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RESEARCH ARTICLE :

Adoption behaviour of small farmers about mustard production technology in Bharatpur district of Rajasthan

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SUMMARY : The present study was conducted in Bharatpur district of Rajasthan during of the year 2011-12 covering 3 Panchayat Samities and 108 small farmers. The main emphasis was laid on to know the level of adoption of mustard technology among the small farmers and the possible factors responsible for promoting the adoption. The study highlights that of the total 50 per cent respondents had adopted the mustard technology to medium extent. The small farmers were found very conscious about the adoption of high yielding varieties of rapeseed-mustard followed by time of sowing, seed rate and spacing whereas less bothered about the soil treatment and weed management and least adoption was found in case of plant protection measures regarding wheat production technology. The important variable which promoted the adoption were; the higher education, farm power, caste, occupation, social participation, family type, income and housing pattern. The study further revealed that several constraints faced by the small farmers in adoption of mustard production technology *viz*., unavailability of fertilizers at peak season, weed control through herbicide as technically complex method, unavailability of improved seed at the time of sowing, high cost involved in inputs purchasing and harmful residual effect of pesticides on main crops and application of weedicide the reduced the availability of fodder were the main problems which affected the adoption of rapeseed and mustard production technology among the farmers.

KEY WORDS :
Improved package of practices, Small farmers, Farm power, Extent of adoption, Weed management, Peak season, Complex method, Constraints

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BACKGROUND AND OBJECTIVES

The important rapeseed mustard growing countries in the world are India, Canada and China etc. India with 5,00 million hectare and under cultivation and is the largest rapeseed mustard growing country in the world. China ranks first in production followed by India. As much 90 per cent of the total edible oil product in the country comes from two oil seed crops namely groundnut and rapeseed-mustard. Therefore, there is an urgent need of increasing the productivity of these oilseed crops in the country through adoption of recommended technology by the farmers. Oilseed sector as a whole and rapeseed and

mustard in particular, has witnessed a significant increase in production in the last decade. The accomplishments in rapeseed mustard production are rightly being termed as yellow revolution in the country. However, there were fluctuation in rapeseed mustard production due to weather variations, monsoon failure, post incidents and improper adoption. Inspite of best possible efforts by the Central and State Governments to uplift the socio-economic condition of farmers in general and small farmers in particular, there exists a wide gap between the technology available at the research station and its use by the farmers. In such situation where new technology is available and only a part of its is being utilized seems to be a great challenge to the personnel engaged in the transfer of technology. This challenge has to be met without any delay.

The present study is planned to know the level of adoption of mustard and rapeseed technology by the small farmers of Bharatpur district. During the last seven years, there has been a considerable increase in productivity from 1540 kg/ha in 2003-04 to 1950 kg/ha in 2009-10 and production has been increased from 39.42 mt in 2003-04 to 59.93 mt in 2009-10. The rapeseed-mustard production trends represent fluctuating scenario with an all time high production of 8.13 mt from 7.28 mt ha acreage during 2005-06. The yield levels also have been variable ranging from 854 (2002-03) to 1142 kg/ha (2009-10) during the past eight years. It is imperative to develop socio-economic, technological and environmental strategies based on the field level observations for sustainable development of crop with these point of view, the present investigation was under taken with following specific objectives.

– To study the extent of adoption of rapeseed and mustard crop technology by the small farmers.

– To study the socio-economic characteristics of the small farmers and their relationship between the extent of adoption of mustard technology.

– To identify major constraints in adoption of rapeseed and mustard technology by the farmers.

RESOURCES AND METHODS

The present study was based on an intensive study of sample holding (mustard growers) in Bharatpur district of Rajasthan. District Bharatpur has been purposively selected for the study, looking to its typical and apt representation of the state with respect to rapeseed-mustard production. Bharatpur comes at first place on the basis of area and production of rapeseed-mustard crops in Rajasthan. The multistage stratified sampling was adopted with tehsil as primary unit, village as secondary unit and farm holding as the ultimate sampling unit. Out of 10 tehsils of Bharatpur district, three tehsils namely, Bharatpur, Kumher and Bayana were selected randomly. Then from each selected tehsil, 3 villages were chosen randomly. The final selection was done from each selected villages of each tehsil based on proportion to number of rapeseed-mustard growers. From the list so prepared from 9 villages, 12 small farmers were selected randomly from each villages. In all 108 respondents were selected for the study purpose. The personal interview technique was used for the collection of primary data. Scale developed by Trivedi (1963), Singh and Reddy (1965) and Sen Gupta (1987) were used with slight modifications to suit the local conditions. Eleven improved package of practics were included in adoption technology *viz*., soil and field preparation, high yielding varieties, soil treatment, seed treatment, time of sowing, seed rate and spacing, manures and fertilizers, irrigation and weed management, plant protection measures and harvesting, threshing and storage. Practice-wise adoption of rapeseed-mustard production technology by the respondents was worked out. For this mean per cent score (MPS) were calculated. Zero order correlation co-efficient and X^2 text were employed to see the relationship between socio-economic characteristics and adoption of mustard technology. The present investigation was carried out during the 2011-12.

OBSERVATIONS AND ANALYSIS

The results obtained from the present study as well as discussions have been summarized under following heads:

Extent of adoption of rapeseed and mustard technology:

It is evident from the Table 1 that 59.26 per cent of the respondents were found under medium adoption category 22.22 per cent respondents were having high level of adoption category only 18.52 per cent respondents were found under the low adoption category. The similar results have also observed by the Ogunifiditimi (1981); Choudhary *et al*. (1988); Gautam and Gautam (1991); Girase *et al*. (1991); Singh and Singh (2002) and

Singh *et al*. (2006).

Relationship between socio-economic features and extent of adoption of mustard technology :

Practice wise adoption of improved package of practices of rapeseed and mustard production technology by the small farmers was worked out. For this mean per cent scores were calculated. The findings about the same have been presented in Table 2.

A close examination of Table 2 reveals that maximum adoption level was reported in practice of high yielding varieties with mean per cent score 90.83. This was followed by practice like time of sowing, seed rate and spacing, irrigation management, manures and fertilizers and soil and field preparation. The mean per cent scores of these practices were 89.81, 87.51, 75.12, 72.52 and 70.64, respectively while, practices like harvesting, threshing and storage, soil treatment, seed treatment and weed management were having less adoption level with mean per cent scores 70.50, 52.50, 50.55 and 40.78, respectively. Least adoption level was also found in case of plant protection measures with 39.75 MPS. A close observation of the table shows that the adoption level was higher in case of required low cost investment technology. Hence, it may be inferred from the above results that the respondents were found very conscious about the adoption of high yielding varieties of mustard whereas, they were least bothered about the adoption of time of sowing practices. Similar findings were reported by Girase *et al*. (1991); Saraswat (1991); Shriballabh and Pal (1991); Verma *et al*. (1998); Singh *et al*. (2002) and Singh *et al*. (2006).

Association between socio-economic characteristics and adoption of improved technology of mustard production technology.

It is evident from Table 3 that the education, caste, family type, housing pattern, size of holding, income, farm power and social participation of the respondents were significantly related with the adoption of soil technology, while the age, family size and occupation of the respondents have not shown any significant relationship with the soil technology.

The education, caste, occupation, housing pattern, income and farm power of the respondents had significant association with the extent of adoption of seed technology. The age, family type, family size, size of holding and social participation have no significant relationship with the extent of adoption of seed technology.

The age, caste, occupation and size of holding of the respondents had positive and significant relationship with the extent of adoption of nitrogenous, and phosphatic fertilizers while the education, family type, housing pattern, income, farm power and social participation were

Table 1 : Distribution of respondents according to their adoption regarding rapeseed and mustard production technology (n = 108)

Adoption category	No. of respondents	Percentage
Low (Score below 38.85)	20	18.52
Medium (Score between 38.85 to 57.72)	64	59.26
High (Score above 57.72)	24	22.22
Total	108	100.00

Table 2 : Extent of adoption regarding rapeseed and mustard production technology

Sr. No.	Package of practices	MPS	Rank
1.	Soil and field preparation	70.64	VI
2.	High yielding varieties	90.83	I
3.	Soil treatment	52.50	VIII
4.	Seed treatment	50.55	IX
5.	Time of sowing	89.81	II
6.	Seed rate and spacing	87.51	III
7.	Manures and fertilizers	72.52	V
8.	Irrigation management	75.12	IV
9.	Weed management	40.78	X
10.	Plant protection measures	39.75	XI
11.	Harvesting, threshing and storage	70.50	VII

found to be positively and significantly related with the extent of adoption of nitrogenous, phosphatic and soil amendments, respectively. Only character *i.e.*, family size was found to be non-significant with the extent of adoption of fertilizer technology, whereas, age, caste, occupation and size of holding were not found significant with the extent of adoption of soil amendments of sub-component of fertilizers technology. The age, education, caste, family size, family type, occupation, farm power and housing pattern of respondents were found to be positively and significantly related with the extent of adoption of irrigation technology. Out of 11 characteristics of socio-economic characteristics of respondents, seven characteristics were positively and significantly related with the extent of adoption of weedicide technology and remaining four *viz*., caste, family type, size of holding and housing pattern have not shown significant relationship. The Table 3 clearly indicates that out of 11

Table 3 : Association between socio-economic characteristics and adoption of improved technology of rapeseed and mustard cultivation

Sr. No.	Socio-economic characteristics	Correlation/ Association	Extent of adoption of improved technology of rapeseed and mustard cultivation							
			Soil	Seed	Fertilizer technology			Irrigation	Weedicide	Plant protection measures
					Nitrogenous	Phosphatic	Soil amendments			
1.	Age	r	0.205NS	0.234NS	0.360*	0.301*	0.250NS	0.845*	0.384*	0.364*
2.	Education	X^2	35.97*	36.94*	37.8*	38.6*	22.27*	45.60*	47.82*	21.98*
3.	Caste	X^2	9.66*	13.67*	16.98*	20.81*	8.45*	21.69*	2.81NS	3.58NS
4.	Family type	X^2	37.90*	9.38NS	37.25*	15.66*	16.39*	30.67*	2.49NS	3.34NS
5.	Family size	X^2	10.35NS	9.18NS	3.24NS	4.84NS	1.68NS	23.70*	12.49*	1.096NS
6.	Occupation	X^2	9.15NS	13.99*	28.24*	30.39*	16.9NS	10.36*	22.63*	25.76*
7.	Housing pattern	X^2	46.00*	32.36*	36.88*	49.62*	43.5*	49.92*	4.13NS	5.47NS
8.	Size of holding	X^2	0.211*	0.579NS	0.493*	0.203*	0.296NS	0.280NS	0.219NS	0.210NS
9.	Income	r	0.697*	0.364*	0.672*	0.164*	0.610*	0.366NS	0.104*	0.140*
10.	Farm power	X^2	59.70*	3.53*	15.17*	14.36*	8.76*	117.16*	50.72*	52.96*
11.	Social participation	X^2	39.90*	9.46NS	37.76*	48.59*	47.56*	7.67NS	13.56*	17.56*

NS = Non-significant.
X^2 = Significant at 0.05% level of probability. *indicates significance of value at P=0.05
r = Significant at 0.01% level of probability

Table 4 : Major constraints perceived by the small farmers in adoption of recommended production technology of mustard cultivation

Sr. No.	Constraints	MPS	Rank
1.	Unavailability of improved seed at the time of sowing	89.47	III
2.	High cost involved in inputs	88.81	IV
3.	Unavailability of chemicals	83.55	VII
4.	Inadequate irrigation facilities	70.39	XIII
5.	Lack of technical know-how about soil testing and seed treatment	63.26	XVI
6.	Do not believe in soil treatment	82.89	VIII
7.	Lack of trustworthiness about recommendations	44.73	XVIII
8.	Scarcity of moisture in soil	75.00	XII
9.	Unavailability of fertilizers at peak season	96.71	I
10.	Lack of technical know-how about weedicide and PP measures	69.73	XIV
11.	Weed control through herbicide is technically complex method	90.50	II
12.	Application of weedicide reduced the availability of fodder	84.25	VI
13.	Use of weedicide put an adverse effect on the main crop	79.55	XI
14.	Lack of operational skills in the plant protection measures	65.78	XV
15.	Harmful residual effect of pesticides on main crop	86.25	V
16.	High incidence of insect pest infestation	80.25	X
17.	Occurrence of natural calamities (fog, frost, hails, storms and untimely rains)	82.25	IX
18.	Inaccessibility of fumigants in storage	40.71	XVIII

socio-economic characteristics of the respondents, six were significantly associated with the extent of adoption of plant protection technology *viz.*, age, education, occupation, income, farm power and social participation. The remaining five characteristics *viz.*, caste, family type, family size, size of holding and housing pattern have not shown significant association with the extent of adoption of plant protection technology. Similar results have also been observed by the Saraswat (1991); Shriballabh and Lal (1991); Verma *et al*. (1998); Singh *et al*. (2001); Singh *et al*. (2002); Sharma and Chauhan (2001); Singh *et al*. (2006) and Singh *et al*. (2011).

Observation of Table 4 reveals that unavailability of fertilizers at peak season was reported very important constraint by the farmers and they awarded high MPS (96.71) and ranked Ist. Farmers perceived that weed control through herbicide is technical complex method (MPS 90.50) and unavailability of improved seed at the time of sowing (MPS 89.47) were another important constraints. These constraints were ranked second and third, respectively by the respondents.Further, data divulge that high cost involved in input purchasing (MPS 88.81), harmful residual effect of pesticides on main crop (86.25 MPS), application of weedcide reduced the availability of fodder (MPS 84.25) and unavailability of chemicals (83.55 MPS) were also perceived important constraints by majority of the small farmers.Observation of table further reveals that do not believe in soil treatment (MPS 82.89), occurrence of natural clamities (Fog, frost, hails, storms and untimely rains etc.) with MPS 82.25 and high incidence of insect pest infestation (MPS 80.25) were also perceived as major problems which farmers were facing regularly of the study area. Further, farmers of the study area were of the opinion that use of weedicide put an adverse effect on the main crop, with 79.55 MPS and ranked XIth under the constraints related to chemical weed control. Scarcity of moisture in soil (MPS 75.0) and in adequate irrigation facilities (MPS 70.39) were other important problems accorded XII and XIII rank by the farmers, respectively.

Data of table reveal that lack of technical know-how about weedicide and plant protection measures (MPS 69.73), lack of operation skills in the plant protection measures (MPS 65.78) and lack of technical know-how about soil testing and seed treatment jointly (MPS 63.26) were main problems faced by the respondents awarded rank XIV, XV and XVI, respectively.

Table 4 further shows that lack of trust worthiness about recommendations (MPS 44.75) and accessibility of fumigants in storage (MPS, 40.71) were not so important constraints in the opinion of respondents.The findings are in line with findings reported by Gautam and Gautam (1991); Singh and Singh (2002); Sachan and Sharma (2002); Sonawane *et al.* (2009) and Singh *et al.* (2010).

Conclusion :

From the foregoing explanation it may be concluded that 59.26 per cent respondents had adopted the mustard and rapeseed technology to the medium extent. The education, farm power, caste, occupation, social participation, family type, income and housing pattern had shown significant association with the extent of adoption of soil, seed, fertilizer, irrigation, weedicide and plant protection technology of rapeseed and mustard crops, while caste, family type and housing pattern had not shown positive association with the weedicide and plant protection technology.

It may be further concluded that there were several constraints in adoption of improved rapeseed-mustard production technology. Among the major constraints were unavailability of fertilizers at peak season, weed control through herbicide is technically complex method, unavailability of improved seed at the time of sowing, high cost involved in inputs purchasing and harmful residual effect of pesticides on main crops and application of weedicide reduced the availability of fodder were the main problems which affect the adoption process of mustard production technology among the small farmers.

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