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Adoption of cumin (*Cuminum cyminum* L.) production technology in arid zone of Rajasthan

Bhagwan Singh

Central Arid Zone Research Institute
Jodhpur – 342 003, Rajasthan, India.

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Abstract

A study was conducted in four districts of Rajasthan, namely, Jodhpur, Pali, Bikaner and Jaisalmer, to determine the extent of adoption of various technologies in cumin (*Cuminum cyminum*) by farmers in the arid zone of the state. The study revealed that a majority (62.5%) of the farmers had adopted various production technologies to a medium level. Out of 16 variables, 5 variables, namely, education, occupation, irrigation facilities, sources of information and knowledge were positively and significantly correlated with overall adoption whereas, age and farming experience were negatively and significantly correlated with overall adoption of production technologies. The 16 independent variables taken together explained 59.9% of the variation in adoption of cumin production technology.

Key words: Cumin, *Cuminum cyminum*, technology adoption.

Cumin (*Cuminum cyminum* L.) is grown in about 2,00,000 ha with a production of about 76,000 t in Rajasthan. Though cumin occupies 44.7% of the total area under condiments and spices in the state, its productivity is very low (3.84 q ha^{-1}). Various technologies are being generated by agricultural universities and institutes, to increase the production and productivity of cumin in the state. The present study was undertaken to determine the extent of adoption of cumin production technology by the farmers in Rajasthan and find out the relationship between socio-economic characteristics and adoption of technology.

The study was conducted in four districts of Rajasthan, namely, Jodhpur, Pali, Bikaner and Jaisalmer. Two panchayat samities, from each district namely, Bilada and Osian from Jodhpur District; Rohet and Jetaran from Pali District; Nokha and Lunkaran from Bikaner District and Pokharan and Jaisalmer from Jaisalmer District were selected randomly. From each panchayat samiti, one village and from each village 15 cumin growing farmers were selected randomly and thus the total sample size was 120. The data were collected through structured interview schedules. The extent of adoption of technologies was determined by calculating the adoption index as indicated below:

$$\text{AI (adoption index)} = \frac{\text{Respondents' total score}}{\text{Total possible score}} \times 100$$

(Respondents total score=Total number of practices adopted by farmers, multiplied by respective practices weightage and summated; Total possible score=Total number of practices recommended, multiplied by respective practices weightage and summated)

The respondents were categorized as low (up to 33.33%), medium (33.34 to 66.66%) and high adoption (above 66.66%) levels.

Extent of adoption of technology

A majority (90.8%) of the respondents were in low adoption level regarding cultivation of high yielding varieties of cumin. Low adoption of improved varieties might be due to non-availability of seeds of improved varieties at proper time and lack of knowledge. In case of seed rate, 58.3% of respondents were in high adoption category. With respect to seed treatment, a majority (91.7%) of the respondents were in low adoption category. Similar findings were also reported by Singh *et al.* (1999). In case of spacing, a majority (85.8%) of respondents were in low adoption category. However, a majority (54.2%) of the respondents were in high adoption category in case of time of sowing. With regards to methods of sowing, a majority (97.5%) of respondents were in low adoption category (Table 1).

A majority (69.2%) of the respondents were in medium adoption category with regards to use of nitrogenous fertilizers; however regarding method of application of fertilizers, 53.3% of respondents were in low adoption category. Regarding time of nitrogenous fertilizer application, majority (60.8%) of the farmers belonged to high adoption category. In case of phosphatic fertilizers, the extent of adoption was of medium category by majority of farmers (48.4%); with respect to method and time of application a majority (53.3% and 67.5%, respectively) was under high adoption category.

A majority (91.7%) of respondents were at low adoption category with regard to plant protection measures. Singh *et al*. (1999) also reported that majority of the farmers adopted plant protection chemicals at low adoption level for wheat in Rajasthan. This might be due to lack of knowledge regarding plant protection chemicals and high cost of plant protection chemicals and equipments. A majority (81.7%) of the respondents were at low adoption level with regard to weedicide application. Majority (56.7%) of the respondents adopted the irrigation technology at high adoption level of the recommended practices (Table 1).

Table 1. Extent of adoption of cumin production technology by farmers in Rajasthan

Technology	Extent of adoption		
	Low	Medium	High
Seed technology			
High yielding varieties-seed	109 (90.8)	7 (5.8)	4 (3.4)
Seed rate	20 (16.7)	30 (25.0)	70 (58.3)
Seed treatment	110 (91.7)	8 (6.7)	2 (1.6)
Spacing	103 (85.8)	10 (8.4)	7 (5.8)
Time of sowing	16 (13.3)	39 (32.5)	65 (54.2)
Method of sowing	117 (97.5)	2 (1.7)	1 (0.8)
Fertilizer technology			
Nitrogenous fertilizer-dose	20 (16.7)	83 (69.2)	17 (14.1)
Method of application	64 (53.3)	30 (25.0)	26 (21.7)
Time of application	22 (18.4)	25 (20.8)	73 (60.8)
Phosphatic fertilizer-dose	28 (23.3)	58 (48.4)	34 (28.3)
Method of application	5 (4.2)	45 (37.5)	70 (58.3)
Time of application	11 (9.2)	28 (23.3)	81 (67.5)
Plant protection technology			
Chemicals	110 (91.7)	6 (5.0)	4 (3.3)
Weedicides	98 (81.7)	16 (13.3)	6 (5.0)
Irrigation technology	5 (7.5)	43 (35.8)	68 (56.7)

Total respondents=120; Figures in parenthesis indicates percentage

Table 2. Distribution of farmers according to their overall adoption of cumin production technology in Rajasthan

Adoption level	Frequency	%
Low	24	20.0
Medium	75	62.5
High	21	17.5
Total	120	100.0

A majority (62.5%) of the respondents belonged to medium adoption category of overall adoption of improved technology recommended for cumin production (Table 2).

Socio-economic characteristics

Analysis of socio-economic characteristics and adoption of technologies indicated that age of the farmers was negatively and significantly correlated with adoption of the cumin production technology, probably due to better education of younger farmers. The level of education of farmers was positively and significantly correlated with adoption of technologies. These findings are similar to the findings of Singh (1991).

Irrigation facilities available with farmers were positively and significantly correlated with adoption of technologies. Sujatha & Annamalai (1998) found positive and significant relationship between infrastructure facilities and adoption. Farming experience of farmers was negatively and significantly correlated with adoption indicating that farmers who had less experience in farming had adopted the technology to a greater extent. The reason may be due to their better education. Sources of information of farmers and knowledge of the respondents were positively and significantly correlated with adoption of technologies. Variables like, caste, land holding, type of family, size of family, annual income, extension contact, economic motivation, scientific motivation and risk orientation of the farmers had non-significant relationship with adoption of technologies (Table 3).

Multiple regression analysis

Multiple regression analysis revealed that all the 16 selected independent variables taken together explained a variation of 59.9% towards the dependent variable, namely, adoption. The 'F' value 9.628064 was significant at 1% level of probability. The results implied that all the 16 variables accounted for significant amount of variation for adoption. Further, it was also observed that 't' (test of significance) value expressed as coefficient of regression 'b' value was positively significant for knowledge (at 1% level of probability). On the contrary, coefficient of regression 'b' value was non-significant for age, education, caste, occupation, land holding, irrigation facilities, type of family, size of family, farming experience, annual income, extension contact, sources of information, economic motivation, risk orientation and scientific motivation (Table 4).

The study indicated that a majority of the farmers had adopted the cumin production technology at medium level. Knowledge was the most important predictor of adoption of cumin production technology.

Table 3. Correlation between independent variables and adoption of cumin production technology in Rajasthan

Independent variable	Correlation co-efficient (r)
Age	-0.19824*
Education	0.21480*
Caste	0.00492 NS
Occupation	0.25328*
Land holding	0.04109 NS
Irrigation facilities	0.21349*
Type of family	-0.06232 NS
Size of family	-0.02304 NS
Farming experiences	-0.20208*
Annual income	-0.06269 NS
Extension contact	0.01284 NS
Sources of information	0.22119*
Economic motivation	0.16415 NS
Scientific motivation	0.16279 NS
Risk orientation	0.04953 NS
Knowledge	0.73881**

*=Significant at P=0.05; **=Significant at P=0.01; NS=Non-significant

Table 4. Multiple regression between independent variables and adoption of cumin production technology in Rajasthan

Independent variable	Regression co-efficient ('b') value	't' value
Age	-0.01575	-0.37966
Education	0.30814	0.73126
Caste	-0.32058	0.93461
Occupation	-0.39407	-0.60611
Land holding	0.01163	1.27863
Irrigation facilities	-0.14471	0.20273
Type of family	-0.38700	-0.27082
Size of family	0.01225	0.17269
Farming experiences	-0.01009	-0.24493
Annual income	0.00026	0.05865
Extension contact	-0.58088	-1.68442
Sources of information	0.07406	1.15958
Economic motivation	0.02230	0.12034
Scientific motivation	-0.12546	-0.71389
Risk orientation	-0.01096	-0.62080
Knowledge	0.58872	10.01266**

R^2=0.599298; F=9.628064**; **=Significant at P=0.01

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