

Economics of Intercropping with Sugarcane in Selected Areas of North Bengal Sugar Mills Zone

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ABSTRACT

A study was conducted to determine the profitability of growing intercrops, such as potato, mustard, gram and lentil with sugarcane in 1987-88. The study revealed that sugarcane + potato accrued the highest net return and sugarcane+ lentil earned the lowest. The extra profit per hectare accrued from mustard was the highest and that from lentil was the lowest. The co-efficient of output elasticity of cost indicated that an increase in costs helped to increase total returns in each of the intercrop combination with sugarcane except sugarcane + lentil. The study also revealed that growing of potato, mustard and gram were found as most compatible intercrops with sugarcane which helped in reducing the cost of sugarcane production.

INTRODUCTION

Sugarcane is grown as one of the major cash crops mainly in the greater districts of Rajshahi, Kushtia, Rangpur, Bogra, Faridpur, Barisal, Dhaka and Mymensingh of Bangladesh (Anon, 1978). Sugarcane is a biennial crop mainly competes with cereal rotations and with some wintercrops (SRTI Annual Report, 1986; 1983). Sugarcane is planted at adequate row spacings and its seedling stage extends over a period of nearly four months from the date of planting. This interrow space practically remains vacant and unutilized by the crop (Tawari and Singh, 1982). The scientists of Sugarcane Research & Training Institute have recommended intercrops with sugarcane after studying at SRTI farm and at the farmers field elsewhere (SRTI Annual Report, 1979, 1983). The sugarcane growers have been advocated to cultivate compatible intercrops with early planted sugarcane which will add more financial benefit to their income like other short duration crops and also help in reducing the cost of sugarcane production. However, no such study have so far been made with longitudinal data from sample farmers on economics of intercropping with sugarcane at NBSM zone. Therefore, the present study was undertaken with the following objectives :

- i) To quantify the costs and returns per hectare production of sugarcane and sugarcane with intercrops(s),
- ii) To determine the impact of intercropping on farmer's income position; and
- iii) To determine that intercropping helps in reducing the cost of sugarcane production.

MATERIALS AND METHODS

The study was based on collection of data from three purposively selected cane growing villages namely, Puratan Ishurdi and Ilsamari villages of Lalpur upazilla in the district of Natore and Zokadoha village of Ishurdi Upazilla in the district of Pabna. The farmers who grew sugarcane as sole crop and those who intercropped potato, gram,

mustard and lentil with sugarcane were listed. Only 59 farmers were selected to ensure representation from sugarcane as sole crop and different intercrops with sugarcane. Out of 59 farmers, 16 farmers grew sugarcane as sole crop and 43 farmers grew intercrops of four combinations with sugarcane viz. sugarcane+potato (22 farmers), sugarcane+gram (12 farmers), sugarcane+mustard (5 farmers) and sugarcane+lentil (4 farmers).

For working out the economics of sugarcane and intercrops with sugarcane, various cost components of human labour (family+hired), animal power, seeds, manures, fertilizers, harvesting and carrying were recorded by following enterprise costing technique. Variable costs included costs on casual labour, seeds, manures, fertilizers, insecticides, marketing and interest on operating capital, while fixed costs included costs on family labour, animal labour, interest on the value of land and depreciation. Costs of inputs like seeds, manures, fertilizers and pesticides were computed on the basis of market prices. Cost of human labour (family+hired) were also computed as per wage rate in that village (choudhuri and Ali, 1962). Cost of animal power were also computed on that basis. Gross return per hectare is expressed by the value of crops and by-products. The net return is derived by deducting the total cost from gross return. Partial budgeting technique was also applied in *ex-post* sense using the costs and returns of sugarcane and sugarcane with intercrop(s) to determine the net effect of intercrops in farm income (Barnard and Nix, 1973). Co-efficient of output elasticity of cost were calculated by using the following formula (Handerson and Quandt, 1980) to determine the responsiveness of returns to changes in the costs involved.

$$EC = \frac{dR}{dC} \cdot \frac{C_1 + C_2}{R_1 + R_2}$$

Where,

EC = Co-efficient of output elasticity of cost

C = Total cost

R = Gross return

d = Partial change

C₁ = Total cost of sugarcane grown as sole crop

C₂ = Total cost of sugarcane and the intercrop

R₁ = Total return from sugarcane grown as sole crop

R₂ = Total return from sugarcane and the intercrop

RESULTS AND DISCUSSION

The highest net return per hectare was obtained from sugarcane+potato (Tk. 26,774.01) followed by sugarcane+gram (16,176.63), sugarcane+mustard (Tk.11,754.56) sugarcane+lentil (Tk. 5,968.30) and sugarcane as sole crop (Tk.5,792.49) (Table 1). The results revealed that net returns from every intercrop combination with sugarcane was higher than that of sugarcane as sole crop (Table 1). Partial budgeting analysis indicated that extra profits per hectare accrued from mustard (Tk. 5,962.07), potato (Tk. 2,237.44), gram (Tk. 2,806.95), and lentil (Tk. 175.74) as intercrop with sugarcane.

(Table 2,3,4 and 6). The study indicates that yield of sugarcane was the highest when it was intercropped with potato (Table 1). It appears from the results that mustard intercrop earned the highest extra profit and that of lentil was the lowest.

Table 1. Costs and returns per hectare and per MT cost of production of sugarcane and sugarcane with intercrops.

Crops	Gross return (Tk.)	Total costs (Tk.)	Net returns (Tk.)	Yield (MTH)	Cost of production per MT
Sugarcane (sole)	40,848.38	35,055.89	5,792.49	54.15	647.38
Sugarcane+potato	72,404.15	45,630.14	26,774.01	—	—
Sugarcane	59,592.46	35,055.89	24,536.57	79.26	442.29
Potato	12,811.69	10,574.25	2,237.44	2.39	4,424.37
Sugarcane+gram	50,910.27	34,733.64	16,176.63	—	—
Sugarcane	48,425.57	33,931.50	14,494.07	63.94	530.68
Gram	2,484.70	802.14	1,682.56	0.25	3,208.56
Sugarcane+mustard	44,558.31	32,803.75	11,754.56	—	—
Sugarcane	37,960.42	31,544.17	6,416.25	49.98	631.14
Mustard	6,597.89	1,259.58	5,338.31	0.62	2,031.58
Sugarcane+lentil	37,497.86	31,529.63	5,968.23	—	—
Sugarcane	34,593.14	30,242.49	4,350.65	46.10	656.02
Lentil	2,904.72	1,287.14	1,617.58	0.25	5,148.56

Table 2. Partial budget for sugarcane with mustard.

Debits	Taka/ha	Credits	Taka/ha
Revenue forgone		Extra revenue	
Difference between		Revenue from mustard	6,597.89
revenue from sugarcane			6,597.89
grown as sole crop.			
(Tk.40,848.38) and that from			
sugarcane only grown with			
mustard (Tk. 37,960.42)	2,887.96		
	2,887.96		
Extra costs		Costs saved	
Costs for mustard	1,259.58	Difference between sugarcane	
	1,259.58	grown as sole crop (Tk. 35,055.89)	
		and those of sugarcane only grown	
		with mustard (Tk.31,544.17)	3,511.72
Total debits	4,147.54		
Extra profit	5,962.07		
	10,109.61	Total credits	10,109.61

Table 3. Partial budget for sugarcane with potato.

Debits	Taka/ha	Credits	Taka/ha
		Extra revenue	
		Revenue from potato	12,811.69
			<u>12,811.69</u>
Extra costs			
Cost for potato	10,574.25		
	<u>10,574.25</u>		
Total debits	10,574.25		
Extra profit	<u>2,237.44</u>		
	12,811.69	Total credits	12,811.69

Table 4. Partial budget for sugarcane with gram.

Debits	Taka/ha	Credits	Taka/ha
		Extra revenue	
		Extra revenue from gram.	2,484.70
			<u>2,484.70</u>
Extra costs		Costs saved	
Costs for gram	802.14	Difference between costs	
	<u>802.14</u>	of sugarcane grown as	
		sole crop (Tk. 35,055.89)	
		and those of sugarcane	
		only grown with gram	
		(Tk. 33, 931.50)	1,124.39
			<u>1,124.39</u>
Total debits	802.14		
Extra profit	<u>2,806.95</u>		
	3,609.09	Total credits	3,609.09

Table 5. Output elasticity of cost for different crop combinations.

Crop combinations	Co-efficient of output elasticity of cost
Sugarcane with potato	2.12
Sugarcane with gram	3.08
Sugarcane with mustard	1.31
Sugarcane with lentil	0.81

Table 6. Partial budgets for sugarcane with lentil.

Debits	Taka/ha	Credits	Taka/ha
Revenue forgone		Extra revenue	
Difference between revenue from		Revenue from lentil	2,904.72
sugarcane grown as sole crop			2,904.72
(Tk. 40,848.38) and that from			
sugarcane only grown with lentil			
(Tk. 34,593.14).	6,255.24		
	6,255.24		
Extra costs		Cost saved	
Costs for lentil	1,287.14	Difference between costs	
	1,287.14	of sugarcane grown as	
		sole crop (Tk. 35,055.89)	
		and those from sugarcane	
		only grown with lentil	
		(Tk. 30,242.49).	4,813.40
			4,813.40
Total debits	7,542.38		
Extra profit	175.74		
	7,718.12	Total credits	7,718.12

The co-efficient of output elasticity of cost of sugarcane with gram, sugarcane with potato, sugarcane with mustard and sugarcane with lentil were calculated as 3.08, 2.12, 1.31, and 0.81, respectively (Table 5). These depicted that one percent increase in total cost of sugarcane with intercrop would increase gross return by 2.12, 3.08, and 1.31, in case of crop combination of sugarcane with potato, sugarcane with gram and sugarcane with mustard respectively. It was found to be less than one when sugarcane with lentil was cultivated by the farmers.

The study also indicated that growing of compatible intercrops with sugarcane in the study locations helped in reducing the cost of sugarcane production which were estimated for sugarcane with potato Tk. 205.09/ MT, sugarcane with gram Tk. 116.70/MT and sugarcane with mustard Tk. 16.24/MT (Table 1).

It appears from the study that all the intercrop combinations with sugarcane were found to be profitable. The study also reveals that compatible each intercrop, such as potato, mustard and gram with sugarcane not only increased extra income of the farmers but also reduced the cost of sugarcane production. Further research is needed in other areas where different intercrops are grown by sugarcane growers.

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