Extent of adoption of recommended practices of maize (*Zea mays*) cultivation in the state of Nagaland

ABSTRACT

Agriculture is considered as the backbone of Nagaland's economy where about one-third of the population depends on agriculture. Major variants of cereals produced in Nagaland are rice, maize and millet. The two most common methods of cultivation in the state are jhum and terrace cultivation which makes about 86 per cent of the total cultivable area. With the increasing trend in population, there arises a need to stress more on improving the production and productivity of agriculture so as to overpass the gap between the demand and supply of food grains. A study was carried out in six districts of Nagaland with a sample size of 300 maize farmers to measure the extent of adoption in regard to recommended cultivation practices of maize. The respondents were interviewed personally with the help of structured schedule. The data obtained were coded, tabulated and analysed using frequency, percentage, mean, standard deviation and co-efficient of variance. Findings revealed that 69 per cent of the respondents had moderate level of adoption, followed by 19.33 per cent having high adoption level and 11.67 per cent having low adoption level for recommended cultivation practices of maize.

Keywords: Extent of Adoption, Extension, Maize farmer, Recommended cultivation practices.

1. INTRODUCTION

In India, maize is the third most important cereal crop cultivated after rice and wheat covering an area of about 9.47 million hectares with a production of 28.72 million tonnes (Directorate of Economics & Statistics, Directorate of Agriculture Co-operation & Farmer's Welfare, 2018-19). India stands fifth in global maize production. Maize is grown in India throughout the year with kharif season being the main season for its cultivation covering nearly 80 per cent area of maize. Productivity of maize in India at 2.5 metric tonnes per hectare is less than half the global average of 5.5 metric tonnes per hectare. Presently, production of maize is 28.72 million tonnes and projected demand of maize to be 45 million tonnes by 2030. This demand can only be made by increasing the area under maize cultivation and technological interventions such as adopting high yielding varieties and improved package of practices.

Maize is an important crop which ranks next to rice in the state of Nagaland. It is grown for consumption purpose as well as feed and fodder for farm animals. Maize is usually grown as a pure crop in some instances and mostly grown as an inter-crop with different crop combinations such as jhum paddy, vegetables, legume crops etc. Maize is locally known as Seko, Metata, Tsungro, Kholakithi, Ongchuk etc. by different tribes of the state. The maize cultivars grown varies from popcorn, sticky and sweet corn types. Total area under maize cultivation is 68960 hectares with a production of about 136540 metric tonnes (Nagaland Statistical Handbook, 2018). Maize can be grown in all over the state in the kharif season, some of the varieties can be also grown successfully in the location such as river valley and plain areas in the rabi season.

With the ever-increasing trend in population, there is a high rise in global demand of food grains among consumers which can only be met by increasing the global agricultural production by a larger percentage. The need to produce sufficient food to feed the growing population has become the most serious challenge facing mankind in this present era (Essiet, 2001). To meet these challenges of global shortage of food grains, it is very crucial that the farmers and the farming community adopt and put into practice improved and evolving farming technologies for improved crop yield and sustainable crop production. Rogers and Shoemaker (1971) stated adoption as making full use of an innovation as the best course of action available. Study revealed that modern and enhanced technologies play a crucial role in snowballing agricultural productivity and improving livelihoods of the farming community

(Adenuga *et al.*, 2014). A drastic development in agricultural sector is seen when farmers adopt modern agricultural technologies and improved cultivation practices (Ibrahim *et al.*, 2012). Keeping this in view, the present study was carried out to assess the extent of adoption of recommended cultivation practices of maize by the farmers.

2. METHODOLOGY

The state of Nagaland was selected as the study area from which six districts *viz.*, Dimapur, Kohima, Wokha, Mokokchung, Tuensang and Zunheboto were selected purposively for the study keeping in view the area and production of maize in these districts. For selection of the respondents, a multistage purposive cum random sampling design was followed. From each district, two rural development blocks were selected randomly and two villages from each rural development blocks were selected randomly thus making a total of 24 villages. Finally, a total of 300 maize farmers were selected as respondents using random sampling technique. The data were collected personally by the researcher through the means of personal interview technique by administering a structured schedule.

Extent of Adoption

Extent of adoption was operationalised as the degree to which a farmer accepts and adopts recommended cultivation practices of rice. For measuring the extent of adoption of recommended cultivation practices of rice, the recommended package of practices of maize developed by the Department of Agriculture Nagaland was followed. In order to check the relevancy of the recommended package of practices of maize, judges rating was conducted where the developed package of practices was mailed to various scientists, agricultural professors and KVK officials where the experts ranked each practice on the basis of its relevancy *viz*., highly relevant, moderately relevant and not relevant. Based on the responses received, the package of practices of maize recommended by the Department of Agriculture Nagaland was found to be highly relevant therefore this package of practices was followed to measure the extent of adoption of recommended cultivation practices of maize.

Three adoption categories namely ‘full’, ‘partial’ and ‘low’ with a score of 3, 2 and 1 were given for each of the practices respectively. Frequency and percentage were calculated for each category of responses by the respondents based on the respondent’s compliance with recommended practices as ‘full adoption’ when the respondent fully complied with the recommendations for that practice, ‘partial adoption’ when the respondent partially complied with the recommendations for that practice and ‘no adoption’ when the respondent did not

comply with the recommendations at all, respectively. The total score obtained for each of the practices by a respondent were summed up and respondents' extent of adoption score were calculated using the formula given below:

Adoption Score = Total adoption score obtained/Maximum obtainable score × 100

Categorization was done by finding the mean and standard deviation and score range was given as below:

Category	Range
Low ($\bar{X}$-SD)	<43.18
Medium ($\bar{X}$ ± SD)	43.18-52.58
High (Above $\bar{X}$+SD)	>52.8

3. RESULTS AND DISCUSSIONS

Extent of Adoption of Recommended Cultivation Practices of Maize by the Farmers

Table 1. Frequency and percentage of respondents based on the extent of adoption of recommended cultivation practices of maize **N=300**

CULTIVATION PRACTICES		EXTENT OF ADOPTION		
		FULL	PARTIAL	LOW
Seed bed preparation	Ploughing	285(95%)	15(5%)	0(0%)
	Ridges/Earthing	285(95%)	15(5%)	0(0%)
	Drainage	250(83.33%)	15(5%)	35(11.67%)
Sowing of seeds	Sowing time (Kharif-March to April) (Rabi-mid sept to mid oct)	105(35%)	141(47%)	54(18%)
	Seed rate (20kg/ha)	63(21%)	183(61%)	54(18%)
	Spacing (row to row 60-75 cm) (plant to plant 25-30 cm)	90(30%)	146(48.67%)	64(21.33%)
	Sowing methods	102(34%)	198(66%)	0(0%)

Manures and fertilizers	FYM @25-30 cart loads		0(0%)	51(17%)	249(83%)
	N(40-50) P(30-45) K(20-25) kg/ha		0(0%)	57(19%)	243(81%)
Irrigation	Flowering and grain filling stage (1-2 irrigation)		20(6.67%)	66(22%)	214(71.33%)
	Winter seasons (5-8 irrigations at different growth stages)		20(6.67%)	36(12%)	244(81.33%)
Weed management	Hand weeding at 30 DAS		102(34%)	198(66%)	0(0%)
	Hand weeding at 60 DAS		102(34%)	198(66%)	0(0%)
	Earthing up		35(11.67%)	69(23%)	196(65.33%)
	Chemical weeding (Atrazine @1.5 kg/ha)		0(0%)	57(19%)	243(81%)
Insect-pest and disease control	**Pest**	**Control**			
	Stem borer	4% Endosulfan or carbaryl granules	0(0%)	57(19%)	243(81%)
		release trichogramma	55(18.33%)	24(8%)	221(63.77%)
	Army	Spray crop with endosulfan 0.05%	0(0%)	23(7.67%)	277(92.33%)
	Grey weevil	Spray crop with 0.05% Metasystox 25 EC or	0(0%)	57(19%)	243(81%)
		0.06% Rogor 30 EC	0(0%)	57(19%)	243(81%)
	Disease	**Control**			
	Leaf spot	Use resistant varieties and practice crop rotation	87(29%)	171(57%)	42(14%)
	Seedling blight	Seed treatment with captan or Thiram @ 3gm/kg of seed	0(0%)	23(7.67%)	277(92.33%)
	Downy mildew	Spray the crop with Dithane M-45 @ 0.2%	0(0%)	57(19%)	243(81%)
	Crop rotation		87(29%)	171(57%)	42(14%)

	Chemical control	0(0%)	17(5.67%)	283(94.33%)
Harvesting	Estimation of moisture content (25-30%)	102(34%)	198(66%)	0(0%)
	Drying before shelling	131(43.67%)	143(47.67%)	26(8.66%)

Table 1 revealed that under seed bed preparation practices, 95 per cent of the respondents fully adopted ploughing and ridges/earthing practices respectively while 83.33 per cent fully adopted drainage practices. Under sowing of seeds practices, majority i.e., 47 per cent partially adopted sowing time, 61 per cent of the respondents partially adopted seed rate (20 kg/ha) and 48.67 per cent partially adopted spacing and 66 per cent partially adopted sowing methods. Under manures and fertilizers, majority of the respondents, 83 per cent and 81 per cent did not adopt FYM and NPK respectively. Majority of the respondents did not adopt flowering and grain filling stage 1-2 irrigations (71.33 per cent) and winter seasons 5-8 irrigation at different growth stages (81.33 per cent) respectively under irrigation practices. Under weed management, 34 per cent of the respondents fully adopted hand weeding at 30 DAS and hand weeding at 60 DAS respectively, while 23 per cent partially adopted earthing up and majority (81 per cent) did not adopt chemical weeding. Under insect-pest and disease control, majority of the respondents did not adopt recommended chemical control for pest such as stem borer (81 per cent), army worm (92.33 per cent) and grey weevil (81 per cent) while 18.33 per cent fully adopted release of trichogramma for control of stem borer. For disease control, 29 per cent of the respondents fully adopted use of resistant varieties for leaf spot, 92.33 per cent did not adopt seed treatment with captan or thiram for seedling blight, 81 per cent did not adopt spraying the crop with dithane for downy mildew, 29 per cent fully adopted crop rotation and 94.33 per cent did not adopt chemical control. Lastly, 34 per cent of the respondents fully adopted estimation of moisture content and 43.67 per cent fully adopted drying before shelling respectively under harvesting practices.

Table 2. Distribution of respondents based on their extent of adoption in regard to overall recommended cultivation practices of maize **N=300**

Adoption Level	Range	Frequency	Percentage	Mean	SD	CV
Low	<43.18	35	11.67			
Moderate	43.18-52.58	207	69	47.88	4.70	9.81
High	>52.8	58	19.33			

Table 2 showed that 69 per cent of the respondents had moderate level of adoption, followed by 19.33 per cent having high adoption level and 11.67 per cent having low adoption level. In a similar study conducted by Kothari *et al.* (2010), majority (48 per cent) of the non-beneficiary farmers had medium level of adoption. Netam *et al.* (2018) in their study also found that 73.70 per cent of the respondents had medium level of adoption regarding recommended maize production technology. Fadare *et al.* (2014) in their study on factors influencing adoption decisions of maize farmers in Nigeria reported that farm size, educational level of farmers and access to extension services were significant determinants of adoption of improved maize technologies. Also, in a study on determinants of adoption of improved maize technology conducted by Akumbole *et al.* (2018) found out that farm size, farming experience, annual income and extension contact were found to be significant in determining farmers' level of adoption.

4. CONCLUSION

The overall extent of adoption of recommended cultivation practices of maize by the farmers was found to be of medium level. This moderate level of adoption of recommended cultivation practices of maize by the farmers may be due to farmer's favourable attitude towards traditional and conventional farming practices, lack of knowledge, awareness, interest or sceptical nature towards recommended cultivation practices. Also, most of the farmers were practicing organic way of farming and did not practice application of chemical fertilizers and chemical control of disease and pest management. Appropriate research and extension strategies should be undertaken by concerned departments to impart knowledge, spread awareness and disseminate information towards improved cultivation practices through extensive trainings, demonstrations and exhibition programmes etc., to increase the extent of adoption of the farmers. A proper linkage between research-extension-farmer should

be established so that farmers are involved in decision making and technology development so that new and improved technologies are developed based on the farmers' need and situation. Also, suitable modifications in the package and practices of recommended cultivation practices should be done by giving priority on integrated approach such as integrated nutrient management, integrated pest and disease management strategies etc., which will be more beneficial to the farmers practicing organic farming methods.

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