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ECONOMIC CULTIVATION OF TRANSPLANT AMAN RICE UNDER DIFFERENT WEED MANAGEMENT TECHNIQUES AND PLANT SPACING

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ABSTRACT

An experiment was carried out at the Agronomy field, Sher-e-Bangla Agricultural University, Dhaka during the period from July to December, 2006 to evaluate the economic cultivation of transplant aman rice under different weed management techniques and plant spacing. The experiment comprised six weeding treatments viz. no weeding, two hand weeding at 15 and 40 days after transplanting (DAT), one weeding with BRRI push weeder at 15 DAT + one hand weeding at 40 DAT, pre-emergence application of M.Chlor 5G (Butachlor) at 5 DAT + one hand weeding at 40 DAT, pre-emergence application of Oxastar 25 EC (Oxadiazon) at 5 DAT + one hand weeding at 40 DAT, pre- emergence application of Rifit 500EC (Pretilachlor) at 5 DAT + one hand weeding at 40 DAT and three plant spacings viz. 20cm x 10cm, 25cm x 15cm and 30cm x 20cm. Twelve weed species belonging to seven families were found in the experimental field of which *Sphenoclea zeylanica, Eclipta alba* and *Ludwigia octovalvis* were the most dominating weed species in transplanted aman rice. The overall performance of use of Pretilachlor at the spacing of 25cm x 15cm was found to be the best and it produced the highest grain yield (3.87 t ha^{-1}), highest net profit (23847.00 Tk ha^{-1}) and highest BCR (1.79) that followed by BRRI push weeder + one hand weeding at the spacing of 30cm x 20cm.

Key words: Weed management, plant spacing, weed control and yield

INTRODUCTION

Rice (*Oryza sativa L.*) is the staple food of Bangladesh, where it's production has increased more than two times during the last 3 decades and reached more than 25 million tons in 2001-2002 (BBS, 2002). For food security of the country, rice production is needed to be increased from 3 tons ha^{-1} to 5 tons ha^{-1} in next 20 years (Mahbub *et al.*, 2001). The majority of rice area is covered by aman rice comprising about 52.77% of the total rice area of which transplanted aman rice cover 87.05% (BBS, 2003). But the yield of transplanted aman rice in Bangladesh is much lower than that of other rice growing countries of the world. Among the various factors, severe weed infestation is the most important for such low yield (Kurmi and Das, 1993). Mamun (1990) reported that weed growth reduced the grain yield by 16-48% for transplanted aman rice. Manual weeding (hand weeding) is generally practiced in major area of rice cultivation in Bangladesh. But the availability of agricultural labourers has now decreased. To reduce the cost of rice production, it has been urgently needed to adopt alternative method of weed control viz. mechanical weed control, biological weed control, and chemical weed control in combination with manual weeding. BRRI has developed new weeder of low cost and very easy to handle. Pre-emergence herbicides are effective in controlling weeds along with hand weeding (Ahmed *et al.*, 2003).

The growth, development, yield and yield components of rice and the absolute density, weight and intensity of weed infestations are greatly influenced by plant spacing. When the planting densities exceed an optimum level, competition among plants of same species for light or for nutrients become

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severe. Again, when the planting densities do not cover an optimum level, the remaining space will be filling up by the other plant species like weed species and the interplant competition is at a maximum level. So, to find out the economic cultivation of transplant aman rice under different weed management techniques and plant spacing is needed to be examined.

MATERIALS AND METHODS

The experiment was conducted at the Agronomy field, Sher-e-Bangla Agricultural University, Dhaka during the period from July to December, 2006. The soil of the experimental area belonged to the Modhupur tract (AEZ No. 28). It was a medium high land with non-calcarious dark grey soil. The pH value of the soil was 5.6. The experiment was laid out in a randomized complete block design (factorial) with three replications. The size of the individual plot was 4.0m x 2.5 m. The field was fertilized with 70-45-40-10-5 kg $ha^{-1}$of N, P_2O, K_2O, S, Zn, respectively, from their sources of Urea, TSP, MP, Gypsum and Zinc Sulphate. The twenty five days old seedlings were transplanted on the well puddled experimental plots on August 5, 2006 by using two seedlings $hill^{-1}$.The experiment comprised of six weeding treatments viz. W_1 = no weeding, W_2 = two hand weedings at 15 and 40 days after transplanting (DAT), W_3 = one weeding with BRRI push weeder at 15 DAT + one hand weeding at 40 DAT, W_4 = pre-emergence application of M.Chlor 5G (Butachlor) at 5 DAT + one hand weeding at 40 DAT, W_5 = pre-emergence application of Oxastar 25 EC (Oxadiazon) at 5 DAT + one hand weeding at 40 DAT, W_6 = pre- emergence application of Rifit 500 EC (Pretilachlor) at 5 DAT + one hand weeding at 40 DAT and three plant spacings viz. S_1 = 20cm x 10cm, S_2 = 25cm x 15cm and S_3 =30cm x 20cm. Other cultural operations were done properly as and when required. The crop was harvested plot wise at full maturity on December 2, 2006. The data were statistically analyzed and the differences were adjusted by least significant difference (LSD) test at 5% level of significance.

From beginning to ending of the experiment, individual cost data on all the heads of expenditure in each treatment were recorded and classified according to Mian and Bhuiya (1977) as well as posted under different heads of cost of production, which were shown in Tables 5 to 8.

Input cost

Input costs were divided into two parts. These were as follows:

A. Non-material (labour)

The human labour was obtained from adult male labourers. Eight working hours of a labourer was considered as a man day. The animal labour was obtained from bullocks. A period of eight working hours of a pair of bullocks was taken to be an animal day. The mechanical labour came from the tractor. A period of eight working hours of a tractor was taken to be tractor day.

B. Material

The seeds of BRRI dhan 37 were purchased from BRRI headquarter @ Tk.15 per kg. Chemical fertilizers eg. Urea, TSP, MP, Gypsum and Zinc sulphate were bought from the authorized dealer at local market. Irrigation was done from the existing facilities of irrigation system of the Sher-e-Bangla Agricultural University field. Herbicides, fungicides and insecticides were bought from the respective dealers at the local market.

Overhead cost

The interest on input cost was calculated for 6 months @ 12.5% per year based on the interest rate of the Bangladesh Krishi Bank. The value of land varies from place to place and also from year to year. In this study, the value of land was taken Tk. 200000 per hectare. The interest on the value of land was calculated @ 12.5% per year for 2 months for nursery and 4 months for main field.

Miscellaneous overhead cost (common cost)
It was arbitrarily taken to be 5% of the total inputs cost. Total cost of production has been given in Table 4 to 7.

Gross return
Gross return from transplanted aman rice cultivation (Tk. ha^{-1}) = Value of grain (Tk ha^{-1}) + Value of straw (Tk ha^{-1}).

Net return
Net return (Tk ha^{-1}) = Gross return (Tk. ha^{-1}) – Total cost of production (Tk. ha^{-1})

Benefit cost ratio (BCR)

$$\text{Benefit cost ratio (BCR)} = \frac{\text{Gross return (Tk. ha}^{-1})}{\text{Cost of production (Tk. ha}^{-1})}$$

RESULTS AND DISCUSSION

Weed species found in the experimental field
The most important weeds of the experimental plots were *Sphenoclea zeylanica, Eclipta alba, Ludwigia octovalvis.* Among the twelve species, five were grasses, three were sedges and four were broad leaved (Table 1).

Table 1. Weed species found in the experimental plots in transplanted aman rice

Sl. No.	Local name	Scientific name	Family	Lifecycle	Type
1.	Jhilmorich	*Sphenoclea zeylanica*	Sphenocleaceae	Annual	Broad leaf
2.	Keshuti	*Eclipta alba*	Asteraceae	Annual	Broad leaf
3.	Panilong	*Ludwigia octovalvis*	Onagraceae	Annual	Broad leaf
4.	Khude shyma	*Echinochloa colona*	Gramineae	Annual	Grass
5.	Jaina	*Fimbristylis miliacea*	Cyperaceae	Annual	Sedge
6.	Holde mutha	*Cyperus difformis*	Cyperaceae	Perennial	Sedge
7.	Pani kachu	*Monochoria vaginalis*	Pontederiaceae	Perennial	Broad leaf
8.	Chechra	*Scirpus maritimus*	Cyperaceae	Perennial	Sedge
9.	Shyma	*Echinochloa crussgalli*	Gramineae	Annual	Grass
10.	Kakpaya	*Dactyloctenium aegyptium*	Poaceae	Annual	Grass
11.	Angata	*Paspalum scrobiculatum*	Gramineae	Perennial	Grass
12.	Arail	*Leersia hexandra*	Gramineae	Perennial	Grass

Combined effect of weeding and plant spacing on yield and yield components

Combined effect of weeding and plant spacing significantly influenced on the yield and yield components of rice (Table 2). The highest number of total tillers $hill^{-1}$ produced by the interaction between plant spacing 30cm x 20cm along with all the integrated weed management techniques.

Table 2. Combined effects of different weed management and spacing on the yield and yield contributing characters of transplanted aman rice

Treatment Combinations	Total tillers hill^{-1} (No.)	Effective tillers hill^{-1} (No.)	Total grains panicle^{-1} (No.)	Filled grains panicle^{-1} (No.)	Sterile grains panicle^{-1} (No.)	1000 grain weight (g)	Grain yield (t ha^{-1})	Straw yield (t ha^{-1})	Biological yield (t ha^{-1})	Harvest index (%)
W_1S_1	11.64	5.82	96.76	58.71	38.05	13.37	1.46	4.36	5.82	22.23
W_1S_2	12.92	7.23	107.40	72.85	34.53	13.90	1.61	4.25	5.86	27.42
W_1S_3	12.77	7.01	106.63	69.58	37.05	13.70	1.24	3.98	5.22	23.77
W_2S_1	13.85	8.28	119.10	84.42	34.67	15.30	3.27	4.84	8.10	40.31
W_2S_2	15.05	10.94	119.30	90.93	28.33	18.31	3.57	4.81	8.38	42.68
W_2S_3	18.63	14.97	124.80	100.80	24.00	17.25	3.65	4.75	8.40	43.69
W_3S_1	12.28	7.99	111.04	75.93	35.11	15.65	2.99	4.72	7.71	38.80
W_3S_2	14.15	9.99	114.40	86.40	28.00	18.89	3.20	4.52	7.72	41.40
W_3S_3	18.81	14.98	111.80	95.85	15.93	19.02	3.82	4.42	8.24	46.35
W_4S_1	13.24	8.99	109.30	74.97	34.30	15.84	3.36	4.67	8.03	41.87
W_4S_2	14.57	10.99	114.30	89.24	25.03	19.36	3.69	4.64	8.33	44.28
W_4S_3	18.02	12.98	112.00	93.24	18.75	19.76	3.35	4.49	7.84	42.68
W_5S_1	13.86	9.93	103.20	72.12	31.07	15.12	3.35	4.43	7.78	43.13
W_5S_2	14.8	11.98	110.90	82.43	28.50	19.12	3.70	4.68	8.38	44.27
W_5S_3	18.32	13.00	111.90	90.27	21.61	19.73	3.24	4.47	7.70	42.02
W_6S_1	13.94	10.49	102.90	71.20	31.67	14.32	3.37	5.09	8.46	39.83
W_6S_2	16.61	13.00	107.00	80.75	26.24	18.94	3.87	4.61	8.49	45.65
W_6S_3	18.26	14.00	109.40	89.90	19.50	20.32	3.55	4.50	8.05	44.13
LSD 0.05	1.24	2.78	11.49	15.38	8.16	2.18	0.48	0.20	0.20	0.71
CV (%)	4.95	5.57	6.25	11.27	17.26	3.69	9.24	4.62	4.61	5.08

Here, W_1= No weeding, W_2= Two hand weeding (HW), W_3= BRRI push weeder + 1 HW, W_4=Butachlor + 1HW, W_5= Oxadiazon + 1 HW, W_6= Pretilachlor + 1 HW and S_1 = 20 cm x 10 cm, S_2 = 25 cm x 15 cm, S_3 = 30 cm x 20 cm.

The lowest number of total tillers hill^{-1} was found in W_1S_1 treatment combination (11.64), which was statistically similar to W_3S_3 and W_1S_3 treatment combinations. The highest number of effective tillers hill^{-1}(14.98) was observed in the treatment combination of W_3S_3, which was statistically similar to W_2S_2, W_6S_3, W_6S_2, W_5S_3 and W_4S_3 treatment combinations. Treatment combination W_2S_3 produced the highest total grains panicle^{-1} (124.80), which was statistically similar to the treatment combinations of W_2S_2, W_2S_1, W_3S_2 and W_4S_2. The lowest total grains panicle^{-1} was obtained from the W_1S_1 treatment combination (96.76). The highest number of filled grains panicle^{-1} (100.80) was obtained in W_2S_3 treatment combination, which was statistically similar to W_3S_3, W_4S_3, W_2S_2, W_5S_3, W_6S_3, W_4S_2, and W_3S_2 treatment combinations. The lowest number of filled grains panicle^{-1} (58.71) was recorded in W_1S_1 treatment combination, which was statistically similar to W_1S_3, W_6S_1, W_5S_1 and W_1S_2 treatment combinations. It was observed that W_1S_1 treatment combination produced the highest number of sterile grains panicle^{-1} (38.05). The lowest number of sterile grains panicle^{-1} (15.93) was obtained from W_3S_3 treatment combination. The highest thousand grain weight was observed in the treatment combination of W_6S_3 (20.32 g) and the lowest thousand grain weight was observed in the treatment combination of W_1S_1 (13.37 g). The highest grain yield (3.87 t ha^{-1}) was obtained from the treatment combination of W_6S_2 followed by the W_3S_3 producing 3.82 t ha^{-1}, which was statistically similar with the yields obtained from W_5S_2, W_4S_2, W_2S_3, W_2S_2 and W_6S_3. In the W_6S_2 treatment combination all the yield contributing characters were higher, when it was calculated on unit area basis. For this reason it gave the highest yield. The highest straw yield (5.09 t ha^{-1}) was obtained from W_6S_1 treatment combination. The highest biological yield (8.49 t ha^{-1}) was obtained from the treatment combination of W_6S_2, which was statistically similar with the W_6S_1, W_4S_2, W_2S_3 and W_2S_2.

The highest harvest index (46.35%) was observed in the treatment combination of W_3S_3, which was statistically similar with W_6S_2 (45.65%). In an experiment Jacob and Syriac (2005) opined that application of pre-emergence Anilofos + 2,4-D ethyl ester (0.40+0.53 kg a.i. ha^{-1}) at six days after transplanting supplemented with 2,4-D Na salt (1.0 kg a.i. ha^{-1}) at 20 days after transplanting with 20cm x 10cm spacing generally favoured increased yield and net income. In another experiment, Nurujjaman (2001) found that weed control by Pretilachlor @ 1.0 l ha^{-1} appeared to be the best weed management practice for BR 22 transplanted aman rice grown at a spacing of 25cm x 15cm.

Economic performance of different weed control treatments under different spacing

The weeding cost was Tk. 3710.00, 3710.00, 4200.00, 2450.00, 2450.00, 2800.00, 1620.00, 1620.00, 1830.00, 2315.00, 2455.00, 2665.00, 1740.00, 1810.00 and 2020.00 for the treatment combination of W_2S_1, W_2S_2, W_2S_3, W_3S_1, W_3S_2, W_3S_3, W_4S_1, W_4S_2, W_4S_3, W_5S_1, W_5S_2, W_5S_3, W_6S_1, W_6S_2 and W_6S_3, respectively (Table 3).

Table 3. Weeding cost of different weed control treatments for one hectare of land of transplanted aman rice

Treatment Combinations	Immaterial cost		Material cost		Total cost (Tk.)
	Labour (man-day)	Cost (Tk.)	Amount	Cost (Tk.)	Cost (Tk)
W_1S_1	0.00	0.00	0.00	0.00	0.00
W_1S_2	0.00	0.00	0.00	0.00	0.00
W_1S_3	0.00	0.00	0.00	0.00	0.00
W_2S_1	53.00	3710.00	0.00	0.00	3710
W_2S_2	53.00	3710.00	0.00	0.00	3710
W_2S_3	60.00	4200.00	0.00	0.00	4200
W_3S_1	35.00	2450.00	0.00	0.00	2450
W_3S_2	35.00	2450.00	0.00	0.00	2450
W_3S_3	40.00	2800.00	0.00	0.00	2800
W_4S_1	12.00	840.00	13kg	780.00	1620
W_4S_2	12.00	840.00	13kg	780.00	1620
W_4S_3	15.00	1050.00	13kg	780.00	1830
W_5S_1	10.00	700.00	1.9L	1615.00	2315
W_5S_2	12.00	840.00	1.9L	1615.00	2455
W_5S_3	15.00	1050.00	1.9L	1615.00	2665
W_6S_1	11.00	770.00	970ml	970.00	1740
W_6S_2	12.00	840.00	970ml	970.00	1810
W_6S_3	15.00	1050.00	970ml	970.00	2020

These variations of costs were due to treatment variables where number of labourers and cost of weeding were varied. The total cost of production of BRRI dhan 37 rice was the highest (Tk.32733.00 ha^{-1}) for the treatment W_2S_1 (two hand weeding at 20cm x 10cm spacing) and the lowest (Tk.30052.00 ha^{-1}) with W_6S_3 (Pretilachlor + one hand weeding) at 30cm x 20cm spacing treatment (Table 4). The highest gross return (Tk 54052.00 ha^{-1}) was obtained from Pretilachlor + one hand weeding at 25cm x 15cm spacing and the lowest gross return (Tk.19317.00 ha^{-1}) was obtained from no weeding under 30cm x 20cm spacing. The highest net return (Tk.23847.00 ha^{-1}) was obtained from the treatment Pretailachlor + one hand weeding under 25cm x 15cm spacing. It could be seen from the economic analysis (Table 4) that the herbicidal plots along with one hand weeding each at the spacing of 25cm x 15cm (W_6S_2) gave the highest BCR (1.79) than the other treatments. The second highest BCR (1.73) was given by the treatment combination of W_3S_3 (BRRI push weeder + one hand weeding at 30cm x 20cm spacing) and the third highest BCR (1.72) was given by the W_4S_1 (Oxadiazon + one hand weeding at 25cm x 15cm spacing). All the unweeded treatments at different spacings showed

negative BCRs. This might be because less production due to higher weeds competition. Similar results were also reported by Nurujjaman (2001) and BRRI (1998).

Table 4. Cost of production, gross return and benefit cost ratio (BCR) of transplanted aman rice cv. BRRI Dhan 37 under different treatments

Treatment Combinations	Cost of production (Tk. ha^{-1})			Gross return (Tk. ha^{-1})			Net Profit (Tk. ha^{-1})	BCR
	Variable fixed cost	Weeding cost	Total cost	Grain	Straw	Total		
$W_1 S_1$	29023.00	0.00	29023.00	19019.00	3486.00	22505.00	-6518.00	0.78
$W_1 S_2$	28395.00	0.00	28395.00	20891.00	3402.00	24293.00	-4102.00	0.86
$W_1 S_3$	28032.00	0.00	28032.00	16133.00	3184.00	19317.00	-8715.00	0.69
$W_2 S_1$	29023.00	3710.00	32733.00	42471.00	3870.00	46341.00	13608.00	1.42
$W_2 S_2$	28395.00	3710.00	32105.00	46358.00	3850.00	50208.00	18103.00	1.56
$W_2 S_3$	28032.00	4200.00	32232.00	47411.00	3810.00	51221.00	18989.00	1.59
$W_3 S_1$	29023.00	2450.00	31473.00	38870.00	3774.00	42644.00	11171.00	1.35
$W_3 S_2$	28395.00	2450.00	30845.00	41535.00	3618.00	45153.00	14308.00	1.46
$W_3 S_3$	28032.00	2800.00	30832.00	49673.00	3538.00	53211.00	22379.00	1.73
$W_4 S_1$	29023.00	1620.00	30643.00	43693.00	3734.00	47427.00	16784.00	1.55
$W_4 S_2$	28395.00	1620.00	30015.00	47957.00	3714.00	51671.00	21656.00	1.72
$W_4 S_3$	28032.00	1830.00	29862.00	43498.00	3594.00	47092.00	17230.00	1.58
$W_5 S_1$	29023.00	2315.00	31338.00	43485.00	3544.00	47029.00	15691.00	1.50
$W_5 S_2$	28395.00	2455.00	30850.00	48100.00	3744.00	51844.00	20994.00	1.68
$W_5 S_3$	28032.00	2665.00	30697.00	42081.00	3574.00	45655.00	14958.00	1.49
$W_6 S_1$	29023.00	1740.00	30763.00	43810.00	4072.00	47882.00	17119.00	1.56
$W_6 S_2$	28395.00	1810.00	30205.00	50362.00	3690.00	54052.00	23847.00	1.79
$W_6 S_3$	28032.00	2020.00	30052.00	46202.00	3600.00	49802.00	19750.00	1.66

W_1= No weeding, W_2= Two hand weeding (HW), W_3= BRRI push weeder + 1 HW, W_4=Butachlor + 1 HW, W_5= Oxadiazon + 1 HW, W_6= Pretilachlor + 1 HW and S_1 = 20 cm x 10 cm, S_2 = 25 cm x 15 cm, S_3 = 30 cm x 20 cm

Table 5. Wages and price of different items used in the experiment

Sl. no	Item of expenditure	Rate (TK)
A.	Labour:	
	(i) Human labour (man-day 8 hours)	70.00
	(ii) Animal labour (animal-day of 8 hours of a pair of bullock)	60.00
	(iii) Mechanical labour (tractor-day of 8 hours)	1740.00
B.	Rice seed BRRI Dhan 37 per kg	15.00
C.	Fertilizer	
	(i) Urea per kg	6.00
	(ii) TSP per kg	13.00
	(iii) MP per kg	10.00
	(iv) Gypsum per kg	4.00
	(v) Zinc sulphate per kg	40.00
D.	Irrigation (One irrigation per hectare)	650.00
E.	Pesticide	
	(i) Herbicide	
	(a) M.Chlor 5G per kg	60.00
	(b) Oxastar 25 EC per 100 ml	85.00
	(c) Pretilachlor 500 EC per 100 ml	100.00
	(ii) Insecticide	
	(a) Basudin 10 G per kg	95.00
F.	Value of land (One hectare)	1,50,000.00
G.	Interest on inputs and value of land per year	12.50 %
H.	Miscellaneous overhead cost	5 %

Table 6. Operation wise break up of labour required and cost per hectare of transplanted aman rice (excluding weeding cost)

Sl. no.	Operation	Man-day for 20 x 10 cm^2	Man-day for 25 x 15 cm^2	Man-day for 30 x 20 cm^2	Animal- day	Tractor -day
1.	Land preparation	35.00	35.00	35.00	20.00	0.5
2.	Fertilizer application	2.00	2.00	2.00	-	-
3.	Seedling transplantation	40.00	35.00	32.00	-	-
4.	Weeding	variable	Variable	variable	-	-
5.	Irrigation	1	1	1	-	-
6.	Plant protection (spraying insecticides)	2	2	2	-	-
7.	Harvesting	27.00	25.00	24.00	-	-
8.	Carrying	15.00	15.00	15.00	-	-
9.	Threshing	20.50	20.50	15.00	-	-
10.	Cleaning, drying, weighing and bagging	13.50	13.50	13.50	--	-
	Total labour	156.00	149.00	145.00	20.00	0.5
	Total cost of labour	10920.00	10430.00	10150.00	1200.00	870.00

Table 7. Cost of production of raising rice seedlings for 500m^2 of land for transplanted aman rice

Sl. no	Head of expenditure	Quantity			Total cost (Tk.)		
		20 x 10 cm^2	25 x 15 cm^2	30 x 20 cm^2	20 x 10 cm^2	25 x 15 cm^2	30 x 20 cm^2
1.	Input cost						
	A. Immaterial inputs						
	i. Human labour (man-day)	7	7	7	490	490	490
	ii. Animal labour (animal-day)	2	2	2	120	120	120
	Sub-Total (Immaterial input cost)				610	610	610
	B. Material input cost						
	i. Rice seed	30	25	22	450	375	330
	ii. Water	2 irrigation	2 irrigation	2 irrigation	65.00	65.00	65.00
	iii. Pesticides (Vitavex-200)	80g	80g	80g	46.00	46.00	46.00
	Sub-total (material input cost)				561.00	486.0	441.00
	Total input cost				1171.00	1096.00	1051.00
2.	Overhead cost						
	i. Interest on input cost	1171.00	1096.00	1051.00	24.00	22.00	21.00
	ii. Interest on value of land	7500	7500	7500	156.00	156.00	156.00
	iii. Miscellaneous overhead cost	1171.00	1096.00	1051.00	58.00	54.00	52.00
	Total overhead cost				228.00	228.00	228.00
3.	Total cost of seedlings				1409.00	1328.00	1280.00

Table 8. Cost of production per hectare of transplanted aman rice excluding weeding cost

Sl. No	Head of cost of production	Cost (Tk.) 20 x 10 cm^2	Cost (Tk.) 25 x 15 cm^2	Cost (Tk.) 30 x 20 cm^2
1	Input cost			
	A. Immaterial cost	12990.00	12500.00	12220.00
	B. Material cost			
	i. Seedling (for one hectare)	1409.00	1328.00	1280.00
	ii. Fertilizer			
	(a)Urea 150 kg	900.00	900.00	900.00
	(b) TSP 100 kg	1300.00	1300.00	1300.00
	(c) MP 70 kg	700.00	700.00	700.00
	(d) Gypsum 60 kg	240.00	240.00	240.00
	(e) Zinc sulphate 10 kg	400.00	400.00	400.00
	iii. Irrigation (2 times)	1300.00	1300.00	1300.00
	iv. Insecticides (Basudin 5G) 15 kg	1425.00	1425.00	1425.00
	Total input cost (Material + immaterial cost)	20664.00	20093.00	19765.00
2.	Overhead cost			
	i. Interest on input cost @ 12.5% for 5 months	1076.00	1047.00	1025.00
	ii. Interest on value of land @ 12.5% for 4 months	6250.00	6250.00	6250.00
	iii. Miscellaneous overhead cost @ 5% of input cost	1033.00	1005.00	988.00
	Total overhead cost	8359.00	8302.00	8267.00
	Total cost of production (excluding weeding cost)	29023.00	28395.00	28032.00

It can be concluded that two times weeding, one with pre-emergence herbicide (Pretilachlor) application at 5 days after transplanting (DAT) along with one hand weeding at 40 DAT under 25cm x 15cm plant spacing of T. Aman cultivation, where labourers are unavailable. But weeding once with BRRI push weeder + one hand weeding at 40 DAT under 30cm x 20cm plant spacing might be the economical practice for controlling weed and keeping pollution at minimum level, when labourers are available.

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