

Economics of Fertilizer Use in Sugarcane Production and Its Impact on Sugar Yield in Some Selected Mills Areas of Bangladesh

M.M. Alam, G.M. Monirul Alam and S.M. Bokhtiar
Bangladesh Sugarcane Research Institute,
Ishurdi, Pabna, Bangladesh.

Received on 20.12.06

ABSTRACT

The study was conducted during 2004-05 cropping season in the sugar mills zone area of Bangladesh. The study was conducted to understand the impact of fertilizer on sugarcane production and yield of sugar. Data were collected randomly among credit farmers from 90 sample farmers from Pabna, Chuadanga and Joypurhat sugar mills area. Out of 90 sample farmers 35.45% (32) used recommended doses of fertilizer (N, P, K) and 65.55% (58) did not apply recommended doses of fertilizer in the mill zones. Higher sugarcane yield 67.93 ton/ha as well as return Tk. 37270/ha obtained by the farmer who used the recommended doses of fertilizer on an average. On the other hand, the farmers who did not use the recommended doses of fertilizer obtained on an average yield 41.33 ton/ha and return Tk. 15332/ha. Sugarcane production and sugar yield gap were 26.6 ton/ha and 1.91 ton/ha respectively. Supply of fertilizer among credit farmers from mills were very much less than requirement that affect sugarcane production as well as sugar yield to a great extent.

Key words: Sugarcane, recommended fertilizer, impact, yield, net return

INTRODUCTION

To meet up the increasing demand of the growing population, further production increase through intensification of agriculture is dire need. In line with the government's policy to ensure food self-sufficiency for the growing population and to promote crop diversification, there is a need to further develop high yielding varieties. This will require more plant nutrients to obtain and sustain high levels of agricultural output. High yielding varieties however, take up more nutrients compared to the local varieties. If balanced nutrients leading to production decline as well as a deterioration of soil physical and chemical properties. In order to sustain agricultural production, it is important to maintain these soil physical and chemical properties by using organic and inorganic fertilizers in the best possible way.

The study was conducted during 2004-05 cropping season in the sugar mills zone area of Bangladesh. It was aimed to understand the impact of fertilizer mainly N, P and K as they called primary nutrients of plants because of their large requirement on sugarcane production and yield of sugar. Fertilizer is indispensable for the crop production systems of modern agriculture. Among the factors that affect crop production, fertilizer is the single most important one that plays a crucial role in increasing yield. Inorganic fertilizers today hold the key to the success of the crop production systems of Bangladesh agriculture, being responsible for about 50 percent of the total production. Adoption of recommended dose of fertilizer use (N, P, K) is very limited in sugarcane production at farmer's level in the mills zone area of Bangladesh, though the sugar mills have strong extension department and supervised credit programmes. Experiences showed that most of the credit farmers of sugar mills area practiced to divert chemical fertilizer partially to their other crop field as supplied by the sugar mills for only sugarcane production. This practice may have adverse effect on sugarcane production as well as sugar yield in Bangladesh. Samuels (1965) reported that Nitrogen deficiency in the early growing season decreases cane yield while excess N at ripening stage reduces juice quality and sucrose content. Mutanda (1980) reported that application of higher amount of fertilizer caused a reduction in the sucrose (%) of sugarcane juice while lower application reduced the cane yield. However, fertilizer requirement of sugarcane varies from place to place according to soil, agro-climatic condition and other agronomic factors (Sing and Sing, 1972). Studies at home and abroad revealed that a significant positive relationship existed between the N dose and yield of cane (Rahman *et al.*, 1998; Majid *et al.* 1992; Banger and sharma, 1991). The proper application of fertilizers concerns not only their quality, but also their quantity, as too little of the right fertilizer does not give the most economic return while too much beyond the needs to the crop affects it adversely (Chaudhry and Corpuz, 1984). Among the various nutrients, nitrogen

plays a vital role on the cane yield and subsequently germination of sugarcane buds (Majid et al., 1999). The proper uses of fertilizer have been observed as another important factor of agronomic practices (Pal, 1971). There is no adequate information regarding different level of fertilizer dose used by the cane farmers and their impact on per hectare sugarcane and sugar yield in the mills zone area. From this study the economic impact of recommended dose of fertilizer application in sugarcane production could be find out. The findings of the study would be useful to the farmers, millers, researchers and policy makers as they could be able to take necessary steps in this regard.

METHODOLOGY

Three locations were selected for the study depending on the intensity of cane growing in the mills zone areas of Bangladesh. For AEZ 11, Pabna and Chuadanga mills zone and for AEZ 3, Joypurhat mill zone areas were selected for the study. The sample farms were selected from supervised credit farmers whom cultivated three major varieties of sugarcane under Pabna, Joypurhat and Carew & Co. sugar mills zone area. Data were collected randomly from 90 sample farmers' from Pabna, Chuadanga and Joypurhat sugar mills area taking 30 farmers from each location. Data on production cost & return of sugarcane, actual dose of fertilizer (N, P, and K) application, pesticide and irrigation use were collected from farmers in the respective area. Secondary data were also used for the study. Descriptive statistics were employed to analyze the data of the study.

RESULTS AND DISCUSSION

It was observed from the study that out of 90 sample farmers 35.45% (32) used recommended doses of fertilizer (N, P, K) and 65.55% (58) did not applied recommended doses of fertilizer in the mill zones. Location wise recommended doses of fertilizer and yield goal are given in Table 1.

Table 1. Location wise yield goal and recommended fertilizer.

Location	Yield Goal (ha)	Fertilizer Recommendation (kg/ha)		
		N	P	K
PBSM (AEZ-11)	80 $\pm$ 8	120	40	72
Carew & Co. (AEZ-11)	80 $\pm$ 8	120	40	72
JSM (AEZ-3)	80 $\pm$ 8	120	25	100

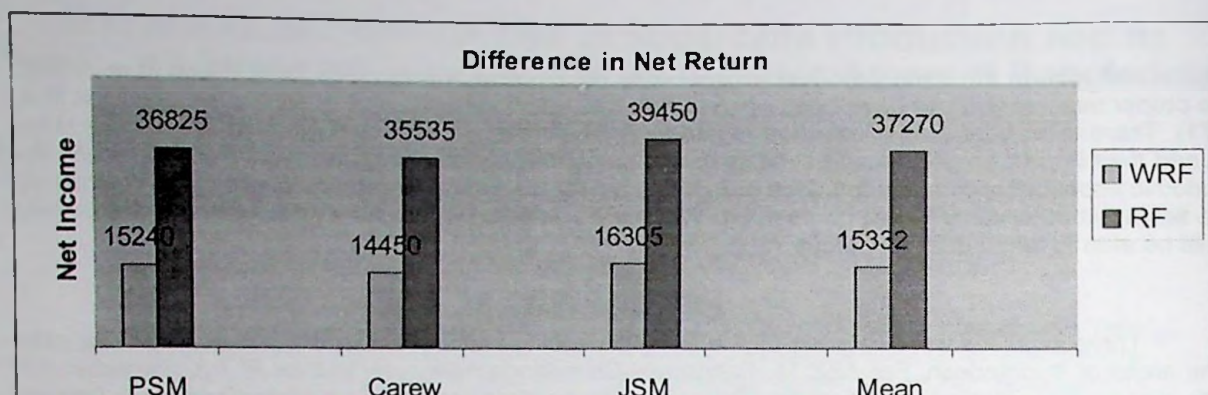
Source: Fertilizer recommendation guide, 2005

Higher sugarcane yield 67.93 ton/ha was obtained by the farmers who used the recommended doses of fertilizer. On the other hand, the farmers who did not use the recommended doses of fertilizer obtained yield 41.33 ton/ha in 2004-05 cropping year (Table 2). Average net return were Tk. 37270/ha and Tk. 15332/ha for the farmers who used the recommended doses of fertilizer and did not use the recommended doses of fertilizer respectively. All the locations yield and net return were substantially higher for the user of the recommended doses of fertilizer than non-user of the recommended doses of fertilizer.

Table 2. Sugarcane production with and without recommended fertilizer.

Location	Number of sample farmers	With recommended doses of fertilizer (NPK)			Without recommended doses of fertilizer (NPK)		
		No. of farmer(%)	Yield (Ton/ha)	Net Return (Tk/ha)	No. of farmer (%)	Yield (ton/ha)	Net Return (Tk/ha)
PSM	30	10 (33)	67.81	36825	20 (67)	40.05	15240
Carew and Co.	30	9 (30)	65.98	35535	21 (70)	41.01	14450
JSM	30	13 (43)	70.00	39450	17 (57)	42.95	16305
Mean	90	32 (35)	67.93	37270	58 (65)	41.33	15332

Source: Field Survey, 2004-05



WRF : Without Recommended Fertilizer; RF : Recommended Fertilizer

Fig. 1. Location wise difference in net return with and without recommended fertilizer

From Table 3 it can be seen that farmers who used recommended doses of fertilizer obtained 26.6 ton/ha more sugarcane than non user of recommended fertilizer. Use of recommended fertilizer was an impact on sugar yield. Farmers without recommended fertilizer obtained 2.97 ton/ha of sugar where as with recommended fertilizer obtained 4.88 ton/ha of sugar. So the difference in sugar yield between with and without recommended fertilizer user group was 1.91 ton/ha (Table 3).

Table 3. Impact of fertilizer use on sugarcane and sugar production.

Location	Sugarcane yield (ton/ha)			Sugar yield (ton/ha)		
	With recommended doses	Without recommended doses	Yield gap (ton/ha)	With recommended doses	Without recommended doses	Yield gap (ton/ha)
PBSM	67.81	40.05	27.76	4.88	2.88	2.00
Carew and Co.	65.98	41.01	24.97	4.74	2.95	1.80
JSM	70.00	42.95	27.05	5.03	3.09	1.94
Mean	67.93	41.33	26.6	4.88	2.97	1.91

Source: Field Survey, 2004-05

Fertilizer distributions among credit farmers through mills were very much lower than requirement. In one hand farmers naturally do not buy fertilizer for sugarcane cultivation by own on the other hand, supply shortage of fertilizer by the mills hampered sugarcane production robustly. About less than 50% of recommended fertilizer especially Urea and MP were provided to the farmers as a result production was much more less than what should in all the locations (Table 4).

Table 4. Distribution of fertilizer under credit programme (2003-2004) and production in sugar mills area.

Name of Sugar Mills	Credit Area (ha)	Fertilizer Used				Yield Ton/ha
		Fertilizer	Recommended Fertilizer Quantity (Ton)	Actual (Ton)	% of Recommended	
PBSM	2944.13	Urea	956.84	213.00	22.26	49.62
		TSP	736.03	695.00	94.43	
		MP	529.94	301.00	56.80	
FSM	4511.74	Urea	1446.00	493.00	34.09	44.66
		TSP	1127.94	954.00	84.58	
		MP	812.11	391.00	48.15	
Carew & Co.	4054.66	Urea	1317.76	374.00	28.38	47.89
		TSP	1013.67	1154.00	113.84	
		MP	729.84	458.00	62.75	
TSM	2800.00	Urea	756.00	510.00	67.46	40.41
		TSP	490.00	782.00	159.00	
		MP	560.00	510.00	91.07	
JSM	2654.25	Urea	716.65	461.00	64.33	47.72
		TSP	464.49	765.00	162.76	
		MP	530.85	466.00	87.78	

Source: Field Survey, 2004-05

So it is significant to conclude that without bringing new area into sugarcane cultivation, although it is almost impossible to bring new area under sugarcane cultivation in the present socio-economic condition we could able to increase our sugarcane production and sugar yield tremendously by proper utilization of recommended doses of fertilizer and others technologies in a large scale. Extension service should be strengthened in this regard so that sugarcane farmers utilize sugarcane production technologies properly. Diversion of fertilizer from sugarcane to others crop should be stopped. Rewarding system to the farmers whom production per hectare is high should be introduced in the respective mills zone. If sugarcane production per hectare increases it will increase the income of farmers and thus increases the interest of farmers to bring more area under sugarcane cultivation and as a consequence of it overall sugarcane production and sugar yield will boost up in Bangladesh.

REFERENCES

- BARC, 2005. Fertilizer Recommendation Guide-2005, Bangladesh Agricultural Research Council, Farmgate, New Airport Road, Dhaka.
- Banger, K.S. and Sharma, S.R. 1991. Response of sugarcane (*Saccharum officinarum* L.) varieties to nitrogen fertilization. *Indian J. Agro*, **536**: 440-445.
- Chaudhry, B.A. and Corpuz, I.T. 1984. Profitability of fertilizers and dolomite application to sugarcane in Philippines. *Sucar-Y-Azucar*, **79**:21-44.
- Pal, B.P. 1971. Fertilizer use and strategy. *Indian Farming*. **20**:5.
- Majid, M.A.; Rahman, M.H.; Khondaker, M. and Barma, A.C. 1992. Effect of nitrogen and spacing on transplanted sugarcane. *Pro. Inter-Congress Conference of Commission IV International Society of Soil Science*, Dhaka. pp.29-33.
- Majid, M.A.; Alam, F.; Islam, M.J.; Ghafur, M.A. and Chowdhury, S.N.A. 1999. Effect of nitrogen and inter-plant spacing on the production of seed cane and germination of buds. *Bangladesh J. Sugarcane*, **21**: 61-66.
- Mutanda, P.P. 1980. Response of sugarcane to nitrogen fertilizer and climate on two major soils in W. Kenya. *Proc. ISSCT*, **21**: 200-211.
- Rahman, M.H.; Khondaker, M.; Pal, S.K.; Majid, M.A.; Zaman, M.W. and Ali, M.Y. 1999. Effect of nitrogen on growth, yield and sucrose content of sugarcane. *Bangladesh J. Sugarcane*, **11**: 83-86
- Samuels, G. 1995. The response of sugarcane to fertilizer application as influenced by irrigation. *Proc. ISSCT*, **12**: 222-226.
- Sing, O. and Sing, B.P. 1972. Response of mid season and late varieties of sugarcane to nitrogen. *Indian Sugar*, **21**: 10-14.