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Factors influencing technological gaps in adoption of mustard (*Brassica juncea* L.) production technology in arid zone of Rajasthan

Bhagwan Singh

Central Arid Zone Research Institute
Jodhpur-342003, Rajasthan, India.
E-mail: bsing@cazri.raj.nic.in

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Abstract

A study was conducted in four districts of Rajasthan namely, Jodhpur, Pali, Bikaner and Jaisalmer, to identify the technological gaps in adoption of mustard (*Brassica juncea*) production technology and to find out the relationship between the socio-economic characteristics of farmers and technological gaps in adoption of the technology. The study revealed that 68.2% of farmers belonged to medium technological gap category and there was a high technological gap in seed treatment, method of sowing, dose, time and method of application of fertilizers and herbicide, irrigation and plant protection measures. Out of 16 variables, 9 variables namely, education, caste, irrigation facilities, type of family, extension contact, sources of information and knowledge were negatively and significantly correlated with overall technological gap, whereas, age and farming experiences were positively and significantly correlated with overall technological gap. The 16 independent variables taken together explained 53.7% of the variation in technological gap, and knowledge of farmers was the most important predictor of the technological gap.

Keywords: *Brassica juncea*, mustard, technological gap.

Mustard (*Brassica juncea* L.) occupies about 11.91 lakh hectares with a total production of 11.78 lakh tonnes in Rajasthan and contributes 67.2% of the total oil seed production in the state. The average productivity of mustard is 9.89 q ha^{-1} (2002–03) in the state. There exists a gap between the technologies developed at research stations and technologies followed by farmers. Singh & Chauhan (1996) observed 54.5% technological gap in adoption of recommended mustard production technology in Rajasthan. The present study was undertaken to identify the technological gaps in adoption of the technology and to find out the relationship between socio-economic characteristics of the farmers and technological gaps in adoption of mustard production technology.

The study was conducted in Jodhpur, Pali, Bikaner and Jaisalmer districts of Rajasthan. 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 11 mustard growing farmers were

selected at random; thus the sample size was 88.

The data were collected through specially developed interview schedules. For studying the technological gaps, 11 important cultivation practices namely, high yielding varieties, seed rate, seed treatment, time of sowing, method of sowing, spacing, application of nitrogeneous fertilizers, application of phosphatic fertilizers, weedicide application, irrigation and plant protection measures were considered. Sixteen independent variables namely, 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, scientific orientation, risk orientation and knowledge were computed for determining correlation co-efficients in order to find out their relationship with the dependent variable, namely, technological gap. The formula used for measuring the technological gap was as follows:

$$\text{Technological gap index} = \frac{R-A}{R} \times 100$$

where, R=Recommended technology; A=Technology actually adopted by farmers.

The measurement of other variables were based on the past extension literature.

Technological gap

The responses received from the farmers were categorized into three groups, namely, low (up to 33.33%), medium (33.34 to 66.66%) and high technological gap (above 66.66%) categories. Majority (57.9%) of farmers belonged to low technological gap category followed by medium (25.0%) and high (17.1%) technological gap categories in the use of high yielding varieties of mustard. Singh & Chauhan (1996) reported that 48.0% of farmers adopted improved varieties of mustard in Jodhpur District. In case of seed rate, 53.4%, 19.3% and 27.3% of farmers belonged to low, medium and high technological gap categories, respectively. In respect of seed treatment, a majority (92.1%) of farmers were in high technological gap category. It was observed that 35.3% of farmers belonged to high technological gap category in adoption of correct spacing; 51.1% of farmers were in low technological gap category in case of time of sowing. With regard to method of sowing, a majority (62.5%) of the farmers were in high technological gap category (Table 1). The possible reason for the high gap might be due to lack of improved implements.

A majority (50.0%) of farmers were in medium technological gap category with regard to dose of nitrogenous fertilizer application. A majority (59.1% and 60.2%) of farmers were in high technological gap category in case of time and method of nitrogen fertilizer application. In case of phosphatic fertilizers, 42.0% of farmers were in medium technological gap category. In case of method and time of application, 55.7% and 58.0% of farmers were in low technological gap category (Table 1).

With regard to irrigation, 54.5% of farmers had adopted the irrigation technology as per recommendations. A majority (78.4%) of farmers were in high technological gap category with regard to plant protection measures. Singh & Chauhan (1996) also reported that majority of the farmers were in the low adoption level as far as plant protection in concerened. This might be due to lack of knowledge and high cost of plant protection chemicals and equipments. A majority (88.6%) of respondents had high technological gap in weedicide application, probably due to lack of knowledge and high cost of weedicides (Table 1).

When the distribution of farmers according to their overall technological gap was considered, 14.8% of respondents belonged to low technological gap category, 68.2% medium and 17.0% high technological gap category in adoption of improved technology recommended for mustard production (Table 2). Similar findings were reported by Singh & Singh (2002) in Bharatpur.

Table 1. Extent of technological gap in mustard production technology at Rajasthan

Technology	Technological gap		
	Low	Medium	High
Seed technology			
High yielding varieties	51 (57.9)	22 (25.0)	15 (17.1)
Seed rate	47 (53.4)	17 (19.3)	24 (27.3)
Seed treatment	3 (3.4)	4 (4.5)	81 (92.1)
Spacing	31 (35.2)	29 (33.0)	28 (31.8)
Time of sowing	45 (51.1)	18 (20.5)	25 (28.4)
Method of sowing	13 (14.8)	20 (22.7)	55 (62.5)
Fertilizer technology			
Nitrogenous fertilizer			
Dose	21 (23.9)	44 (50.0)	23 (26.1)
Method	10 (11.4)	26 (29.5)	52 (59.1)
Time	21 (23.9)	14 (15.9)	53 (60.2)
Phosphatic fertilizer			
Dose	19 (21.6)	32 (36.4)	37 (42.0)
Method	49 (55.7)	22 (25.0)	17 (19.3)
Time	51 (57.9)	21 (23.9)	16 (18.2)
Irrigation technology	48 (54.5)	25 (28.4)	15 (17.1)
Plant protection technology			
Plant protection chemicals	8 (9.1)	11 (12.5)	69 (78.4)
Weedicides	3 (3.4)	7 (8.0)	78 (88.6)

Total respondents=88; Figures in parenthesis indicate percentage

Table 2. Distribution of respondents according to their overall technological gap in adoption of mustard production technology at Rajasthan

Technological gap	Frequency	Percentage
Low technological gap	13	14.8
Medium technological gap	60	68.2
High technological gap	15	17.0
Total	88	100.0

Socio-economic characteristics and technological gap

Correlation coefficients were worked out to find out the relationship between socio-economic characteristics of farmers and technological gap in adoption of mustard production technology (Table 3).

Age of farmers was positively and significantly correlated to technological gap in adoption of mustard production technology indicating that adoption level of young farmers was more compared to old farmers, probably due to their better education. Education of the farmers was negatively and significantly correlated with

Table 3. Correlation co-efficient between socio-economic characteristics of respondents and technological gap in mustard production technology at Rajasthan

Independent variables	Correlation co-efficient (r)
Age	0.27047**
Education	-0.38302**
Caste	-0.25515**
Occupation	0.17851NS
Land holding	-0.11136NS
Irrigation facilities	-0.28498**
Type of family (single/joint family)	-0.30069**
Size of family	0.02829NS
Farming experience	0.22408*
Annual income	-0.18976NS
Extension contact	-0.24637*
Sources of information	-0.38734**
Economic motivation	-0.11763NS
Scientific orientation	-0.04253NS
Risk orientation	-0.18227NS
Knowledge	-0.63471**

N S= Non-significant; * Significant at P=0.05;
**Significant at P=0.01

technological gap indicating that as the level of education increased the adoption level of mustard production technology also increased. This finding is similar to the finding of Bhati (2002).

Irrigation facilities and type of family of the farmers were negatively and significantly correlated with technological gap in mustard production technology. Farmers belonging to joint families showed lower technological gap, the probable reason being decision making was influenced by progressive members of the family. Farming experience of farmers was positively and significantly correlated with technological gap. Higher farming experience in the study, represented older farmers who had lower education status and probably this was one of the reasons for higher technological gap. Extension contact, sources of information and knowledge of farmers had a negative and significant relationship with technological gap in adoption of the mustard technology. Similar findings were also reported by Bhati (2002).

Variables like occupation, land holding, size of family, annual income, economic motivation, scientific motivation and risk orientation of the farmers were not significantly correlated with technological gap.

Multiple regression analysis

Multiple regression analysis was used to determine the influence and contribution of 16 independent variables in predicting the extent of technological gap in mustard production technology. The results revealed that all the 16 independent variables taken together explained 53.7% of the variation for technological gap and the respective 'F' value 5.29436 was significant at 1% level of probability (Table 4). 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. Hence, knowledge was the most important predictor of overall technological gap in mustard production technology.

Table 4. Multiple regression analysis of independent variables with respect to technological gap in adoption of mustard production technology at Rajasthan

Independent variable	Regression coefficient ('b' value)	Standard error	't' value
Age	0.0710	0.0759	0.9356
Education	-1.0553	0.8535	-1.2364
Caste	-0.4486	0.7729	-0.5805
Occupation	1.7176	1.0257	1.6745
Land holding	-0.0035	0.0175	-0.1985
Irrigation facilities	-0.3717	1.3265	-0.2802
Type of family	-0.2015	1.1176	-0.1803
Size of family	0.2173	0.1343	1.6174
Farming experience	-0.0282	0.0715	-0.3937
Annual income	-0.0170	0.0091	-1.8675
Extension contact	0.7031	0.5943	1.1831
Sources of information	-0.0473	0.0986	-0.4794
Economic motivation	-0.6126	0.3169	-1.9729
Scientific orientation	0.5403	0.3329	1.6228
Risk orientation	-0.1707	0.35528	-0.4839
Knowledge	-0.4802	0.0995	-4.8257**

R^2=0.5371; F=5.2943** ; * * Significant at P=0.01

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