

YIELD AND YIELD ATTRIBUTING CHARACTERS OF RAINFED SUGARCANE DURING TRANSITION TO ORGANIC PRODUCTION

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Sugarcane is one of the important commercial crops in North Coastal Zone of Andhra Pradesh and rainfed sugarcane occupies around 45 per cent of total cane area in North coastal districts of Andhra Pradesh. Sugarcane production has tended to remain either stagnant or is declining despite application of high-cost inputs. Experts attribute this stagnation is due to destruction of soil health by application of imbalanced fertilizers without addition of organic matter. Organic farming is a holistic production system which promotes and enhances agro-ecosystems health including bio-diversity, biological cycles and soil biological activities. Application of organic manures at the time of land preparation is very important to improve and maintain soil fertility and crop productivity. Besides providing plant nutrients, organic matter helps in improving soil structure, water holding capacity and microbial activity. Under the context of environmental pollution, health hazards and great threat for soil sustainability, organic farming is gaining prominence even though it has merits and demerits in crop production. In rainfed crops input usage had a higher effect than cultural practices. Organic manures have been found to enhance the efficiency and reduce the requirement of chemical fertilizers besides improving quality of produce and sustaining soil health. Hence, the present study was conducted from 2021-22 onwards to standardize the production protocols for sugarcane under rainfed condition with a objective to study the effect of organic farming on yield attributes, yield and quality of sugarcane. Earlier research results at RARS, Anakapalle showed that the application of organic manures in conjunction with chemical fertilizers on annual basis to sugarcane helped in saving of recommended dose of chemical fertilizers to an extent of 25 % besides slight increase in fertility of soils. Cane and sugar yields got stabilized in irrigated sugarcane under organic farming after five years of experimentation recording comparable yields as that of inorganic farming.

MATERIALS AND METHODS

Field experiment was conducted from 2021-22 to 2023-24 in *Inceptisols* with 2 treatments i.e T1 : Organic Farming (Nutrient Management : Cane trash *insitu* incorporation, Farm Yard Manure @ 10 t per ha, Biofertilizers i.e Azotobacter, PSB & KRB @ 5 kg ha⁻¹ at the time of planting and application of enriched compost @ 2 tha⁻¹ at 30DAP, Spraying of Panchagavya @ 3 % @ at 30 & 60 DAP and Biofertilizers i.e Azotobacter, PSB & KRB @ 5 kg ha⁻¹ at 45 DAP. Drenching of Jeevamrutham @ 1000 L ha⁻¹ at, 45, 60, 75, 90 and 105 DAP), T2 : Inorganic Farming : 100 % recommended dose of chemical fertilizers with a test variety of 93A 145. Exhaust crop was sown before main crop and two

treatments were isolated with a distance of 1.5 m. Land preparation followed by furrow formation at 60 cm spacing. Planting was done with 3 budded setts. All the package of practices were followed as per the protocol given above. Juice analysis was carried out prior to harvesting, observations on Juice quality i.e % Sucrose percent was estimated as per the method suggested by Meade and Chen (1971). Shoot population was taken at formative and grand growth stages and Number of Milleable canes were taken at harvest along with cane yield data. Sugar yields were computed from the cane yield multiplied with % CCS.

RESULTS AND DISCUSSION

Shoot population and Number of Milleable Canes at different growth stages:

Three years mean shoot population counts at formative and grand growth was 99303 & 92053 No. ha⁻¹ in organic farming and it was 100060 & 89175 No.ha⁻¹ in inorganic farming, respectively. Mean NMC of 83933 No./ha was recorded in organic farming while it was 83362 No./ha in inorganic farming. Percent mortality of shoots from formative to maturity was 18.31 in organic Farming whereas in inorganic farming, it was 21.62. During first year of study shoot population at formative & grand growth were relatively superior in inorganic farming (92200 & 101560 No. ha⁻¹, respectively) over organic farming (91650 & 99860 No.ha⁻¹, respectively in organic farming, respectively), whereas in third year it was slightly higher in organic farming over inorganic farming it was evidenced by percent mortality of shoots also.

Regarding milleable canes, onpar results were observed during first two year whereas in third year significantly highest milleable canes were observed in organic farming over inorganic farming. Shoot mortality from formative to harvest was slightly higher in inorganic farming during first two years and during third year significantly highest shoot mortality was observed in inorganic farming compared to organic farming. It might be due to continuous availability of nutrients through organic inputs in organic farming.

Juice quality:

Juice quality with reference to juice sucrose for mean of three years clearly showed that, slightly higher juice sucrose in organic farming (18.98 %) over inorganic farming (18.63 %). In all the three years also, same trend was noticed.

Cane yields and sugar yields:

Regarding cane and sugar yields, during first two years significantly superior cane and sugar yields were recorded in inorganic farming over organic farming, however onpar cane yields (58.27 & 56.20 tha⁻¹ in organic and inorganic farming, respectively) during third year of study. Three years mean cane yields of 55.51 & 59.65 tha⁻¹ were recorded in organic and inorganic farming, respectively with yield reduction of 13.18 % in organic farming. Sugar yields also followed the same trend as higher sugar yields were recorded in inorganic farming during first two years, whereas in third year relatively higher sugar yields was recorded in organic farming with a mean sugar yield of 7.48 & 8.03 tha⁻¹, respectively in organic and inorganic farming, respectively.

Table 1. Effect of Organic Farming on cane population and percent mortality of shoots under rainfed sugarcane (pooled data)

Year	Shoot population at formative (No.ha ⁻¹)		Shoot population at grand growth (No.ha ⁻¹)		NMC at harvest (No.ha ⁻¹)		% mortality of shoots from formative to maturity	
	OF	IF	OF	IF	OF	IF	OF	IF
2021-22	99860	101560	91650	92200	85462	85960	16.84	18.14
2022-23	101600	102600	93530	92600	84835	84495	19.76	21.42
2023-24	96450	96019	90980*	82725	81503*	76632	18.34	25.30*
Mean	99303	100060	92053	89175	83933	82362	18.31	21.62

Table 2. Effect of Organic Farming on Juice sucrose (%), cane and sugar yields (tha⁻¹) under rainfed sugarcane (pooled data)

Year	Sucrose (%)		Cane yield (tha ⁻¹)		% yield reduction	Sugar yield (tha ⁻¹)	
	OF	IF	OF	IF		OF	IF
2021-22	18.85	18.60	55.75	64.58*	15.86	7.51	8.57
2022-23	19.68	19.10	52.50	63.10	20.19	7.37	8.32
2023-24	18.42	18.18	58.27	56.20	3.50	7.56	7.19
Mean	18.98	18.63	55.51	59.65	13.18	7.48	8.03

