

Interactive Relationship between Growth and Yield Characteristics of Autumn Sugarcane (*Saccharum Officinarium* L.) and Associated Cultures

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ABSTRACT

A field Study pertaining to the effect of intercropping on growth and yield components of autumn sugarcane was conducted at agronomic research area, University of Agriculture, Faisalabad. Among different treatments, sugarcane alone produced the highest cane yield of 149.94 t ha⁻¹ but it did not differ significantly from that of either lentil or peas or garlic intercropped in sugarcane. Higher cane yield in sugarcane alone was due to more number of millable canes m⁻², cane length and weight per cane. Income from these combinations was also higher than others or when sugarcane was grown as a sole crop.

Key Words: Intercropping; Yield; Income; Sugarcane

INTRODUCTION

Sugarcane (*Saccharum officinarum* L.) is an important sugar crop of Pakistan. It is grown on area of 8770 thousand hectares, with the average production of 39 tones of cane ha⁻¹ and 8.5 per cent of white sugar recovery (Anonymous, 1991).

The practice of intercropping in sugarcane is also becoming popular among the farmers because of its economic benefits and efficient utilization of inputs. Primarily intercropping has principally been developed to meet the diversified needs of the growers both for food and socioeconomic uplift. Research has shown that intercropping helps in maintaining soil fertility, economic utilization of land, labour and capital (Ishaq & Ali, 1972). The present study was initiated to evaluate the comparative productive efficiency of a few intercrops against autumn sugarcane under irrigated conditions at Faisalabad.

MATERIALS AND METHODS

A field experiment was conducted at the University of Agriculture, Faisalabad during 1997-98. The experiment was laid out in randomized complete block design with 4 replications. Sugarcane associated cultures comprised sugarcane + sunflower, sugarcane + wheat, sugarcane + gram, sugarcane + lentil, sugarcane + peas, sugarcane + garlic and sugarcane + sarson in addition to sole sugarcane crop. Sugarcane variety BF-162 was used as a medium of trial and the crop was sown on September 25. Sunflower, garlic and sarson were intercropped on October 18, 1997, whereas lentil, gram wheat and peas were sown on November 1, 1997. Other agronomic practices for all the

treatments were kept normal and uniform as recommended for the area. Fertilizer at the rate of 150 kg nitrogen, 100 kg P₂O₅ and 100 kg K₂O ha⁻¹ was applied as a basal dose. Observations on growth and yield characteristics of sugarcane and that of economic yield for each intercrop were recorded using standard procedures. Sucrose contents in the juice were determined. The data collected were analyzed statistically by using Fisher's analysis of variance technique and Duncan's New Multiple Range Test at 5 per cent probability was applied to compare the differences among treatment means (Steel & Torrie, 1984).

RESULTS AND DISCUSSION

Significant differences in the number of millable canes were found between sugarcane alone and that of intercropping treatments (Table I). The highest number of millable canes (12.17 m⁻²) was recorded in sugarcane alone as against the lowest (9.97 m⁻²) observed in sugarcane + sarson treatment. However, number of millable cane m⁻² in sugarcane alone treatment did not significantly differ from that when grown in association with gram or lentil or peas or garlic. The highest number of canes in sugarcane alone may be attributed to more number of tillers per unit area as reported by Kar *et al.* (1972). Marked differences in cane length were noted among different treatments. Length of cane in sugarcane alone treatment was the highest (2.89 m) over all other treatments which was followed by sugarcane + garlic combination, this in turn did not differ significantly from all other treatments except sugarcane + sarson combinations. Where lowest cane length of 2.48 m

Table I. Effect of autumn sown and associated cultures on growth, yield and net income of sugarcane

Treatment	No. of Millable canes (m ⁻²)	Cane length (m)	Cane weight (kg)	Stripped cane yield (t ha ⁻¹)	Net income (Rs.)
Sugarcane alone	12.17 a	2.89 a	1.40 a	149.94 a	39052.12
Sugarcane + Garlic	11.79 ab	2.66 b	1.36 a	147.92 a	50711.01
Sugarcane + Peas	11.25 abcd	2.63bc	1.31 ab	146.09 a	47229.50
Sugarcane + Lentil	11.69 abc	2.60 bc	1.22 bc	142.70 ab	41838.93
Sugarcane + Gram	10.99 abc	2.57 bc	1.21 bc	132.36 bc	40138.96
Sugarcane + Sunflower	10.54 bcd	2.50 bc	1.20 bc	123.06 bcd	42272.68
Sugarcane + Wheat	10.34 cd	5.50 bc	1.18 c	122.92 cd	39764.30
Sugarcane + Sarsoon	9.97 d	2.48 c	1.17 c	117.25 d	41400.54

Means followed by the same letter do not differ significantly at 5% probability level

was noted (Table I). Mahmood (1986) also reported similar results in cane length between sugarcane alone and other intercrop treatments. Table I further indicated that there were highly significant differences in weight/cane among sugarcane alone and various associated cultures such as sugarcane + sarson or sugarcane + wheat or sugarcane + sunflower or sugarcane + gram or sugarcane + lentil treatments respectively. No significant differences in weight per cane however were noted among sugarcane alone, sugarcane + garlic and sugarcane + peas treatments. The results indicate that intercrop competition effects on performance of sugarcane were less suppressive in sugarcane + peas and / or garlic treatments than others. Moreover, the cane length in sugarcane alone, or sugarcane + garlic and or peas was also higher than that of other combinations. The higher cane length contributed to greater cane weigh in these treatments. Similar results were reported by Venktaraman *et al.* (1978). Sugarcane planted alone gave significantly the highest cane yield of 149.94 t ha⁻¹ mainly. This was at par with that of sugarcane + garlic, sugarcane + pea and sugarcane + lentil combinations which produced 147.92, 146.09, and 142.70 t ha⁻¹ of stripped cane, respectively. The lowest cane yield of 117.25 t ha⁻¹ was obtained in sugarcane + sarson treatment, but it was statistically the same as recorded in sugarcane + sunflower (123.06 t ha⁻¹) and sugarcane + wheat (122.92 t ha⁻¹) treatments. The results indicate that sugarcane grown as a sole crop or in combination with peas or garlic though yielded statistically the same but they were better in performance than other treatments. Among other treatments, however, sugarcane + sarson was the lowest yielder. Higher tonnage of stripped cane in sugarcane alone or sugarcane + peas or garlic could be attributed to more number of millable canes

m⁻², higher cane length and weight cane⁻¹ as compared to that observed in other treatments.

Economic analysis data show that treatments where sugarcane was grown in association with legume and non-legume crops fetched more income per hectare compared with of sugarcane alone. Among different associated cultures sugarcane + garlic was a source of maximum income of Rs. 50711.0, while the minimum (Rs. 39052.12) was noted in sugarcane alone treatment. Income in other combinations ranged from Rs. 39764.30 to Rs. 47229.50. The results lead to conclusion that sugarcane + garlic was much profitable combination as the yield of stripped cane was equal to that recorded in sugarcane alone treatment. Results therefore, suggest that yield of sugarcane when grown in association with either garlic or gram or lentil is not affected adversely. The associated crop becomes a source of income to the farmer in addition to the income obtained from the sole sugarcane.

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