Bangladesh J. Sugarcane, 22 : 88-92 *July, 2000*

Performance of Double Intercropping with Sugarcane in Modhupur Tract Soils

M. H. Rashid, M.A. Quddus, M.A. Rashid[1], A. H. Khan and N.E. Elahi
Bangladesh Rice Research Institute,
Gazipur-1701, Bangladesh.

Received on 21.02.2000

ABSTRACT

An experiment was conducted at the Bangladesh Rice Research Institute (BSRI) Farming Systems Research and Development (FSR & D) Site, Kapasia in the Modhupur Tract Soils during 1998-99 cropping season to find out a suitable crop varieties appropriate for first and second intercropping with sugarcane for higher agronomic and economic return of the sugarcane based intercropping systems. Potato, edible poded pea (EPP), bush bean and cabbage as the first and red amaranth as the second intercrop were grown with sugarcane variety, Amrita. Though the cane yields of intercropping and sole cropping systems did not differ significantly, an increased cane yield of 237.3 t ha^{-1} was obtained from the treatment when potato and red amaranth were grown as the first and second intercrop with sugarcane. Economic analysis of sole sugarcane and sugarcane based intercropping systems showed that potato or cabbage when first intercropped with sugarcane followed by intercropping red amaranth gave about 28% higher gross margin than sole sugarcane suggesting that either potato of cabbage could be an appropriate first intercrop with red amaranth as second intercrop with sugarcane for the Modhupur Tract Soils.

Key words: Sugarcane, intercropping, potato, amaranth.

INTRODUCTION

Sugarcane is grown in the Modhupur Tract Soils as one of the major income-generating crop. Diagnostic analysis reveals that farmers of Kapasia usually cultivate sugarcane as sole crop. They grow local sugarcane varieties of low yield potential with poor management practices under rainfed conditions in the month of March and April and this results poor economic return (Quddus *et al.* 1998)

Since sugarcane is a long duration crop planted at wide space as sole crop, it takes about 80 to 90d to cover the ground by leaf canopy. Intercropping of fast growing early maturing crops may offer an excellent opportunity to increase total land productivity and monetary return through utilizing natural resources like light, nutrient and moisture and fulfill the diversified needs of the farmers (Singh *et al.*, 1986). Growth of sugarcane for first 12 weeks is slow and this crop does not require first earthing up until 12-16 weeks after planting. To take the advantage of the slow initial growth and less lateral spread across the vacant space between rows of sugarcane, one or two crops can be grown simultaneously with sugarcane (Hossain *et al.* 1995). But, it depends mostly on kinds of crops grown in a particular season. The sugarcane growers have been advocated to

[1] Quarantine Station, Bangladesh Sugarcane Research institute, Gazipur-1701, Bangladesh.

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 (Kabir, 1988). Transplanting sugarcane in November-December could provide an opportunity for growing two short duration high value vegetable crops as intercrops and could increase the total productivity of the system. Rabi crops like potato, cabbage, edible poded pea, bush bean could be grown with sugarcane and after harvesting first set of intercrops, a short duration quick growing like red-amaranth may be suited to the system for this locality. Therefore, the present study was undertaken to increase the total system productivity by shifting planting time of cane from March-April to November-December and to find out the suitable crops for first and second intercropping with sugarcane for higher economic return.

MATERIALS AND METHODS

The experiment was conducted at BRRI Farming Systems Research and Development Site, Kapasia during 1998-99 cropping season. The soil of the experimental plot is silty loam in texture, belongs to Modhpur Tract of Agro-ecological region 28. Potato, bush bean, edible poded pea (EPP) and cabbage were grown as the first intercrops while red amaranth was grown as the second intercrop with sugarcane variety, Amrita. Sugarcane grown alone was considered as a control treatment. The experiment was laid out in a randomized complete block design with three replication. Two budded soil bed settling was transplanted on December 7, 1998. One row of potato or cabbage was planted on ridge in between two rows of sugarcane while it was three rows in the case of other intercrops. The management practices followed are presented in Table 1. First set of intercrops was harvested within first week of March and second intercrop (red amaranth) was harvested within mid April. The sugarcane was harvested at maturity in December 1999.

Observation on individual plant parameters was measured from ten randomly selected plants in each plot whereas number of tiller, millable cane and cane yield was measured from the whole plot. The average values of all parameters were statistically analyzed and differences were determined by DMRT. Economics of different treatments were compared based on the prevailing market price of sugarcane and other intercrops.

RESULTS AND DISCUSSION

The number of tillers and millable cane ha^{-1} were not significantly affected by different intercropping systems (Table 2). The highest number of tiller ha^{-1} (350.8 x 103) was obtained from the first and second intercrops of potato and red amaranth respectively with sugarcane. The lowest tillers (269.2 x 103 ha^{-1}) was obtained from the cabbage and red amaranth grown as first and second intercrop, respectively with sugarcane. The highest number of millable cane (89.87 x 103 ha^{-1}) was obtained from the first and second intercrops of cabbage and red amaranth respectively with sugarcane, and the lowest (79.57 x 103 ha^{-1}) from the edible poded pea and red amaranth. Similar result was also reported by BSRI (1994). Cane girth and weight of single cane were significantly affected by different systems. The cane girth and weight of single cane were significantly higher when potato and red amaranth were intercropped as first and second intercrop with sugarcane compared to all other intercropping combinations which were statistically identical (Table 2).

Table 1. Management practices for sugarcane and intercrops.

Management factors	Sugarcane (as sole and with intercrops)	Crops grown as first intercrop with sugarcane				Second intercrop
		Potato	Edible poded pea	Bush bean	Cabbage	Red amaranth
Date of sowing/ Date of transplanting	December 7	December 12	December 12	December 12	November 13	March 10
Spacing (Row x plant) (cm x cm)	90 x 45	Single line x 25	25 x 10	25 x 10	Single line x 40	25 x 10
Fertilizer rate (N-P-K-S-Zn kg hg^{-1})	150-48-100-30-2	69-15-60-0-0	30-25-25-0-0	30-25-25-0-0	50-20-25-0-0	23-5-25-2-0
Basal (kg ha^{-1})	50-48-33-30-2	34-15-60-0-0	15-25-12-0-0	15-25-12-0-0	25-20-12-0-0	11-5-25-2-0
1st topdress (kg ha^{-1}) (DAS/DAP)	50-0-33-0-0 (120)	35-0-0-0-0(30)	15-0-13-0-0 (30)	15-0-13-0-0 (30)	25-0-13-0-0 (30)	12-0-0-0-0 (15)
2nd topdress (kg ha^{-1}) (DAS/DAP)	50-0-34-0-0 (150)	0-0-0-0-0	0-0-0-0-0	0-0-0-0-0	0-0-0-0-0	0-0-0-0-0
Irrigation No (DAS/DAP)	4 (30,60,120 & 150)	2 (30,60)	2 (30,60)	2 (30,60)	2 (30,54)	2 (10,25)
Weeding No (DAS*/DAP**)	2 (30,50)	2 (25,50)	2 (30,45)	2 (30,55)	2 (30,50)	2 (10,25)
Pest control	Curative	Curative	Curative	Curative	Curative	

*DAS = Days after sowing, ** DAP = Days after transplanting.

Table 2. Growth and yield contributing characters of sugarcane under different intercropping.

Treatments	Tiller (10^3 ha^{-1})	Millable cane (10^3 ha^{-1})	Height (m)	Cane girth (cm)	Single cane Weight (kg)
Sugarcane + potato as first intercrop + red amaranth as second intercrop.	350.8	87.85	4.60	7.93 a	2.77 a
Sugarcane +EPP as first intercrop + red amaranth as second intercrop.	281.7	79.57	4.40	6.96 b	2.24b
Sugarcane + Bush bean as first intercrop + red amaranth as second intercrop.	310.0	85.74	4.44	7.12b	2.34 b
Sugarcane + Cabbage as first intercrop + red amaranth as second intercrop	269.2	89.87	4.44	6.50 b	2.09 b
Sugarcane sole	2.92.5	89.23	4.40	6.96 b	2.35 b
CV (%)	11.4	6.8	2.1	6.0	6.8

In a column, means followed by a common letter do not differ significantly at 5% level by DMRT.

The cane yields of intercrops and sole crop differ significantly (Table 3), 237.3 t ha^{-1} cane yield was found in intercropping potato and red amaranth as first and second intercrops treatment and it was higher compared to rest of the treatments. This is possibly due to additive effect of higher fertilizer used in this treatment. Cane yields obtained from other intercropping systems were in decreasing trend. This finding supported the results of Imam *et al.* (1987) where they found that fertilizers applied in the intercropped potato helped to produce increased cane yield. The highest cane yield of the treatment, intercropping potato and red amaranth as the first and the second intercrop was associated with the highest cane girth and heavier single cane weight. The results were in partial agreement with the findings of Singh *et al.* (1998) where they reported that higher cane yield was the result of higher plant height, cane diameter and single cane weight.

Table 3. Cane, intercrops yield and economics of different sugarcane based intercropping systems.

Treatments	Cane yield (TCH)	Yield (t ha-1)		Gross return ('000'Tk. ha^{-1})	Variable cost ('000' Tk.ha^{-1})	Gross margin ('000'Tk. ha^{-1})
		Frist Intercrop	Second intercrop			
Sugarcane + potato as first intercrop + red amaranth as second intercrop.	237.3 a	5.26	3.73	296.5	82.20	214.3
Sugarcane +EPP as first intercrop + red amaranth as second intercrop.	176.2 b	2.78	3.80	222.5	73.70	148.8
Sugarcane + Bush bean as first intercrop + red amaranth as second intercrop.	200.4 ab	3.54	3.67	251.8	72.80	179.0
Sugarcane + Cabbage as first intercrop + red amaranth as second intercrop.	181.7 b	41.23	3.80	294.1	80.50	213.6
Sugarcane sole	209.7 ab	-	-	222.3	55.50	166.8
CV (%)	9.6	-	-	-	-	-

In a column, means followed by a common letter do not differ significantly at 5% level by DMRT.

Economic performance of intercropping of potato and cabbage as the first intercrop and the red amaranth as second intercrop, gave an average gross margin of Taka 214300 and 213600 ha^{-1} respectively which was about 28% higher than the sole sugarcane. The higher gross margin was attributed to higher cane yield and cabbage and potato yields (Table 3) produced in this sugarcane intercropping system. Considering the economic benefit of the intercropping systems, growing potato or cabbage as first intercrop and red amaranth as second intercrop could be disseminated to other similar sugarcane growing areas.

REFERENCES

Bangladesh Sugarcane Research Institute, Ishurdi, Pabna, Bangladesh pp.13-31.

Hossain, A.H.M.D.; Rahman, M.K.; Kabir, M.L.; Matin, M.A. and Alam, J. 1995. Performance of soyabean and some other crops as intercrop with paired row transplanted sugarcane. *Bangladesh J. Sugarcane,* **17**: 119-122.

Imam, S.A.; Ali, M.; Moslemuddin, S.M. and Hossain, A.H.M.D. 1987. Performance of intercropped sugarcane under rainfed fertilizer management *Bangladesh J. Sugarcane*, **9**: 72-82.

Kabir, M. H. 1988. Economics of intercropping with sugarcane in selected areas of North Bangal Sugarmills Zone. *Bangladesh J. Sugarcane*, **10**: 81-86.

Quddus, M.A.; Siddqui, M.R.; Elahi, N.E. and Khan, A.H. 1998. Site characterization and problem analysis using PRA technique. Rice Farming Systems Division. Bangladesh Rice Research Institute, Gazipur. 48p.

Singh, V.; Kothari, S.K. and Tripathi, H.N. 1986. Studies on intercropping in sugarcane in Central Uttar Pradesh. *Indian Sugar.*, 35: 559-562.

Singh, V.P.; Ehsanullah, M. and Singh, B.K. 1998. Comparative performance of the recommended varities of sugarcane in Bihar. *Indian Sugar*, **47** (2): 913-920.