Ind. J. Extn. Educ. & R.D. 21 : 10-14, 2013

ADOPTION OF IMPROVED PRODUCTION TECHNOLOGY OF RABI CROPS IN ARID ZONE

Bhagwan Singh*

ABSTRACT

The study was conducted in 4 districts namely Jodhpur, Pali, Bikaner and Jaisalmer of Rajasthan. From each districts two Panchayat Samiti, from each Panchayat Samiti one village and from each village 11, 16 and 15 mustard, wheat and cumin growing farmers were selected randomly. Thus the sample was 88,128 and 120 for mustard, wheat and cumin respectively. The data were collected through structure interview schedules. The study revealed that extent of adoption of improved technologies of *rabi* crops between 43 to 45 percent. Majority of the farmers had adopted seed treatment, plant protection measures and weedicides in mustard, wheat and cumin crops to a lesser extent. The 16 independent variables jointly taken together explained 53.70, 45.19 and 59.92 % of the variation in adoption of mustard, wheat and cumin production technology respectively.

INTRODUCTION

The total geographical area of Rajasthan state is 342.70 lakh ha, out of which 169.74 lakh ha area (49.53%) under net area sown (2009-10). Mustard, wheat and cumin are the important *rabi* crops of the state. The shares of mustard, wheat and cumin are 13.03, 14.10 and 1.20 percent respectively to net area sown of the state. The productivity of mustard, wheat and cumin is 1316, 3133, and 395 kg/ha respectively (2009-10). There is a considerable scope for increasing the production of these crops. Various technologies are being generated by State Agricultural Universities and Research Institutes belonging to Indian Council of Agricultural Research to increase production and productivity of above *rabi* crops, but only the farmers accepted few technologies. Hence keeping in view the study was undertaken with following objectives:

1. To study the extent of adoption of improved technology of *rabi* crops.
2. To study the relationship between socio economic characteristics and adoption of improved technology of *rabi* crops.

RESEARCH METHODOLOGY

The study was conducted in 4 districts namely Jodhpur, Pali, Bikaner and Jaisalmer of Rajasthan. Two Panchayat Samities, namely Bilada and Osian from Jodhpur district, Rohet and Jetaran Panchayat Samities from Pali district, Nokha and Lunkaran Panchayat Samitis from Bikaner district and Pokharan and Jaisalmer Panchayat Samiti from Jaisalmer district were selected randomly. From each Panchayat Samiti one village and from each village 11, 16 and 15 mustard, wheat and cumin growing farmers were selected randomly. Thus the sample was 88,128 and 120 for mustard, wheat and cumin respectively.

The technological Package for cultivation of mustard, wheat and cumin was categorized into four sub technologies i.e. seed technology, fertilizer technology, irrigation technology and plant protection technology. In seed technology 5 practices i.e. high yielding varieties, seed rate, time of sowing, method of sowing and seed treatment were included. In case of fertilizer technology, dose, time and method of nitrogenous and phosphatic fertilizer were included. Regarding irrigation technology, time and number of irrigation were included. In plant protection technology, plant protection measures and use of weedicides were included.

The extent of adoption of technology was determined by calculating the adoption index as indicated below.

$$\text{AI (Adoption Index)} = \frac{\text{Respondent's total score}}{\text{Total possible score}} \times 100$$

* Principal Scientist (Agril. Extension), Central Arid Zone Research Institute, Jodhpur (Raj.)

(Respondent's total score = Total number of practices adopted by the farmers multiplied by respective practice weight age and summed. Total possible score=Total numbers of practices recommended, multiply by respective practices weightage and summed.)

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

RESULTS AND DISCUSSION

Practice wise adoption of improved technology of mustard, wheat and cumin crops

The data presented in table 1 indicated that majority of farmers adopted high yielding varieties of mustard (82.95%) and wheat (90.62%). The low adoption was found 12.50 percent in case of cumin variety. Low adoption of improved varieties might be due to non-availability of seed of improved varieties at proper time, lack of knowledge and high cost of seed. Similar finding was also reported by Singh (2005). Regarding recommended seed rate, majority of the farmers adopted recommended seed rate in all the *rabi* crops (mustard, wheat and cumin). In case of seed treatment, 8-11 percent farmers adopted seed treatment in mustard, wheat and cumin crops. The possible reason may be lack of knowledge. It was found that majority (71-89%) famers adopted time of sowing in all three *rabi* crops. Majority (85.15%) of farmers adopted method of sowing in wheat crop. Low adoption of method of sowing was found 37.50 and 4.16 percent in mustard and cumin crop respectively. The possible reason may be due to non-availability of improved seed drill for crops and lack of knowledge.

Table further indicates that 42 to 49 percent farmers have adopted nitrogen fertilizers in terms of recommended dose and method of application whereas majorities (62 to 87 %) of farmers have adopted nitrogenous fertilizer in terms of time of application in mustard, wheat and cumin crops. The low adoption of recommended dose may be due to low knowledge and high cost of fertilizer. In case of phosphatic fertilizer, 41 to 48 percent farmers have adopted phosphatic fertilizers in terms of recommended dose whereas majority (80 to 95 %) of farmers adopted the phosphatic fertilizers in terms of time and method of application in mustard, wheat and cumin crops. Similarly, Singh (2002) reported that majority farmers were found applying nitrogen and phosphorus in less than recommended dose in mustard crop. Regarding irrigation practice, majority farmers adopted recommended number and time of irrigation in mustard, wheat and cumin crops. In case of plant protection measures, only 8-21 percent farmers have adopted plant protection chemicals and weedicides in mustard, wheat and cumin crops. The possible reason may be due to high cost of pesticides and weedicides, and lack of knowledge. Findings are in line with the findings of Singh *et al.* (1999), and Singh (2005) they reported that majority of the farmers adopted plant protection and weedicides chemicals in low level.

Distribution of respondents according to overall adoption of improved production technology of *rabi* crops

Table -2 revealed that mean adoption was found 43.95, 44.89 and 40.41 percent of mustard, wheat and cumin crops respectively. Majority of mustard growers (68.20%) were found in medium adoption category followed by low (17 %) and high (14.80%) adoption category. Regarding wheat, 19.53, 64.06 and 16.41 percent farmers belonged to low, medium and high adoption category respectively. In case of cumin crop, majority (62.50%) farmers were found in medium adoption category, 20.00 percent low and 17.50 percent farmers were found in high adoption category. The above findings are in conformity with the findings reported by Rajnish *et.al.* (2001), Patel *et.al.* (2003), and Singh (2005).

Relationship between socio-economic characteristics of the farmers and adoption of improved production technology of *rabi* crops

To find out the relationship between socio-economic characteristics of the farmers and adoption, correlation coefficient was worked out and presented in Table 3.

A perusal of Table 3 indicated that age of the farmers and farming experience were negatively and significantly related with adoption of mustard production technology indicating that farmers who were young and had less experience in farming had enhanced adoption of the technology compared to old

Table 1: Practice wise adoption of improved production technology of *rabi* crops

S.No.	Practices	Mustard (n-88)		Wheat (n-128)		Cumin (n-120)	
		f	%	f	%	f	%
1.	**Seed technology**						
	High yielding varieties seed	73	82.95	116	90.62	15	12.50
	Recommended seed rate	64	72.73	112	87.50	100	83.33
	Seed treatment	7	7.95	14	10.93	10	8.33
	Time of sowing	63	71.59	115	89.84	104	86.67
	Method of sowing	33	37.50	109	85.15	5	4.16
2.	**Fertilizer technology**						
	Nitrogenous fertilizer						
	Dose/ha	43	48.86	55	42.96	56	46.66
	Method of application	36	40.91	63	49.21	56	46.67
	Time of application	55	62.50	111	86.72	98	81.67
	Phosphatic fertilizer						
	Dose/ha	41	46.60	53	41.40	58	48.33
	Method of application	71	80.68	113	88.28	95	95.83
	Time of application	72	81.82	107	83.59	109	90.83
3.	**Irrigation technology**						
	Number of irrigation	60	68.18	83	64.84	71	59.17
	Time of irrigation	73	82.95	106	82.81	105	87.50
4.	**Plant protection technology**						
	Plant protection chemicals	19	21.59	10	7.81	10	8.33
	Weedicides	10	11.36	20	15.63	22	18.33

Table 2: Distribution of respondents according to overall adoption of improved production technology of *rabi* crops

S.No.	Practices	Mustard (n-88)		Wheat (n-128)		Cumin (n-120)	
		f	%	f	%	f	%
1.	Low adoption	15	17.00	25	19.53	24	20.00
2	Medium adoption	60	68.20	82	64.06	75	62.50
3.	High adoption	13	14.80	21	16.41	21	17.50
	Overall	**43.95**		**44.89**		**40.41**	

Table 3: Correlation between socio- economic characteristics of the respondents and adoption of improved production technology of *rabi* crops

S.No	Socio economic characteristics	Correlation (r)		
		Mustard	Wheat	Cumin
1.	Age	-0.27047**	-039381**	-0.19824*
2.	Education	0.38302**	0.34405**	0.21480*
3.	Caste	0.25515**	-0.00277	0.00492
4.	Occupation	-0.17851	0.19973*	0.25328*
5.	Land holding	0.11136	-0.7552	0.04109
6.	Irrigation facilities	0.28498**	0.25814**	0.21349*
7.	Type of family	0.10069	0.16646	-0.06232
8.	Size of family	-0.02829	0.11104	-0.02304
9.	Farming experiences	-0.22408*	-0.16731	-0.20208*
10.	Annual income	0.18976	0.07647	-0.06269
11.	Extension contact	0.24637*	0.17556	0.01284
12.	Sources of information	0.38734**	0.29075**	0.22119*
13.	Economic motivation	0.11763	0.17048	0.16415
14.	Scientific orientation	0.04253	0.19876*	0.16279
15.	Risk orientation	0.18227	0.16359	0.24953 **
16.	Knowledge	0.63471**	0.52351**	0.73881**

NS: Non-significant; *-significant at 5 % level; **Significant at 1 % level

Table 4: Multiple regressions between independent variables and adoption of improved production technology of *rabi* crops

S.No	Socio economic characteristics	Mustard		Wheat		Cumin	
		Regression cofficient ('b' value)	't' value	Regression coefficient ('b' value)	('t' value)	Regression coefficient ('b' value)	't'value
1.	Age	-0.0710	-0.9356	-0.0592	-0.8932	-0.0157	-0.3796
2.	Education	1.0553	1.2364	0.7576	1.21632	0.3081	0.7312
3.	Caste	0.4486	0.5805	-1.0465	-2.1808*	-0.3206	0.9346
4.	Occupation	-1.7176	-1.6745	-2.5828	-3.0244**	-0.3941	-0.6061
5.	Land holding	0.0035	0.1985	-0.0153	-1.1894	0.0116	1.2786
6.	Irrigation facilities	0.3717	0.2802	0.4038	0.4011	-0.1447	0.2027
7.	Type of family	0.2015	0.1803	1.0271	1.2739	-0.3870	-0.2708
8.	Size of family	-0.2173	-1.6174	0.1284	1.2334	0.0123	0.1727
9.	Farming experiences	0.0282	0.3937	-0.0293	-0.4514	-0.0101	-0.2449
10.	Annual income	0.0170	1.8675	0.0103	1.5068	0.0003	0.0586
11.	Extension contact	-0.7031	-1.1831	-0.0516	-0.1137	-0.5808	-1.6844
12.	Sources of information	0.0473	0.4794	-0.0113	-1.1832	0.0741	1.1596
13.	Economic motivation	0.6126	1.9729	0.2910	1.0066	0.0223	0.1203
14.	Scientific orientation	-0.5403	-1.6228	-0.2287	-0.8136	-0.1255	-0.7138
15.	Risk orientation	0.1707	0.4839	-0.0104	-0.3792	-0.0109	-0.6208
16.	Knowledge	0.4802	4.8257**	0.4561	5.2404**	0.5887	0.0126**
	R^2		0.5371		0.45194		0 .599298
	F		5.2943**		5.82302**		9.62806**

farmers. Probably due to their better education. The variables education, caste, irrigation facilities, extension contact, sources of information and knowledge of the respondents were positively and significantly correlated with adoption of mustard production technologies. Its shows that farmers who had higher education, belonged to general caste, more irrigation facility, more extension contact, consulted more sources of information and eknowledge had enhanced adoption of mustard production technology.

Regarding wheat production technology, age of the farmers had shown negative and significant relationship with adoption. A perusal of Table 3 indicated that out of sixteen variables, education, occupation, irrigation facilities, sources of information, scientific orientation and knowledge of the farmers were found to be positively and significantly correlated with adoption of wheat production technology. This shows that the farmers who had better education, agriculture occupation, had irrigation facilities, consulted more sources of information, had more scientific orientation and good knowledge showed higher adoption.

In case of cumin production technology, age of the farmers and farming experience were negatively and significantly co-related with adoption whereas education, occupation, irrigation facilities, sources of information, risk orientation, and knowledge of farmers were positively and significantly correlated with adoption of cumin production technology.

Multiple Regression Analysis:

Multiple regression analysis was used to determine the influence and contribute of 16 independent variables in predicting the extent of adoption of improved technology of mustard, wheat and cumin. The results revealed that all the 16 independent variables taken together explained 53.71, 45.19 and 59.92 % variation in adoption of mustard, wheat and cumin production technology respectively (Table 4). The respective 'F' value was found to be significant.

Further, it was also observed that 't' test of significance expressed in coefficient of regression ' b' value was positively significant for knowledge at 1 % level of probability. The depth analysis of the relationship between dependent and independent variables proved that knowledge of the farmers was most important variable among all the 16 selected variables in the study, which was predictor of adoption of improved technologies of mustard, wheat and cumin.

CONCLUSION

From the above results it can be concluded that majority of the farmers had adopted mustard, wheat and cumin production technology to a medium extent. The 16 independent variables jointly taken together explained 53.70, 45.19 and 59.92 % of the variation in adoption of mustard, wheat and cumin production technology respectively. Knowledge was the most important predictor of over all adoption of mustard, wheat and cumin production technology.

REFERENCES

Patel,M.M.,Chatterjee, Amit and Khan, Mohmood (2003). Adoption of wheat production technology. Indian Journal of Extension Education Vol. 39(1&2): 58-62.

Rajnish,V.P., Malik, R.S. and Punia, R.K.(2001). Adoption of rapeseed-mustard production technology. Indian Journal of Extension Education Vol. 7(1&2): 58-62.

Singh, Bhagwan (2005). Adoption of cumin *(Cuminum cyminum L)* production technology in arid zone of Rajasthan. Journal of Spices and Aromatic Crops, Vol. 14 (2): 148-151.

Singh K, Singh J P & Singh P 1999.Adoption behavior of small farmers in Bharatpur district of Rajasthan. Raj. J. Extn. Edu. 7:6-9.

Singh, Bhagwan (2002). Adoption of chemical fertilizers in mustard. Indian Journal of Extension Education Vol. 38(3&4): 200-2002.

❑❑❑

Received : February, 2013
Accepted : January, 2014