



Impact of Improved Technology in Enhancing Productivity and Income of Paddy Farmers in Assam- An Analysis in Dibrugarh District of Assam

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ABSTRACT

Background: Paddy is a very important agricultural crop of Assam occupying 71.59 per cent of its total net cropped area. Among paddy, Sali paddy occupies 78.21 per cent of total paddy area in the state. Ranjit variety of Sali paddy developed by Assam Agricultural University found to be proven variety having yield potential of 6 ton per hectare in farmer's field. Hence University did large scale demonstration across the state and results were encouraging.

Methods: The present study was an attempt to find out the impact of improved technology in enhancing the productivity and income of paddy farmers in Assam, India. Study was conducted during the year 2021-22. Sample for the study consisted of 88 randomly selected beneficiary farmers of improved technology intervention in Sali paddy cultivation undertaken by Assam Agricultural University, Jorhat in Dibrugarh district with proven variety Ranjit.

Result: The study revealed that there was increase of productivity of Sali paddy by 2 times, gross return and net return by 3.48 times and 50.37 times, respectively, due to the adoption of improved technology and Benefit-cost ratio was 2.24 with adoption and 0.95 without improved technology. Horizontal spread of technology increased by 61.54 per cent in number and 539.67 per cent in area cultivated. These implied the positive impact of technology intervention in paddy cultivation.

Key words: Impact, Improved Technology, Income, Productivity, Paddy.

INTRODUCTION

The state Assam is an Agrarian State and more than 75 per cent of state's population depend on agriculture as farmers, agricultural laborers, or both for their livelihood and provides employment and support to more than 50 per cent of its total workforce (Anonymous, 2018). The net sown area and gross cropped area of the state is 2801 and 4060 thousand hectares, respectively and resulting cropping intensity is about 145 per cent. The total geographical area of Assam is 78,438 square kilometer which is 2.4 per cent of our country's total geographical area and supports 312.05 lakh populations (Anonymous, 2011). Geographically the state is situated between 89°42'E to 96°E longitude and 24°8'N to 28°2'N latitude.

Paddy is a very important agricultural crop of Assam occupying 71.59 per cent of its total net cropped area and among paddy; Sali paddy occupies 18.78 lakh hectare of area which is 78.21 per cent of total paddy area of 24.01 lakh hectare in the state. Rice being a staple food for the people of Assam, the economic influence of paddy on the livelihood of people in the state is quite sizable where 27.2 lakh farm families are engaged in cultivation of this particular crop every year. The average productivity of paddy in the state is 3377 kg per hectare (Anonymous, 2021) vis-a-vis country's average productivity standing at 3878 kg per hectare (Anonymous, 2021). But state has a very suitable soil and climatic condition for growing most of agricultural crops having very market demand both at local and global level. So, in order to meet the growing demand for food,

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income and standard of living of paddy farmers in particular and farming community in general enhancement of productivity level of crops particularly the productivity of paddy is one of the viable and profitable option which demand its optimum exploitation. Here comes the importance of use of suitable high yielding varieties of paddy in the state with a greater interest to enhance the production, productivity and profit of farmers. In order to bring about a desirable change in this direction, the Assam Agricultural University, Jorhat Assam conducted some large scale technology showcasing programme on certified seed production of paddy with its owned developed suitable variety Ranjit because this variety has the proven yield potential of about 6 ton per hectare across the state with a duration of 150-155 days and average plant height 102 cm. One such programme was conducted in the Dibrugarh district under the supervision of Krishi Vigyan Kendra Dibrugarh. Therefore, present study was conducted in

Dibrugarh district to find out the impact of improved technology intervention in enhancing the productivity and income of paddy farmers for judicious undertaking of farming decision in future time.

MATERIALS AND METHODS

For the present study the district Dibrugarh, Assam, India was selected purposively because technology showcasing on improved cultivation of Sali paddy with high yield variety Ranjit was conducted by the Krishi Vigyan Kendra Dibrugarh of Assam Agricultural University Jorhat Assam. Out of the 20 adopted villages 10 villages were selected randomly and out of the 353 beneficiary paddy farmers 50% farmers (88Nos) were selected randomly for the purpose of investigation. The primary data were collected from the respondent farmers with the help of specially designed pre-tested interview schedules through personal method. Respondent farm households were stratified into four size group on the basis of their operational holding as - Marginal (below 1 ha), Small (1-2 ha), Medium (2-10 ha) and Large (10 ha and above). In the sample area there were no large farmers. Only marginal, small and medium group of farms were available and these were- 53 marginal, 20 small and 15 medium sized farm households (Table 1). Data collected were compiled and analyzed duly for the purpose of report writing and future decision making.

Table 1: Classification of operational holding in the sample area, Dibrugarh.

Size group (in hectare)	Number of holdings
Marginal (below 1.0)	53
Small (1.0-2.0)	20
Medium (2.0-10.0)	15
Large (10.0 and above)	0
All farm	88

Source: Field survey data.

Table 2: Cropping pattern of the sample area, Dibrugarh, Assam.

Particulars	Size group				
	Marginal	Small	Medium	Large	All farm
No. of households	53	20	15	0	88
Local paddy area (ha)	23.03	13.78	19.33	0	56.14
% of local paddy area	56.60	48.82	53.04	0	53.27
HYV paddy area (ha)	17.66	14.45	17.12	0	49.23
% of HYV paddy area	43.40	51.18	46.96	0	46.73
Total paddy area (ha)	40.69	28.23	36.45	0	63.07
% of gross cropped area	91.65	94.69	90.75	0	92.13
Vegetables area (ha)	1.14	0.6	0.88	0	2.62
% of gross cropped area	2.57	2.01	2.19	0	2.29
Double cropped area (ha)	2.57	0.98	2.83	0	6.38
Net cultivated area (ha)	41.83	28.83	37.33	0	107.99
Gross cultivated area (ha)	44.4	29.81	40.16	0	114.37
Cropping intensity (%)	106.13	103.41	107.59	0	105.91
Average size of operational holding (ha)	0.80	1.44	2.49	0	1.24

Source: Field survey data.

Description about study area

The district Dibrugarh is an important district of Assam and known as the Tea City of Northeast India. The Dibrugarh District is situated in eastern part of Assam. The district is located at 95° 51' 45"E Longitude and 27° 21' 49"N Latitude with a geographical area of 3, 38,100 hectares support 1326335 population as revealed in the Census of India, 2011. Average annual rainfall found is 2200 mm with highest during the month from May to September. The district has two major classes of soil belonging to Inceptisol and Entisol. The net cropped area and gross cropped area of the district is 150167 hectares and 164518 hectares, respectively and its cropping intensity is 109.56 per cent. There are 109439 farm families in the district and 82.02 per cent are of small and marginal farm families. Total paddy area in the district is 76156 hectares which is 50.71 per cent of its net cropped area and 41.11 per cent of Sali paddy area is covered by high yielding varieties of paddy mainly by the variety, Ranjit, whose potential yield is about 6000 kg per hectare.

RESULTS AND DISCUSSION

The sample area is characterized by the dominance of Sali paddy crop occupying more than 90 per cent of its gross cropped area across various size groups of farms and on an average Sali paddy occupies 92.13 per cent of its gross cropped area (Table 2). The percentage coverage of local and high yielding Sali paddy in the sample area was 53.27 and 46.73 per cent, respectively. The area coverage by vegetables in the sample area was 2.29 per cent of gross cropped area and average cropping intensity of the area was 105.91 per cent against the average cropping intensity of 145 per cent of the state. The average size of operational holding in the sample area was found to be 1.24 hectares. This implies that sample area has the clear scope for double

or multiple cropping with suitable crop-varieties combination having increasing market demand.

In the study area improved technology included several component like- high yield variety, seed rate, seed treatment, time of planting, recommended dose of fertilizers and farm yard manures, timely intercultural operations, plant protection measures etc. along with training of paddy farmers on improved cultivation of Sali paddy in time. Impact of improved technology application was studied in terms of change in productivity, income and profit along with gain of knowledge of paddy farmers about improved cultivation of paddy crop. This was compared with the results of paddy without adoption of improved technology in the sample area.

With the adoption of improved agricultural technology showcased by the Krishi Vigyan Kendra Dibrugarh of Assam Agricultural University Jorhat Assam in the sample area in the form of suitable high yielding Sali paddy variety like Ranjit and its very improved method of proven cultivation in right time and place along with proper training of paddy farmers about this technology, respondent farmers realized the encouraging impact of improved technology meant for this paddy crop. The result of the study revealed that the productivity of Sali paddy increased remarkably with the adoption of improved technology across different size group of farms. Productivity of improved Sali paddy cultivation varies from 5800 kg to 6167 kg per hectare across size group of farms and the average productivity in the sample area achieved was 5962 kg per hectare. On the contrary, the

productivity of paddy without the adoption of improved technology was 1771 to 1967 kg per hectare across different size group of farms that is with their traditional method of cultivation with local crop variety. The average productivity local paddy without the use of improved technology was 1863 kg per hectare. Thus, there was increase of productivity of Sali paddy due to the adoption of improved technology by more than three times (220 per cent) in the sample area over the traditional method of Sali paddy cultivation. This implies that improved technology has positive impact in enhancing the productivity of paddy in the sample area. Similar type findings also reported by Abate *et al.*, 2018; Bhati *et al.* (2018); Khaiwal, (2014); Noltze, *et al.* (2013); Samant, (2015); Sajeev *et al.* (2018); Sharma and Thomas (2013); Singhal *et al.* (2012); Singh *et al.* (2019); Singh and Sharma (2018); Tadesa(2019); Villano, *et al.*, 2015; Zeng *et al.*, 2015.

The study also revealed that gross return per hectare varied from ₹ 81200 to ₹ 86388 across different size group of farms and on an average it was ₹ .83475 (Table 3). Against this, the gross return without the adoption of improved technology in paddy cultivation varied from ₹ 17710 to ₹ 19670 per hectare and average gross return was ₹ 18627 per hectare. Thus gross return in paddy cultivation with the adoption of improved technology was more than 3 times over the cultivation without the adoption of improved technology. Another impact of improved technology adoption in paddy cultivation in the sample area was reflected in the

Table 3: Economic impact of Improved Technology on paddy cultivation (Variety-Ranjit) in the sample area, in Dibrugarh, Assam.

Parameters	Size group											
	Marginal			Small			Medium			All farm		
	Wol	WI	difference	Wol	WI	difference	Wol	WI	Difference	Wol	WI	difference
Productivity (kg/ha)	1771	5920	4149	1850	5800	3950	1967	6167	4200	1863	5962	4099
% increase in productivity		234			214			214			220	
Cost of Cultivation (₹/ha)	18780	36500	17720	19300	37560	18260	20500	37650	17150	19527	37237	17710
% change in cost of cultivation		94.36			94.61			83.66			90.70	
Gross return (₹/ha)	17710	82880	65170	18500	81200	62700	19670	86338	66668	18627	83473	64846
% change in gross return		368			339			339			348	
Cost of production (₹/q)	10.60	6.17	-4.44	10.43	6.48	-3.96	10.42	6.11	-4.32	10.48	6.25	-4.24
% change in cost of production		-41.86			-37.93			-41.42			-40.43	
Net return (₹/ha)	-1070	46380	45310	-800	43640	42840	-830	48688	47858	-900	46236	45336
% change in net return		4235			5355			5766			5037	
Benefit-cost ratio	0.94	2.27		0.96	2.16		0.96	2.29		0.95	2.24	
% change in B:C ratio		140.79			125.54			138.99			135.00	

Source: Field survey data; N: B. Wol= Without Intervention of technology, WI=With intervention of technology.

Table 4: Horizontal spread of technology from the sample area, Dibrugarh, Assam.

Particulars	Size group			
	Marginal	Small	Medium	All farm
Additional number of farm adopting technology	9	12	11	32
% of farm households covered by horizontal spread	29.03	100	122.22	61.54
Additional adopted area increase(ha) for technology	2.27	40.77	116	159.04
% area of horizontal spread	21.56	470.24	1129.50	539.67

Source: Field survey data.

cost of production. It was found that cost of production reduced by 40.43 per cent and net return per hectare varied from 40.35 to 57.66 times increase over the traditional method of cultivation and the net return in the sample area was 50.37 times more than that of paddy cultivation without the adoption of improved technology. In absolute term net return with adoption of improved technology in paddy cultivation was ₹ 46236 per hectare in the sample area. Bhati *et al* (2018); Tadesa (2019); Singh *et al* (2019); Sharma and Thomas (2013); Rimal *et al* (2015); Khaiwal, R. (2014) also reported the positive impact of adoption of improved technology in crop production on the income and profit of farmers. The benefit-cost ratio in the sample area was 0.95 without intervention of improved technology and 2.24 with the intervention of improved technology in paddy cultivation. Thus farmers in the study area realized the positive impact of improved technology intervention in paddy cultivation and this is really encouraging for their greater benefit in their way of life. Study also revealed that additional horizontal spread of improved technology intervention in paddy cultivation was 61.54 per cent in number and 539.67 per cent in area cultivated (Table 4). This may be due to positive gained realized in terms of enhanced productivity, income and profit due to adoption of improved technology in paddy cultivation in the sample area.

CONCLUSION

Thus the given study established that intervention of location specific suitable and improved agricultural technology intervention in the form of suitable high yielding variety, package of practices of crop cultivation, effective and timely training etc enhanced the productivity, income and profit level of paddy farmers besides increasing their knowledge level about the suitable improved method of cultivation. Still there exist vast scope for enhancing the productivity and profit of all agricultural crop cultivation of these farmers with more improvement of their method of cultivation or package of practices through adoption of following measures in very right time and place placing due emphasis on sustainability of agricultural activities.

1. Implementing more effective effort in adoption of suitable improved agricultural technology in due space and time.
2. Ensuring regular availability of quality seed, variety, manures and fertilizers, pesticides and agro-advisories in a very easily accessible, affordable and profitable manner.
3. Undertaking more regular motivating and sensitizing measures like showcasing of proven improved technology, training and awareness programme at farmers' field.

4. Timely due support to farmers in the form of required infrastructures like irrigation, communication, electricity, storage, credit, value addition, market, remunerative price support, market information etc.

Thus, the economies of scale in the intervention of suitable improved agricultural technology in all areas with similar agro-climatic environment and suitable and sustainable human effort can bring about a desirable change in enhancing the productivity, income and profit of our farming community with greater coverage in both number of farm families and area cultivated.

Conflict of interest: None.

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