A study on theProfile Characteristics of riceandMaizeandFarmers in the State of Nagaland, India

ABSTRACT

The present study was conductedin six selected districts of Nagaland with a sample size of 300 respondents to find out the profile characteristics viz., personal, socio-economic communication and psychological characteristics of rice and maize farmers. The profile of the farmers revealed that more than half (59.7%) of the respondents were medium aged and were males (65.7%), less than one-third of them were illiterates (31.7%), majority belonged to nuclear family type (86%) and more than half (51.7%) of them had afamily size of 3-5 members. A little more than two-third (67.7%) of the farmers did cultivation as anoccupation, majority (46%) had marginal operational land holding, 80.67 per cent had medium (<Rs. 12009->Rs. 80905) income level, more than half (57.7%) of them had 13-32 years of farming experience, less than half (49.3%) of the farmers had no membership in any organization, 47.67 percent of them had amedium level of information sources utilization and 51.67 percent had medium level of extension contact. Majority (23.66%) of them had contact with ATMA officials, 67 per cent of them visited town for agriculture purpose. More than half (69.67%) of the respondents had medium level of innovativeness, 45.67 per cent had medium level of economic motivation, 62 percent having medium level of scientific orientation, 56.67 per cent having medium level of achievement motivation while 63.7 per cent of them hada moderate level of attitude towards shifting cultivation.

Keywords: Maize Farmers, Rice Farmers, Profile Characteristics, Recommended Cultivation Practices.

1. INTRODUCTION

TheIndian agriculture sector is primarily dominant by small and marginal farmers with rice, wheat and maize being the major food crops cultivated in the country, respectively. Indiastands first in thearea of rice in the world and second behind China in terms of production,whichis grown in an area of 43.79 million hectares with a production of 112.91 million tonnes and anaverage yield of2578 kg per hectare (Directorate of Economics & Statistics, DAC&FW, 2018-19).While, India stands fifth in global production of maize crop

and it covers an area of about 9.47 m ha with a production of 28.72 mtin India (Directorate of Economics & Statistics, DAC&FW, 2018-19). Nagaland is a small state which lies in the north-eastern part of India with a population of less than two million people. Most of the people depends on agriculture for their livelihood where crops such as rice, maize and millet are being cultivated in more than two-thirds of the total cultivable area in the state. Majorfood cropsgrown in the state are rice and maize respectively. The total area under rice is 206,660 ha with a production of about 505,060mtwhereas the total area under maize cultivation is 68960 ha with a production of about 136540 mt (Nagaland Statistical Handbook, 2018). The population growth has been a serious concern in the country as the demand of foodgrains increases with theincrease in population, which can be a threat to food security and sustainability in the long run.A study conducted by Alexandratos and Bruinsma (2012) indicates that the global agricultural production will need an increase of 60 percent by 2050 to meet the world's consumption demand. So, there is a need to increase the production and productivity of food crops so as to meet the growing demands of food in the long run. These can be achieved when farmers start adopting sustainable modern and scientific agricultural practices. Growth and development in theagriculture sector can be observed when farmers adopt modern agricultural technologies and improved cultivation practices(Ibrahim *et al.*, 2012). Painkra *et al.* (2010) found out that themajority (64.16%) of the paddy growers belonged to small and marginal farmerscategories which was followed by semi-medium (20%) and large (5%) farmers categories, respectively.Raganatha*et al.* (2018) in their study on theadoption of rice production technologies found out that themajority (58.57%) of the respondents had amedium level of extension contact which was followed by high (27.15%) and low (14.28%) levels of extension contact, respectively. Rathod*et al.* (2013) found out that almost half(40.00%) of the farmers had ahigh level of scientific orientation which was followed by farmers having medium (36%) and low (24%) level of scientific orientation, respectively.Adesehinwa*et.al* (2004) in a study stated that understanding the socio-economic factors can help in seeking solutions to reduced productivity.Keeping this in view, the present study was carried out to find out the profile characteristics of maize farmers in the state of Nagaland.

2. METHODOLOGY

The study was conducted in sixdistricts of Nagaland*viz.*,Dimapur, Kohima, Wokha, Mokokchung, Tuensang and Zunheboto which were selected purposively keeping in view the area and production of maize in these districts. A multistage purposive cum random sampling

design was followed for theselection of the respondents. Two rural development blocks were selected randomly from each of the districts and two villages were selected randomly from each of these rural development blocks, thus making a total of 24 villages. A total of 300 maize farmerswere finally selected as respondents using arandom sampling technique. The data were collected personally by the researcher through the means of personal interview technique by administering a structured schedule. Statistical tools such as frequency, percentage, range, mean, standard deviation and coefficient of variance were utilized to analyse the data.

2.1. Profile characteristics and its measurement

Table 1. Profile characteristicsand their measurement techniques

Sl. No.	Profile characteristics	Measurement techniques
1.	Age	Structured schedule
2.	Gender	Structured schedule
3.	Education	Structured schedule
4.	Type of family	Structured schedule
5.	Family size	Structured schedule
6.	Occupation	Structured schedule
7.	Operational land holding	Structured schedule
8.	Annual income	Structured schedule
9.	Farming experience	Structured schedule
10.	Social participation	Scale developed by Trivedi and Pareek (1964)
11.	Information sources utilization	Structured schedule
12.	Extension contact	Structured schedule
13.	Cosmopoliteness	Scale developed by Siddaram (2008) with slight modifications
14.	Innovativeness	Scale developed by Moulik (1965) with slight modifications
15.	Economic motivation	Scale developed by Supe (1969) with slight modifications
16.	Scientific orientation	Scale developed by Singha (1991) with slight modifications
17.	Achievement motivation	Scale developed by Banerjee (1996) with slight modifications
18.	Attitude towards shifting cultivation	Scale developed by Khuhly and Mishra (2016)

3. RESULTS AND DISCUSSION

3.1 Age

Table 2. Distribution of respondents based on their age

Category	Frequency	Percentage
Upto 35 years	60	20
36-59 years	179	59.7
60 years & above	61	20.3
Total	300	100
Mean=48.16	SD= 12.19	

Table 2 revealed that themajority (59.7%) of the respondents belonged to 36-59 years age category, followed by 20.3 per cent and 20 per cent belonging to 60 & aboveand upto 35 yearsage categories, respectively.The majority of the population in villages are found to be of the middle and old age who are mostly dependent on agricultural activities since the young generations usually migrate to towns and cities for pursuing higher education and in search of employment opportunities. This finding is similar to that of Painkra*et al.*(2010), Nirmala (2012) and Patel *et al*. (2015)

3.2 Gender

Table 3. Distribution of respondents based on their gender

Category	Frequency	Percentage
Male	197	65.7
Female	103	34.3
Total	300	100

Table 3 depicts the distribution of respondents according to their gender. The result indicated that 65.7 percent were males and 34.3 percent were females.This may be due to the

fact that Nagaland has a patriarchal system whereby a man is considered as the head of the family. The head of the family assumes all the responsibility in taking care of the family by involving in tougher physical activities like farming while the woman takes careof thehousehold and domestic chores like cooking and cleaning etc. This finding is similar to that of Assis and Ismail (2011),Rezvanfar*et al.* (2011) and Akumbole*et al.* (2018).

3.3 Education

Table 4. Distribution of respondents based on their educational level

Level of Education	Frequency	Percentage
Illiterate	95	31.7
Primary school	90	30
Middle school	62	20.7
High school	28	9.3
HSLC pass	14	4.6
HSSLC pass	6	2
Graduate	5	1.7
Total	300	100

Table 4 showing the education level of respondents revealed that 31.7 percent of respondents were illiterate, followed by primary school (30%), middle school (20.7%), high school (9.3%), HSLC (4.6%) and mere percentage of HSSLC (2%) andgraduates (1.7%). In this study, it is foundthatthemaximum number of the respondentswere illiterate.This may be due to poor educational facilities in their villages, poor economic status, lack of interest or high dependency on farming for livelihood. Education is a very powerful tool that broadens a person's mind, understanding and increases a person's ability to make decisions and solve problems. An educated farmer will have an added advantage as he can read and access various sources of information related to farming practices. This finding is similar to that of Patel *et al.* (2015).

3.4 Family type

Table 5. Classification of respondent based on family type

Family type	Frequency	Percentage
Nuclear	258	86

Joint	42	14
Total	300	100

Table 5 indicates that 86 percent of the respondents belonged to nuclear family followed by 14 per cent belonging to joint family.This is due to the fact that nuclear family type has been the basic form of a family in the study area where a family consists of a husband, wife and their children. Once the children attain adulthood and get married, they leave their parent's home and start a new family of their own. This finding is similar to that of Chayal*et al*.(2013).

3.5 Family Size

Table 6. Distribution of respondents based on their family size

Category	**Frequency**	**Percentage**
Upto 2 members	89	29.7
3-5 members	155	51.7
6 members& above	56	18.6
Total	300	100
Mean= 3.90	SD= 1.90	

Table 6 revealed that more than half (51.7%) of the respondents belonged to 3-5 members family size category which wasfollowed by 29.7 per cent of therespondents belonging to upto 2 membersfamily size categoryand 18.6 per centbelonging to 6 members& abovefamily sizecategory.This may be due to the fact that most of the younger members of the family usually migrates to towns and cities for availing ofeducation and in search of job opportunities. This finding has close similarities to that of Dhruw (2008) and Barman *et al.* (2013).

3.6 Occupation

Table 7. Distribution of respondents based on their occupation

Occupation	**Frequency**	**Percentage**
Cultivation	203	67.7
Cultivation + Business	78	26

Cultivation + Service	19	6.3
Total	300	100

Table 7 showed that a large majority (67.7%) of the respondents were into cultivation while 26 per cent of them also did business and 6.3 per cent of them were in service.This is due to the fact that most of the rural people are dependent on agriculture and farming has been always their main source of income for their livelihood and sustenance since generations. This finding is similar to that of Anup*et al.* (2010).

3.7 Operational land holding

Table 8. Distribution of respondents based on their operational land holding

Category	Frequency	Percentage
Marginal (below 1ha)	138	46
Small (1-2 ha)	84	28
Semi-medium (2-4 ha)	59	19.67
Medium (4-10)	15	5
Large (above 10 ha)	4	1.33
Total	300	100

Table 8 revealed that almost half (46%) of the farmers had marginal operational land holding, followed by small (28%), semi-medium (19.67%), medium (5%) and large (1.33%) operational land holdings, respectively.This may be due to the reason of land fragmentation from one generation to another whereby land is divided among the members of the family. And moreover, the farmers usually cultivate on a small scale mostly for their self-consumption rather than for profit making. The more income a farmer earns, the more his operational land holding will be as a farmer can invest more in farming inputs and resources. This finding is similar to that of Dhruw (2008), Painkra *et al.* (2010), Arathy (2011) and Barman *et al.* (2013).

3.8 Annual Income

Table 9. Distribution of respondents based on their annual income

Category	Frequency	Percentage
<Rs. 12009	25	8.33
<Rs. 12009->Rs. 80905	242	80.67

>Rs. 80905	33	11
Total	300	100

Table 9 shows that more than half (80.64%) of the respondents hadan annual income of<Rs. 12009->Rs. 80905,followed by 11 per cent having anannual income of>Rs. 80905 and 8.33 per cent havingan annual income of <Rs. 12009.An overwhelming majority of the respondents hadan average level of annual income as the farmers'operational land holding in the study area was small, since income is directly related to the farm size of a farmer. And, also most of the farmers in the study area cultivated crops for their consumption rather than for the purpose of selling it. This finding is similar to that of Patel (2008) and Anup*et al.* (2010).

3.9 Farming Experience

Table 10. Distribution of respondents based on theirfarming experience

Category	Frequency	Percentage
Upto 12 years	64	21.3
13-32 years	173	57.7
33 years& above	63	21
Total	300	100
Mean=22.69	SD=10.68	

Table 10 showed that themajority (57.7%) of the respondents had13-32 years offarming experiencewhich was followed by 21.3 per cent havingfarming experienceupto 12 years age and 21 per cent having farming experienceof 33 years& above.This trend may be due to the fact that young and middle-aged individuals are more energetic and efficient in performing farming activities and after a certain period of time when an individual ages, the ability to work and perform physical activities greatly declines down. This finding is similar to that of Nirmala (2012) and Akumbole*et al.* (2018).

3.10 Social Participation

Table 11. Distribution of respondents based on their social participation

Category	Frequency	Percentage

No membership	148	49.3
Membership in one organization/SHG	91	30.3
Membership in more than one organization	41	13.7
Office bearer/leader of an organization	20	6.7
Total	300	100

Table 11 reveals that almost half (49.3%) of the respondents had no membership, 30.3 per cent of them had membership in one organization/SHG, 13.7 per cent of them had membership in more than one organization and 6.7 per cent of them were office bearers/leader of an organization.Table 11 also revealed that almost half of the respondents did not have amembership in any organization. This may be due to respondent'shigh involvement in farming activities and lesser social contact, respondent's low education and knowledge level or low rate of activities conducted by social organizations and institutions. This finding is similar to that of the findings of Dhruw (2008) and Sivanarayana*et al.* (2008).

3.11 Information sources utilization

Table 12.Distribution of respondents based on information sources utilization (N=300)

Category	**Frequency**		**Percentage**	
	Yes	**No**	**Yes**	**No**
Radio	96	204	32	68
Television	57	243	19	81
Newspaper	39	261	13	87
Periodicals	43	257	14.33	85.67
Farm Publications	26	274	8.67	91.33
Others	21	279	7	93

Table 12 revealedthat 32 per cent of the respondents hadan access to radio whereas 19 per cent of the respondents had anaccess to television.Around13 per cent of the respondents had ansaccess to newspapers, 14.33 per cent had access to periodicals, 8.67 per cent of the respondents having access to farm publications and 7 per cent of the respondents had access to other sources of information.Table 12 showed that most of the farmers used radio and

television to access information related to agriculture. This maybe due to thepoor literacy rate of the farmers as most of them are unable to read and write. Concerned departments shouldbe focused in theimplementation of various educational programs for the farmers and set up proper infrastructural facilities to provide basic education to the rural areas so that they can keep up with the fast-changing world. Basic education is crucial in any developmental activities as farmers can make full use of all the available resources and technologies or overall development.

3.12 Extension contact

Table 13. Distribution of respondents based on their extension contact (N=300)

Source	Frequently		Often		Seldom		Never	
	F	%	F	%	F	%	F	%
Agri Field Assistant/Agriculture Inspector	33	11	95	31.67	73	24.33	99	33
Agriculture Officer/Extension Officer	37	12.33	107	35.67	99	33	57	19
Agriculture Experts/KVK-SMSs	46	15.33	107	35.67	74	24.66	73	24.33
ATMA	71	23.66	95	31.67	56	18.66	78	26
Agri-clinics	13	4.33	81	27	59	19.67	147	49

Table 13 revealed that 23.66 per cent of the respondents had frequent contact withATMAfollowed byagriculture experts/KVK-SMSs(15.33%), agriculture officer/extension officer (12.33%), Agri field assistant/Agriculture Inspector(11%) and agri-clinics (4.33%).35.67 per cent of them had often contact with both agriculture officer/extension officer and agriculture experts/KVK-SMSs followed by Agri field assistant (31.67%), ATMA (31.67%) and agri-clinics (27%).About 33 per cent of them had seldom contact with agriculture officer/extension officer followed by agriculture experts/KVK-SMSs (24.66%), Agri field assistant (24.33%), agri-clinics (19.67%) and ATMA (18.66%).Almost half of them (49%) had never contacted agri-clinics followed by Agri field assistant (33%), ATMA (26%), agriculture experts/KVK-SMSs(24.33%) and agriculture officer/extension officer (19%).

3.13Cosmopoliteness

Table 14. Distribution of respondents based on their cosmopoliteness (N=300)

Sl. No.	Particulars	Frequency	Percentage
1	**Frequency of visits to town**		
A	Once in a week	73	24.33
B	Once in a fortnight	87	29
C	Once in a month	109	36.33
D	Occasionally	31	10.34
2	**Purpose of visit to town**		
A	Visit relating to agriculture	183	61
B	Personal/domestic	97	32.33
C	Entertainment	20	6.67

Table 14 depicts that 36.33 per cent of the respondents visited town once in a month, 29 per cent visited fortnightly, 24.33 per cent visited once a week and 10.34 per cent visitedthe town occasionally. It is also found that 61 per cent of the respondents visited towns mainly for agriculture, 32.33 per cent visited towns related to personal/domestic purposes and 6.67 per cent visited town for entertainment purposes.This might be due to the fact that most of the farmers usually go to town for their basic needs or related to farming activities such as to buy inputs etc. Also, since most of the towns are far away from the village and there is no proper mode of transportation, farmers usually don't visit towns and cities unless it is of utmost importance. The findings show close similarities to that of the findings of Siddaram (2008).

3.14 Innovativeness

Table 15. Distribution of respondents based on their innovativeness (N=300)

Category	Range	Frequency	Percentage	Mean	SD	CV
Low	<19.89	48	16			
Moderate	19.89-28.37	209	69.67	24.13	4.23	17.56
High	>28.37	43	14.33			

Table 15 shows that themajority (69.67%) of the respondents had amoderate level of innovativeness, followed by 16 per cent having alow level of innovativeness and 14.33 per cent of them having ahigh level of innovativeness.An innovative farmer is the first to introduce new ideas and methods into a farming community for better results and outcomes. They not only transform their lives but that of the other farming community as well through their innovative approaches and ideas. Innovative farmers are more keen and ready to adopt new ideas and farming techniques.The finding is similar to that ofDhruw (2008), Arathy (2011) and Karuppasamy (2013).

3.15Economic motivation

Table 16. Distribution of respondents based on their economic motivation(N=300)

Category	Range	Frequency	Percentage	Mean	SD	CV
Low	<18.18	59	19.67			
Moderate	18.18-21.57	137	45.67	19.87	1.69	8.53
High	>21.57	104	34.66			

Table 16 shows that the majority (45.7%) of the respondents had amoderate level of economic motivation, followed by 34.6 per cent having ahigh level of economic motivation and 19.67 per cent of them having alow level of economic motivation.This may be due to the reason that the farmers did farming merely for their sustenance rather than for economic gains and profit making. Economic motivation can play a crucial role for a farmer in adopting new farming technologies. Economic gains stimulate a farmer in wanting to know more about the farming practices and adopt new technologies which can improve their livelihood through income generation. This finding is similar to the findings ofDhruw (2008) and Arathy (2011).

3.16 Scientific orientation

Table 17. Distribution of respondents based on theirscientific orientation (N=300)

Category	Range	Frequency	Percentage	Mean	SD	CV
Low	<22.54	45	15			
Moderate	22.54-28.31	186	62	25.43	2.88	11.34
High	>28.31	69	23			

Table 17 shows that themajority (62%) of the respondents had amoderate level of scientific orientation, followed by 23 per cent having ahigh level of scientific orientation and 15 per cent of them having low level of scientific orientation.Table 17shows more than half of the respondents havinga medium level scientific orientation may be due to their extension contact enabling them to develop abetter scientific outlook. Better scientific orientation leads to better scientific understanding towards a technology leading to adoption. This finding is similar to the finding of Kumar *et al.* (2012).

3.17 Achievement motivation

Table 18. Distribution of respondents based on their achievement motivation(N=300)

Category	Range	Frequency	Percentage	Mean	SD	CV
Low	<72.07	53	17.67			
Moderate	72.07-79.79	170	56.67	75.93	3.85	5.08
High	>79.79	77	25.66			

Table 18 shows that themajority (56.7%) of the respondents had amoderate level of achievement motivation, followed by 25.6 per cent havinga high level of achievement motivation and 17.67 per cent of them havinga low level of achievement motivation.This may be due to farmers medium level of economic motivation since a farmer with high economic motivation will have a desire to achieve more. Farmer with high achievement motivation will want to achieve more, try to compete and perform better than the other farmers which my lead to the farmer adopting new improved farming practices. This finding is similar to the finding of Khuhly (2016).

3.18 Attitude of farmers towards shifting cultivation

Table 19. Distribution of respondents based on theirattitudetowards shifting cultivation (N=300)

Category	Range	Frequency	Percentage	Mean	SD	CV
Least favorable	<62.28	49	16.33			
Moderate	62.28-70.35	191	63.7	66.32	4.03	6.08
Highlyfavorable	>70.35	60	20			

Table 19 shows that themajority (63.7%) of the respondents had amoderately favorable attitude towards shifting cultivation, followed by 20 per cent having highlyfavorable attitude towards shifting cultivation and 16.33 per cent of them having lowfavorable attitude towards shifting cultivation.Table 19indicated that most of the respondents had amoderately favorable attitude towards shifting cultivation since shifting cultivation has been the most common, easiest anddominant means of cultivation practice followed in the study area since and the farmers are able to sustain their livelihood through this method. This finding is similar to the finding of Khuhly (2016).A good knowledge and understanding of the pros and cons of shifting cultivation practices will help the farmers in adopting the right methods and techniques in an efficient and judicious manner. There have been many debates and concerns about the possible effects of shifting cultivation on natural biodiversity, as such there have beenmany interventions to totally eradicate the practice. Since this practice is deeply rooted into the cultures of the people, a more gradual comprehensive and sustainable strategies should be adopted by policy makers keeping in mind of the food security, livelihood and challenges of the farmers which will be beneficial to them while also conserving the natural resources and biodiversity.

4. CONCLUSION

The majority i.e., 59.7 per cent of the respondents belonged to 36-59 years category of age group. Findings revealed that 31.7 per cent of respondents were illiterate, followed by primary school (30%), middle school (20.7%) and high school (9.3%). Almost half (46%) of the farmers had marginal operational land holding, followed by small (28%), semi-medium (19.67%), medium (5%) and large (1.33%) operational land holdings.Majority of the

respondents i.e., 57.7 per cent had 13-32 years of farming experience and almost half (49.3%)of the respondents had no membership in any organization. Majority of the respondents had medium level of extension contact. Majority of the respondents i.e., 67.67 per cent had moderate level of innovativeness,45.7 per cent had moderate level of economic motivation,62 per cent had moderate level of scientific orientation, 56.7 per cent had moderate level of achievement motivation and 63.7 per cent had moderately favorable attitude towards shifting cultivation. The socio-economic status of the farmers can be improved with a focus on imparting technical knowledge and training to the farmers towards a more favourable attitude towards agricultural development.

REFERENCES

AlexandratosN and BruinsmaJ (2012). *World agriculture towards 2030/2050: The 2012 Revision* (ESA Working Paper No. 12-03). Rome: Food and Agriculture Organization of the United Nations (FAO), Agricultural Development Economics Division.

Adesehinwa, A.O.K., Okunola, J.O. and Adewumi, M.K. (2004). Socio-economic characteristics of ruminant livestock farmers and their production constraints in some parts of South-western Nigeria. *Livestock Research for Rural Development* 16:6.

Akumbole, J.A.,Zakaria, H. and Adam, H.(2018). Determinants of adoption of improved maize technology.*Agricultural Extension Journal,***2**(3):165-175.

Anup, P.R., Upadhyay,S.J., Taufiq, A.H. and Singh, A.K. (2010). Evaluations of farm school on All India Radio on organic farming.*Journal of Communication Studies,***18**(5):131-132.

Arathy, B. (2011). Constraint analysis of rice farmers of Trissur district of Kerala. *M.Sc. (Ag.) Thesis.* ANGRAU, Hyderabad.

Assis, K. and Ismail, H.A (2011). Knowledge, Attitude and Practices of Farmers towards Organic Farming. *Int. J. Eco. Res.,* **2**(3): 1-6.

Banerjee, M. (1996). A study on the women entrepreneurs in Assam. M.Sc. Thesis submitted to A.A.U, Jorhat.

Barman, S., Pathak, K. and Pathak, P.K. (2013). Training needs of tribal farmers in rapeseed production technology of Upper Brahmaputra Valley Zone of Assam. *Journal of Academia and Industrial Research,* **1**(11):686-688.

Chayal, K., Dhaka, B.L.,Poonia, M.K., Tyagi, S.V.S. and Verma, S.R. (2013). Involvement of farm women in decision making in agriculture. *Stud. Home Com. Sci.*,**7**(1):35-37.

Dhruw, K.S. (2008). A study on adoption of recommended maize production technology among the farmers of Kanker district of Chhattisgarh state. *M.Sc. (Ag) Thesis*, Indira Gandhi KrishiVishwavidyalaya, Raipur.

Directorate of Economics & Statistics, Department of Agriculture, Cooperation and Farmers Welfare. 4th Advance Estimates. Annual Report 2018-19.

Ghimere, R, Huang, W.C, Shrestha R.B. (2015). Factors affecting adoption of improved rice varieties among rural farm households in Central Nepal Rice Sci, 22(1): 35-43.

Hasan, M. (2016). Adoption of Modern Practices in Rice Cultivation by The Farmers of MadhukhaliUpazila Under Faridpur District. *M.S. Thesis*, Dept. of Agricultural Extension and Information System, SAU, Dhaka.

IbrahimAA, Mustapha SB and Nuhu SH (2012). Effects of adoption of rice production technologies on farmers' income in Borno State, Nigeria. *J of Agric. Vet Sci.* **1**(4):19-22.

Government of Nagaland (2018).Statistical Handbook of Nagaland. Directorate of Economics & Statistics, Nagaland:Kohima.

Karuppasamy, A. (2013). Effectiveness of Paddy Expert System in terms of Knowledge Grain, Skill Acquistion and Symbolic Adoption Behaviour among Paddy growers-A Experimental Research. *M.Sc. (Ag.) Thesis.* TNAU, Coimbatore.

Khuhly, B.L. (2016). Adoption of Organic Farming Practices and Its Impact on Organic Farmers: A Study in Mizoram. *PhD Thesis.* Assam Agricultural University.

Khuhly, B.L. and Mishra, P. (2016). A scale to measure the attitude of farmers towards shifting cultivation. *Agric. Update*, **11**(3): 340-343.

Kumar, P.L.M.K., Chaturvedi, M.L and Sharma, K.N.Y. (2012). Communication behavior of the tribal farmers towards hybrid rice production technology in Surguja district of Chattisgarh. *J.Commun. Stud.*, **26**: 91-93.

Moulik, T.K. (1965). A study of predictive values of some factors on adoption of Nitrogenous fertilizers and the influence of source of information on adoption behavior. *Ph.D. Thesis*, Indian Agricultural Research Institute, New Delhi.

Nirmala, K. (2012). A study on diffusion status and adoption of System of Rice Intensification (SRI) in Mahaboobnagar district of Andhra Pradesh. *M. Sc. (Ag.) Thesis.* Acharya N.G. Ranga Agricultural University, Hyderabad.

Painkra,S.K.,Dev,C.M. and Mandal,B.K. (2010).Information sources of tribal rice growers of Bastar district of Chhattisgarh. *J.Commun. Stud.*, **28**(9): 135-139.

Patel, K.H.,Patel, U.M. andKhanorkar, S.M. (2015). Adoption of Farmers About Scientific Cultivation of Maize in Panchmahal and Dahod District.*Guj. J. Ext. Edn.,***26**(2).

Patel, M.K. (2008). A study on Technological Gap in Recommended Soybean Production Technology among the Farmers of Kabirdham District of Chhattisgarh State. *M.Sc. (Ag.) Thesis.* IGKV, Raipur.

Rathod, M.K., Tidke, G.R. and Mandve, R.P. (2013). Impact of front line demonstration on adoption of seed treatment in Soybean. *Indian Res. J.Extn.Edn.*,**13**(2): 72-77.

Raganatha, A.D., Ramachandra, C., Mahesh, D.S. and Kowsalya, K.S. (2018). Studies on Adoption of Rice Production Technologies in Cauvery Command Area of Mandya District. *Bull.Envt.Pharmacol. Life Sci.*, **7**(8): 18-21.

Rezvanfar, A., Eraktan, G. and Olhan, E. (2011). Determinant of Factors associated with the adoption of organic agriculture among small farmers in Iran. *African J. Agric. Res.*, **6**(13):2950-2956.

Salehin, M.M., Kabir, M.S., Morshed, K.M. and Farid K.S. (2009). Socioeconomic changes of farmers due to adoption of rice production technologies in selected areas of Sherpur district. *J. Bangladesh Agril. Univ.* **7**(2): 335-341.

Siddaram (2008). A study on analysis of organic farming practices in pigeonpea in Gulbarga district of Karnataka. *M.Sc. (Ag.) Thesis*, Univ. Agric. Sci., Dharwad (India).

Singha, A.K. (1991). A study of the determinants of entrepreneurial behaviour in the adoption of selected farm practices of the farmers of Cachar district of Assam, *M.Sc. Thesis,* Assam Agricultural University, Jorhat.

Sivanarayana, G., Ramadevi, M. and VenkataRamaiah. (2008). Awareness and adoption of cotton integrated pest management practices by the farmers of Warangal district in Andhra Pradesh. *Indian J.Agril. Res.,***36**(4): 33-40.

Supe, S. V. and Singh, S. N. (1969). "Economic motivation scale, scientific orientation and risk preference scale." *In:* Singh, K. N., Singh, S. N. and Lokhande, M. R. (ed.). Measurement in Extension Research: Instruments Developed at IARI (1963-1972). Division of Agril. Extn., New Delhi, p.172.Statistical Handbook of Nagaland, 2018.

Trivedi, G. and Pareek, V. (1964).Socio-economic status scale of rural measurement in extension research. Institutional Redevelopment at IARI (1963-1972). Division of Extn.Edn., IARI, New Delhi.