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## Impact of front line demonstrations on yield and economics of sugarcane + cauliflower intercropping in Pune district

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**Abstract**

The present study was conducted with one hundred demonstrations on pre-seasonal sugarcane + cauliflower intercropping in Pune district of Maharashtra. Front line demonstrations were conducted by the active participation of the farmers with the objective of percolating improved technologies of sugarcane + cauliflower production potential. The improved technologies consist of integrated nutritional management (soil test based) and pest and disease management. Demonstrations recorded the average sugarcane yield 62.45 tones acre<sup>-1</sup> in demonstration plot as against 47.5 tones acre<sup>-1</sup> in farmer's practice and cauliflower yield 5.34 tones acre<sup>-1</sup> in demonstration plot as against 3.65 tones acre<sup>-1</sup> in farmer's practice. The 77.60 tones acre<sup>-1</sup> maximum, 40.80 tones acre<sup>-1</sup> minimum sugarcane yield were recorded from demonstrations along with 3.4 tones to 7.60 tones acre<sup>-1</sup> cauliflower. The higher Benefit Cost Ratio of 2.39 was obtained in demonstrations as against 2.01 in farmers practice.

**Keywords:** Sugarcane, cauliflower, demonstrations

**Introduction**

Sugarcane (*Saccharum officinarum* L.) crop occupies an important position in Indian agriculture and plays a pivotal role in national economy by sustaining the second largest organized agro industry in the country next to textile. In India it is grown in 5.00 million hectares area with a production of 350.00 million tonnes and the average productivity is 70.00 t ha<sup>-1</sup> [1]. As like India, sugarcane is also one of the most important cash crops of the Maharashtra state. Intercropping, the agricultural practice of cultivating two or more crops in the same space at the same time, is an old and commonly used cropping practice which aims to match efficiently crop demands to the available growth resources and labour [2]. When different crops are grown together, the productivity of sugarcane enhances ultimately due to better use of resources and complementary effect of different crops Islam and Islam [3].

The development of the Agriculture is primarily depends on the application of the scientific technologies by making the best use of available resources. One of the major constraints of sugarcane farming is low productivity because of non-adoption of advanced technologies like improved varieties, use of recommended fertilizers doses and application at proper time and integrated crop management technologies etc. Hence to increase the production, productivity and quality of agricultural produce, front line demonstrations were conducted at farmers' field. All the recommended practices were provided to the selected farmers. The data related to the cost of cultivation, production, productivity, gross return and net return were collected as per schedule and analyzed.

**Materials and methods**

Pune district, is located in the western part of Maharashtra. The total geographical area of the district is 15.62 lakh hectares, comprises 5 per cent of the state's total geographical area. The Pune district lies between 17.54 to 19.24 degree North latitude and 73.19 to 75.10 degree eastern longitude. The climate of district is characterized by dry atmosphere except during monsoon. The summer is moderately high and temperature varies from 36 °C to 46 °C. The average annual rainfall is 905 mm mostly during the months of June to September.

On the basis of feedbacks and participation of farmers, the project is being implemented with objectives to demonstrate Mahatma Phule Krishi Vidyapeeth developed technologies through cluster approach on farmer's field for improving production, productivity and income of

farmers, to test the adoption of technologies with the components of sugarcane + cauliflower intercropping based production technologies.

The present study was conducted in Pune district of Maharashtra during 2016 under Farmer FIRST Project by Regional Extension Center, College of Agriculture, Pune. All the participating farmers were trained on various aspects of sugarcane + cauliflower intercropping production technologies. The field was prepared by deep ploughing and harrowing. All the recommended practices like FYM application before plantation, timely planting, seed treatment with biofertilizers, plantation spacing as per soil types, integrated weed management, integrated nutrient management, integrated plant protection and timely crop harvesting. The yield and economic performance of the front line demonstrations, the data on output were collected from FLDs as well as farmers based plots and finally the sugarcane and cauliflower yield, cost of cultivation, net returns with benefit cost ratio was worked out.

**Benefit cost ratio (BCR):** It was calculated by following formula <sup>[4]</sup>.

$$\text{BCR} = \frac{\text{Gross returns}}{\text{Total production cost}}$$

The block demonstrations on sugarcane + cauliflower intercropping based technology were organized in the selected cluster villages on 40 hectares area with critical inputs. The details of technology package and village cluster as well as material for the study for FLDs are given in Table 1 and 2. University scientists monitored the demonstration plots time to time and guided the participated farmers about the sugarcane and cauliflower cultivation by giving them technology knowledge. Also demonstration field visits, group discussions and farmers rally were organized during the crop period at selected village.

## Results and discussion

### Sugarcane yield

After completion of harvesting in cauliflower and sugarcane, the data on yield, production cost and market prices were collected and compiled (Table 4). The average yield of

sugarcane and cauliflower was much higher as 62.45 and 5.34 tones acre<sup>-1</sup> than the average yield of farmers practice as 47.5 and 3.65 tones acre<sup>-1</sup> respectively. The average per cent increased in the yield over farmers practice was 32.73 per cent in sugarcane and 46.30 per cent in cauliflower. The results indicated that the front line demonstrations have given the good impact over the farming community of Pune district as they were motivated by new agricultural technologies/inputs distributed amongst farmers applied in the FLD plots (Table 1). It is reported a yield reduction of 17.1%, when cauliflower were intercropped with sugarcane <sup>[5]</sup>. The potato as intercrops with autumn cane improved the cane yield by 8.25% while cane + cauliflower, cane + cabbage, cane + knoll khol and cane + turnip reduced the cane yield to the tune of 4.03%, 3.49%, 4.42% and 4.75%, respectively than that of sole cane <sup>[6]</sup>.

### Extension gap

The extension gap of sugarcane 15.4 tonnes acre<sup>-1</sup> and cauliflower 1.69 tonnes acre<sup>-1</sup> has been recorded through FLDs. This emphasized need to educate the farmers through various means for the adoption of improved agricultural technologies to reverse the trend of wide extension gap. More and more use of latest production technologies and inputs required to achieve the higher production without harmful to the environment and also to avoid the soil hazards subsequently change this alarming trend of galloping extension gap. The new technologies will eventually lead to the farmers to discontinue the old technology and to adopt new technology and inputs (Table 1).

### Economic returns

The input and output prices of commodities prevailed during the study of were taken for calculating gross returns, cost of cultivation, net returns and benefit: cost ratio (Table 4). The cultivation of sugarcane + cauliflower intercropping under improved technologies gave higher gross monetary returns of Rs.1,80,220/- per acre as compared to farmers practices. The benefit cost ratios of sugarcane + cauliflower intercropping under improved technologies were 2.39 as compared to 2.01 under farmers practice. The highest net return (Rs. 450244 ha<sup>-1</sup> and Rs. 486429 ha<sup>-1</sup>) was obtained from sugarcane + potato than other intercrops and sole sugarcane during 2011-12 and 2012-13 <sup>[7]</sup>.

**Table 1:** Component Package per Demonstration (0.40 ha)

Sr. No.	Name of Inputs	Project share	Packing size	Rate Rs/Pack.	Project share cost (Rs.)
1	Soil analysis (pH org.carbon, available, P2O5)	1		460	460
2	Seed treatment at time of sowing)				
	Sugarcane- Acetobactor	4lit	1lit	130	520
	P.S.B.	500ml	500ml	73	73
	Carbendazim (0.1%)	100gm	100g	53	53
	Intercrop- Azotobactor	2.5kg	1lit.	130	333
			500ml	73	
3	Micronutrients (at the time of sowing mix with 100kg FYM) as per soil test				
	Zinc sulphate	10kg	10kg	400	400
	Ferrous sulphate	10kg	10kg	165	165
4	Plant protection				
	Sugarcane				
	Mancozeb (0.3)	500g/200lit.water	1kg	182	182
	Phorate (10%)	4kg	1kg	74	296
	C0hlorantraniliprole18.2SC (coragen)	100ml/200lit water	100ml	578	578
	Inter crops				
	Mancozeb (0.3)	500g/200lit. water	Included in sugarcane i.e. (sugarcane500g+Intercrop500g=1kg)		

Prophenophos(50EC)/Chloropyriphos (20EC)	500ml/200lit. water	500g	140	140
Total amount per Demonstration/ acre				3200
No.of demonstrations (100 acres of 100 farmers)				100
Total amount for 100 demonstrations				3,20,000

**Table 2:** Cluster villages selected for Demonstrations and area

Sr. No.	Name of village	Tahsil & Dist.	No. of farmer partners	Area (ha)
Sugarcane + vegetable intercrops				
1.	Naigaon	Haveli, Dist. Pune	48	19.20
2.	Sashte	Haveli, Dist. Pune	52	20.80
Total			100	40

**Table 3:** Sugarcane and cauliflower yield of demonstrations

Crop	Farmers associated	Total area (ha)	Maximum yield (t acre <sup>-1</sup> )	Minimum yield (t acre <sup>-1</sup> )	Average yield (t acre <sup>-1</sup> )
Sugarcane	100	40.00	77.60	7.60	62.45
Cauliflower	100	40.00	40.80	3.40	5.34

**Table 4:** Average yields and monetary benefits of demonstrations

Crop	Average yield (t/acre)		Monetary returns (Rs./acre)		Average cost of production (Rs./acre)		Gross monetary returns (Rs./acre)		Average B:C ratio	
	DP	FP	DP	FP	DP	FP	DP	FP	DP	FP
Sugarcane	62.45	47.5	153007	116375	75142	67140	180220	134993	2.39	2.01
Cauliflower	5.34	3.65	27212	18618						

**Note:** Average Market rate –Rs.2450/- per tonne of sugarcane

Average Market rate –Rs.5101/- per quintal of cauliflower

DP- Demonstration plots

FP- Farmer practice

## Conclusion

On an average, the sugarcane produced 33.00 per cent and cauliflower produced 47.00 per cent higher yields than the crop sown under farmers practice. The average productivity of sugarcane and cauliflower of 100 demonstrations was 62.45 and 5.34 tones acre<sup>-1</sup> respectively (Table 4). Thus it can be concluded that the cultivation of sugarcane + cauliflower intercropping with improved production technology was found to be more productive over farmer practice. The yield and economics of sugarcane and cauliflower can be boost up by adopting recommended technologies. Intercropping has been recognized an excellent and alternative way to future crop production under threat of land, population and high monetary returns.

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