonstrations varied from 817 kg to 1355 kg ha^{-1} during all five years and highest yield in demonstration was recorded during 2010-11 followed by 2012-13 (1313 kg ha^{-1}), 2011-12 (1302 kg ha^{-1}), 2014-15 (1198 kg ha^{-1}) and 2013-14 (817 kg ha^{-1}) respectively. In local checks also same trend was found i.e., maximum average yield (1175 kg ha^{-1}) was recorded during 2010-11 and lowest yield (632 kg ha^{-1}) was observed during 2014-15. The overall increase in average yield of coriander FLDs was 26% over local plots during the study period. The variety ACr 1 was found superior in term of yield (1198 kg ha^{-1}) and resistance to stem gall disease as compared to farmers sown varieties RCr 436, CS 6 and local during the year 2014-15. The production and productivity of coriander was drastically reduced during the year 2013-14 and 2014-15 in the Baran district due to the severe incidence of stem gall disease and adverse weather conditions like frost, long days fogginess, and lacking of sunshine during the both crop season. Although, the yield performance and seed boldness of variety RCr 436 and CS 6 was liked by the farmers. It might be due the soil type & its moisture availability, rainfall & weather condition, disease & pest attacks as well as the change in the locations of demonstration plots every year. In general, in all the years grain yield of FLDs plots was higher as compared to local check which was due to good variety, seed treatment, recommended fertilizer doses, plant protection measures were followed by the demonstrators and scientists in the demonstrations plots (Dayanand *et al*., 2014, Lal *et al*., 2015 and Singh *et al.*, 2015). Hence, it can be concluded from the table 1 that increased yield was due to adoption of improved varieties and conducting demonstration of

Table 1. Yield performance of frontline demonstrations on coriander crop

Season and Year	Variety	No. of Demo	Area (ha)	Average Yield (Kg ha^{-1})		Increase in Yield (%) over local
				Demo	Check	
Rabi 2010-11	CS 6	17	8.5	1355	1175	15.31
Rabi 2011-12	RCr 436	30	15	1302	1103	18.04
Rabi 2012-13	RCr 436	162	27	1313	1125	16.71
Rabi 2013-14	RCr 436	12	6	817	715	14.27
Rabi 2014-15	ACr 1	100	20	1198	632	89.56
Overall average				**1197**	**950**	**26.00**

proven technologies yield potentials of crop can be increased to greater extent.

Economic performance

The year wise economics of coriander production under demonstration were estimated and the result has been presented in table 2. The economic analysis of the data over all the five years revealed that coriander recorded higher gross returns (` 65000), net returns (` 45300) and B: C ratio (3.30) as compared to local checks. The cost of cultivation increased successively of the years of study in demonstration as well as local plots. The figures in table 2 clearly explain the significance of coriander demonstration at farmer's field during five years of study in which greater net returns were obtained under demonstration plots than control. The highest net return was received in the year of 2014-15 (` 71000) and lowest during 2011-12 (` 26000). The Benefit cost ratio was higher under coriander demonstration as compared to control plots during the all years of study (Table 2). The higher net returns and B:C ratio in coriander demonstration might be due to the higher yield and better pricing of the produce in the market (Dhaka *et.al.* 2010, Hiremath and Nagaraju 2009 and Lal *et al*., 2015).

Level of knowledge

It is assumed that the knowledge of a farmer is largely depends upon the extent of exposure given to him or her about the technology. The FLDs conducted on coriander crop by KVK, Baran was supposed to imparted knowledge of coriander production technology to the farmer, where frontline demonstrations were conducted on his farm. Therefore, efforts were made to assess the knowledge level of beneficiary as well as non-beneficiary farmers regarding coriander production technologies. The knowledge of the respondents about improved package of practices were measured in term of mean percent scores (MPS). Total ten practices were included to assess the knowledge as given in Table 3.

The data in the Table 3 depicts that the both type of

Table 2. Economic performance of frontline demonstrations on coriander crop

Season and Year	Cost of cultivation (` ha^{-1})		Gross Return (` ha^{-1})		Net Return (` ha^{-1})		Benefit Cost Ratio	
	Demo	Check	Demo	Check	Demo	Check	Demo	Check
Rabi 2010-11	15500	14500	50000	43500	34500	29000	3.23	3.00
Rabi 2011-12	16000	15000	42000	35000	26000	20000	2.63	2.33
Rabi 2012-13	18500	17500	80000	68000	61500	50500	4.32	3.89
Rabi 2013-14	23500	22000	57000	50000	33500	28000	2.43	2.27
Rabi 2014-15	25000	23000	96000	51000	71000	28000	3.84	2.22
Overall average	**19700**	**18400**	**65000**	**49500**	**45300**	**31100**	**3.30**	**2.69**

Table 3. Level of knowledge of the respondents about improved coriander production technologies

S.No.	Coriander production technology	Max. Score	Beneficiary (n=50)		Non- Beneficiary (n=50)		Difference
			MPS	Rank	MPS	Rank	
1	Improved &quality seed	15	92.00	III	86.93	III	5.07
2	Field preparation	05	90.80	V	85.20	IV	5.60
3	Seed treatment	07	88.29	VIII	76.57	IX	11.72*
4	Time & methods of sowing	06	93.33	I	90.00	I	3.33
5	Seed rate & spacing	07	77.71	X	66.57	X	11.14*
6	Fertilizer application	14	91.71	IV	78.86	VII	12.85*
7	Irrigation scheduling	05	92.20	II	87.20	II	5.00
8	Weed control	09	90.67	VI	78.89	VI	11.78*
9	Plant protection measures	19	87.58	IX	76.63	VIII	10.95*
10	Harvesting & storage	06	89.00	VII	85.00	V	4.00
	Overall	**100**	**89.33**		**81.12**		**8.21**

*Significant difference

respondents possessed maximum knowledge regarding time of sowing, irrigation scheduling and improved quality seeds of coriander. The mean percent scores of knowledge of beneficiary farmers varied from 77.71 to 93.33, while in case of non- beneficiary farmers, the mean percent scores varied from 66.57 to 89.33. This indicates a little gap of knowledge between both categories of respondents. The data further revealed that knowledge of beneficiary farmers regarding practices like fertilizer application, field preparation, weed control, harvesting & storage, seed treatment, plant protection measure, and seed rate & spacing were found to be 91.71, 90.80, 90.67, 89.00, 88.29, 87.58 and 77.71 mean percent score, respectively. In-case of non- beneficiary famers, the knowledge regarding field preparation, harvesting & storage, fertilizer application, weed control, plant protection measure, seed treatment, and seed rate & spacing, were found to be 85.20, 85.00, 78.89, 78.86,76.57 and 66.57 mean percent score, respectively.

The Table 3 also revealed that the knowledge of beneficiary farmers regarding different improved coriander production technologies was higher than non- beneficiary ranging from 4.33 MPS of harvesting & storage to 12.85 MPS of fertilizer application. The significant difference between both categories of respondents was found in knowledge of fertilizer application (MPS 12.85) followed by weed control (MPS 11.78), seed treatment (MPS 11.72), seed rate & spacing (MPS 11.14) and plant protection measures (MPS 10.95) respectively. The overall difference in knowledge level of beneficiary and non beneficiary farmers was only 8.21 MPS which was non- significant as per criterion followed by researcher or KVK, Baran (Kumawat 2008, and Meena *et al*., 2013. This might be due the fact that there were number of other extension education programme which are working on the principle "*learning by doing*" and "*seeing is believing"* organized by different organizations and communication media for farmers which provide knowledge about coriander production technology, resulting in increase of knowledge not only to beneficiary but non beneficiary farmers also.

Extent of adoption level

Extent of adoption level of beneficiary and non- beneficiary farmers was measured for ten practices of coriander production technologies. Table 4 revealed that the beneficiary respondents adopted time of sowing on their farm at the highest extent with MPS 90.33 followed by irrigation scheduling, field preparation, and improved and quality seed with MPS 88.00, 87.60, and 87.07, respectively. The study further showed that MPS pertaining to practices like; fertilizer application, harvesting & storage, weed control were 84.00, 82.67, and 81.78 respectively, which showed high adoption of these practices by beneficiary farmers. On the contrary, the practices such as seed treatment, plant protection measures, and seed rate & spacing were found least adoption by beneficiary farmers with 76.14, 77.71, and 67.46 MPS, respectively.

The extent of adoption of non- beneficiary farmers was also measured. The data of table 2 also depicts that non-beneficiary farmers adopted time of sowing to the highest extent with MPS 87.67 followed by irrigation scheduling (MPS 81.20) and field preparation (MPS 79.60), respectively. The study also indicated that the practices like; improved and quality seed, harvesting & storage and fertilizer application were adopted to the extent of 78.80, 77.67 and 69.71 MPS, respectively. The weed control,

Table 4. Adoption level of the respondents about coriander production technologies

S.No.	Coriander production technology	Max. Score	Beneficiary (n=50)		Non- Beneficiary (n=50)		Difference
			MPS	Rank	MPS	Rank	
1	Improved &quality seed	15	87.07	IV	78.80	IV	8.27
2	Field preparation	05	87.60	III	79.60	III	8.00
3	Seed treatment	07	77.71	VIII	58.00	IX	19.71*
4	Time & method of sowing	06	90.33	I	87.67	I	2.66
5	Seed rate & spacing	07	67.46	X	55.14	X	12.32*
6	Fertilizer application	14	84.00	V	69.71	VI	14.29*
7	Irrigation scheduling	05	88.00	II	81.20	II	6.80
8	Weed control	09	81.78	VII	63.33	VII	18.45*
9	Plant protection measures	19	76.14	IX	61.05	VIII	15.09*
10	Harvesting & storage	06	82.67	VI	77.67	V	5.00
	Overall	**100**	**82.28**		**70.98**		**11.30***

*Significant difference

plant protection measures, seed treatment, and seed rate & spacing were found to be least adopted by non- beneficiary farmers with 63.33, 61.05, 58.00 and 55.14 MPS, respectively. When difference in extent of adoption of various aspects of coriander production technologies between beneficiary and non- beneficiary farmers was measured, it was found that difference in extent of adoption level between both categories of respondents ranging from MPS 5.00 to 19.71. The highest and significant difference between both categories of respondents was observed in adoption of seed treatment with MPS 19.71 followed by weed control, plant protection measures, fertilizer application and seed rate & spacing with MPS 18.45, 15.09, 14.29, and 12.32, respectively. Overall difference in extent of adoption level between both categories of respondents was MPS 11.30 which was considered as significant as per criterion followed by researchers of KVK, Baran. It was clear that adoption of coriander production technologies was more among the beneficiary as compared to non- beneficiary farmers. It might be due to the fact that continuous contact of beneficiary farmers with scientists during conducting FLDs at their farm, motivating them to acquire knowledge and skills for adopting coriander production technologies for maximize their yield and income Baran (Kumawat 2008, and Meena *et al*., 2013).

Constraints towards coriander cultivation

Constraints in adoption of coriander production technologies that perceived by the respondents was also measured by researchers. Table 3 depicts that maximum respondents (97) were assigned first rank in constraint hierarchy to stem gall disease of coriander followed by non-availability of improved and quality seed (92), low market price during produce harvest (89), lack of grading and storage facilities (83) cloudy weather, rainfall at the time of flowering and seed formation (77) as 2nd, 3rd, 4th and 5th rank respectively. The other important constraints perceived by the respondent farmers were fluctuation in time of sowing due to climate change (71), non-availability of reliable insecticide/fungicide (69), lack of knowledge of coriander production technologies (66) and infestation of insect-pest & other disease (65) with 6th, 7th, 8th and 9th rank respectively in problem hierarchy (Meena *et. al.*, 2013 and Chattopadhyay and Mohapatra, 2015).

Conclusion

It is revealed from the above study that the adoption of improved variety with production and management technologies through frontline demonstration gave 26% higher yield and 14200 ha^{-1} more net returns to the growers over local checks. It can be concluded that frontline demonstration conducted under the close supervision of scientists is one of the important tool for extension to demonstrate newly released crop production and protection technologies and its management practices in the farmer's field under different agro-climatic regions and farming situations. FLDs are playing important role in motivating the farmers for adoption of improved agriculture technology resulting in increasing their yield and profits.

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Table 5. Constraints faced by the farmers towards cultivation of coriander production technologies (n=100)

S. N	Constraints	No. of respondents	Rank
1	Lack of knowledge of coriander production technologies	66	VIII
2	Non-availability of improved & good quality seed	92	II
3	Stem gall disease in coriander	97	I
4	Lack of grading and storage facilities	83	IV
5	Low market price during produce harvest	89	III
6	Non-availability of reliable insecticide/fungicide	69	VII
7	Infestation of insect-pest & other disease	65	IX
8	Fluctuate in time of sowing due to climate change	71	VI
9	Cloudy weather, rainfall at the time of flowering and seed formation (Adverse weather conditions)	77	V

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