Adoption behaviour of Farmers and Constraints towards Improved Sugarcane Cultivation Practices in Dimapur District of Nagaland

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Original Research Article

ABSTRACT

Adoption of the improved technology is the ultimate aim for enhancing the production and income of the farming system. This study was conducted in Kuhuboto block of Dimapur district, Nagaland during the session 2021-22. Through proportionate random sampling procedure, a total number of 120 respondents from 4 villages were selected. The findings revealed that around 54.1 per cent of the respondents were middle aged group with a primary level education of 42.5 per cent had medium level annual income of 68.33 per cent and medium size land holding of 45.84 per cent. Majority of the respondents have a nuclear type of family having upto five members and semi-cemented type of house had medium (10-20) years of farming experience, use of sources of information, mass media exposure and level of extension contact. The findings also revealed that around 71.66 per cent of respondents are medium category adopters. In respect of correlation analysis between adoption level and the independent variables like age, occupation, annual income, farming experience and source of information are significantly associated with adoption of sugarcane growers. The major problems experienced by the respondents were lack of proper resources and capital, costly critical inputs, lack of proper market facilities, lack of credit facility at time, lack of technical knowledge, unavailability of seed at time, lack of knowledge about major

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insect- pest diseases & their control, lack of training program related with improved practices etc. Thus, the study suggests for immediate attention of the extension functionary for convincing the sugarcane growers which would result in the higher adoption and income.

1. INTRODUCTION

Agriculture is one of the most significant sectors of the Indian economy and contributes significantly to India's GDP despite the decline of its share in India's GDP. The agriculture sector of India has occupied 43% of India's geographical area and is contributing 16.1% of India's GDP. These include different food crops, commercial crops, oil seeds etc. Sugarcane is one of the important commercial crops grown in India [1].

Sugarcane (Saccharum officinarum) is an important agro-industrial crop in India, occupying 4.0-million-hectare area. It involves less risk and farmers are assured up to some extent about return even in adverse conditions. Nowadays sugarcane cultivation and industry become one of the decisive pillars of the Indian economy [2].

From warm tropical south to foothills of Himalayas the sugarcane crop under warm humid conditions can be grown in a wide range of climate. The crop does its best in tropical regions, receiving rainfall of 750-1200mm. However, its height is strongly influenced by the age of the crop and the season. Moist soil and temperature range of 21-250C are necessary for good bud sprouting, whereas emergence and tillering occur best at 30-350C with relative humidity of about 50 percent and bright sunshine [3].

Sugarcane cultivation is traditionally practiced by farmers in Nagaland and is an important cash crop in the state. Although the Sugar Mill in the state has been defunctioned for many years now, the farmers still continue to cultivate sugarcane in all the districts mainly for making molasses (Gur) to generate income as well as for other purposes. The state agriculture department is implementing Sugarcane development in Nagaland under Rashtriya Krishi Vikas Yojana (RKVY) sub-scheme. In order to improve the economy and living standard of small and marginal farmers, the department through this programme proposed to take up various activities in order to enlarge the production and productivity of sugarcane in the state. During 2015-16, an area of about 1200 ha is targeted to be developed with an expected production of 48000 MT. This was stated in the Annual Administrative Report 2015-16 of the Agriculture Department [4].

The total production of cane in India is 341.20 million tonnes while the sugar recovery is around 10.0 percent [5]. However, there is potential of increasing the average cane yield if new technologies are transferred to the farmers' fields. At harvest sugarcane has a sucrose content of 10–18% and a fibre content of 10–15%. After 10–24 months the stems or stalks develop from buds, and are ready for harvesting. It is essentially a plant of the warm tropics and grown best when frequent heavy rainfall is interspersed with bright sunshine [6-8]. There are many factors affecting sugarcane production such as choice of cane variety, climatic and soil conditions and availability of water. Therefore, study was initiated to ascertain the level of adoption of sugarcane production practices.

1.1 Hypothesis

Formulation of hypothesis: The nature of relationship between the independent and dependent variables is determined on the basis of review of literature. The hypothesis is setup and presented in null form (Ho), as below

Ho: There is no significant relationship between the selected independent variables (age, education, income) and dependent variables (adoption) of respondents.

1.2 Objectives

1. To determine the level of adoption of sugarcane production practices by the respondents
2. To ascertain the constraints confronted by the respondents in adoption of sugarcane cultivation practices and seek their suggestions for better adoption.

2. RESEARCH METHODOLOGY

The descriptive research design was employed for the current research study. The investigation

was administered in Dimapur district of Nagaland. There are six blocks in Dimapur district namely; Dhansiripar, Kuhuboto, Medziphema, Chumukedima, Nihokhu and Niuland. Out of these, Kuhuboto block have been selected through purposive sampling method because majority of farmers were involved in sugarcane cultivation. A list of farmers involved in sugarcane cultivation from the selected villages shall be prepared and out of these 120 respondents shall be selected through random sampling.

The primary data was compiled with the help of personal interview technique and with the help of pre-tested & pre-structured interview schedule designed especially in the light of objectives, set up for the study. Secondary information was gathered from library, journals, books, papers and their documents related with the topic. The entire data was converted into normal score for tabulation. The independent variables as well as dependent variable were categorized as low, medium and high or the term applicable so far on the basis of score obtained. Keeping in view the objectives of the study and to draw logical conclusion the statistical tests i.e., frequency, percentage, mean, standard deviation and correlation coefficient were used for analyzing and interpretation of the data.

3. RESULTS

3.1 Adoption

Table 1. Distribution of adoption of the respondents about recommended sugarcane cultivation practices

| Sl. No.	Variables	Adoption level of respondents					
		Fully adopted		Partially adopted		Not adopted	
		Freq.	%	Freq.	%	Freq.	%
1.	Varieties recommended	80	66.67	28	23.33	12	10
2.	Planting/ sowing time	86	71.67	24	20	10	8.33
3.	Field preparation	48	40	65	54.17	7	5.83
4.	Method of sowing	89	74.17	22	18.33	9	7.5
5.	Manures and fertilizers	22	18.33	65	54.17	33	27.5
6.	Spacing	55	45.83	60	50	5	4.17
7.	Seed rate	45	37.5	62	51.67	13	10.83
8.	Seed treatment	12	10	32	26.67	76	63.33
9.	Irrigation	11	9.17	27	22.5	82	68.33
10.	Weed management	37	30.83	72	60	11	9.17
11.	Pest control	9	7.5	30	25	81	67.5
12.	Disease control	12	10	33	27.5	75	62.5
13.	Harvesting	96	80	22	18.33	2	1.67
14.	Yield per hac	68	56.67	46	38.33	6	5
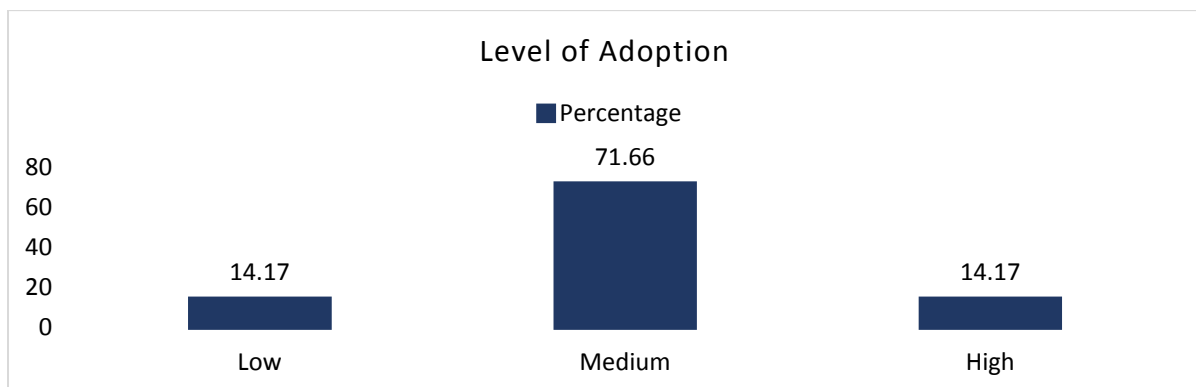
Fig. 1. Distribution of the respondents based on the level of adoption towards sugarcane cultivation

Table 2. Based on their level of adoption the distribution of respondents towards Sugarcane cultivation

S.No.	Category	Frequency	Percentage	Mean	SD
1.	Low (<27.77)	17	14.17		
2.	Medium (27.77-32.36)	86	71.66	30.0	2.9
3.	High (>32.36)	17	14.17		
	Total	120	100.00		

Table 3. Association between selected independent variables with adoption of respondents in sugarcane cultivation practices

S.No.	Variables	Pearson's correlation coefficient
1.	Age	0.210 *
2.	Education	-0.201 NS
3.	Marital status	0.016 NS
4.	Type of family	-0.136 NS
5.	Family size	0.061 NS
6.	Type of house	0.107 NS
7.	Occupation	0.202 *
8.	Land holding	-0.096 NS
9.	Annual income	0.200 *
10.	Farming experience	0.203*
11.	Social participation	-0.052 NS
12.	Mass media exposure	0.119NS
13.	Source of information	0.241*

* = Significant at p = 0.05%, NS= non-Significant

3.2 CONSTRAINT

Table 4. Constraints confronted by the respondents in adoption of the recommended sugarcane cultivation practices

| S.No.	Constraints	Score (Weighted Mean)	Rank
1.	Lack of credit facility at time	82	IV
2.	Lack of proper market facilities	79	V
3.	Inadequacy of visit by agricultural personnel time to time	62	1X
4.	Lack of storage and transport	76	VI
5.	Unavailability of improved variety and seed at time	87	III
6.	Irregular supply of electricity	20	X
7.	Lack of training program related with improved practice	71	VII
8.	Lack of proper information at time	69	VIII
9.	Lack of technical knowledge	93	II
10.	Costly critical inputs (seed, pesticide & fertilizer)	113	I
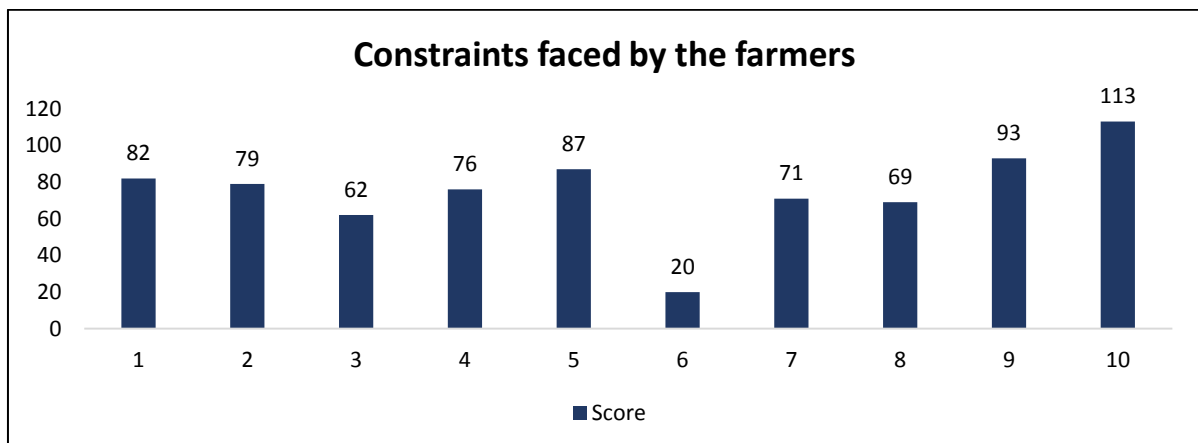
Fig. 2. Constraints confronted by the respondents in adoption of the recommended sugarcane cultivation practices

4. DISCUSSIONS

Table 1, shows the distribution of the adoption level of the respondents about recommended sugarcane cultivation practices. The above table shows that a majority of 66.67%, 71.67%, 86.67% and 74.17% of the respondents had fully adopted the recommended varieties, the optimum time of sowing, field preparation and recommended method of sowing of sugarcane cultivation practices respectively. It is observed that 54.17%, 50% and 51.67% had partially adopted manure and fertilizer, spacing and seed rate of sugarcane practices respectively. Maximum of the parameters were still not adopted.

Table 2 revealed that 71.66% of respondents were having medium level of adoption followed by 14.17% of respondents having high level of adoption whereas 14.17% of respondents were having low level of sugarcane crop. Similar findings were also proclaimed by Kumar et al. [9].

From Table 3, it may be inferred that respondent's age, their occupation, annual income, high farming experience and source of information were positive and significantly correlated and had relatively higher level of adoption of recommended sugarcane cultivation practices. Further, the variables education, marital status, type of family, family size, type of house, land holding, extension contact and mass media exposure was deemed to be negative and non-significant.

The apparent reason for the medium level of adoption is due to the farmers farming experience, their expertise in their occupation and with the help of information source. Certain factors of non-significance hamper the adoption but the overall result of adoption behaviour of sugarcane farmers shows positivity. Some of the discussion of similar findings related to adoption of sugarcane cultivation are discussed below. Kumar et al., (2018) indicated that majority (64.17%) respondents having medium level of adoption about sugarcane production practices whereas 17.50 per cent and 18.33 per cent respondents have low and high level of adoption [9]. Sasane *et al.,* (2010) reveals that majority of the sugarcane growers were aware about adoption about and selection of soil (90.00 per cent) and preparatory tillage operations (92.50), harvesting (87.50 per cent). Majority of sugarcane growers were having complete adoption about planting season (38.33 per cent),

inter culturing (92.50%), improved varieties (67.50percent), plant protection (48.33percent) [10]. Gurjar *et al.* found that significant majority of the trained farmers had complete adoption in following practices i.e., field preparation, improved variety, and time of sowing & method and manure & fertilizer application while partial adoption was observed in rest of the practices. In case of untrained farmers complete adoption was observed in field preparation and time of sowing & method while partial adoption was observed in rest of the practices [11]. Chouhan et al. revealed that majority of the respondents (74.16%) had medium level of adoption of improved sugarcane cultivation practices. A negligible percentage of the respondents, 13.34 per cent and 12.50 per cent had low and high adoption level respectively. Further, majority of sugarcane growers had poor adoption level about green manure application, soil testing, bio-fertilizer application, seed treatment, disease management and integrated pest management [12].

According to the Table 4, costly critical inputs-seed, pesticide and fertilizer ranked number I for constraints faced by the respondents, lack of technical knowledge(Rank II), unavailability of improved variety and seed at time (Rank III), lack of credit facility at time(Rank IV), lack of proper market facilities (Rank V), lack of storage and transport (Rank VI), Lack of training program related with improved practices(Rank VII),Lack of proper information at time(Rank VIII), Inadequacy of visit by agricultural personnel time to time (Rank IX) and Irregular supply of electricity (Rank X).

From the Fig. 2 it can be stated that the major constraints in adoption of recommended sugarcane production technology were unavailability seeds in time, lack of training programs related with improved practice, lack of credit in time, insufficient knowledge about plant protection, lack of fertilizer in time, lack of proper information at time, inadequacy of visit by agricultural personnel time to time. The findings are partially similar to Rai et al. [13].

Also, major constraints as ranked according to data collection from the respondents which shows similarity with different authors and their findings are mentioned. Rai et al., (2012) found that the major constraints in adoption of recommended sugarcane production technology were lack of credit in time , followed by nonavailability of seeds in time, lack of irrigation

facility, unavailability of improved varieties of seeds in time, lack of training programs about improved cultivation, insufficient knowledge about plant protection, lack of information in right time, lack of fertilizer in time ,non-availability of inputs in time and lack of field visit by extension workers and agriculture officers [13]. Singh *et al.,* (2011) found that majority of the farmers have expressed that lack of control measures for weed, leaf curl in sugarcane, high cost of pesticide and fertilizer, lack of marketing, lack of mandi facility, impure seeds and chemical, timely labour availability as the major reasons for non-adoption of improved technologies [14]. Raza et al., (2020) indicated that there were various constraints like shortage of irrigation, lack of marketing facilities, late payment by the sugar mill, lack of technical knowledge, labour shortage, lack of awareness about integrated pest management and unavailability of resistant varieties [15]. Patel and Vyas (2014) reported that majority of sugarcane growers faced constraints of high cost of farm inputs followed by shortage of labours, unavailability of plant protection appliances, lack of knowledge about disease control, fluctuation in the price, unavailability of inputs in time, respectively [16].

5. CONCLUSION

It is achieved from the present study that majority of the respondents were middle aged people, had education up to primary level, majority are married, had nuclear family, up to 5 family members and most of them lived in semi-cemented house. Majority had agriculture as their occupation, had farming experiences of 10-20 years. A large number of the respondents had medium level of income. Most of the respondents also had social contacts with NSRLM. It was found that large number of respondents had medium level of knowledge and medium level of adoption. The main constraints faced by the respondents were lack of proper resources and capital, lack of proper market facilities, Lack of proper training program, Lack of credit facility at time and Unavailability of seed. They have suggested that seeds and other inputs should be made available at the village/block level, trainings should be given according to locally available resources and more training programs should be carried out by various extension workers which gives the farmers a wider range of knowledge regarding various types of cultivation practices as well as various schemes they are able to apply so as to assist them in balancing

their earning and the subsidiaries provided by the government.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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