



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; SP-12(8): 1748-1751
© 2023 TPI
www.thepharmajournal.com
Received: 25-06-2023
Accepted: 30-07-2023

Rajneesh Srivastava
Krishi Vigyan Kendra (ICAR-
Indian Institute of Vegetable
Research, Varanasi, Deoria,
Uttar Pradesh, India

Kamlesh Meena
Krishi Vigyan Kendra (ICAR-
Indian Institute of Vegetable
Research, Varanasi, Deoria,
Uttar Pradesh, India

Ajay Kumar Rai
Krishi Vigyan Kendra (ICAR-
Indian Institute of Vegetable
Research, Varanasi, Kushinagar,
Uttar Pradesh, India

Shamsher Singh
Krishi Vigyan Kendra (ICAR-
Indian Institute of Vegetable
Research, Varanasi, Kushinagar,
Uttar Pradesh, India

RP Chaudhary
Krishi Vigyan Kendra (ICAR-
Indian Institute of Vegetable
Research, Varanasi, Bhadohi,
Uttar Pradesh, India

AK Chaturvedi
Krishi Vigyan Kendra (ICAR-
Indian Institute of Vegetable
Research, Varanasi, Bhadohi,
Uttar Pradesh, India

Neeraj Singh
ICAR-Indian Institute of
Vegetable Research, Varanasi,
Deoria, Uttar Pradesh, India

Corresponding Author:
Kamlesh Meena
Krishi Vigyan Kendra (ICAR-
Indian Institute of Vegetable
Research, Varanasi, Deoria,
Uttar Pradesh, India

Intercropping of cowpea with spring sugarcane: A proven technology toward the doubling income of sugarcane growers in eastern part of Uttar Pradesh

Rajneesh Srivastava, Kamlesh Meena, Ajay Kumar Rai, Shamsher Singh, RP Chaudhary, AK Chaturvedi and Neeraj Singh

Abstract

There is an urgent need to supply enough food for the world's growing population. A important strategy for increasing labor utilization per available area of land and production is to intensify land use. Intercropping, the practice of growing two or more crops simultaneously in the same area, is a tried-and-true crop management technique that aims to match crop needs to labor and resource availability as effectively as feasible. With a canopy development time of 100–120 days, sugarcane is a long-term crop that enables the growth of intercrops in the early phases. Small sugarcane growers cannot wait a long time to receive a financial return from a single sugarcane harvest, so sugarcane planters take advantage of this by cultivating other short-term crops like cowpea, etc. as intercrops to earn intermediate returns. In the adopted village, ICAR-IIVR-KVK has conducted On Farm Trials (OFT) at a few farmer fields. The following agricultural practices were examined in spring-sown sugarcane at a farmer's field: sugarcane-cowpea intercropping, irrigation planting pattern, sowing methodology, plant geometry, fertilizer dose, intercultural activities, and plant protection strategies. In comparison to the average benefit cost ratio of sloe sugarcane (3.52:1), which was 22.15 percent greater than the solitary sugarcane crop during both study periods, a higher average benefit cost ratio (4.36:1) was seen with sugarcane + cowpea intercropping.

Keywords: On farm trial, sugarcane, cowpea, intercrops, economic, yield

1. Introduction

After Brazil, India is the world's second-largest producer of sugar cultivated by approximately five million farmers in tropical and subtropical two major agro-climatic zones of India. Subtropical regions account for around 45 percent and 55 percent of total sugarcane production and area in the country, respectively. Intercropping is the practice of growing two or more crops at the same time as on the same plot of land with a certain row-planting pattern for the raise production per unit area. The implementation of intercropping system has been made necessary for rapidly growing population, increased food consumption, a shortage of scope for expanding cultivation to new areas, and the diverse needs of small farmers in terms of both food and money. Because sugarcane grows slowly, much of the land between two rows of sugarcane becomes unusable during the first 1-120 days of growth. Growing companion crops allows the farming community to profitably utilize available area. To compensate, sugarcane growers plant a variety of short-duration crops as intercrops, such as potato, legumes, cereal crops, vegetables, and spices, to earn temporary income. Small sugarcane growers do not have to wait till the harvest of their sole sugarcane crop to see a profit. Utilizing the currently limited land resources to intercrop economically significant short-term crops with sugarcane would help to sustain sugarcane cultivation and provide interim returns to marginal and small farmers, in addition to supplying the rising demand for vegetables and pulses. Information on intercropping practices and economically benefits in sugarcane with cowpea is offered in this research article.

2. Materials and Methods

In present study, intercropping of cowpea with sugarcane in spring season under Hot Sub-humid (moist) Eco-Region Uttar Pradesh, India was evaluated through On Farm Trial (OFTs) at among selected farmer's field during cropping season 20018-19 to 2019-20. The study was carried out by the Krishi Vigyan Kendra, Malhana, Deoria under Indian Institute of Vegetable.

Research, Varanasi Uttar Pradesh in sandy loam soil having irrigated condition. Deoria district of the Eastern Uttar Pradesh comprised between 26° 6' north and 27° 8' to 83° 29' east and 84° 26' east. The cropping intensity of the district is 158% (Ground Water brochure Deoria District, U.P, 2010-11). The climate is characterized by hot and humid rainy season, cold and dry winter season and hot and dry summer season with average rainfall of the district 1120 mm. Mono/sole cropping pattern, widely adopted by the farming community, is a very crucial reason of. After independence Indian Agriculture has witness many changes, the green revolution has encourage the farmer to invest on the inputs but reducing factor productivity and increasing cost of cultivation day by day because of increasing prices of inputs pilfered the profitability of the farmers. Rising prices of diesel, tractor, and fertilizer, seeds and farm machinery has worsened the situations. Therefore serious efforts are urgently required to reduce the cost of cultivation and to boost the production to maintain the sustainability and increase the profit margin to the farmers. Intercropping with sugarcane through optimum utilization of natural resource is the need of hour. Therefore Krishi Vigyan Kendra (ICAR-IIVR) has introduction On Farm Trial on intercropping of cowpea with sugarcane in district Deoria. Technology option for assessment of sugarcane mono-cropping (T₁) and sugarcane +

cowpea (T₂) developed by IISR, Lucknow, Uttar Pradesh were tested at selected 5 famers field. The sugarcane was sown in the second week of February through trench method and cowpea was sown after completion of sugarcane planting and harvested of cowpea in the month of April as well as the sugarcane crop harvested in the month of December. As per recommendation for sugarcane full dose of phosphorus and potash was applied at the time of planting, hence nitrogen was applied in three equal splits at planting, 80-90 and 140-150 days after planting. The observations on yield and related traits of sugarcane was recorded on five randomly selected millable canes whereas, in cowpea at the time of pod maturity and computed for economical aspects

3. Result and Discussion

3.1 Effect of treatments on Growth of Sugarcane

According to the results shown in Figure 1, sugarcane + cowpea intercropping produced greater average values for plant height, internodes count, internodes' length, and cane girth than sugarcane monoculture. The data in Figure 1 showed that during the investigation period, the average plant height under the sugarcane + cowpea intercropping was 190.45 cm, which was 4.9 percent greater than the average plant height of solitary sugarcane (182.25 cm).

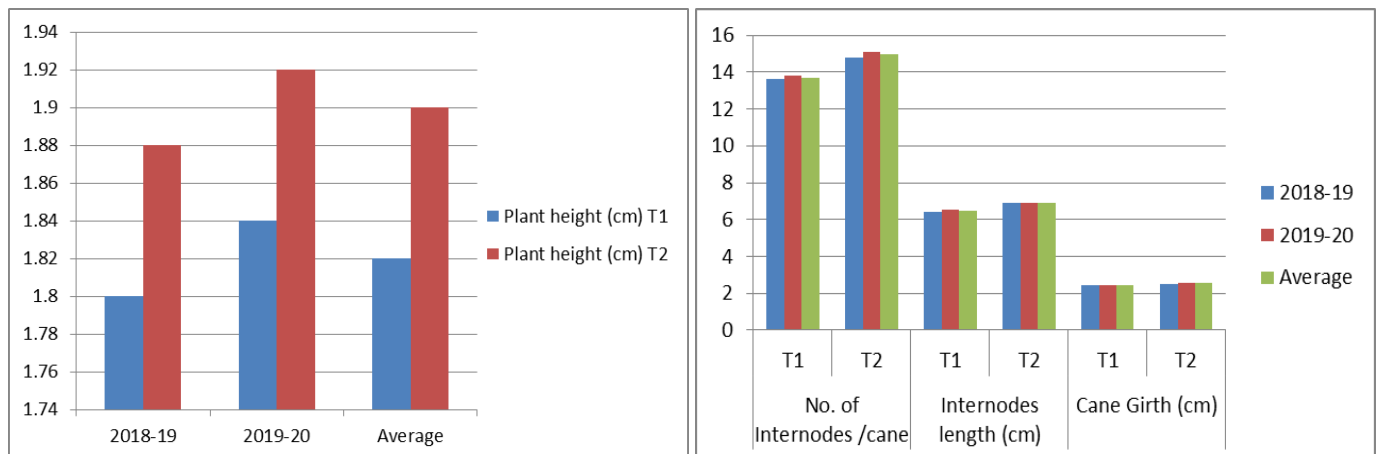


Fig 1: Performance of treatments on growth parameters of sugarcane plant

While more average internodes per cane 14.95 was recorded under intercropping than the average internodes 13.70 per plant of sole crop which was 9.12 percent higher than sole crop of sugarcane (Table 1). Hence the data presented in figure 2 revealed that higher average internodes length 6.91 cm was noted in intercropping of sugarcane with cowpea than the average internodes length 6.46 cm of sole cane crop which was 6.96 percent higher than sole crop. Therefore the more average cane girth 2.53 cm was recorded in intercropping than the average cane girth 2.45 cm of sole crop which was 3.26 percent higher than the sole crop of sugarcane during study period of OFT.

3.2 Effect of treatments on yield

The data presented in Figure 2 clearly showed that sugarcane + cowpea intercropping produced more cane yield (79211 kg/ha) than sugarcane mono-cropping (72239.5 kg/ha) and

9.66 percent higher yield than mono-cropping/sole planting of sugarcane. Similar evidence was published by Ahmed (1999) [1], who found that growing sunhemp as an intercrop in continuous sowing or at 30 cm intervals greatly boosted the cane production in sandy loam soils. According to Veerabhadraiah *et al.* (1986) [6], sugarcane intercropped with soybeans resulted in a 17% higher cane production. When sugarcane variety CoC 85061 was intercropped with the green manure crop daincha in sandy loam soils, Guru *et al.* (2000) [2] likewise observed a significant improvement in sugarcane production. Studies revealed that the cane yields in intercropped cane with wheat, lentils, and gram were similar to one another. Imran *et al.* (2000) [3], Santanu and Ray (2003) [5] and Nazir *et al.* (2002) [4] reported similar findings. Therefore 5880 and 6040 kg/ha yield of cowpea were recorded under sugarcane + cowpea intercropping during both the years respectively.

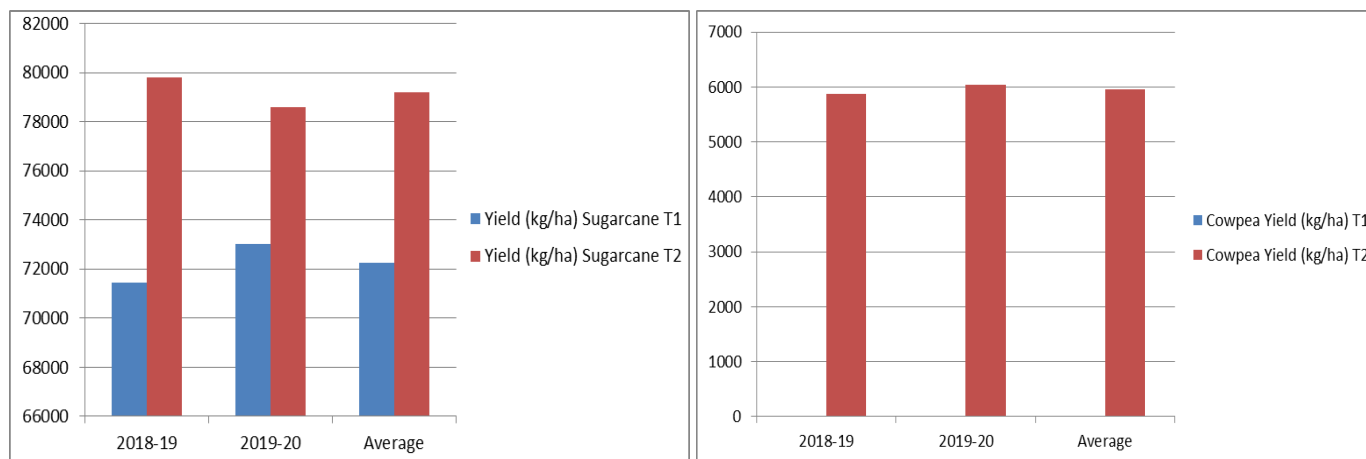


Fig 2: Performance of intercropping on yield of sugarcane and cowpea during study period

3.3 Effect on economics

The data presented in Table 1 and Figure 3 resulted in that more average cost of cultivation (83058 Rs/ha) and average gross return (363557 Rs/ha) was recorded under sugarcane + cowpea intercropping than average cost of cultivation (68215 Rs/ha) and average gross return (240615 Rs/ha) of sole

sugarcane. The data presented in Figure 3 clearly indicated that a higher average net return (280499 Rs/ha) was noted under sugarcane + cowpea intercropping than the net return (172400 Rs/ha) of sole sugarcane, which was 62.70 percent higher than the sole sugarcane crop during the study period of the On-Farm-Trial.

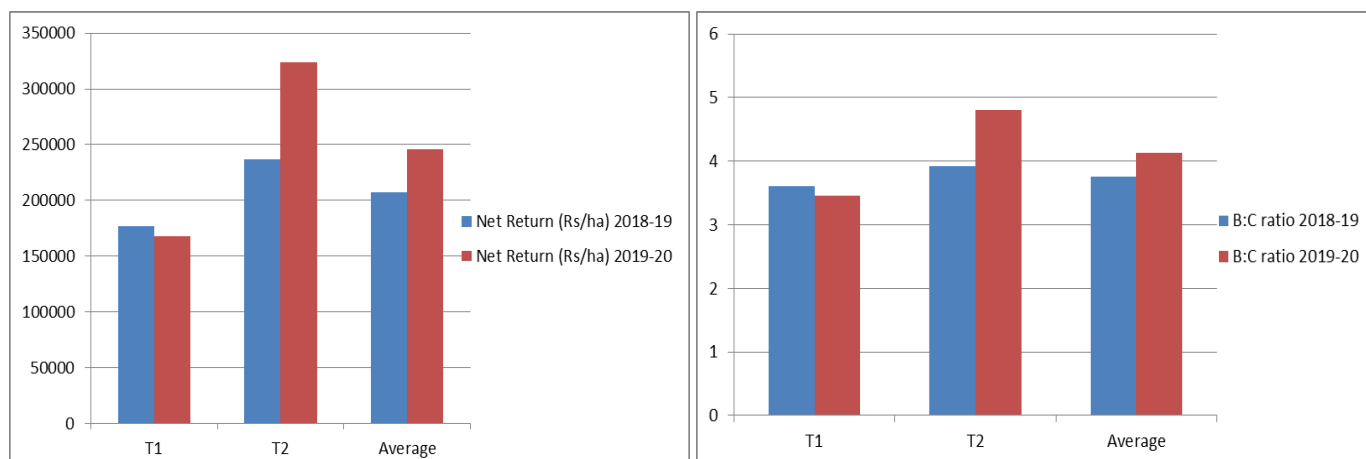


Fig 3: Economical performance of the treatments

While the data showed in Table 1 revealed that a higher average benefit cost ratio (4.36:1) was recorded under sugarcane + cowpea intercropping than the average benefit

cost ration (3.52:1) of sole sugarcane, which was 22.15 percent higher than the sole sugarcane crop during both the study period (Fig.3).

Table 1: Effect of sugarcane + cowpea intercropping on economic of sugarcane and cowpea during both the years of investigation

Technology Option	Treatments	Economics (Rs/ha) of the treatments							
		2018-19				2019-20			
		Cost of cultivation Rs/ ha	Gross return (Rs/ha)	Net Return (Rs/ha)	B:C	Cost of cultivation Rs/ ha	Gross return (Rs/ha)	Net Return (Rs/ha)	B:C
T ₁	Sugarcane	68040	245170	177130	3.60	68390	236060	167670	3.45
T ₂	Sugarcane + cowpea	81246	318189	236943	3.92	84870	408926	324056	4.81

4. Conclusion

The research report unequivocally highlights the advantages of crop combination in cropping systems based on sugarcane. Even though intercropping systems generally have biological advantages, most studies have shown that intercrops have a lowering effect on sugarcane, which is intercropping's main crop. Intercropping has been used extensively around the world for thousands of years, but despite this, it is still poorly understood from an agronomic standpoint, and research in this area is far less progressed than that in monoculture. This

is caused by a number of factors, including the widespread use of pure crop cultures in wealthy countries, the relative scarcity of resources in poor countries, and last but not least, the complexity of the issues at hand. Therefore, more study is required to better comprehend the operation of intercrops and create intercropping systems that are compatible with existing farming methods. Agro-techniques like fertiliser application, seed rates for the intercrop and base crop, and the choice of suitable genotypes must be taken into consideration for an intercrop combination to be biologically advantageous. This

will lessen the depressing effect of intercrops on sugarcane and increase the productivity and profitability of the intercropping system.

5. References

1. Ahmed S. Influence of sunhemp intercropping in sugarcane. SISSTA Sugar J A Conv, Bangalore. 1999;24:51-53.
2. Guru GP, Jayapaul R, Durai Singh, Senthilvel T, Joseph M. Influence of population and stage of incorporation of intercropped green manure (daincha) and N levels on yield and quality of sugarcane. Indian Sug. 2000;XLIV(12):989-981.
3. Imran M, Shaukat A, Ilyas M, Ishtiaq A. A glance at the agro economic study of sugar intercropping with three other crops. Pakistan Sugar J. 2000;15(1):18-21.
4. Nazir MS, Jabbar A, Ahmed I, Nawaz S, Bhatti IH. Production potential and economics of intercropping in autumn-planted sugarcane. Int J Agric Biol. 2002;4(1):140-142.
5. Santanu G, Ray BR. Studies on intercropping on productivity and profitability of autumn planted sugarcane in West Bengal. Indian Sug. 2003;53(3):179-182.
6. Veerabhadriah S, Patel SM, Rajappa MG. Companion cropping of soybean and sugarcane. Mysore J Agric. Sci. 1986;20(3):176-178.