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BJAE, Vol 1,1 (1978), 101-113 Research Note

LABOUR REQUIREMENTS FOR PRODUCTION OF MAJOR CROPS IN BANGLADESH

M. A. Jabbar and A. K. M. Faruque*

ABSTRACT

Operation wise per acre labour requirements for 21 varieties of different crop are estimated from various Farm Management Studies conducted during 1967 to 1976. It is expected that the results will be useful for (1) estimating employment effects of specific crop production strategy, (2) determining appropriate crop combination to attain crop combination to attain specific employment target, (3) proper planning and budgeting of individual farm business.

I. INTRODUCTION

Two recent studies have presented substantially different results on the projected impact of the HYV strategy on employment in Bangladesh (see, Clay and Khan 1977; Allen 1978). Employment estimates in both the studies were based on the long term acreage growth projections of the Economic Intelligence Unit (EIU 1977) while each of those studies used independent and quite different estimates of current labour requirements particularly for rice and wheat production. As a result, Clay and Khan have estimated aggregate labour requirement of 7.52 million man year equivalents for rice and wheat production in 1975/76 while Allen's estimation showed requirement of 5.84 million man-year equivalents in 1976/77. Reviewing these differences, Clay (1978) has concluded that, "more accurate estimation of the current employment and under employment requires better data than is currently available and exploration of the relationships between agricultural growth, technical change and employment should be undertaken within a consistent modelling framework".

Optimal or standard labour requirement data is essential for estimating employment effects of specific crop production strategy or alternatively, for determining appropriate crop combination to attain specific employment target. Such information is also required for proper planning and budgeting of individual farm business.

Clay and Khan (1977) and Allen (1978) have derived labour requirement data partly from their own observation/recorded information and partly from a number of farm management surveys. Their estimated labour requirements

*Respectively Assistant Professor and Graduate Student, Department of Agricultural Economics, Bangladesh Agricultural University, Mymensingh.

differed mainly because they have derived data from different set of sources. Actually more farm management survey results are available covering longer period and wider geographical area than the above authors had derived their data from. The present note intends to bring all those scattered information together. The results may not produce Clay's expected "better data than is currently available" but this will expectedly provide a better ground for producing better data.

In section II, methodology and characteristics of the data sources are discussed and in section III, the summary of results are discussed.

II. DATA SOURCE AND METHODOLOGY

Data compiled in this note are derived from farm management/cost of production studies conducted during 1967-76 by different institutions, mainly the department of Agricultural Economics, Bangladesh Agricultural University, Mymensingh. Data were available for the following crops : Aus Low Yielding Variety (LYV), Aus High Yielding Variety (HYV), Transplanted Aman LYV, Transplanted Aman HYV, Broadcast Aman single, Broadcast Aman with Aus, Boro LYV, Boro HYV[1], wheat LYV, wheat HYV, Sugarcane Maincrop, Sugarcane Ratoon, Jute LYV, Jute HYV, Tobacco Virginia, Tobacco Motihari, Potato, Sweet Potato and Tomato.

For each of the above crop, operationwise per acre labour use data were available from certain number of sources (ranging from 1 to 21), each source providing average data for a sample of 30-100 farms (modal value 50 farms)[2]. These averages were treated as basic data and simple average of these averages was taken as per acre labour requirement for a specific crop. Weighted average would give more accurate estimate of labour requirements but all the necessary information required for estimating wighted average were not available in all the sources.

Averaging data from different sources also presented a number of other problems. Sets or types of operation for a crop varied from source to source, some showing certain operations together, other showing seperately ; some

1. Clay and Khan (1977) have also distinguished rice varieties according to traditional and modern irrigation use.
2. A few studies have reported total per acre labour use but no details for different operations. Such studies were not considered in this note.

identifying certain operations, others not doing do. This problem was solved by aggregating certain operations into broad categories because this was easier than disggregating combined operations. Some sources showed labour use in man-hours, others in man-days. Man-hours were converted into man-days assuming 8 hours equal to one man-day.

Where data were available from 3 or more sources, coefficient of variation in total labour requirement per acre is shown. The coefficient refers to variation as between sources providing data, and not between individual farms in the original samples. The coefficient also does not clearly refer to variation in labour use over time although data for a number of years were available in some cases. For example, data were available for T. Aman HYV from 13 sources : 2 for 1969, 7 for 1970, 3 for 1974, and 1 for 1976. The coefficient of variation in this case means variation around the average of the 13 sources.

Information on time distribution of labour is important particularly for seasonal employment/unemployment estimation but such informrtion was not available in any of the sources. An attempt was made to work out time distribution using standard crop calendar[1]. In this, one problem presented itself. Most of the sources have mentioned the time period for which or during which relevant data were collected and for each crop this period appeared to vary between sources. Even different sowing/planting-harvesting durations were reported by a single farm producing a crop on various plots. This is because available labour and animal power may not permit sowing of the plots all at a time. Under the circumstances, the proposed synthetic time distribution would be quite unrepresentative of the situation prevailing on the sample farms. As such, the idea of preparing synthetic time distribution was abandoned leaving the users of this data to workout for themselves to suit their own specific purpose. It is, however, expected that farm management studies in future should show both operational and time distribution of labour use.

III. SUMMARY OF RESULTS

Operationwise per acre labour requirements for various crops are shown in the Appendix. Total labour requirements per acre for various crops are shown in Table 1. The following features emerge : (1) There is wide variation in the number of sources (therefore the number of sample farms and period covered)

1. This method was adopted by Clay and Khan (1977).

TABLE 1 LABOUR REQUIREMENTS PER ACRE FOR PRODUCTION OF MAJOR CROPS IN BANGLADESH AND RELATED INFORMATION

Crop variety	Number of sources a	Period covered	Labour requirement/acre		% of total labour hired
			mandays	coefficient of Variation	
Aus LYV	3	1970	66	b	44
Aus HYV	1	1970	80	b	29
T. Aman LYV	13	1969–76	62	0.28	34
T. Aman HYV	21	1970–76	76	0.35	41
B. Aman Single	2	1976–77	79	b	c
B. Aman with Aus	2	1976–77	105	b	c
Boro LYV	11	1968–76	82	0.32	45
Boro HYV	10	1967–74	113	0.37	60
Wheat LYV	2	1973–76	29	b	31
Wheat HYV	2	1973–76	52	b	33
Sugarcane main crop	8	1973–76	131	0.25	54
Sugarcane Ratoon	1	1975–76	105	b	76
Jute LYV	6	1970–73	104	0.25	43
Jute HYV	5	1970–73	120	0.18	40
Tobacco Jati	2	1974	177	b	24
Tobacco Virginia	2	1974	189	b	15
Tobacco Motihari	2	1974	202	b	18
Potato	1	1967	129	b	c
Sweet Potato	1	1972	60	b	c
Tomato	1	1967	55	b	c

a. Each source shown averege data for 30-100 farms, modal value 50 farms.

b. Not calculated. LYV. Low Yielding Variety (local).

c. Not available. HYV. High Yielding Variety (Improved).

providing data. (2) Average labour requirement of specific crop show substantial variation between sources (as evidenced by the coefficient of variation) implying that the averages are far from 'standards' particularly for those based on small samples. (3) A large part of the total labour required for each crop is hired (casually or seasonally). (4) HYVs in general require more labour than LYVs and proportion of hired labour is also larger in case of HYVs. (5) Transplanting, weeding, harvesting and irrigation required relatively more hired labour compared to other operations (see tables in the appendix).

IV. CONCLUSIONS

Average per acre labour requirements for various crops in Bangladesh are estimated using different farm management survey results. These averages may not as yet be treated as 'standard' or 'optimum' labour requirements because of limitations of the data sources particularly small data base in case of some crops. Practically, there is no general optimal way of growing crops ; there are only differential optima for different crops in different regions. However, it is expected that the information presented here will be currently useful and will pravide a basis for standardizing future information of this kind.

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APPENDIX TABLES

OPERATIONWSIE PER ACRE LABOUR REQUIREMENTS FOR PRODUCTION OF MAJOR CROPS IN BANGLADESH

1. AUS PADDY

Operations	LYV			HYV		
	Man days per acre	% of total	%hired	Man days per acre	% of total	% hired
Preparing land	17.4	26.3	4.0	17.4	21.9	3.0
Manuring, sowing fertilizing	3.3	5.0	1.0	7.2	9.0	—
Raking, weeding	26.0	39.4	69.0	31.4	39.2	56.0
Harvesting, carrying	11.7	17.7	81.0	13.5	16.9	32.0
Thresing, drying, storing	7.7	11.6	5.0	10.3	13.0	9.0
All operations	66.1	100.0	44.0	79.8	100.0	29.0

Source : Jabbar and Haque 1972 ; Haque 1975.

2. BROADCAST AMAN

Operations	Man-days per acre	
	Single	With Aus
Ploughing and laddering	11.4	13.1
Breaking tiles	1.2	1.5
Weeding	39.0	44.7
Harvesting Aus	—	18.7
Harvesting Aman	26.2	27.0
All operations	78.8	105.0

Source : Clay and Bhuiyan 1977.

3. TRANSPLANTED AMAN PADDY

Operations	LYV			HYV		
	Man-days per acre	% of total	% hired	Man-days per acre	% of total	% hired
Preparing land	17·7	28·6	21·0	20·7	27·2	30·0
Manuring, fertilizing and spraying	0·5	0·9	5·0	1·9	2·6	12·0
Uprooting seedling, transplanting	15·7	25·2	59·0	13·2	17·3	49·0
Topdressing, weeding, irrigating	8·4	13·5	21·0	13·7	17·9	41·0
Harvesting, carrying & threshing	16·6	26·7	36·0	23·6	30·8	55·0
Winnowing, drying, storing	3·2	5·1	3·0	3·2	4·2	10·0
All operations	62·1	100·0	34·0	76·3	100·0	41·0

Source : Anonymous 1972 ; Ali 1972 ; Haque 1973 ; Hossain 1975 ; Khan 1975 ; Mian 1977 ; Mian 1974 ; Mustafi 1975 ; Subhan 1975 ; Talukder 1972 ; Uddin 1974.

4. WHEAT

Operations	LYV			HYV		
	Man-days per acre	% of total	% Hired	Man-days per acre	% of total	% Hired
Perparing land	10.4	35.7	34.0	14.7	28.4	34.0
Manuring, sowing, fertilizing	1.9	6.4	41.0	2.7	5.3	17.0
Weeding, spraying, irrigating	4.7	16.1	33.0	11.7	22.5	56.0
Harvesting, carrying	7.0	23.9	34.0	11.0	21.2	36.0
Threshing	3.2	11.0	20.0	7.4	14.2	27.0
Winnowing, storing	2.0	6.9	11.0	4.4	8.4	29.0
All operations	29.2	100.0	31.0	52.0	103.0	33.0

Source : Islam 1974 ; Roy 1977.

5. JUTE

Operatins	LYV			HYV		
	Man-days per acre	% of total	% hired	Man-days per acre	% of total	% hired
Preparing land	18.4	17.7	18.0	24.7	20.7	14.0
Manuriug, sowing, fertilizing	2.3	2.2	23.0	4.8	4.0	37.0
Mulching, weeding, thinning, spraying	35.7	34.4	49.0	31.0	25.9	44.0
Harvesting, making jak for retting	18.9	18.3	62.0	19.8	16.6	67.0
Extracting fibre, washing	18.4	17.8	60.0	26.5	22.1	57.0
Drying, storing	9.8	9.5	3.0	12.6	10.6	2.0
All operations	103.6	100.0	43.0	119.5	100.0	40.0

Source : Faruque 1974 ; Hossain 1974 ; Jabbar 1971 ; Rahmen 1973.

6. BORO PADDY

Operations	LYV			HYV		
	Man-days per acre	% of total	% hired	Man-days per acre	% of total	% hired
Preparing land	13·7	16·7	34·0	18·5	13·6	35·0
Making ails & drains	3·4	4·2	28·0	3·6	3·2	53·0
Manuring, fertilizing topdressing	4·5	5·5	41·0	6·2	5·5	42·2
Uprooting seedling, transplanting	17·7	21·6	66·0	19·0	16·7	80·0
Weeding	9·4	11·5	59·0	24·1	21·2	78·0
Irrigating	9·0	11·0	28·0	9·7	8·5	27·0
Spraying	0·7	0·8	28·0	1·6	1·4	20·0
Harvesting, carrying	13·2	16·1	58·0	15·9	14·0	77·0
Threshing	4·5	5·5	35·0	9·3	8·2	69 0
Drying, winnowing, storing	5·7	7·0	15·0	8·8	7·7	25·0
All Operations	82·0	100·0	45·0	113·5	100·0	60·0

Source : Anonymous 1967 ; Anonymous 1970 ; Elias 1969 ; Islam 1975 ; Masud & Underwood 1970 ; Quddus 1969.

7. TOBACCO

Operations	Man-days per acre	% of total	% hired
	Jati Variety		
Preparing land	35·0	19·7	1·0
Transplanting	9·6	5·4	22·0
Intercultural operations	35·8	20·2	18·0
Irrigating	39·8	22·5	20·0
Manuring, fertilizing	13·4	7·6	21·0
Harvesting, drying	43·6	24·6	16.0
All operations	177·2	100·0	15·0
	Virginia Variety		
Preparing land	38·1	20·2	15·0
Transplanting	10·6	5·6	33·0
Intercultural operations	41·7	22·1	25·0
Irrigating	43·6	23·1	32·0
Manuring, fertilizing	11·5	6·1	30·0
Harvesting, drying	43·0	22·8	21·0
All operations	188·6	100·0	24·0
	Motihar Variety		
Preparing land	30·7	15·2	13·0
Transplanting	9·8	4·9	33·0
Intercultural operations	77·5	38·4	10·0
Irrigating	37·6	18·6	26·0
Manuring, fertilizing	11·8	5·8	33,0
Harvesting, drying	34·7	17·2	24·0
All operations	220·1	100·0	18,0

Source : Jabber 1975 ; Rahman 1972.

8. SUGARCANE[a]

Operations	Maincrop			Ratoon		
	Man-days per acre	% of total	% hired	Man-days per acre	% of total	% hired
Preparing land, manuring	21·0	16·0	33·0	22·1	21·0	33 0
Preparing set	7·6	5·8	46·0	—	—	—
Trench making, planting	18·2	13·9	65·0	—	—	—
Weeding, mulching, gap filling	40·6	30·9	65·0	42·6	40·5	52·0
Topdressing, tying, trashing, spraying	13·7	10·5	39·0	—	—	—
Harvesting, marketing	30·1	22·9	58·0	40·4	38.5	55·0
All operations	131·1	100·0	54·0	105·1	100·0	47·0

a. Sugarcane produced for sugar mills.
Source: Islam 1975 ; Islam 1976 ; Uddin 1975.

9. POTATO, SWEET POTATO, TOMATO

Operations	Potato		Sweet Potato		Tomato	
	Man-days per acre	% of total	Man-days per acre	% of total	Man-days per acre	% of total
Preparing land	22·1	17·1	6·0	9·9	15·5	28·4
Fertilizing	13·1	10·2	0·4	0·7	9·3	16·9
Planting / transplanting	23·0	17·8	4·0	6·6	2·5	4·6
Weeding, Hilling	21·1	16·3	10·0	16·6	—	—
Irrigating	25·8	20·0	—	—	6·2	11·3
Spraying	1·8	1·4	—	—	—	—
Harvesting	19·6	15·2	20·0	33·1	17·7	32·3
Others	2·5	2·0	20·0	33·1	3·6	6·5
All operations	129·1	100·0	60·4	100·0	54·7	100·0

Source : Anonymous 1967a ; Anonymous 1970a ; Anonymous 1974.