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DISSEMINATION OF IMPROVED PRACTICES OF CORIANDER (*CORIANDRUM SATIVUM* L.) THROUGH FLDS IN ZONE V OF RAJASTHAN PROVINCE

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Abstract: A total 200 Front Line Demonstrations (FLDs) on coriander (*Coriandrum sativum* L.) were organized on the farmers' field in Jhalawar district of Zone V (South Eastern Humid Zone) of Rajasthan for demonstrating the production potential and economic benefits of improved practices comprising high yielding variety namely CS-6 during *rabi* seasons from 2007-08 to 2010-11 in irrigated farming situation. The improved practices (IP) recorded an average yield ranging from 8.15 to 12.95 qha^{-1} with a mean of 10.28 qha^{-1}. The per cent increase yield under improved practices (IP) ranged from 10.78 to 32.56 qha^{-1} in respective years. The average extension gap, technology gap and technology index were 1.99 qha^{-1}, 3.73 qha^{-1} and 26.61 per cent, respectively. The improved practices gave higher benefit cost ratio ranging from 1.71 to 2.23 with a mean of 1.82 compared to local checks (1.58) being grown by farmers under locality.

Keywords: Front Line Demonstrations, coriander (*Coriandrum sativum* L.), Improved practices.

Introduction

Coriander (*Coriandrum sativum* L.) is the important seed spices crop. Seed spices are primarily used for flavouring, seasoning and imparting aroma in variety of food items and beverages. Seed spices are important export oriented commodities and about ten per cent of the production is exported in raw as well as value added products realizing foreign exchange worth of rupees 275 corers. The usage of spices by consumers is increasing worldwide because they are completely natural, rather than artificial additives for seasoning and flavoring of foods. Coriander generally known as "Dhania" (*Coriandrum sativum* L.) is cultivated in Rajasthan, Gujarat, Madhya Pradesh, Tamil Nadu, U.P., etc. It is mainly used as a condiment for its medicinal properties as well as for culinary purposes as spice. Green

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leaves of coriander are also extensively used for culinary purposes. It is being cultivated on 197891 ha area, 218899 q production and 10.53 qha^{-1} productivity in Rajasthan. Jhalawar district is the leading in area and production. The productivity of coriander (08.89 qha^{-1}) in the district is low as compared to average state productivity (Anonymous, 2010-11). Lack of suitable high yielding varieties as well as poor knowledge about production practices are ascribed as main reasons for low productivity of coriander in the district. The productivity of coriander could be increased by adopting recommended scientific and sustainable management production practices. (Dhaka *et al.* 2010 and Sharma *et al.,* 2013). Front Line demonstration is the new concept of field demonstration evolved by the Indian Council of Agriculture Research (ICAR) with main objective to demonstrate newly released crop production technologies and its management practices at the farmers' fields under different agro-climatic regions of the country in varying farming situations. While demonstrating the technologies at the farmer's fields, the scientists are required to study the factors contributing higher crop production, field constraints of production and thereby generate production data and feedback information. Taking into account the above considerations, frontline demonstrations (FLDs) were carried out in a systematic manner on farmer's field to show the worth of a new variety and convincing farmers to adopt improved production management practices of coriander for enhancing productivity.

Materials and Methods

This study was conducted at farmers' fields to demonstrate production potential and economic benefits of improved practices in Jhalawar district which agro-climatically falls in Zone V (South Eastern Humid Zone) of Rajasthan state during *rabi* season from 2007-08 to 2010-11 under irrigated farming situation. To popularize the improved coriander production practices; constrains in coriander production were identified though PRA. Based on identified top rank farmers' problems, front line demonstrations were planned and conducted at the farmer's fields under ICAR and Agriculture Technology Management Agency (ATMA). In all, total 200 full packages of practices front line demonstrations were conducted to convince them about potentialities of improved variety of coriander *viz.,* CS-6 during *Rabi* seasons from 2007-08 to 2010-11 under irrigated farming condition, in medium to heavy soils with low to medium fertility status. Each demonstration was conducted in an area of 0.4 ha and adjacent to the farmer's fields in which the crop was cultivated with farmer's practice / local variety.

The package of practices included were improved variety, seed treatment, seed rate, sowing

method, recommended fertilizers dose, weed management, irrigation management, plant protection measures, spray of sulphur, etc. The sowing was done of variety CS-6 between third week of October to first week of November during the study period with the seed rate of 20 kg/ha by seed cum fertilizer drill. All the participating farmers were trained on scientific aspects of coriander production management before implementing the FLDs at their field. To study the impact of front line demonstrations, data from FLDs and local practices were collected and analyzed. The extension gap, technology gap and technology index were calculated using the formula as suggested by Samui *et al*. (2000).

Extension gap (qha^{-1}) = DY (qha^{-1}) – LY (qha^{-1}).
Technology gap (qha^{-1}) = PY (qha^{-1}) – DY (qha^{-1}).
Technology index (%) = [PY (qha^{-1}) – (DY (qha^{-1}) / PY (qha^{-1})] x 100
Where, DY- Demonstration yield, LY:- Local Check Yield, PY:- Potential Yield of variety.

Results and Discussion

Constraints perceived by the farmers in coriander production: Constraints regarding coriander production technology facing by farmers were identified in this study. Preferential ranking technique was utilized to identify the constraints faced by the respondent farmers in coriander production (Table-1 and figure -1). A perusal of table indicates that Stem gall infestation (92.00) was given the top most rank followed by Frost injury (89.50) and Lack of improved varieties (75.00). Based on the ranks given by the respondent farmers for the different constraints revealed that Higher seed rate, Aphid, Time and method of sowing, Powdery mildew, Blight, Inadequate fertilizer, Weed management and Improper irrigation were found to reduce coriander production and productivity. Other study by Dhaka *et al.,* 2010 at KVK, Bundi has reported similar constraints in maize crop.

Table 1. Constraints perceived by the farmers in coriander production.

(n=200)

S. No.	Constraints	Percentage	Ranks
1.	Stem gall infestation	92.00	I
2.	Frost injury	89.50	II
3.	Lack of improved varieties	75.00	III
4.	Higher seed rate	72.00	IV
5.	Aphid	54.50	V
6.	Time and method of sowing	46.00	VI
7.	Powdery mildew	43.00	VII
8.	Blight	39.50	VIII
9.	Inadequate fertilizer	34.50	IX
10.	Weed management	32.50	X
11.	Improper irrigation	28.00	XI

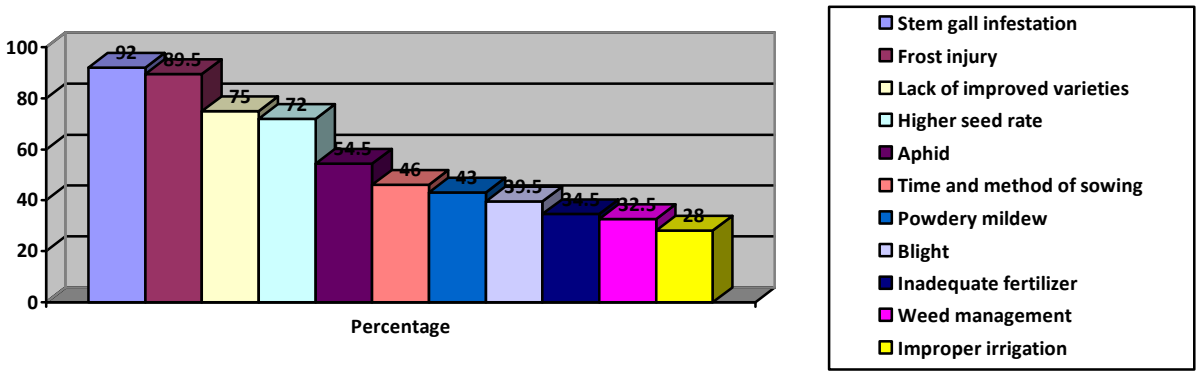

Figure 1. Constraints perceived by the farmers in coriander production.

Performance of FLD: The data presented in the table-2 and figure -2 revealed that the productivity of coriander in Jhalawar district under improved practices ranged between 08.15 to 12.95 qha^{-1} with a mean yield of 10.28 qha^{-1} and between 8.05 to 08.60 with a mean of 08.29 qha^{-1} under farmers practices (FP). The per cent increase yield under improved practices ranged from 10.78 to 32.56 (CS-6) in respective years of FLDs. This increment in grain yield with improved practices was mainly because of high yielding variety. The variation in the productivity was also caused unusual delay in sowing in some of the farmer's fields. Similar yield enhancement in different crops in front line demonstration has amply been documented by Tiwari *et al.*, (2003), Tomar *et al.*, (2009), Dhaka *et al.*, (2010) and Kumar *et al.*, (2010). From these results it is evident that performance of improved variety was found better than the local check under local conditions. Farmers were motivated by results of agro technologies applied in the FLDs trials and it is expected that they would adopt these technologies in the coming years also.

Table 2. Yield of Coriander as influenced by improved production technologies and high yielding varieties over local practices in farmer's fields (2007-08 to 2010-11).

Year	Variety	Area (ha)	Demo. Nos.	Yield (qha-1)				Percent Increase over local check	Extension gap (qha-1)	Technology gap (qha-1)	Technology Index (%)
				Improved Practice			Local Check				
				Max.	Min.	Avg.					
2007-08	CS-6	15.00	25	11.85	08.15	09.85	08.05	22.36	1.80	4.15	29.64
2008-09	CS-6	05.50	11	11.15	08.85	09.25	08.35	10.78	0.90	4.75	33.93
200	CS-6	40.5	82	12.6	09.0	10.6	08.1	30.06	2.45	3.40	24.29

9-10		0		5	5	0	5				
2010-11	CS-6	41.50	82	12.95	10.10	11.40	08.60	32.56	2.80	2.60	18.57
	Total	102.50	200	48.60	36.15	41.10	33.15	95.76	7.95	14.90	106.43
	Average			12.15	09.04	10.28					
				12.15	9.04	10.28	8.29	23.94	1.99	3.73	26.61

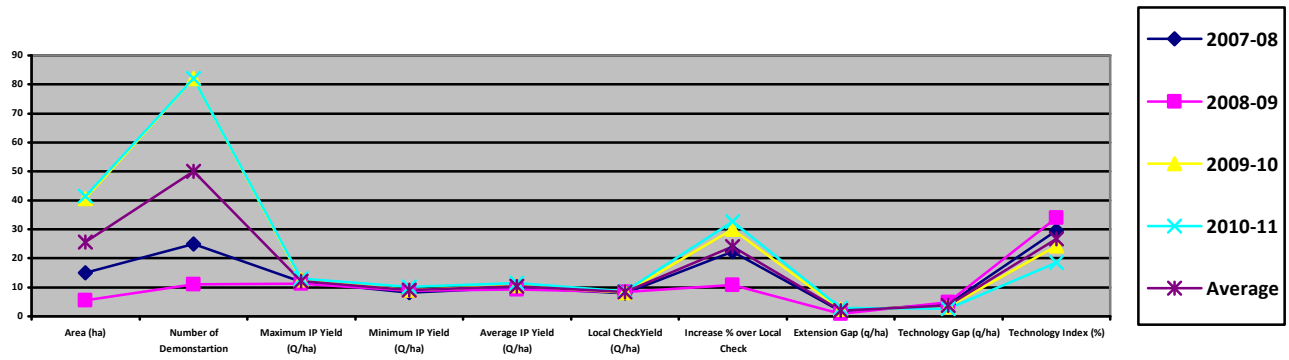

Figure 2: Yield of coriander as influenced by improved production technologies and high yielding varieties over local practices in farmer's fields.

Yield of the front line demonstration trials and potential yield of the different varieties of crop was compared to estimate the yield gaps which were the extension gap was calculated *i. e.* 1.99 qha^{-1}. The technology gap shows the gap in the demonstration yield over potential yield and it was 3.73 qha^{-1}. The observed technology gap may be attributed to dissimilarities in soil fertility, erratic rainfall and other vagaries of weather conditions in the area. Hence, to narrow down the gap between the yields of different varieties, location specific recommendation appears to be necessary. Technology index shows the feasibility of the variety at the farmer's field. The lower the value of technology index (26.61%) more is the feasibility (Table-2 and figure -2). The finding of the present study is in line with the findings of Dhaka *et al.* (2010) and Verma *et al.* (2016).

The economic feasibility of improved practices (IP) over traditional farmer's practices (FP) was calculated depending on the prevailing prices of inputs and output costs (Table 3 and figure -3). It was found that cost of production of coriander under improved practices (IP) varied from Rs. 23400 to 25700 ha^{-1} with average Rs. 24075 ha^{-1} and an average of Rs. 22112.50 ha^{-1} in farmers' practice. The additional cost incurred in the improved practices (IP) was mainly due to more costs involved in the cost of improved seed only. Front line

demonstrations recorded higher mean gross returns (Rs. 43785 ha^{-1}) and mean net return (Rs. 19710 ha^{-1}) with higher benefit cost ratio (1.82) under improved practices of coriander as compared to local checks. These results are in line with the findings of Singh & Sharma (2005) and Verma *et al.*, (2016). Further, average additional cost of Rs. 1962.50 ha^{-1} in demonstration has yielded additional net returns of Rs. 6772.50 ha^{-1} with incremental benefit cost ratio 3.45 suggesting its higher profitability and economic viability of the demonstration. Similar results were also reported by Dhaka *et al.* (2010) and Meena *et al*. (2014) in maize crop as well as Verma *et al.*, (2016) in cereal crops. The results from the present study clearly brought out the potential of improved production technologies in enhancing coriander production and economic gains in irrigated farming situations conditions of this region of Rajasthan. Hence, coriander production technologies have broad scope for increasing the area and productivity at each and every level.

Table 3. Cost of cultivation (Rs.ha-1), net returns (Rs.ha-1) and Benefit: Cost ratio of Coriander as affected by improved production technologies over local practices (2007-08 to 2010-11).

Year	Variety	Total cost of cultivation (Rs.ha^{-1})		Gross return (Rs.ha^{-1})		Net return (Rs.ha^{-1})		Benefit : Cost ratio		Add. Cost (Rs.ha^{-1})	Add. Net (Rs.ha^{-1})
		IP*	FP**	IP*	FP**	IP*	FP**	IP*	FP**		
2007-08	CS-6	25700.00	22000.00	40950.00	32400.00	15250.00	10400.00	1.59	1.47	3700.00	4850.00
2008-09	CS-6	23400.00	22500.00	40000.00	34000.00	16600.00	11500.00	1.71	1.51	900.00	5100.00
2009-10	CS-6	23800.00	21200.00	41940.00	28700.00	18140.00	7500.00	1.76	1.35	2600.00	10640.00
2010-11	CS-6	23400.00	22750.00	52250.00	45100.00	28850.00	22350.00	2.23	1.98	650.00	6500.00
	Total	96300.00	88450.00	175140.00	140200.00	78840.00	51750.00	7.30	6.32	7850.00	27090.00
	Average	24075.00	22112.50	43785.00	35050.00	19710.00	12937.50	1.82	1.58	1962.50	6772.50

*IP- Improved Practice, **- FP- Farmer Practice.

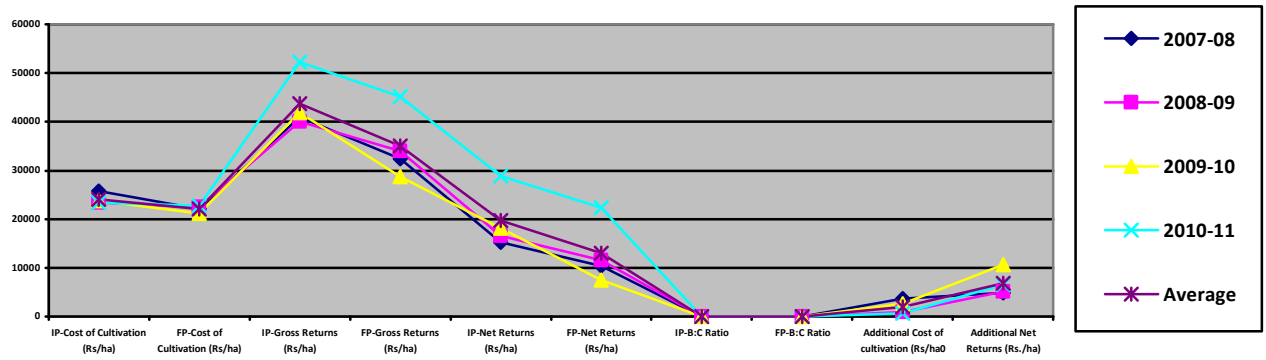

Figure 3: Cost of cultivation (Rs.ha-1), net returns (Rs.ha-1) and Benefit: Cost ratio of coriander as affected by improved production technologies over local practices.

Conclusion

On the basis of above findings in present study, it can be concluded that the yield gap between farmers' practices and improved practices was perceptibly higher; there is urgent need to make stronger extension services for educating the cultivators in the implementation of improved practices. However, the yield level under FLDs was better than the local varieties and performance of this variety could be further improved by adopting recommended packages of practices. Hence, it can be also observed that increment in yield was because of adoption of high yielding variety and front line demonstration of proven technologies. Yield potentials of crop can be increased to greater extent. This will subsequently increase the income as well as the livelihood of the farming community of the district. From the above research findings it can be also concluded that the maximum number of the respondents had medium level of knowledge and extent of adoption regarding recommended coriander production technology.

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