

PN-ABS-183

Draft for discussion

**COSTS AND RETURNS OF 1992/93  
TRANSPLANTED AMAN CROP CULTIVATION**

Akhter U. Ahmed (IFPRI)

Md. Giashuddin (FPMU)

Md. Mafidul Islam (FPMU)

**INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE  
BANGLADESH FOOD POLICY PROJECT**

(USAID Contract No. 388-0027-C-00-9026-00)

**January 1993**

-/-

**COSTS AND RETURNS OF 1992/93  
TRANSPLANTED AMAN CROP CULTIVATION**

At the request of the Secretary, Ministry of Food (MOF) a Rapid Rural Appraisal (RRA) on costs and returns of 1992/93 T. Aman paddy cultivation practices has been conducted by IFPRI and FPMU. Representatives of Directorate of Agricultural Extension (DAE) and Bangladesh Bureau of Statistics (BBS) participated in the RRA field work, along with IFPRI and MOF officials. The RRA has been headed and sponsored by IFPRI Bangladesh Food Policy Project.

**Methodology**

**Sampling**

T. Aman paddy cultivation is practiced throughout Bangladesh by farmers of various farm sizes, growing different varieties, and employing a range cultivation practices. Therefore, some purposive selection of respondents was necessary to assure representation from those categories that are considered important to this study. An effort was made to select respondents from each of the following categories:

1. Major T. Aman paddy production regions;
2. HYV and fine (local) variety seed users; and
3. Farm size groups.

Eight regions (greater districts) were selected on the basis of their importance in T. Aman paddy production, while survey thanas and villages within the district were randomly selected.

Respondents (farmers) were selected and interviewed on the basis of their availability at the time the surveyors were in the villages. Data were obtained from farmers of various farm sizes and growing different seed varieties. Farmers were interviewed at village hat (market) or at the farm.

In total, 541 farmers were interviewed during the RRA. The breakdown of sample size by district and seed type is shown in Annex 2.

**RRA Procedures**

A short, pre-coded questionnaire was designed for the RRA (Appendix 3). Three survey teams were formed and trained. Given the limited man-power and time available for the RRA field work, it was not possible to collect detailed information on the use of hired and family labor, and bullock power. Instead, labor and bullock coefficients for respective districts were taken from the IFDC

farm survey study,<sup>1</sup> and were utilized to estimate the use of these inputs. However, information was collected on total number of hired labor used for cultivation. T. Aman RRA field work began on December 10, and ended on December 27, 1992.

## Analysis

The RRA data were entered in a computer data file, and analyzed with the "Lotus 123" package program. Simple averages of input use, crop yields and production costs were calculated. The benefit/cost ratios and returns to labor were also calculated to assess the profitability of 1992/93 T. Aman paddy cultivation.

## RRA Findings

### Per Maund Costs of Cultivation

Cost of producing a unit (maund) of rice is the relevant concept for the purpose of pricing, rather than cost of production per unit of land (i.e. per acre cost). Cost per maund can be viewed in terms of break-even point, indicating the price that farmers must receive for their crop in order to cover their costs.

Costs per maund are calculated with and without land rent. Here, a note of caution is in order for the surveyors and analysts. Since land rent constitutes the largest share in cost components, information on land rental ought to be collected and analyzed with care and understanding. Land rent for T. Aman (or any other crop) should reflect the true opportunity cost of the land for that particular crop. The opportunity cost of land is the net value of production foregone when the land is engaged in its next best alternative use. Estimating a production function would indicate the contribution of the land to the value of output. However, the estimation of production function is not a practical method for this type of RRA analysis because of its analytical complexities. An alternative and straightforward approach is to use land rent when such a rental market exists. In this approach it is important to note that the renting-out price determines the opportunity cost, not the renting-in price. As the supply of land is fixed, land rent is determined by demand and therefore is affected by product price. Since the price of 1992/93 Aman paddy was relatively low, land rental is likely to be low as well during the current Boro season.

Table 1 summarizes the per maund costs of production of HYV (BR 11), Pajam and Fine (local) varieties of T. Aman paddy, with and without land rent. Per maund costs of HYV paddy were lower than the Tk 210 per maund official procurement price in all major procurement zones, even with land rent included in cost calculations.

---

<sup>1</sup>Sidhu, S., A. Baanante and E. Ahsan. 1984. Agricultural Production, Fertilizer Use, and Equity Considerations: Results and Analysis of Farm Survey Data, 1980/82, Bangladesh. International Fertilizer Development Center (IFDC).

Cost per maund of paddy were relatively higher in other regions mainly due lower yields (Table 2) and high wage rates of labor (Table 6). The values of the coefficients of variation (standard deviation divided by the mean) suggest that the variability of per maund cost of paddy production relative to the average values were quite high. The high degrees of variation in costs of production were mainly due to variability in yields and labor wage, as indicated by the estimated coefficients of variation of yields (Table 2) and labor wages (Table 6). The farmers reported that the principal factor responsible for T. Aman yield variability in the past season was the erratic rainfall patterns. Figures in Table 4 indicate that the variability in costs among farm size groups was also quite high.

Table 3 provides the relative shares of input costs in T. Aman paddy cost of production. Besides land rent, labor was by far the most important cost component in T. Aman paddy cultivation, followed by farm power (bullock and mechanical power). As mentioned earlier, region-wise labor and bullock coefficients were used in calculating the use of these inputs. Labor wage and bullock hire rates were obtained from the respondents during the RRA. Data on total number of hired labor employed in T. Aman paddy cultivation were also obtained from the respondents. The use of family labor was calculated by subtracting the hired labor from the labor coefficients. Hired labor was valued at market wage rates, while family labor was valued at 60% of wage rates, assuming that the opportunity cost of family labor is lower than the market wage rate.

#### Returns from T. Aman Paddy Cultivation

The benefit/cost ratios and returns to labor (RTL) are chosen in this study as indicators of farmers' profitability of growing T. Aman paddy. The benefit/cost ratio is simply the grower's paddy price over cost per maund of paddy. RTL is defined as net revenue per acre ( i.e. total revenue minus all non-labor costs including land rent) over employment per acre of land. Total revenue is calculated by multiplying paddy yields with the grower's price of paddy.

Table 5 presents the benefit/cost ratios for 1992/93 T. Aman paddy. If only variable costs are considered for owner-cultivators, then T. aman cultivation could be termed as profitable to farmers during the 1992/93 Aman season. If the opportunity costs of land were as high as land rent reported by the farmers, then T. Aman cultivation was only marginally profitable in a few districts (costs per maund with land rent in Table 1 compared with paddy prices in Table 5).

Another useful measure of the profitability of 1992/93 T. Aman paddy cultivation is returns to labor. Since RTL is an indicator of returns to labor and farm entrepreneurship, this should be substantially higher than the market wage rate to indicate a profitable investment of labor and management skills. Table 6 provides this comparison.

Table 1. T. Aman cost of production

Region (Greater District)	Without Land Rent			With Land Rent		
	BR 11	Pajam	Fine	BR 11	Pajam	Fine
( Taka per maund of paddy )						
Dinajpur	111	106	137	190	200	236
Rangpur	119	130	101	175	204	178
Bogra	114	144	-	185	263	-
Mymensingh	102	131	144	169	211	244
Jessore	173	-	150	251	-	228
Comilla	179	142	-	257	218	-
Noakhali	181	199	200	232	257	267
Chittagong	168	171	198	229	229	279
All Regions	153	159	167	225	230	252
Coefficient of variation (%) <sup>a</sup>	36.7	33.3	31.7	31.2	26.0	25.3

<sup>a</sup>Coefficient of variation is the standard deviation divided by the mean.

Table 2. T. Aman paddy yields

Region	Seed Variety		
	BR 11	Pajam	Fine
	(maunds per acre)		
Dinajpur	41.0	43.5	29.5
Rangpur	43.3	37.2	34.8
Bogra	43.3	30.8	-
Mymensingh	39.8	32.9	24.2
Jessore	33.3	-	29.1
Comilla	36.8	38.7	-
Noakhali	35.9	33.7	28.8
Chittagong	42.5	40.8	35.0
All Regions	37.8	36.6	28.4
Coefficient of variation (%)	24.7	25.1	25.0



Table 4. Cost of HYV T. Aman (BR 11) paddy cultivation by farm size groups

Region	Cost without land rent				Cost with land rent			
	Farm size				Farm size			
	Marginal	Small	Medium	Large	Marginal	Small	Medium	Large
( Taka per maund of paddy )								
Dinajpur	116	83	-	126	246	149	-	193
Rangpur	108	131	97	135	166	188	154	180
Bogra	113	116	109	142	186	188	176	234
Mymensingh	91	111	87	107	174	178	149	171
Jessore	156	164	185	175	239	249	260	245
Comilla	150	186	189	147	221	273	259	211
Noakhali	-	169	187	-	-	224	237	-
Chittagong	115	172	167	169	175	232	232	224
All Regions	123	155	162	154	200	230	230	221
Coefficient of variation (%)	39.2	39.5	33.9	29.5	30.6	39.3	29.9	23.8

Note: Land ownership in farm size (FS) classifications: Marginal, 0 FS ≤ 1.0 acre; Small, 1.0 < FS ≤ 2.5 acres; Medium, 2.5 < FS ≤ 5.0 acres; Large, FS > 5.0 acres.

Table 5. Profitability of T. Aman paddy cultivation

Region	Seed Variety		
	PK 11	Pajam	Fine
	<u>Paddy Price at Harvest (Taka/maund)</u>		
Dinajpur	155	226	298
Rangpur	154	182	185
Bogra	159	224	-
Mymensingh	190	210	193
Jessore	186	-	198
Comilla	203	220	-
Noakhali	213	224	281
Chittagong	202	206	269
	<u>Benefit/Cost Ratio</u>		
Dinajpur	1.66	2.29	2.26
Rangpur	1.45	1.50	1.84
Bogra	1.51	1.62	-
Mymensingh	2.02	1.78	1.48
Jessore	1.25	-	1.36
Comilla	1.19	1.58	-
Noakhali	1.19	1.17	1.46
Chittagong	1.28	1.29	1.41

Note: In calculating the benefit/cost ratio, land rent was not included in cost of paddy per maund.

Table 6. Returns to labor from T. Aman paddy cultivation

Region	Return to labor by Variety			Wage Rate <sup>a</sup>
	BR 11	Pajam	Fine	
	(Taka per day)			
Dinajpur	18	79	98	38
Rangpur	24	27	41	37
Bogra	29	21	-	34
Mymensingh	56	45	20	38
Jessore	13	-	28	41
Comilla	12	47	-	46
Noakhali	43	45	74	55
Chittagong	53	64	62	68
All Regions	26	50	56	47

Note: Return to labor (RTL) is defined as net revenue per acre (total revenue minus all non-labor costs, including land rent) over employment per acre of land. Revenue is calculated by multiplying output with grower's price.

a. Coefficient of variation of wage rate = 29.6%

1992/93 T.Aman RRA Participants

1.	Akhter U. Ahmed (Study leader)	Consumption Economist, IFPRI
2.	Md. Giashuddin	Chief, FPMU, MOF
3.	Md. Mafidul Islam	Research Officer, FPMU, MOF
4.	Sohela Khanam	Research Investigator, FPMU, MOF
5.	M. Sekandar Ali	Research Officer, FPMU, MOF
6.	A. F. Nurun Nabi	Deputy Secretary, MOF
7.	Md. Delwar Hossain	Director, Agricultural Statistics Wing, BBS
8.	Md. Mujibullah	Statistical Officer, Agricultural Statistics Wing, BBS
9.	Md. Qumrul Habib	Deputy Director, DAE
10.	Mahbubur Rahman	Program Co-ordinator, IFPRI
11.	Wahidur Rahman Quabili	Senior Data Analyst, IFPRI
12.	Faruque Ahmed	,,
13.	Khondaker Mahbub Alam	Data Analyst, IFPRI
14.	Zahidul Hassan	,,
15.	A. B. Siddique Khan	Field Investigator, IFPRI
16.	Pradip Kumar Shaha	,,
17.	Abdur Rahim	,,
18.	A. U. M. Waziullah	,,
19.	Mollah Farid Ahmed	,,

---

IFPRI =	International Food Policy Research Institute
FPMU =	Food Planning and Monitoring Unit
MOF =	Ministry of Food
BBS =	Bangladesh Bureau of Statistics
DAE =	Directorate of Agricultural Extension

RRA sample size by region

Annex 2

Region	Sample size by seed variety				Total
	BR 11	BR 14	Pajam	Fine	
Dinajpur	10	-	4	17	31
Rangpur	22	2	9	2	35
Bogra	26	-	12	1	39
Mymensingh	37	4	34	28	103
Jessore	111	-	-	6	117
Comilla	47	-	6	4	57
Noakhali	6	-	25	28	59
Chittagong	36	1	53	10	100
All Regions	295	7	143	96	541

1992/93 T. Aman Cost of Production Questionnaire (RRA)

1. T. Aman variety grown (circle one): BR-11 / BR-14 / Pajam  
 Fine variety: Nizarshail / Kataribhog / (other) \_\_\_\_\_
2. Area under the above variety \_\_\_\_\_ decimals
3. Total paddy production in the above area \_\_\_\_\_ maunds
4. Costs of Production of this paddy:

Cost Items	Quantity (kg)	Own (tick)	Purchased (tick)	Price (Tk/kg)	Total Cost (Tk)
Seedlings					
Manure					
Fertilizer:					
- Urea					
- TSP					
- MP					
- Other					
Pesticides					
Irrigation					
Equipment rental	Cult.				
	Thresh				
Land rent					

5. Number of labor hired for this paddy cultivation \_\_\_\_\_
6. Wage rate paid to hired labor:  
 cash \_\_\_\_\_ Tk/day + Value of meals given \_\_\_\_\_ Tk/day
7. Bullock hire rate \_\_\_\_\_ Tk/pair/day
8. Price of straw \_\_\_\_\_ Tk/maund
9. Quantity of this paddy sold since harvest \_\_\_\_\_ maunds

10. Paddy selling price \_\_\_\_\_ Tk/maund
11. Where sold (circle one): Trader at farmgate / Trader at Hat / Hat / Govt. LSD
- 12.1. Do you know the government paddy procurement price for this Aman season? \_\_\_\_\_ Yes = 1, No = 2
- 12.2. If yes, what is the price? \_\_\_\_\_ Tk/maund of paddy
- 12.3. Have you sold any Aman paddy this season to the government? \_\_\_\_\_ Yes = 1, No = 2
- 12.4. Have you ever sold any paddy, rice, or wheat to the government? \_\_\_\_\_ Yes = 1, No = 2
- 13.1. Have you taken any credit for this Aman production? \_\_\_\_\_ Yes = 1, No = 2
- 13.2. Credit information:

Major source	Amount taken (Tk)	Amount already repaid	
		Cash (Tk)	Paddy (maunds)

14. Name of respondent \_\_\_\_\_
15. Total owned cultivable land \_\_\_\_\_ bighas (1 bigha= \_\_\_\_\_dec.)
16. Village \_\_\_\_\_ Thana \_\_\_\_\_ District \_\_\_\_\_
- Interviewer: \_\_\_\_\_ Date: \_\_\_\_\_
- 

Comments: