Scaling the Adoption of Recommended Rice Production Technologies by the Farmers in Assam State

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ABSTRACT

The present study was carried out in the districts of Karimganj, Lakhimpur and Jorhat of Assam to assess the extent of adoption of rice production technology recommended by Assam Agricultural University. A purposive sampling technique was followed and statistical methods such as percentage, frequency, mean and ranking were used for analyzing the data. Data were collected through personal interview method during the period from late 2009 to early 2010. A total of 360 respondents were interviewed with the help of the structured schedule. Different rice production technologies like 'Harvesting methods', 'Puddling', 'Ploughing' and 'Age of uprooting of seedlings' had the highest number of full adopters among all the 25practices recommended by AAU. However, 'Bio-fertilizers' had the highest percentage of 'no adopters' (98.05%) and in most cases the respondents had no idea about bio-fertilizers. The study implies that majority of the respondents were partial adopters and their extent of adoption increases with the increases in 'family size' and 'economic motivation'. The two variables 'family size' and 'economic motivation' are also good predictors of extent of adoption of recommended rice production technology.

Key words: *Extent of adoption; Recommended Production technology; Correlation;*

Assam Agricultural University has developed many location specific technologies and released several noteworthy varieties especially in case of rice which is the primary crop in Assam. However, over the years technology generation has become a very costly affair in terms of the amount of financial support rolled out to a research organization/university in addition to support to the manpower resources. *Singh (1992)* reported that high technological gap existed in adoption of recommended technology in various field crops. Varietal attributes like ease of threshing, cooking and swelling quality are significant determinants of adoption (*Adesina and Seidi, 1995*). Also, labour availability, farm size, contact with extension services, market-oriented production, credit availability and gender friendly are the most common farm and farmer-specific attributes that influence adoption or non-adoption of a technology (*Adesina and Zinnah, 1993*). The average productivity of rice in Assam is much lower than the national level (*Barah et al., 2001*). Rice occupies about two-third of the total cropped area in the state of Assam. Being the single major source of agricultural GDP, rice plays a significant role in the economy of Assam. Further, its importance in the consumption basket (the average monthly consumption per capita is about 13 kg) also speaks volumes on the rice orientation of the state (*Barah et al., 2001*).

A mere increase of 50 kg rice/ha in Assam can lead to a total estimated income of more than Rs.125 crores to the state from around 25 lakh ha of rice. This is possible when technology is most appropriate to the farmers' situation and needs, and technology dissemination processes are quicker and more efficient. So, the study was conducted with the following objectives-

i. To find out the extent of adoption of rice production technologies recommended by AAU.
ii. To study relationship between the extent of adoption of recommended rice production technology with the socio economic parameters of respondents.

METHODOLOGY

The study was carried out in the districts of Karimganj, Lakhimpur and Jorhat. These districts were

purposively selected as Jorhat and Karimganj basically have rice research stations. Lakhimpur was also selected along with the other two districts as it conducts research on deep water rice. The number of farmers interviewed in each of the districts was 120, taking the total sample size to 360 farmers. Six villages were selected and 20 farmers in each village were interviewed to take the total number in each district to 120. The level of adoption was measured in 3 categories i.e 'No', 'Partial' and 'Full' by calculating percentage considering the total numbers of respondents. The data in the present study were collected directly from the farmers with the help of the structured schedule, through personal interview method. The statistical techniques used are frequency, percentage, mean and rank.

RESULTS AND DISCUSSION

Table 1 shows that majority (84.16%) of the respondents partially adopted the recommended practice of seed selection, while 10.00 per cent fully adopted and 5.83 per cent did not adopt it at all. The reason behind this practice may be the fact that this recommended practice is more or less similar to the conventional system of most of the farmers with slight modifications. 'Seed rate' in nursery bed was also partially adopted by majority (88.61%) of the respondents followed by 10.00 per cent 'no adopters' and 1.38 per cent 'full adopters'. This shows that most of the farmers were unaware of the correct seed rate recommended for nursery beds. The reason behind this may be the traditional mindset of the farmers which prevents them from going for accurate seed rates.

Similarly, seed treatment was partially adopted by 48.33 per cent respondents, although a healthy percentage of respondents (26.38%) went for full adoption and the remaining 25.27 per cent respondents went for no adoption. In this regard, 'Karimganj' district was far ahead of the other two districts with 59.16 per cent respondents going for full adoption. The reason behind most respondents showing partial or no adoption was probably because respondents weren't aware of the correct seed treatment doses and the benefits of this practice against seed borne diseases.

'Seed rate' in broadcasting method was also partially adopted by majority (73.05%) of the respondents followed by 18.05 per cent 'no adopters' and 6.38 per cent 'full adopters'. The reason behind this may be that most farmers tend to follow approximate values as they might think accurate rates won't make much of a difference. The percentage of partial adopters in terms of 'nursery bed size' was at 68.05 per cent. About 29.72 per cent respondents were 'full adopters' and the rest 2.22 per cent were 'no adopters'. Interestingly, most of the respondents were extremely accurate with the breadth of the nursery bed but their lengths were quite random. It was seen that majority (62.50%) of the respondents fully adopted nursery height recommendations followed by 37.50 per cent respondents who adopted it partially.

The reason behind most respondents fully adopting this recommendation may be attributed to the simplicity of the procedure. In case of application of manures and fertilizers in nursery beds, it was found that FYM (48.61%) had the highest percentage of 'full adopters' followed by Nitrogen (8.33%). 'Phosphorous' and 'Potassium' did not have a single 'full adopter'. 'Bio-fertilizers' had the highest percentage of 'no adopters' (98.05%) among all 25 practices. This was probably due to the lack of knowledge on bio-fertilizers of the respondents. Also, application of the rest of the nutrients by most of the respondents were entirely need based especially 'Nitrogen' which was only applied when slightly stunted growth was noticed.

Moreover, several farmers applied very little FYM to the nursery beds as there was left over FYM from vegetable cultivation in the beds. The practice of irrigation in nursery beds was fully adopted by only 18.05 per cent respondents whereas majority (76.38%) of the respondents adopted it partially. Most of the respondents claimed that they irrigated only if they notice a distinct shortage of water in the nursery beds. The reason behind this was probably that nursery beds of the main rice crop gets plenty of monsoon rain. Plant protection measures for pests showed 63.06 per cent partial adoption whereas plant protection for diseases showed 86.94 per cent partial adoption.

The percentage of 'full adopters' was fairly similar (7.50% and 6.38% respectively for plant protection measures for pests and diseases) while there were 27.77 per cent 'no adopters' in case of pests and only 5.55 per cent 'no adopters' in case of diseases. Such a high percentage of respondents being 'partial adopters' mean that they have the experience of plant protection measures. It was seen that majority (91.66%) of the

respondents were 'full adopters' in terms of ploughing and 94.44 per cent respondents were 'full adopters' in terms of puddling. This was the case probably the farmers tend to adjust these practices according to their soil type, prevailing weather conditions and type of variety cultivated. There were 85.83 per cent 'full adopters' in terms of uprooting of seedlings, 59.16 per cent 'full adopters' in terms of number of seedlings/hill and 68.05 per cent 'full adopters' in terms of depth of transplanting. These three practices respectively had 14.16 per cent, 40.83 per cent and 31.94 per cent 'partial adopters'. The reason behind these three practices may be because of the similarity of the traditional practices with the AAU recommended ones.

Majority (67.22%) of the respondents were 'partial adopters' when it came to application of manures and fertilizers in the fields. The remaining 32.78 per cent respondents were 'full adopters' in this regard. The reason behind majority of the respondents being 'partial adopters' may be the prevalence of traditional mind sets which might prevent the farmers from investing too much on fertilizers as they want to curb the cost of cultivation. Moreover, some of the sampled areas had new settlements which meant their land was relatively unused and had high nutrient status. The entire sampled population (100%) adopted plant protection measures partially as they treated plant protection chemicals as completely need based. None of the respondents went for prophylactic application of these chemicals. This might be the case because the farmers did not have adequate knowledge about the practice or they wanted to cut down the cost of production. *Akila and Chander (2012)* in his study of Adoption Behaviour of the Farmers Towards Draught Bullocks in South India also found that majority of the farmrs were partial adopters (52.86%) followed by high adopters (25.71%) and low adopters (21.43%) with the mean score of 49.70. *Ram et. al (2012)* in the study of 'Adoption Level of IPM Practices in Cabbage and Cauliflower growers of Manipur' revealed that majority of the respondents had medium level of adoption of IPM practices while equal per cent of respondents (20%) had high and low level of adoption, respectively.

Moreover, most of the respondents perceived that, unless and until there is severe water shortage which leads to uneven flowering, the pest attack cannot cause serious problems. It is revealed that majority (92.22%)

Table 1. Extent of adoption of AAU recommended rice production technology in sampled villages of selected districts of the study area (N = 360)

Practices of rice crop		No	Partial	Full
Seed selection method		21 (5.83)	303 (84.16)	36 (10.00)
Seed rate in nursery bed		36 (10.00)	319 (88.61)	5 (1.38)
Seed treatment		91 (25.27)	174 (48.33)	95 (26.38)
Seed rate in broadcast		65 (18.05)	263 (73.05)	23 (6.38)
Raising of seedlings	Nursery bed size	8 (2.22)	245 (68.05)	107 (29.72)
	Nursery height	0 (0.00)	135 (37.50)	225 (62.50)
Manures an fertilizer in nursery	FYM	0 (0.00)	185 (51.38)	175 (48.61)
	N	0 (0.00)	330 (91.66)	30 (8.33)
	P	0 (0.00)	360 (100.0)	0 (0.00)
	K	0 (0.00)	360 (100.00)	0 (0.00)
Biofertilizers		353 (98.05)	7 (1.94)	0 (0.00)
Irrigation		20 (5.55)	275 (76.38)	65 (18.05)
Plant protection measures	Pest	100 (27.77)	227 (63.05)	23 (6.38)
	Diseases	20 (5.55)	313 (86.94)	27 (7.50)
Field preparation	Ploughing	0 (0.00)	30 (8.33)	330 (91.66)
	Puddling	0 (0.00)	20 (5.55)	340 (94.44)
Age of seedlings				
Uprooting of seedlings		0 (0.00)	51 (14.16)	309 (85.83)
Seedling/ hill (number)		0 (0.00)	147 (40.83)	213 (59.16)
Depth of transplanting (in cm)		0 (0.00)	115 (31.94)	245) (68.05
Application of manures and fertilizers		0 (0.00)	242 (67.22)	118 (32.77)
Plant protection measures		0 (0.00)	360 (100.00)	0 (0.00)
Intercultural operations		8 (2. 22)	332 (92.22)	20 (5.55)
Water management		20 (5.55)	329 (91.38)	11 (3.05)
Harvesting		0 (0.00)	132 (36.66)	228 (63.33
Determination of ripening		0 (0.00)	8 (2.22)	352) (97.77
Methods				

of the respondents partially adopted intercultural operations in the study area. There were 5.56 per cent 'full adopters' and 2.22 per cent 'no adopters'. The reason behind only a small percentage of respondents fully adopting recommended intercultural operations may be due to less weed problems or due to the farmers' reluctance as he perceives it will further increase his cost of production. Another reason cited by the respondents themselves was that as several farmers did not follow the practice of line transplanting, they found intercultural operations to be very tedious.

Water management practices showed 91.38 per cent partial adoption followed by 5.55.per cent 'no adopters' and 3.05 per cent 'full adopters'. The reason behind such a high percentage of the respondents being 'partial adopters' may be lack of proper facilities to carry out this practice. The small percentage of respondents fully adopting the practice was probably due to the presence of small streams near the fields of these farmers. Regarding the harvesting practices it was seen that 63.33 per cent respondents were 'full adopters' in terms of determination of ripening and 97.77 per cent respondents were 'full adopters' in terms of method of harvesting. The reason behind this was probably the fact that the traditional methods were quite similar to the recommended one for this practice.

Table 2. Correlation coefficients of extent of adoption of recommended rice production technology with socio economic parameters of respondents

Socio-economic parameters	'r' value
Age	0.1418
Educational level	0.0501
Family Size	0.2441**
Family member engaged in Farm Activities	0.0204
Social participation	-0.0158
Types of house	0.1388
Main occupation	-0.0151
Information sources used	0.0963
Operational land holding	0.0870
Total Annual Income	0.0862
Training exposure	0.1234
Economic motivation	0.3331**
Scientific orientation	0.1762

*Significant at 0.05 level probability,
**Significant at 0.01 level probability

Correlation between extent of adoption of recommended rice production technology with socio economic parameters of respondents: Table 2 reveals that extent of adoption of recommended rice production technology had positive and significant correlation with family size (r = 0.2441**) and economic motivation (r = 0.3331**). This means that with the increasing size of the family or economic motivation there was increasing rate of adoption of AAU recommended rice production technology.

This might be because a farmer with higher economic motivation tries harder to increase his income and in the process adopts modern technologies more readily compared to a farmer with lower economic motivation. Also, a farmer who has a large family may be forced to try out new things and adopt modern techniques to increase his income which in turn helps him in taking care of his large family. Sharma and Nair (1974) also reported a positive and significant relationship between economic motivation and adoption behaviour of farmers. Similar findings were also reported by, *Sangle, 1984; Kumar, 1992; Talukdar and Sontaki, 2005; Goswami et. al., 2010; Singha et al. 2011*). A positive and significant relationship between family size and extent of adoption was also reported by *Singh (1989). Chanu et.al (2014)* found that socioeconomic attributes like education, land holding, annual income, attitude towards modern agricultural technology, mass media exposure, extension contact, information sources used, value added product management show the positive and significant relation with adoption level of pineapple growers. *Devi and Ponnarasi (2009)* indicated that age, farm size, income of the farm, number of earners in the family and number of contacts with extension agencies are positive and highly influence the adoption behaviour of the farmers. Lacks of skilled labour, awareness, training on new technology and experience have been opined as the main problems in adoption of this technology by the farmers.

Multiple Regression Analysis of extent of adoption of recommended rice production technology with socio economic parameters: It is clear from Table 3 that the regression coefficients of family size (b= 2.03409*) and economic motivation (b=1.53606**) were found to be significant. Therefore, these two parameters can be termed as good predictors of extent of adoption of recommended rice production technology. The R2 value being 0.22808 suggests that the socio-economic parameters jointly contributed 22.80 per cent towards variation in extent of adoption of recommended rice production technology. The F value (F =1.9206) was

also found to be significant. This indicates the significant effectiveness of these socio-economic parameters in predicting the extent of adoption of recommended rice production technology when all of them were functioning jointly.

Singh et. al (2010) revealed that among the correlates of extent of adoption of mango production technology, religion, land size, education, farm power, socio-economic status, risk taking behaviour, innovativeness, economic aspiration, scientific orientation and credit orientation were positively and significantly associated with fruit grower's extent of adoption of improved mango production technology at 0.01 level of probability. Regression analysis of extent of adoption of fruit growers on improved mango production technology revealed that level of knowledge of mango cultivation practices was found to be contributing positively and significantly in predicting the extent of adoption of mango fruit growers.

Table 3. Multiple Regression analysis of extent of adoption of recommended rice production technology with socio economic parameters of respondents

Variables	b value	t value
Age	0.04863	1.02435
Educational level	0.31858	0.62782
Family size	2.03409*	1.99142
Family members engaged in farm activities	-0.71178	-1.66658
Social participation	-0.35848	-0.65764
Types of house	0.99419	1.35057
Main occupation	-1.12520	-0.89712
Information sources used	0.23970	0.31700
Operational land holding	0.32932	0.46556
Total Annual Income	-0.00001	-0.23273
Training exposure	-0.22396	-0.53935
Economic motivation	1.53606**	2.78212
Scientific orientation	0.32476	0.63586

R^2=0.22808, Adjusted R^2= 0.10932 F value =1.9206*
*Significant at 0.05 level probability,
**Significant at 0.01 level probability

CONCLUSION

The study revealed that majority of the sampled respondents was partial adopters. Furthermore, it was seen that most of the respondents were completely dependent on fertilizer shops for advice on application of fertilizers and pesticides and did not have any contact with the local ADO or VLEW's. Also, 'Biofertilizers' had the highest percentage of 'no adopters' (98.05%) among all 25 practices and in most cases the respondents had no idea about biofertilizers. This shows the lack of knowledge on bio-fertilizers of the respondents and gives us an opportunity to strengthen the extension activity in this regard. Production technologies like 'Harvesting methods', 'puddling', 'ploughing' and 'age of uprooting of seedlings' had the highest number of full adopters which shows a promising trend. However, the extent of adoption increases with the increases in 'family size' and 'economic motivation'.

The overall findings of the study shows the lack of adequate extension work in the area for which most of the respondents depend on fertilizer shops for seeking information which is the main reason for non-adoption of bio-fertilizers by majority of the respondents**.** The study highly recommends strengthening the extension wings of the research stations to percolate the need based information in time**.** Also**,** it was seen that the extent of adoption of recommended production technologies was slightly better in the areas which had a rice centric research station. Moreover, this indicates that farmers residing in districts that do not have an RARS altogether will probably get even less information and opportunities regarding recommended production technologies of AAU. So, AAU should try to improve the quality of extension work going on in districts that do not have rice centric RARS or an RARS altogether to ensure a better bridge between the laboratory and the fields.

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