ADAPTIVE RESEARCH AND IMPACT STUDY OF THE BRRI DEVELOPED AGRICULTURAL MACHINERY IN BANGLADESH

M. A. Baqui
Chief Scientific Officer
Farm Machinery and Postharvest Technology Division
Bangladesh Rice Research Institute, Gazipur, Bangladesh

Abstract The study was carried out during January 1998 to December 2000 with an objective to identify the needs of using agricultural machinery at different stages of rice cultivation. Another objective was to determine the acceptability and impact of popularizing the BRRI developed agricultural machinery among the farmers of Bangladesh. With a view to this, as many as 34 demonstrations were conducted with BRRI Rice-wheat reaper, BRRI Rice-Wheat thresher and BRRI open drum power thresher at selected sites of Bangladesh. Among them 13 demonstrations were conducted in wheat growing areas. Machines were demonstrated before the farmers, DAE officials, manufacturers and NGO workers. 75-96% of the participants expressed satisfaction on the performance of the BRRI Rice-Wheat reaper and thresher. Most (65-74%) farmers wanted to purchase thresher and reaper as group ownership for wheat and paddy. 76-91% of them wanted to use reaper and thresher at rental basis. For paddy threshing, 69% of the participants expressed satisfaction on the performance of thresher. Almost 96% farmers wanted to have this machine as their own. The expected price offered by the farmers was Tk 10,000/unit. More than 250 farmers used this machine for wheat and paddy threshing. Ninety percent farmers expressed for the necessity of these machines in agricultural operation. BRRI developed reaper and thresher were found acceptable, suitable, reliable and economically viable to the farmers. Therefore, the impact is encouraging towards mechanized reaping and threshing.

Key word: Reaper, thresher, demonstration, farmer

INTRODUCTION

The function of extension is essential for the farmers for successful adoption of a new technology. The gains in economic growth of Bangladesh have been partially offset by the population growth. It is inevitable that production process must be modernized in order to maintain sustainable economic growth. As agricultural modernization gets under way, there would be an increased demand for machinery to increase agricultural output, labor productivity and income of farmers as well as improve their working conditions inspite of the apparent labor surplus and fear of worsening unemployment in Bangladesh. Moniruzzaman (1993) pointed out that, demonstration is one of the strongest methods to introduce new machines among farmers. These need strong infrastructural and institutional arrangements, which are totally absent in the country. These issues must be given due importance and appropriate measures be taken to farmers for extension and proper management of the agricultural machinery in the fields. Without proper advice regarding management of machinery and irrigation water, efficiency of agricultural production system is definitely to reduce and even negative impact may be created among the farmers about the technology. Esmay (1988) stated that agricultural mechanization must be appropriate for small farmers. Tools, machines and equipment most feasible for these farms are usually manufactured by local shops and craftsman. These local entrepreneurs need to be improved in order to adequately fulfill the market needs. The traditional method of paddy threshing (bullock treading) causes grain loss as high as 6% (Miah, 1990). At a very conservative estimate of 3%, the amount that can be saved by using mechanical thresher is about 0.6 million metric tons of rice annually. It is also observed that wheat threshing is very difficult and acute labor shortage exists during wheat harvesting seasons which jeopardizes wheat cultivation to a great extent. Results from a couple of field demonstrations have also indicated that farmers need mechanical threshers for wheat threshing. Therefore, in order to change Bangladesh agriculture into a production oriented, dependable and profitable business; BRRI has been developing farm machinery suitable for Bangladeshi farmers.

OBJECTIVE

General objective

To demonstrate and popularize the BRRI developed agricultural machinery among the farmers of Bangladesh.

Specific objectives

i) To determine the acceptability of the local made agricultural machineries at farm level.
ii) To verify the quantitative and qualitative performances of the machines.
iii) To encourage local enterprises for manufacturing agricultural machinery.
iv) To study the impact of machinery use among farmers and related agencies.

MATERIALS AND METHODS

a) Site Selection

Selection of demonstration sites was made on the basis of the following criteria:

- easily accessible
- of high cropping intensity area
- an area of labor shortage (Suburb area, where laborer migrate to the urban area and Boarder area, where they might be engaged in other off farm job).

b) Machinery Demonstrated

1. BRRI Rice-Wheat Thresher (TH-7 and TH8)
2. BRRI Rice-Wheat Reaper
3. BRRI Open Drum Power Thresher

c) Method of demonstration

At each site at least 50 participants mostly farmers, DAE officials, manufacturers and NGO workers were invited. Introductory sessions were arranged to familiarize the machine performance, unit price, profitability over traditional practices, operation, repair and maintenance of the machine. Machines were operated before the participants at least for half an hour. Discussion session was arranged to collect participant's reaction on the prospects and drawbacks of the machines. Short questionnaire was supplied to the participants asking their opinion/comments on machine performance. Afterwards data were analyzed and discussions were made.

d) Record of farmer's opinion on the machine performance

An interview schedule was prepared and respondents reaction were recorded on

1. social acceptability,
2. technical performance,
3. profitability/social benefits,
4. effectiveness of communication and training programs,
5. private entrepreneurship possibility for equipment repair and maintenance and
6. maintenance needs of the equipment

RESULTS AND DISCUSSION

Mechanization status of selected sites

Table 1 describes the different kinds of farm machinery are being used in one of the selected sites (Baliadangi thana, Thakurgaon). There are 125 DTW's, 2178 STW's, 61 PT's, 4260 nos. traditional plough and 13194 nos. improved ploughs. It is very interesting that adoption of improved ploughs is more than 50% higher than that of country plough. It confirms that farmers always ready to accept improved technologies if its is suitable to their socio-economic condition. It may be mentioned here that in Baliadangi thana 61 PTs cultivated about 2545 ha land i.e. land under mechanized cultivation is about 11% in the study area. Threshing loss was as high as 6.11% in wheat threshing, which indicated considerable amount of crop may be saved by machine wheat threshing.

Demonstration

As many as 34 demonstrations were conducted with BRRI Rice-Wheat thresher and BRRI Rice-Wheat reaper at different selected places of Bangladesh. Among them 13 demonstrations were conducted in wheat harvesting seasons during the project period. The summary of demonstration results have been presented in Table 2. There were about 307 and 550 participants responded on the performances of BRRI thresher for wheat and paddy threshing, respectively. However, only 100 and 97 farmers responded for BRRI reaper machine for wheat harvesting and paddy harvesting respectively. For wheat threshing, 75% of the participants expressed satisfaction on the performance of the BRRI Rice-Wheat thresher (TH-7). However, 95% of the farmers wanted to buy the machine at Tk 10,000/unit. Most (65-74%) farmers wanted to purchase thresher and reaper as group ownership for wheat and paddy. 76-91% of them wanted to use thresher and reaper at rental basis. They offered a hire charge of Tk 100-200/bigha. Participants did not encounter any problem to operate the machine. However, a skilled operator is needed for efficient operation. For wheat reaping 68% of the participants expressed satisfaction on the performance of the BRRI Rice-Wheat reaper. However, 96% of the participants wanted to buy the reaper at maximum price of Tk. 10,000/unit. On the other hand, 86% farmers opined for rental uses at a rental charge of Tk 100-200/bigha. For paddy threshing, 69% of the participants expressed satisfaction on the performance of thresher. Almost 96% farmers wanted to have this machine. Respondents argued the less price of the machine and expected that the price of the machine should be within Tk 10,000/unit. 91-98% farmers felt the necessity of this machine in agricultural operation. Most (91-96%) farmers expressed that the field level operation of the thresher was quite safe.

Farmer's comments for successful adoption of BRRI Rice-Wheat Reaper and Thresher

i) In the peak period the machine can help to mitigate the problem of labor shortage

ii) Repair workshop should be available at the nearest place of machine operation.

iii) Availability of machine during crop harvesting period is important.

iv) Development of farmers cooperative society is imperative for group ownership of machines.

v) Development of entrepreneurship to supply these machine as rental basis.

vi) Credit facility is needed so that farmers can buy these machines at installment basis.

vii) Arrangements have to be made to supply these machines at block level so that farmer can use them at rental basis.

viii) Organizing training program for the operator is necessary.

IMPACT STUDY OF POPULARIZING BRRI DEVELOPED AGRIL. MACHINES

Promotional activity

Enlisted 12 (twelve) farm machinery manufacturers throughout the country to manufacturer BRRI developed farm machinery. BRRI supplied them the prototype to be manufactured and provided technical assistance. Among them 8(eight) manufacturers sold 26 (Twenty six) TH7, 3 (three) TH8, 36 (thirty six) open drum thresher and 3 (Three) reaper during the year 1998 to 2000. KRISHIKAUSHAL PROKALPA, KRISHIKAL PROKALPA and PALLYKOUSHAL PROKALPA bought 9 (seven), 2 (two) and 1(one) BRRI develop threshers respectively.

Entrepreneurship development

Three entrepreneurs were developed with technical support, namely: KRISHIKAUSAL PROKALPA, Baliadangi, Thakurgaon; KRISHIKAL PROKALPA, Ranisankail, Thakurgaon and PALLIKAUSAL PROKALPA, Katoali, Thakurgaon

Income generated by entrepreneurs through rental service of BRRI developed threshers

During the year 1999 to 2000, KRISHIKAUSAL PROKALPA, KRISHIKAL PROKALPA, PALLYKAUSAL PROKALPA earned Tk.132,985, Tk 57,339 and Tk. 28,850 respectively by renting out BRRI Rice-Wheat Thresher machine for paddy and wheat threshing.

Machinery sold by the manufacturers (Number)

Among the 12 (twelve) manufacturers, 8(eight) manufacturers sold 26 (Twenty six) TH7, 3 (three) TH8, 36 (thirty six) open drum thresher and 3 (Three) reaper during the year 1998 to 2000 (Table 3).

Farmers benefited

Benefited 249 farmers to harvest and thresh their crop by BRRI developed reaper and thresher during the project period (Table 4).

Employment generation

Generated 207 seasonal employment due to introduction of BRRI rice-wheat reaper and thresher during the project period for operation and maintenance of the machine (Table 4).

Machinery investment

Investment on BRRI developed machinery were Tk 3,46,000, Tk 1,92,000 and Tk 6,87,000 in the year 1998, 1999 and 2000 respectively (Table 4).

Amount of paddy and wheat threshed (ton)

During the project period, 333 ton of wheat and 130 ton of paddy were threshed with BRRI developed machine (Table 4).

CONCLUSIONS

BRRI developed thresher and reaper have been demonstrated to more than 1800 farmers through 34 demonstration in 15 districts during 1998-00. Farmer's comments on different indicators are given below:

a. Acceptability, suitability and performance

75-100% farmers expressed satisfaction about the performance of the machines. Therefore, we can conclude that BRRI developed thresher and reaper machines are acceptable to farmers.

b. Workability and reliability

91-96% farmers expressed the field level operation was quite safe. Therefore, we can conclude that BRRI developed thresher and reaper machines are reliable to farmers.

c. Economic viability

Threshing by machine costs, lesser (Tk.87.00/t) than that of traditional threshing (Tk.190.00/t). Therefore, we can conclude that thresher machines were found to be economically viable for the farmer's use.

d. Impact

More than 180 farmers used this machine for wheat threshing and 70 farmers used this machine for paddy threshing in 1998-00. Therefore, we can conclude that the impact is positive towards mechanized threshing.

e. Awareness

A rising farmers awareness has been created towards mechanized threshing and harvesting since the demand for machine uses gradually increases.

RECOMMENDATIONS

1. Operator's training is needed for more efficient operation
2. Supply of machine should be ensured at the beginning of the crop season
3. Farmers cooperative society is essential to procure and operate BRRI machines at farm level.
4. Development of entrepreneurship is imperative to make BRRI machines in operation for rental service
5. Bank loan should be provided to the farmers for machine purchase
6. Prototype of each agricultural machinery should be available in all district headquarters of DAE for adequate extension.
7. Tax should be reduced on agricultural machinery manufacturing.
8. Demonstration program should be continued until adequate awareness is created among the farmers
9. Information of agricultural machinery should get coverage in TV and mass media for developing quick awareness.

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Table 1. Blockwise information on the mechanization status of Baliadangi thana, Thakurgaon

Block name	Deep tube well (no.)	Shallow tubewell (no.	Power tiller		Country plough		Improved plough		Thresher machine (power/ manual)
			No.	Land cultivated (ha)	No.	Land cultivated (ha)	No.	Land cultivated (ha)	
Paria	3	167	3	120	600	450	650	800	2/×
Machkharia	5	168	2	10	110	60	798	1480	×/5
Dogachia	12	104	4	225	900	600	500	500	×/×
Charol	4	200	4	200	150	85	1500	1100	2/×
Dhantala	3	157	3	350	150	250	300	1200	×/×
Thumunia	4	131	3	120	450	300	650	900	×/×
Bara Palash Bari	2	166	9	175	×	×	1500	1200	5/×
Morol Hat	4	104	7	140	×	×	1500	1000	3/×
Doosho	13	76	2	75	400	350	600	825	×/×
Kalmegh	14	205	3	120	450	300	600	900	×/×
Vanar	18	134	1	50	350	1100	200	1000	×/×
Haldibari	17	97	×	×	300	900	200	1000	×/×
Amagankhor	×	200	4	320	×	×	2296	2500	5/4
Barabari	13	168	12	500	×	×	1300	900	×/×
Baliadangi	13	101	4	150	400	250	600	800	×/×
Total	**125**	**2178**	**61**	**2545**	**4260**	**4645**	**13194**	**16105**	**17/9**
Percent mechanization				**11%**	-	-	-	-	-

Table 2. Summary Results of the demonstration of BRRI thresher and reaper

Sl No.	**Information sought**	**Wheat threshing**		**Wheat reaping**		**Paddy threshing**		**Paddy reaping**	
	Response(%)	Yes	No	Yes	No	Yes	No	Yes	No
1	Performance satisfied	75	18	68	19	69	29	49	48
2	Want to Purchase	95	2	96	2	96	4	87	11
3	Max. Price offered								
	a) >Tk. 10,000	36		34		38		32	
	b) < = Tk. 10,000	51		58		58		55	
	Price not offered	13		8		4		12	
4	Group Ownership	74	20	79	16	78	19	65	28
5	Want to hire	91	3	86	8	82	16	76	14
6	Hire charge offered								
	a) <100/bigha	18		22		32		20	
	b)>100/bigha-<200/bigha	55		49		42		50	
	c) >200/bigha	18		15		12		15	
	d) No charge offered	9		14		14		15	
7	Necessity in Agril. Operation	97	3	97	3	98	2	91	4
8	Safety operation	94	6	96	4	84	3	81	13
	Total respondent	307		100		550		97	

Table 3. Machinery sold by the manufacturers (Number)

Year	1998		1999	2000			
Name of the machine	**TH7**	**TH8**	**TH7**	**TH7**	**TH8**	**Open drum thresher**	**Reaper**
Name of the manufacturer							
MAWTS	3					6	
JK Industries			3		1	7	
Uttaran Engg	5	2	3	3		3	
Rahman Engg. Works							3
Bangladesh Diesel Plant				9		9	
Commilla Co-operative Karkhana						7	
Janata Machine Tools						1	
Izzat Engg, Works						3	
Total	**8**	**2**	**6**	**12**	**1**	**36**	**3**

Table 4. Impact data of BRRI developed machines

	Year		
	1998	1999	2000
Farmers benefited (no.)	5	74	170
Employment generation (no.)	30	20	157
Machinery investment (Tk.)	346000	192000	687000
Amount of paddy threshed (ton)	8	57	65
Amount of wheat threshed (ton)	10	45	278