

Research Article

The technology adoption of major food grain crops in Birbhum district of West Bengal

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SUMMARY : The present study was conducted in Bolpur-sriniketan and Sainthia block of Birbhum district of West Bengal by selecting 60 sample farmers to find out the level of technology adoption for major food grain crops among different categories of farmers. For technology adoption level, a technology adoption index was constructed by taking relevant parameters. It was observed that the level of modern farm technology adoption was not encouraging in the study area and it was positively correlated with size of land holding. Rice emerged as the main foodgrain crop in the area. The overall average technology adoption index for *Rabi* rice (64.66%) was higher than *Kharif* rice (56.16%). Overall technology adoption index were 56.03 per cent, 36 per cent and 37.21 per cent for wheat, chickpea and lentil, respectively. Level of technology adoption was not only varied among the major foodgrain crops but among different categories of farmers also.

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BACKGROUND AND OBJECTIVES

Indian agricultural development can be looked at from two different perspectives: institutional and technological. The institutional approach, mainly typified by land reforms and changing agrarian relations which registered a limited success in Indian agricultural. The technological approach to agricultural development came around the mid-sixties, and made decisive impact on agricultural production and productivity which made the country self-sufficient in the food particularly in cereals. On the other hand, it raised the income of the farmers. Although recently there has been some imports of wheat which has again raised the concern about the food sufficiency in the country. But then, in recent years, technology that heralded the process of green revolution started showing signs of weariness during the nineties. The technological weariness reflects itself, inter alia, in stagnating and falling yield rates for a number of crops.

The pace of adoption of new agriculture technology in West Bengal is in slow progress. In case of major food grain crop of the state (*i.e.*

paddy) farmers were using traditional varieties. Only very recently the HYVs have started to gain attraction of the farmers (Bureau of Economics and Statistics, Review of *Kharif* Production-2003, Government of W.B.). From preliminary observation it is revealed that yield of major foodgrain crops in Birbhum district except wheat are comparatively lower than other districts. One of the main reasons is low level of technology adoption.

The comparison of average yield of major food grain crops in the state as well as in Birbhum district (study area) with the potential yield shows the existence of huge yield gap. The existing yield gap partly may be due to poor adoption of new agriculture technologies.

RESOURCES AND METHODS

Measuring the level of technology adoption:

In order to achieve the first objective of the study, the following procedure has been followed:

– A technology adoption index was prepared for each and every sample farmer of different categories for every major food grain

KEY WORDS:

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crops using the technique given by Dhondyal (1991).

$$L = \frac{1}{6} \left[\frac{X_1 * 100}{A_0} + \frac{X_2 * 100}{F_0} + \frac{X_3 * 100}{A_0} + \frac{X_4 * 100}{A_0} + \frac{X_5 * 100}{A_0} + \frac{X_6 * 100}{I_0} \right]$$

where,

L = Level of technology adoption (%)

A₀ = Total cropped area under the food grain crop (hectare)

X₁ = Area under high yielding varieties (hectare)

X₂ = Doses of fertilizers per hectare at farm level (N:P:K)

F₀ = Recommended dose of fertilizer per hector (N:P:K)

X₃ = Area ploughed by tractor (hectare)

X₄ = Area covered by herbicide used (hectare)

X₅ = Area shown in time (hectare)

X₆ = No. of irrigation given

I₀ = No. of irrigation recommended

The technology adoption index thus prepared varied from 0 to 100. Farmers were categorized depending upon their technology adoption level as given in Table A.

Extent of technological adoption (%)	Adoption category
0-25	Low
25-50	Medium
50-75	High
75-100	Very high

Source: Dhondyal, 1991

– Average level of technology adoption index was prepared for different categories of farmers separately and for all farmers as a whole for every food grain crops.

OBSERVATIONS AND ANALYSIS

The results obtained from the present investigation has been discussed under following sub-heads :

Table 1 : Level of technology adoption among different categories of farmers in Kharif rice

Level of technology adoption	Small	Medium	Large	Overall
Low (0-25%)	0 (0)	0 (0)	0 (0)	0 (0)
Medium (25-50%)	26 (72.22)	0(0)	0 (0)	26(43.33)
High (50-75%)	10 (27.78)	17 (94.44)	2 (33.33)	29 (48.34)
Very high (75-100%)	0 (0)	1 (5.56)	4 (66.67)	5 (8.33)
Total	36 (100)	18 (100)	6 (100)	60(100)

N.B. Figures in parentheses are corresponding percentage

Table 2 : Level of technology adoption among different categories of farmers in Rabi rice

Level of technology adoption	Small	Medium	Large	Overall
Low (0-25%)	0 (0)	0 (0)	0 (0)	0 (0)
Medium (25-50%)	8 (33.33)	0 (0)	0 (0)	8 (19.51)
High (50-75%)	16 (66.67)	7 (63.64)	1 (16.67)	24 (58.54)
Very high (75-100%)	0 (0)	4 (36.36)	5 (83.33)	9 (21.95)
Total	24 (100)	11 (100)	6 (100)	41 (100)

N.B. Figures in parentheses are corresponding percentage

Level of technology adoption:

By new technology we mean the available means which improves the efficiency of scarce resources to satisfy human wants. But in agriculture the term new technology refers to a package of practices that includes HYV seeds, recommended dose of fertilizers and pesticides, assured irrigation, use of farm machinery and equipments. The rate of adoption of modern technology in major foodgrain crops has been analyzed and discussed below.

Level of technology adoption in Kharif rice:

The Table 1 revealed that nearly 92 per cent farmers fall under the category of medium to high level of technology adoption. It is clear from the table that technology adoption was not up to the level. Although no farmer showed poor performance (0-25%) in technology adoption but in case of small farmers' majority of farmers (72.22%) were under the medium category. Only 27.78 per cent of small farmers showed good performances who were high technology adopter. In case of medium and large farmers there was no farmer who falls under the group of low and medium performance. All the medium and large farmers (100%) fell under the category of high to very high. Further it may be noted from the Table 3 that technology adoption index was highest on large farmers (76.15%) followed by medium (67.38%) and small farmers (47.22%).

Level of technology adoption in Rabi rice:

Considering all the sample farmers (60), it was observed that 41 farmers (about 68%) cultivated the Rabi rice. From the Table 2 it was found that about 80 per cent farmers fell under high to very high category i.e. adopting 50 to 100 per cent of the recommended practices. Among the small farmers 66.67 per cent farmers were high technology adopter which showed different picture from Kharif rice where only 27.78 per cent

farmers were high technology adopter. Over all only 19.5 per cent farmers fell under medium technology adopter and like *Kharif* rice no farmer was under poor performance group (0-25%). In case of medium farmers, 63.64 per cent farmers were ranked as high adopter of technology and rest 36.64 per cent farmers were in the category of high adopter. But among the large farmers majority of farmers (83.33%) were in very high adopters category and rest 16.67 per cent farmers were in high adopters groups. So it can be concluded that technology adoption was relatively better in case of *Rabi* rice cultivation. Overall trend of average technology adoption index for different categories of farmer were same as *Kharif* rice. Average technology adoption index was 77.56 per cent for large farmers, 74.15 per cent for medium and 55.97 per cent for small farmers and it was 69.43 per cent for all categories of farmers.

Level of technology adoption in wheat:

Technology adoption status in case of wheat is presented in the Table 4. It was found that 59.09 per cent of sample farmers were under high technology adoption group and 36.36 per cent farmers were medium technology adoption group. Like *Kharif* and *Rabi* rice there was no farmers under the low adopter category. The Table 4 showed that all (100%) of the medium farmers and majority of large farmers (66.67%) were high technology adopter and rest of large farmers (33.33%) were very high technology adopters. Among small farmers 54.14 per cent belonged to medium adoption category. So it can be concluded that in case of wheat also small farmers were relatively poor adopters of new farm technologies.

Average technology adoption index (Table 3) showed direct relationship with the farm size. Here also technology

Table 3 : Average technology adoption index in major foodgrain crops

Crops	Categories				Overall
	Small	Medium	Large		
<i>Kharif</i> rice	47.22	67.38	76.15		56.16
<i>Rabi</i> rice	55.97	74.75	77.56		64.66
Wheat	48.57	67.11	72.38		56.03
Chickpea	36	---	---		36
Lentil	31.26	34.52	51.62		37.21

N.B. Figures in parentheses are corresponding percentage

Table 4 : Level of technology adoption among different categories of farmers in wheat

Level of technology adoption	Small	Medium	Large	Overall
Low (0-25%)	0 (0)	0 (0)	0 (0)	0 (0)
Medium (25-50%)	16 (57.14)	0 (0)	0 (0)	16 (36.36)
High (50-75%)	12 (42.86)	10 (100)	4 (66.67)	26 (59.09)
Very high (75-100%)	0 (0)	0 (0)	2 (33.33)	2 (4.55)
Total	28 (100)	10 (100)	6 (100)	44 (100)

N.B. Figures in parentheses are corresponding percentage

Table 5 : Level of technology adoption among different categories of farmers in chickpea

Level of technology adoption	Small	Medium	Large	Overall
Low (0-25%)	0 (0)	---	---	0 (0)
Medium (25-50%)	10 (83.33)	---	---	10 (83.33)
High (50-75%)	2 (16.67)	---	---	2 (16.67)
Very high (75-100%)	0 (0)	---	---	0 (0)
Total	12 (100)	---	---	12 (100)

N.B. Figures in parentheses are corresponding percentage

Table 6 : Level of technology adoption among different categories of farmers in lentil

Level of technology adoption	Small	Medium	Large	Overall
Low (0-25%)	2 (20)	2 (20)	0 (0)	4 (15.39)
Medium (25-50%)	8 (80)	8 (80)	1 (16.67)	17 (65.38)
High (50-75%)	0 (0)	0 (0)	5 (83.33)	5 (19.23)
Very high (75-100%)	0 (0)	0 (0)	0 (0)	0(0)
Total	10 (100)	10 (100)	6 (100)	26 (100)

N.B. Figures in parentheses are corresponding percentage

adoption index was highest for large farmers (72.38%), followed by medium farmers (67.11%) and small farmers (48.57%). Thus it revealed that adoption status of technology between large and medium farmers was not considerably different whereas the difference of technology adoption status was high for small farmers when compared with large and medium farmers.

Level of technology adoption in chickpea:

Among the sample farmers only 12 farmers cultivated this *Rabi* pulse crop and all of them were small farmers. Majority of these small farmers (83.33%) were medium technology adopter only few (16.67%) were high technology adopter. Average technology adoption index was not encouraging for the crop as revealed. From Table 3, it was observed that average technology adoption index was only 36 per cent which is very poor performance for the district.

Level of technology adoption in lentil:

Comparing Table 5 and 6 it can be concluded that farmers of the Birbhum district preferred lentil than chickpea in recent years in *Rabi* season as 26 farmers cultivated lentil against 12 farmers cultivated chickpea. But the Table 6 revealed that nearly 80 per cent of sample farmers who cultivated lentil were low to medium technology adopters. Thus it can be concluded that the scenario of technology adoption was relatively poor in case of lentil. Only 19.23 per cent of sample farmers were under high technology adoption category and all of them were large farmers. It may be further noted from the Table 6 that 80 per cent of small and medium farmers were medium (25-50%) technology adopter and rest 20 per cent were low technology adopter. In case of large farmers only 16.67 per cent farmers were under medium technology adoption category and rest 83.33 per cent were high technology adopter. From the Table 6 it can be seen that technology adoption in lentil cultivation was not encouraging as average technology adoption for all the sample farmers was only 37.21 per cent. Like all other major food grain crops technology adoption index was highest for large farmers and lowest for small farmers. Average technology adoption index was 51.62 per cent, 34.52 per cent and 31.26 per cent for large, medium and small farmers, respectively.

Summary and Conclusion:

It was observed that the level of modern farm technology adoption was not found encouraging in the study area and it was positively correlated with size of land holding. Although no farmer showed the low level performance in both *Kharif* and *Rabi* rice cultivation but in case of *Kharif* rice majority of small farmers were medium technology adopter. In *Kharif* rice 72.22 per cent of small farmers were under the medium category and only 27.78 per cent of small farmers showed good performances who were high technology adopter. Small farmers showed good performance in *Rabi* rice cultivation where most

of the small farmers (66.67%) were under high technology adoption category. In *Rabi* rice cultivation majority of farmers (80%) were high to very high technology adopter so the average level of technology adoption index was higher than *Kharif* rice. Comparing the rice cultivation in two seasons it was observed that average level of technology adoption was not varied so much in case of large farmers but variation was observed in case of small and medium farmers. In *Kharif* rice average technology adoption was 47.22 per cent for small farmers whereas in *Rabi* rice it was about 56 per cent and in case of medium farmers it was 67.38 per cent and 74.75 per cent for the two seasons, respectively. The overall average technology adoption index for *Rabi* rice (64.66%) was higher than *Kharif* rice (56.16%). So it may be concluded that farmers were keen in adopting modern farm practices in *Rabi* rice cultivation than *Kharif*. Variation was not only found within the two seasons but significant variation was observed among different categories of farmers also within the same season.

Wheat is the second major food grain crop of the district. It was observed that difference in technology adoption between large and medium farmers was not high enough whereas difference in technology adoption was high for small farmers when compared with large and medium farmers. About 57 per cent of small farmers were medium technology adopter. Technology adoption index was highest for large farmers (72.38%), followed by medium farmers (67.11%) and small farmers (48.57%) for the crop.

In case of pulse crops like chickpea and lentil (two major pulse crop of the study area) technological performance was poor. All the chickpea growers were small farmers and majority of them (83.33%) were medium level technology adopter and the average technology adoption index was low, only 36 per cent. In case of lentil, most of the farmers (80%) were low to medium level technology adopter. Small and medium farmers showed similar performance in this crop where 80 per cent of both categories of farmers were found under medium technology adoption group. Like other crops, in case of lentil also large farmers were high technology adopter. However technology adoption in lentil cultivation was not good in overall as average technology adoption index for all the sample farmers was only 37.21 per cent.

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