



E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2019; 8(5): 1602-1604
Received: 16-07-2019
Accepted: 18-08-2019

Firdoz Shahana
Professor Jayashankar
Telangana State Agricultural
University, Telangana, India

Dr. Y Bharati
Professor Jayashankar
Telangana State Agricultural
University, Telangana, India

Dr. B Joseph
Professor Jayashankar
Telangana State Agricultural
University, Telangana, India

Corresponding Author:
Firdoz Shahana
Professor Jayashankar
Telangana State Agricultural
University, Telangana, India

Identification of profitable intercrops in summer sugarcane in NTZ

Firdoz Shahana, Dr. Y Bharati and Dr. B Joseph

Abstract

The field experiment was conducted for three years 2013-2015 in sugarcane variety CO-86032 planted at wider spacing with six different intercrops –Coriander (leaf), Tomato, Bhendi, Chilly, Gum guar and coriander (seed) at Regional Sugarcane and Rice Research Station- Rudrur, Nizamabad, Professor Jayashankar Telangana State Agricultural University with a objective to identify profitable intercrops in sugarcane planted in the months of Jan or Feb in comparison to sole sugarcane. Higher number of millable cane was from Sole Sugarcane ($78.8 \times 10^3 \text{ ha}^{-1}$). The number of millable cane in all intercrops was on par with that of Sole Sugarcane except Sugarcane + Chilly intercropping system. Among the intercrops highest number of millable cane was recorded from Sugarcane + Coriander seed ($74.3 \times 10^3 \text{ ha}^{-1}$) followed by Sugarcane + Gumguar ($73.4 \times 10^3 \text{ ha}^{-1}$). Maximum cane yield was obtained from Sole Sugarcane (75.7 t/ha^{-1}) but cane yield from Sugarcane + Coriander (Seed) and Sugarcane + Gumguar and sugarcane+coriander (leaf) (67.5 t/ha^{-1} , 67.3 t/ha^{-1} and 66.7 t/ha^{-1}) respectively was statistically superior over other intercropping systems and on par with Sole Sugarcane. Maximum equivalent cane yield was recorded in Sugarcane + Bhendi and Sugarcane + Gumguar intercropping combinations (96.7 t/ha^{-1} & 96.5 t/ha^{-1} respectively). But due to lower cost of production in gum guar intercropping, recorded highest net returns of (Rs 1, 11, 411 ha^{-1}) with B:C ratio of 0.92 followed by Sugarcane + Coriander (leaf) with net returns and BC ratio of Rs 107, 881 ha^{-1} and 0.91 respectively.

Keywords: Sugarcane intercrops, sucrose percent yield and yield attributes and B: C ratio

Introduction

India is the second largest producer of sugar after Brazil with a global share of 17% in 2014-15. Over five million farmers are involved in the cultivation of sugarcane in tropical and subtropical India, the two distinct agro-climatic regions of the crop in the country. At present, the area under sugarcane is 157 million ha with production and productivity of 12460 tonnes and productivity $79.4 \text{ tonnes ha}^{-1}$ respectively (DoES, 2015) [3]. Tropical region shares about 45% and 55% of the total sugarcane area and production in the country, respectively. Rapidly increasing population, increased demand for food, limited scope for extension of cultivation to new areas, diversified needs of small farmers for food and cash, etc. have necessitated the adoption of intercropping systems.

Sugarcane, as a long duration crop, gives income about a year after planting, and there is a dire need to diversify the cropping system to provide shorter-term income by introducing other crops, either as sequential or inter-cropping strategies, especially for farmers having smaller land holdings, Jamuna *et al* 2007. The growth rate of sugarcane during its initial stages (first 120 days) is rather slow, with the leaf canopy providing sufficient uncovered area for growing of other crops. Sugarcane growers take advantage of this and grow various short duration crops like cereals, pulses, Vegetables and spices as intercrops to obtain interim return Ayyer 1963 Small sugarcane growers need not wait until the harvest of the sole crop to obtain financial returns. Intercropping of economically important short duration crops with sugarcane through utilization of the present limited land resources would help to sustain sugarcane cultivation and provide interim return to marginal and small farmers.

In general, the optimum row spacing recommended for sugarcane is 90 cm which is widely followed in tropical India. With the introduction of very high tillering and high yielding varieties of sugarcane, there is a possibility to adopt wider row spacing. The present problem of labor shortage may worsen in future affecting the survival of sugar industry and cane growers. Wide row spacing of 150 cm is preferable for sugarcane based intercropping systems. Wide row spacing becomes an important agronomic consideration in future in developing countries (Mahadevaswamy 2001) [8].

Currently sugarcane crop yields are low and its area under cultivation is declining due to its high cost of cultivation and continuous reduction in announcing less remunerative prices

to the farmers by the policy makers. Of late the area under this crop is continuously declining in Telangana state of India. In order to facilitate the farmers to get lucrative prices sugarcane can be intercropped with other crops for midseason income generation from intercrops. In tropical region normal time for sugarcane is from December to March. Dwarf type crops with compact canopy including legumes, oilseeds and vegetables are suitable as intercrops in spring planted sugarcane (Kailasam 2008) [6]. Hence present study was initiated to identify profitable intercrops in sugarcane planted in Northern telangana zone of TELANGANA state.

Materials and Methods

The field experiment was conducted for three years during 2013-14, 2014-15 & 2015-16 at Regional Sugarcane and Rice Research Station- Rudrur, Nizamabad, Professor Jayashankar Telangana State Agricultural University. The experiment was laid out in a randomized block design with three replications. The treatments comprised sole sugarcane, SC + Coriander (leaf), SC + Tomato, SC + Chilli, SC + Bendi, SC + Gum guar and Sugarcane + Coriander (seed). Sugarcane variety Co-86032 which is high tillering and good ratooner and predominant in Telangana was sown at wider spacing of 150 cm between the rows and intercrops were sown in between cane rows. Fertilizers were applied as per RDF separately to sugarcane and intercrops separately. Yields of different intercrops were recorded at harvest. Sugarcane growth, yield attributes, yield and sucrose percentage parameters were recorded. Gross income, cultivation cost, net return and B:C ratios were calculated for the different systems. Statistical analysis was done by using standard procedures.

Results and Discussions

At 90 days after planting maximum tiller count ($73.00 \times 10^3 \text{ ha}^{-1}$) was recorded in Sugarcane + Coriander (Seed) over sole sugarcane ($70.30 \times 10^3 \text{ ha}^{-1}$) but at 120 days after planting it was maximum in Sole Sugarcane ($90 \times 10^3 \text{ ha}^{-1}$) followed by Sugarcane + Coriander (Seed) ($89.00 \times 10^3 \text{ ha}^{-1}$). At 210 days after planting tiller count in sole sugarcane and intercropped sugarcane was on par with each other and significantly superior over sugarcane +chilly intercropping system. These findings are in accordance with Roodagi *et al.* (2000) [11] and Muhammed *et al.* (2000). It was lowest in sugarcane +chilly which may be due to extended growth period of chilly which coincided with tillering and growth phase of sugarcane offering more competition for nutrients and moisture.. Similar results were reported by Keshavaiah *et al.*, 2014.

However differences in plant height of Sole Sugarcane and intercropped Sugarcane were found statistically non – significant. Among the intercrop combinations highest cane height was recorded in Sugarcane + Coriander Seed (241.5 cm) and Sugarcane + Gumguar (239.0 cm) while Sole Sugarcane being highest (245.0 cm). It may be possible due to non exhaustive and dwarf nature of the intercrops and residual effects of additional fertilizers as well as cultural practices and other crop management practices applied to intercrops on sugarcane. Similar results were reported by Muhammed *et al.* (2000). Significantly highest cane girth was recorded in Sole Sugarcane (3.0 cm) over other intercrop combinations. All the intercrops recorded statistically on par cane girth and it ranged from 1.46 cm to 2.36 cm with highest in Sugarcane + Bendi and lowest in Sugarcane + Chilly. Sucrose percent was not significantly influenced by different inter crop combinations.

NMC & Cane yield varied significantly. The highest millable cane was found in Sole Sugarcane ($78.8 \times 10^3 \text{ ha}^{-1}$). The number of millable canes in all intercrops was on par with that of Sole Sugarcane except Sugarcane + Chilly. It may be due to interfering of chilly with tillering and grand growth period of sugarcane for nutrients and water. Among the intercrops highest number of millable cane was recorded from Sugarcane + Coriander seed ($74.3 \times 10^3 \text{ ha}^{-1}$) followed by Sugarcane + Gumguar ($73.4 \times 10^3 \text{ ha}^{-1}$). Higher number of millable canes is mainly attributed to optimum shoot population which eventually resulted in higher NMC. Maximum cane yield was obtained from Sole Sugarcane (75.7 t/ha^{-1}) but cane yield from Sugarcane + Coriander (Seed) and Sugarcane + Gumguar and sugarcane +coriander (leaf) (67.5 t/ha^{-1} , 67.3 t/ha^{-1} and 66.7 t/ha^{-1}) respectively was statistically superior over other intercropping systems and on par with Sole Sugarcane which may be attributed to dwarf nature of these intercrops offering less competition to cane and residual effect of additional fertilizers and cultural practices applied to intercrops enhancing cane yields. These results are in confirmation with Muhammed *et al* (2000) Lowest cane yield was recorded in Sugarcane + Chilly intercropping system (42.00 t/ha^{-1}). The yield reduction compared to Sole Sugarcane was 35% from this system. This indicates that chilly as an intercrop adversely affected various growth and yield parameters of Sugarcane offering heavy competition for nutrients and moisture.

Economics

The economics of different inter crops with Sugarcane was worked out and presented in Table 2. The equivalent cane yield of different inter cropping systems varied significantly with Sole Sugarcane. Maximum equivalent cane yield was recorded in Sugarcane + Bendi and Sugarcane + Gumguar intercropping combinations (96.7 t/ha^{-1} & 96.5 t/ha^{-1} respectively). Rahman *et al.* (1994) [10] found similar results with sugarcane+ onion, sugarcane +potato and other crop combination. This is mainly due to higher cane yield coupled with intercropped yield. Similar findings were reported by Biradar *et al.* (1995) [2] This intercrop combination did not effect growth and yield of sugarcane. Similar opinion was expressed by Srinivas.(1996) [13] All the intercrop treatments except chilly increased net returns from sole sugarcane. But due to lower cost of production in gum guar intercropping, this system recorded highest net returns of Rs 1, 11, 411 ha^{-1} with B:C ratio of 0.92 followed by Sugarcane + Coriander (leaf) with net returns of Rs 107, 881 ha^{-1} and BC ratio of and 0.91 hence identified as most profitable intercrops conversely sugarcane + chilly intercropping combination was found economically unviable.

Conclusions

From the above study it can be concluded that farmers in Northern Telangana Zone of Telangana State can adopt 150 cm between rows with profitable inter crops like gumguar and coriander which are short duration and dwarf and non exhaustive in nature complementing the Sugarcane crop by enhancing cane yield over sole sugarcane with either 90/120 cm between rows. Farmers can realize additional income by these crops in addition to sugarcane yield which is an added advantage and midseason income generation. Hence by choosing profitable intercrops the productivity per unit area and unit time can be increased in long duration crops like Sugarcane.

Table 1: Growth and yield attributing parameters as influenced by different intercropping systems

Treatments	Tiller count ('000/ha)			Number of millable canes ('000/ha)	Cane height (cm)	Cane girth (cm)	Cane yield (t/ha)	Sucrose %
	90 DAP	120DAP	210 DAP					
Sugarcane sole crop	68.7	90.0	87.3	78.8	245.0	3.0	75.7	19.17
Sugarcane + C.leaf	71.0	86.3	85.0	73.1	226.4	2.2	66.7	19.17
Sugarcane + Tomato	71.3	85.0	83.2	71.1	234.0	2.3	64.9	19.23
Sugarcane + Chilli	68.3	74.0	70.0	62.0	227.6	1.8	56.0	19.00
Sugarcane +Bhendi	69.3	86.0	84.6	72.6	232.0	2.4	66.0	18.97
Sugarcane + Gum guar	70.7	87.0	86.3	73.4	239.0	2.3	67.3	19.13
Sugarcane + Coriander seed	73.0	89.0	87.0	74.4	241.5	2.2	67.5	19.27
CD (P=0.05)	N/A	N/A	9.368	8.259	N/A	0.443	8.75	N/A
SE (m)	6.187	16.127	3.007	2.651	4.278	0.142	2.809	0.338
C.V.	15.187	32.734	6.24	6.36	3.152	10.834	7.338	3.063

Table 2: Economics and B: C ratio as influenced by different intercropping systems

Treatments	Inter crop Yield (q/ha)	SC Eq. yield (t/ha)	Total Net Income (Rs/ha)	B:C ratio
Sugarcane sole crop		75.67	75733	0.77
Sugarcane + C.leaf	12.33	93.65	107881	0.91
Sugarcane+Tomato	104.67	95.91	105584	0.85
Sugarcane+Chilli	34.5	81.38	60600	0.47
Sugarcane+Bhendi	41.67	96.71	107321	0.85
Sugarcane+ Gum guar	26.01	96.58	111411	0.92
Sugarcane+ Coriander seed	8.33	93.73	105256	0.88
CD (P=0.05)		11.399		
SE (m)		3.659		
C.V.		6.996		

References

- Ayyer AK. Principles of Crop Husbanding in India. Bangalore Press, 4th Ed, 1963, 250–257.
- Biradar SH, Radder GD, Hunshal CS. Cane yield and economics of soybean intercropping in sugarcane. *Bharatiya Sugars*. 1995; 20:119-121.
- Do ES. Season and crop report Telangana. Directorate of Economics and Statistics (DOES), Government of Telangana, 2015, 51.
- Hossain GMA, Bokhtiar SM, Paul SK, Anam MR. Intercropping of sugarcane with onion and potato followed by sesame in paired row system. *Journal of Agronomy*. 2003; 2:85-91.
- Jamuna P, Naidu NV, Ramalingswamy K, Rosaiah M. Effect of intercropping with legumes, wider row spacing and nutrient management in increasing productivity of sugarcane. In: Proceedings of 68th Annual Convention of Sugar Technologist's Association of India, New Delhi, India, 2007, 46-60.
- Kailasam C. Evaluation of nitrogen levels and seed rates for short duration sugarcane (Co 8338) intercropped with three soybean cultivars of varying growth habits. Ph.D. thesis, Tamil Nadu Agricultural University, Coimbatore, 1994.
- Kathiresan G, Ayyamperumal A. Effect of green manure intercrops under different sowing methods and nitrogen levels on cane yield. *Journal of Cooperative sugar*. 1996; 27:126-128.
- Mahadevaswamy M. Studies on intercropping of aggregatum onion (*Allium cepa* var. *aggregatum*) in wide spaced sugarcane. Ph.D. thesis, Tamil Nadu Agricultural University, Coimbatore, 2001.
- Muhammad IS, Ayaz I, Ahmad MI. A glance at the agronomic study of sugarcane intercropping with three other crops. *Pak. Sugar J*. 2000; 15:18-22.
- Rahman MS, Haq MF, Islam Ms, Hashar MK, Ara N, Sardar PK. Sugarcane based intercropping in selected areas of Rajshahi sugar mills zone. *Bangladesh J. Sugarcane*. 1994; 16:44-48.
- Roodagi LI, Itnal CJ, Khandagave RB. Influence of planting system and intercrops on sugarcane tillering and yield. *Indian Sugar*. 2000; 12:605-609.
- Singh VS, Kothari K, Tripathi HN. Studies on intercropping in sugarcane in central Uttar Pradesh. *Indian Sugar Journal*. 1986; 35:559-562.
- Srinivas S. Green manuring, a strategy to manage fertilizer nitrogen and moisture stress in sugarcane under Tungabhadra command area. *Cooperative Sugar*. 1996; 27:117-125.
- Khandagave RB. Agronomic management of intercropping in sugarcane and its economic implications. *Pro. Int. Soc. Sugarcane Techonology*. 2010; 27:1-5.