

Comparative Studies and Evaluation of Recommended and Traditional Technology on the Yield of Sugarcane in some Selected Areas

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ABSTRACT

The present study was conducted during 1981-82 to assess the effect of recommended and traditional technology, associated with sugarcane cultivation, on yield and income of the farmers in the millzone areas of the North Bengal Sugar Mills (NBSM) and Mobarakganj Sugar Mills (MKSM) and in the non-millzone areas of Pabna and Jessore district. The results showed significant effect on yield in case of adopting recommended technology such as Variety (VT), Healthy Seeds (HS), Early Planting (EP), Fertilizer Dose (FD), Row Spacing (RS), Earthing up (EUP), Trench Planting (TCP), Drainage Practices (DRP), Tractor Ploughing (TRP), Number of Ploughing (NP), Depth of Ploughing (DRP), Seed Treatment (SDT), Soil Treatment (SLT), Hand Weeding (HW), Pest Control (PC) and Disease Control (DC).

The total average net return from a hectare of land in the mill zone was Tk. 9798.29 and in the non-mill zone was Tk. 5531.57. Net return of Tk. 19184.59 was obtained by the growers of the mill zone, who produced 105.54 m. tons of cane per hectare. In the non-mill zone, it was not profitable who produced 37.89 m. tons per hectare. Highest profit of Tk. 16753.15 was obtained in the non-millzone who produced 121.10 m. tons of cane per hectare. The results demonstrated a higher production and income with higher rates of adoption of recommended technology for sugarcane cultivation.

INTRODUCTION

Bangladesh agriculture is characterized by traditional technology with low resource base and low agricultural productivity (Anon., 1979a). Seed-fertilizer is a neutral to scale technology (Jabber, 1977). But these input are not enough to raise per hectare yield. The new technology, including high yielding varieties of sugarcane, were developed to raise per hectare yield. The impact of various technological input in the millzone areas has increased the yield by 25-30% during the last 5 years (Shahjahan, 1980). Studies in many Asian countries have suggested that the modern technology have not been fully accepted by the farmers of these countries including Bangladesh (Anon., 1979a). The technology recommended for adoption should be in conformity with the national and economic goals (Ahsan and Haq, 1975). But these have not been accepted upto the desired level to raise per hectare production of sugarcane. Even the extent of adoption of recommended technology and its impact on the yield of sugarcane is not correctly known to us.

Hence the present study was conducted during 1981-82 season to assess the rate of adoption and the effect of recommended and traditional technology on the yield and income of the farmers in the millzone areas of the North Bengal Sugar Mills (NBSM) and Mobarakganj Sugar Mills (MKSM) and in the non-mill zone areas of Pabna and Jessore district. The importance of this study lie in quantifying and demonstrating to the neighbouring traditional growers the economic impact that have been derived by those who adopted and applied higher extent of recommended technology for sugarcane cultivation.

MATERIALS AND METHODS

The study was based on collection of data from the various yield groups, such as (a) 9.21-27.64 m. tons/ha., (b) 27.65-55.30 m. tons/ha., (c) 55.31-92.16 m. tons/ha., (d) 92.17-up, of farmers by asking them the various methodology (recommended/traditional) they adopted for sugarcane cultivation.

The samples were collected by surveying 122 farms from millzone and non-milzone areas of Bangladesh. Sixty farms of non-milzone areas were surveyed from eight villages (six villages under P. S. Sathia, one village under P. S. Sujanagar in the district of Pabna and one village under P. S. Sailokopa in the district of Jessore). In the millzone areas, sixty two farms were surveyed from 15 villages (seven villages under P. S. Ishurdi in the district of pabna, four villages under P. S. Boraigram and three villages under P. S. Lalpur of North Bengal Sugar Mills Zone in the district of Rajshahi and one village under P. S. Kaliganj of Mobarakganj Sugar Mills Zone in the district of Jessore).

Some purposeful selections of respondents were necessary to ensure representation from the different selected yield groups (9.21-27.64 m. tons ; 27.65-55.30 m. tons ; 55.31-92.16 m. tons ; 92.17-up). It was not possible to select a completely random sample. Instead survey districts and thanas were selected on the basis of their importance in sugarcane production, while survey unions and villages within the thanas were randomly selected as far as practicable.

The survey data were collected on farming practices (recommended/traditional) of different yield groups of farmers stated above, and the adoption rate of such recommended/traditional practices by different yield groups. They were interviewed primarily centering around the adoption/non-adoption of sixteen recommended technology. These are recommended variety (VT), Healthy Seeds (HS), usually disease free, Early plantation (EP), normally in November, recommended Fertilizer Dose (FD), Row Spacing (RS), 3.0-3.5 feet between two rows, Earthing up (EUP), Trench Planting (TCP), Drainage Practices (DRP), Tractor Ploughing (TRP), Number of Ploughing (NP), usually six times or more, Depth of Ploughing (DP), normally 6-9 inches, Seed Treatment (SDT) with Aretan-6, Soil Treatment (SLT) with Heptachlor/Dieldrin, Hand Weeding (HW), generally three times or more, Pest Control (PC) and Disease Control (DC), mainly mechanical operations.

Attempts were made also to collect data on costs and rates of return to determine the economic impact of the adoption of recommended technology in some selected millzone areas and non-millzone areas.

Some production inputs like seed, fertilizer, hired labourers and power source when purchased on cash payment was easy to compute the expenses. But no cash payment was made to a major inputs like family labourers, own bullock power source etc. It was necessary to compute all costs involved for all operations either from family supplies or purchased, to determine the profit/loss of the farmers. The operations were recorded on man hour equivalent basis. These recorded hours were multiplied by the average wages rate of labours to find out the total costs of family labours.

Cost of bullock power in the production of sugarcane was calculated by recording the total hours of bullock power used in different operations and multiplying it by the average per hour rate of bullock power. Data were analysed for scientific interpretation.

RESULTS AND DISCUSSION

The impact of adopting of various recommended practices on the yield of sugarcane in both millzone and non-millzone has been presented in Tables 1, 2 & 4. The extent of adoption appears to have measurable effect on the yield of sugarcane, the yield increases with the extent of the rate of adoption or rate of application of recommended technology to the growers fields (Tables 1 & 2). When the 29% of the farmer's land in the millzone received the recommended technology, the yield ranged between 9.21 and 27.64 (Table 1) with average of 23.59 m. tons/hectare (Table 4). The yield raised to 92.17 or more m. tons/hectare when the farmer applied the recommended technology to 91% of his land (Table 1) with an average 105.54 m. tons/hectare (Table 4).

The similar trend of results were also recorded in the non-millzone areas. With 11% adoption, the yield range between 9.21 and 27.64 m. tons/hectare (Table 1) with an average of 24.40 m. tons/hectare (Table 4). When the adoption rate of technology raised to 62%, the yield increase was 92.17 m. tons/hectare and above (Table 1) with average yield of 121.10 m. tons/hectare (Table 4). This trend was also very evident when the percentages of farmers, who adopted the recommended technology, were analysed and related to the average production from a hectare of land in both the millzone and non-millzone (Table 2).

The average net income from cultivation of sugarcane was Tk. 9798.29 per hectare in the millzone, whereas it was Tk. 5531.57 in the non-millzone (Table 3). The cost of land preparation, weeding, and other intercultural operations and processing expenses of sugarcane was higher in the non-millzone areas than the millzone areas. But the rate of return in the recommended varieties of millzone areas is higher (Tk. 170.80) than the rate of return (Tk. 129.89) in the deteriorated varieties cultivated in the non-millzone areas (Table 3).

Table 1. Extent of Land (percent) Received Recommended Technology in the Mill's and Non-Mill's Zone and Its Effect on Sugarcane Yield.

Yield Groups (m. tons/ha.)	Total Hectares of land	Extent of Land (%) Received the Recommended Technology																Av (%) land Reci- ved Reco- mmended Technology
		VT	HS	EP	FD	RS	EUP	TCP	DRP	TRP	NP	DP	SDT	SLT	HW	PC	DC	
Mill's Zone																		
9-21-27-64	4-47	100	-	14	11	14	46	6	12	-	100	85	24	21	-	12	21	29
27-65-55-30	3-95	100	-	97	85	59	87	-	37	-	100	43	75	75	7	87	44	56
55-31-92-16	5-29	100	-	98	81	49	69	23	23	8	100	75	96	96	11	100	76	63
92-17-up	7-84	100	96	71	99	100	100	99	51	63	100	99	98	98	99	80	100	91
21-55																		
Non-Mills Zone																		
9-21-27-64	3-34	-	-	10	20	-	-	-	-	-	94	30	-	-	16	-	8	11
27-65-55-30	3-21	-	-	28	21	-	45	-	4	-	87	68	7	-	14	4	-	17
55-31-92-16	2-09	-	-	27	32	-	-	-	13	-	100	65	5	-	47	-	-	18
92-17-up	3-16	57	-	81	93	-	85	100	5	-	100	96	91	18	100	100	69	62
11-80																		

Table 2. Extent of Farmers (percent) Adopted the Recommended Technology in the Mill's and Non-Mill's Zone and Its Effect on Sugarcane Yield.

Yield Groups (m.to ns/ha.)	Total No. Farmers Inter- viewed	Percentage of Farmers Adopted the Recommended Technology																Av. % Farmers Adopted Recommended Technology
		VT	HS	EP	FD	RS	EUP	TCP	DRP	TRP	NP	DP	SDT	SLT	HW	PC	DC	
Mills Zone																		
9.21-27.64	17	100	—	23	12	18	65	12	6	—	100	65	35	29	—	6	18	30
27.65-55.30	16	100	—	94	62	44	81	—	31	—	100	43	56	56	12	87	44	51
55.31-92.16	15	100	—	93	87	40	67	13	27	7	100	73	93	93	13	100	73	61
92.16-up	14	100	86	85	93	100	100	93	57	50	100	93	93	93	93	78	100	88
Non-Mills Zone																		
9.21-27.64	17	—	—	12	12	—	—	—	—	-	94	35	—	-	18	—	6	11
27.65-35.30	16	—	—	31	19	—	44	—	6	-	94	50	12	-	19	6	-	17
55.35-92.16	14	—	—	21	28	—	—	—	7	-	100	64	7	-	50	—	-	17
92.17-up	13	54	—	61	92	—	92	100	8	-	100	92	85	29	100	100	69	61

Table 3. Per hectare cost of production of Sugarcane in the Millzone and Non-Millzone areas.

Operations	Mill Zone Variety				Non-Mill Zone Variety			
	Cost of power labour+ bullock (Tk.)	Cost of materials (Tk.)	Total cost (Tk.)	% of total cost of production	Cost of power labour+ bullock (Tk.)	Cost of materials (Tk.)	Total cost (Tk.)	% of total cost of production
Land preparation	858.55	—	858.55	6.21	1499.54	—	1499.54	8.10
Manures & fertilizer	96.03	1191.43	1287.46	9.30	204.74	1001.61	1206.35	6.52
Planting	2550.42	2048.57	4598.99	33.23	738.73	2637.83	3376.56	18.25
Plant protection	a	209.04	209.04	1.51	—	39.08	39.08	0.21
Weeding, spading & other inter-cultural operation	1471.28	—	1471.28	10.63	2511.05	—	2511.05	13.57
Harvesting, carrying & processing	3778.51	—	3778.51	27.30	7600.46	—	7600.46	41.07
Operation cost	8754.79	3449.04	12203.83	88.18	12554.52	3678.52	16233.04	87.72
Interest on operation cost	—	—	1635.48	11.82	—	—	2272.64	12.28
Total cost	—	—	13839.31	100.00	—	—	18505.68	100.00
Gross return	—	—	23637.60	—	—	—	24037.25	—
Net return	—	—	9798.29	—	—	—	5531.57	—
Rate of return of current investment	—	—	170.80	—	—	—	129.89	—

a. cost of labour for plant protection is included in the other inter-cultural operations.

The low yield, associated with the low rate of technology adoption, could not make any profit. The 17 farms (27.42%) which yielded 23.59 m. tons or less per hectare in the millzone, and 17 farms (28.33%) and 16 farms (26.67%) which yielded 24.40 m. tons or less and 37.89 m. tons or less respectively in the non-millzone could not make any profit (Table 4) after paying all other costs including the wages to the family labourers. Sugarcane yields and profits tended to increase in the higher yield groups of farmers who adopted a higher rate of recommended technology for cultivation of sugarcane both in the millzone and non-millzone areas (Table 4).

Table 4. Total Investment and Net Return (Profit/Loss) of the Farmers under different Yield Groups in the Mill Zone and Non-Mill Zone.

Yield Groups (m. tons/ha)	No. of farms	% Adop- tion	Total Farm size (ha)	Average yield/ hectare (m. ton)	Total investment /hectare (Tk.)	Net return/ hectare profit/loss (+)Tk.(—)	% Return
Mill Zone							
9.21-27.64	17	29	4.47	23.59	8574.70	(—) 506.05	(—) 06
27.65-55.30	16	56	3.95	38.93	11698.74	(+) 4300.47	(+) 37
55.31-92.16	15	63	5.29	72.15	10930.44	(+) 16214.17	(+) 148
92.17-up	14	91	7.84	105.54	24153.36	(+) 19184.59	(+) 79
Non-Mill Zone							
9.21-27.64	17	11	3.34	24.40	10602.35	(—) 1816.98	(—) 17
27.65-55.30	16	17	3.21	37.89	15389.01	(—) 2566.55	(—) 16
55.31-92.16	14	18	2.09	78.32	16033.68	(+) 9756.65	(+) 61
92.17-up	13	62	3.16	121.10	31997.69	(+) 16753.15	(+) 52

The results show that a significantly higher rate of application of recommended technology, such as high yielding variety (VT), use of healthy seeds (HS), early plantation (EP) in November, use of recommended fertilizer dose (FD), cane plantation in approved row spacing (RS) of 3.0 to 3.5 feet, earthing up (EUP) in appropriate time, trench planting (TCP), drainage practices (DRP) to drain out the excess rain water to avoid water stagnancy, tractor ploughing (TRP) for deep ploughing, number of ploughing (NP) for at least six times, depth of ploughing (DP) to about 6 to 9 inches, seed treatment (SDT) with Aretan-6, soil treatment (SLT) with Heptachlor/Dieldrin, hand weeding (HW) at least three times, pest control (PC) and disease control (DC) mainly by mechanical operations, was higher in the millzone than the non-millzone areas. The rate of adoption varied from 29 to 91 percent with different yield groups of farmers (9.21-27.64 m. ton/ha.; 27.65-55.30 m. tons/ha.; 55.31-92.16 m. tons/ha.; 92.17-up) in the millzone areas. Whereas such rate of adoption of recommended practices varied from 11 to 62 percent with different yield groups of farmers in the non-millzone (Table 1). The results (Table 2) also demonstrated that a significantly higher number of growers adopted a higher rate of technology in the millzone (30 to 88% in different yield groups) than in the non-millzone (11 to 61% in different yield groups).

The higher rate of adoption and application of recommended technology had a significant impact on the sugarcane yield and farmer's income.

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