Behavioural Insights into Farmers Adoption of Improved Rapeseed-Mustard Cultivation Practices in North Bank Plain Zone of Assam

ABSTRACT

The study examines the adoption behavior of farmers regarding improved rapeseed-mustard cultivation practices in the North Bank Plain Zone of Assam. The primary objective was to analyze the socio-economic factors and adoption levels associated with technological interventions in rapeseed-mustard farming. A purposive sampling method was employed, selecting 240 respondents from four districts. Data were collected using pre-tested interview schedules and analyzed using statistical tools such as frequency, percentage, mean, standard deviation, and correlation coefficients.Results revealed that 67.50 per cent of farmers demonstrated a medium level of adoption, while 21.67per centhad a high adoption level. Socio-economic factors such as age, education, landholding, annual income, mass media exposure, and risk-bearing ability significantly influenced adoption behavior. Farmers with higher risk-bearing ability (42.92%) and medium to high achievement motivation (70.83%) adopted practices more effectively. Key barriers included inadequate awareness of advanced techniques and limited resources.The findings suggest that targeted extension services, knowledge dissemination, and access to resources can enhance adoption levels. Encouraging risk-taking and achievement motivation through capacity-building programs can further improve the adoption of improved cultivation practices.

Keywords: Adoption behavior, Improved farming practices, Rapeseed-mustard cultivation, North Bank Plain Zone, Assam

1. INTRODUCTION

Rapeseed-mustard is the world's third most important source of edible oil, following soybeans and oil palm. After Canada, India is the world's third-largest producer of rapeseed mustard, with

China accounting for about 11% of global production. With 33.34% of the nation's oilseed production coming from it, it is the largest oilseed crop in India. Rapeseed mustard covers 9.12 million ha, with a production of 13.16 million tonnes and a productivity of 1499 kg/ha (DA&FW, 2024). In the last five decades, there has been a steady and spectacular transformation of Indian agriculture from a food deficit to food sufficient state, barring the oilseeds sector. In India, rapeseed and mustard crops are cultivated in a variety of agro-climatic environments, including saline soils, early or late sowing, irrigation, rainfed regions, and hills in the northeast and northwest. However, there are differences in production and productivity between states. The average productivity in Assam is much lower than the national average at just 660 kg/ha during 2018-19 (Sharma *et al.* 2021).Rapeseed-Mustard crop has good production potential if cultivation is supported with suitable technological interventions and knowledge inputs. Incorporating new technologies into the cultivation of oilseeds, particularly rapeseed-mustard is one approach to address this. It can be improved by the proper adoption and implementation of the latest scientific innovations in rapeseed-mustard farming, which might significantly reduce our reliance on imports. Along with raising overall production and assuring self-sufficiency, this would also significantly raise farmer income.In this regard, it would be important to consider the diffusion and adoption modern technology, high-yielding varieties, the committed efforts of farmers, extension agents, and scientists, as well as the programmatic support of the centraland state governments. Therefore, it is necessary to study the adoption behaviour of improvedrapeseed-mustard practices byfarmers.

2. METHODOLOGY

The study was purposively conducted in the North Bank Plain Zone of Assam. North Bank Plain zone of Assam comprises of six districts viz., Udalguri, Darrang, Sonitpur, Biswanath, Lakhimpur and Dhemaji. Among the six districts Dhemaji, Lakimpur, Sonitpur and Darrang districts were selected purposively for the study based on the area and production of the rapeseed-mustard crop. Multi stages sampling was followed for the present study for the selection of samples required. From each district two blocks were selected based on the area and production and 30 respondents from each block were selected randomly following the criteria of having atleast 5 years of experience in rapeseed-mustard cultivation resulting in a total sample size of 240 for the study.The data about the study's objectives were collected with the helpof a pretested interview schedule through personal interview method. The collecteddata were

classified, tabulated and analyzed in light of the objectives by using statistical technique like frequency, percentage, mean, standard deviation and correlation coefficient.

3. RESULTS AND DISCUSSION

3.1.Socio-Economic Profile of the Respondents

The data presented in Table 1 indicate that 65.41 per cent of the respondents are in the middle age group (36-55 years), followed by 18.33 per cent in the older age group (56 years and above), and 16.25 per cent belong to the younger age category (35 years and below). In terms of education, 32.50 per cent of the respondents had education up to the middle school level, followed by 27.08 per cent who completed high school, 23.75 per cent who had completed graduation and beyond, 7.91 per cent with primary school education, and 8.75 per cent were illiterate. Regarding occupational engagement, 30.83 per cent of the respondents were exclusively involved in farming, while 26.67 per cent combined farming with business, 24.58 per cent combined farming with service, and 17.91 per cent were engaged in both farming and labor. In terms of landholding, 43.33 per cent of the respondents owned less than 5 bigha of land, followed by 32.91 per cent who owned between 6-10 bigha, and 23.75 per cent who had more than 10 bigha. In Assam, landholding is measured in terms of bigha (7.5 bigha=1Ha). As per the income was concerned, 44.16 per cent of the respondents had an income between Rs. 96,000-1,20,000, followed by 37.96 per cent earning above Rs. 1,20,000, and 17.91 per cent had an income of less than Rs. 95,000.Concerning mass media exposure, 40.00 per cent of the respondents reported having a medium level of exposure, 36.25 per cent had low exposure, and 23.75 per cent had high exposure. Regarding information-seeking behavior, 40.00 per cent of the respondents exhibited medium behavior, 31.67 per cent showed high behavior, and 28.34 per cent had low information-seeking behavior.Social participation level of the respondents revealed that 43.75 per cent of the respondents had a medium level of participation, followed by 30.84 per cent with low participation, and 25.41 per cent exhibited a high level of participation.In terms of achievement motivation, 40.30 per cent of the respondents had a medium level, 30.00 per cent had high motivation, and 29.17 per cent exhibited low achievement motivation. Regarding risk-bearing ability, 42.92 per cent of the respondents were highly capable of taking risks, followed by 33.75 per cent with medium risk-bearing ability, and 23.34 per cent with low risk-bearing ability.

Table 1: Socio-Economic Profile of the Respondents (n=240)

Sl.NO	Characteristics	Category	Frequency	Percentage
1.	Age (years)	young age (< 35)	39	16.25
		Middle age (36-55)	157	65.41
		Old age (56 and above)	44	18.33
2.	Education	Illiterate	21	8.75
		Primary School	19	7.91
		Middle School	78	32.5
		High School	65	27.08
		Graduation & above	57	23.75
3.	Occupation	Farming	74	30.83
		Farming + business	64	26.66
		Farming + service	59	24.58
		Farming + Labour	43	17.91
4.	Land Holding	< 5 bigha	104	43.33
		6-10 bigha	79	32.91
		>10 bgha	57	23.75
5.	Annual Income	Low (< Rs. 95000)	43	17.91
		Medium (96000-120000)	106	44.16
		High (>120000)	91	37.91
6.	Mass Media Exposure	Low	87	36.25
		Medium	96	40
		High	57	23.75
7.	Information seeking behaviour	low	68	28.33
		Medium	96	40
		High	76	31.66
8.	Social Participation	Low	74	30.83
		Medium	105	43.75
		High	61	25.41
9.	Achievement Motivation	Low	70	29.16
		Medium	98	40.83
		High	72	30
10.	Risk Bearing Ability	Low	56	23.33
		Medium	81	33.75
		High	103	42.91

3.2. Extent of Adoption of Improved Rapeseed-Mustard Cultivation Practices

The data presented in Table 2 reveal that the majority (68.33%) of the respondents fully adopt improved varieties of rapeseed-mustard, while 17.08 per cent partially adopt and 14.33 per cent do not adopt these varieties. Regarding the application of farmyard manure (FYM), 57.08 per cent of the respondents do not apply 2-3 tonnes of FYM per hectare, followed by 24.58 per cent who partially apply it, and 18.34 per cent who fully apply 2-3 tonnes per hectare. In terms of ploughing and planking, 66.25 per cent of the respondents adopt 3-4 ploughings and planking after each ploughing, with 17.50 per cent partially adopting this practice and 16.25 per cent not adopting it. Majority (51.67%) do not follow the recommendation for ensuring that the field is well-drained, pulverized, and leveled, while 38.75 per cent follow this practice, and 9.58 per cent partially follow it. Regarding soil treatment before sowing, 72.50 per cent of the respondents do not treat the soil, 16.67 per cent fully treat the soil, and 10.30 per cent partially treat it. In the case of seed treatment, 52.50 per cent of the respondents do not treat the seed before sowing, while 32.50 per cent fully treat the seed and 15.00 per cent partially treat it with Dithane/Thiram at a rate of 2-3g per kg of seed. As for the recommended sowing time, 57.91 per cent of the respondents follow the recommended timing of mid-October to November, while 30.83 per cent do not adopt this due to the late sowing of Sali rice varieties, and 11.25 per cent partially adopt the recommended sowing time. Regarding the recommended seed rate, 53.75 per cent of the respondents fully adopt the suggested rate, while 27.08 per cent partially adopt it, and 19.17 per cent do not adopt the recommended seed rate.In terms of row-to-row spacing, 65 per cent of the respondents do not follow the recommended spacing, while 20.41 per cent fully follow it, and 14.58 per cent partially follow the recommended spacing. Additionally, 60.42 per cent of the respondents do not follow the recommended plant-to-plant spacing, 23.34 per cent fully follow it, and 16.5 per cent partially follow it. As for sowing depth, 63.33 per cent of the respondents fully adhere to the recommended depth, 27.08 per cent partially follow it, and 9.58 per cent do not follow it. In terms of fertilizer application, 53.37 per cent of the respondents do not adopt the recommended practices, 30.10 per cent fully adopt them, and 16.25 per cent partially adopt them. Regarding the use of borax, 69.58 per cent of the respondents apply it in their fields, while 23.34 per cent do not use it, and 7.08 per cent partially use it. In relation to thinning, 48.34 per cent of the respondents perform thinning after 20-25 days after sowing (DAS), 34.58 per cent do not

perform thinning, and 17.08 per cent partially perform it. Concerning hoeing and weeding, 52.91 per cent of the respondents do not carry out hoeing and weeding after 30-40 DAS, while 29.58 per cent partially carry out these tasks, and 17.50 per cent fully perform hoeing and weeding. Regarding irrigation, 52.50 per cent of the respondents adopt one irrigation at the 50% flowering or early siliqua formation stage, while 30.41 per cent do not adopt this practice, and 17.08 per cent partially adopt it. In terms of pest control, 60.00 per cent of the respondents apply insecticides for insect-pest management, 29.16 per cent partially apply insecticides, and 10.83 per cent do not apply them. Regarding disease control, 42.50 per cent of the respondents apply fungicides or bactericides in their fields, 34.17 per cent do not apply any chemicals, and 23.34 per cent partially apply them. The findings of the study in lined with the studies conducted by (Negi, 2023; Lenin and Mazhar, 2024: Nigam et al, 2024). For harvesting, 79.17 per cent of the respondents harvest when 75% of the pods turn golden yellow and the seed moisture is below 20%, while 10.83 per cent do not follow this practice, and 10.00 per cent partially follow the optimum harvesting stage. Finally, concerning seed storage, 49.58 per cent of the respondents do not store seeds at the recommended 8 per cent moisture content, 40.4 per cent store seeds at 8 per cent moisture, and 8.75 per cent partially store them. As for storage containers, 77.50 per cent of the respondents use gunny bags to control airflow during storage, 1.50 per cent partially use them, and 10.00 per cent do not use gunny bags. The reason behind these findings might be lack of knowledge about some improved production technologies and its benefits. The findings of the present study are in line with Asiwal et al., (2013), Kumar and Rathod (2013)and Singh et al.,(2018).

Table 2: Distribution of respondents based on adoption of different improved technologies of rapeseed-mustard(n=240)

Sl. No	Improved Practices of Rapeseed-Mustard Cultivation	Adopted		Partially Adopted		Not Adopted	
		F	%	F	%	F	%
1.	Adoption of improved varieties of rapeseed-mustard	164	68.33	41	17.08	35	14.58
2.	Addition of 2-3 tonnes of FYM/ha in the field	44	18.33	59	24.58	137	57.08
3.	3-4 ploughing and Planking after every ploughing	159	66.25	42	17.50	39	16.25
4.	Field should be well drained, pulverized and leveled.	93	38.75	23	9.58	124	51.66

5.	Treatment of soil before sowing	40	16.66	26	10.83	174	72.50
6.	Seed Treatment with Dithane-45 or Thiram 2.5-3g/kg before sowing	78	32.50	36	15	126	52.50
7.	Sowing time of rapeseed-mustard is between Mid October to Mid November	139	57.91	27	11.25	74	30.83
8.	Recommended seed rate of mustard is 4-5kg/ha	129	53.75	65	27.08	46	19.16
9.	Recommended spacing (30 cm) between row to row	49	20.41	35	14.58	156	65
10.	Recommended spacing (10-15cm) between plant to plant	56	23.33	39	16.25	145	60.41
11.	Recommended depth of sowing 3-4 cm	152	63.33	65	27.08	23	9.58
12.	Fertilizer application of 60:40:40 kg NPK/ha	73	30.41	39	16.25	128	53.33
13.	Use of Borax 10kg/ha in addition to recommended dose of fertilizers	167	69.58	17	7.083	56	23.33
14.	Thinning is done 20-25 days after sowing	116	48.33	41	17.08	83	34.58
15.	Hoeing and weeding after 30-40 days after sowing	42	17.50	71	29.58	127	52.91
16.	One irrigation at 50% flowering or early siliqua formation stage	168	70	34	14.16	38	15.83
17.	Application of insecticides for control of insect-pests	144	60	70	29.16	26	10.83
18.	Application of fungicides/bactericides for control of diseases	102	42.5	56	23.33	82	34.16
19.	Harvesting is done when 75% pods turn to golden yellow in colour and seed moisture below 20%	190	79.16	24	10	26	10.83
20.	Storage of the seed when its moisture content is about 8 percent	98	40.83	21	8.75	119	49.58
21.	Use of Gunny Bags for storage to control the air flow	186	77.50	30	12.50	24	10

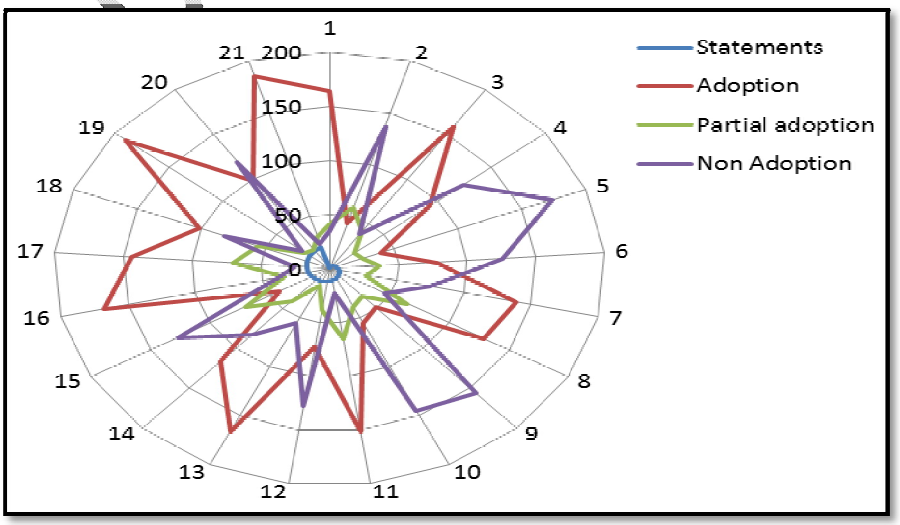

Fig. 1 Radar graph of respondents based on the adoption of different improved practices of rapeseed-mustard cultivation

3.3.Overall adoption level of the respondents towardsimproved mustard cultivation

The data presented in Table 3 revealed that majority of the respondents (67.50%) had medium extent of adoption, followed by 21.67 per cent of respondent possessed high extent of adoption and only 10.83 per cent had low adoption level. Thus, it can be concluded that majority of the respondents were having medium to high level of adoption regarding improved technologies of rapeseed-mustard.The findings of the study in lined with the studies conducted by (Lenin and Mazhar, 2024: Nigam et al., 2024).

Table 3: Overall adoption level of the respondents towards improved mustard cultivation

Sl. No	Adoption Level	Response	
		Frequency	Percentage
1.	Low (15-21)	26	10.83
2.	Medium (22-28)	162	67.50
3.	High (29-37)	52	21.67
	Total	240	100

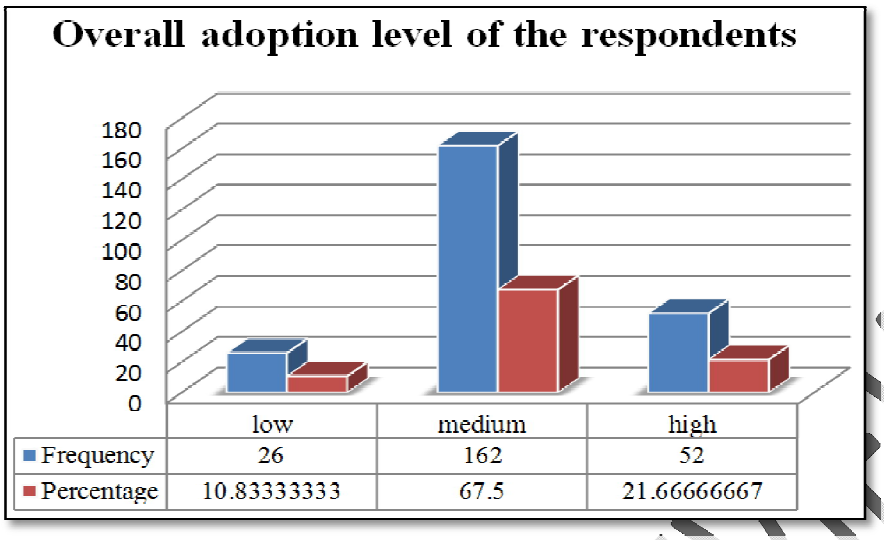

Fig.2 Overall distribution of respondents based on the adoption level of improved Mustard cultivation practices

3.4.Relationship between extent of adoption and Socio-Economic Profile of the Respondents

It is clear from the table 4 that education, occupation, annual income, mass media exposure, information seeking behavior are positively correlated with the adoption behavior towards improved rapeseed-mustard cultivation practices. Whereas age, land holdings, social participationare positively non-significant with the adoption behavior towards improved rapeseed-mustard cultivation practices.The findings of the study in lined with the studies conducted by (Lenin and Mazhar, 2024: Nigam et al., 2024).

Table 4: Relationship between extent of adoption and Socio-Economic

Sl. No.	Independent variables	Correlation coefficient (r)
1.	Age	0.093
2.	Education	0.296*
3.	Occupation	0.204*
4.	Land Holding	0.053
5.	Annual Income	0.243*
6.	Mass Media Exposure	0.287*
7.	Information seeking behaviour	0.219*
8.	Social participation	0.119

9.	Achievement motivation	0.089
10.	Risk bearing ability	0.194*

* = Significant at p = 0.05%, **= Significant at p = 0.01%, NS= Non-Significant

4. CONCLUSION

It can be concluded that 67.5% of the respondents exhibited a medium level of adoption, followed by 21.67% with a high level and 10.83% with a low level of adoption. Socio-economic factors such as age, education, landholding, and annual income significantly influenced adoption levels. Farmers in the middle age group (36–55 years) represented the majority (65.41%), while those with education up to middle school (32.5%) formed the largest group among the respondents.Mass media exposure (40% at a medium level) and information-seeking behavior (31.67% at a high level) were positively correlated with higher adoption rates. Achievement motivation and risk-bearing ability also emerged as strong predictors of adoption, with 40.83% of farmers showing medium motivation and 42.92% demonstrating high risk-bearing capacity. Independent variables like education, occupation, annual income, mass media exposure, information seeking behavior are positively correlated with the adoption behavior towards improved rapeseed-mustard cultivation practices.However, barriers such as limited awareness, insufficient financial resources, and lack of technical guidance restricted adoption.To enhance adoption behavior, it is essential to focus on capacity-building programs that increase farmers' technical knowledge, promote innovation, and improve access to credit and resources. Strengthening extension services and leveraging mass media for effective information dissemination can significantly accelerate the adoption of advanced farming practices.

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