



ASSESSMENT OF RED ROT TOLERANT SUGARCANE VARIETY SWARNAMUKHI IN CHITTOOR DISTRICT

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ABSTRACT

Krishi Vigyan Kendra, Kalikiri has conducted the On-Farm trials during late *Rabi*/summer during the years 2020 and 2021 in order to assess the performance of improved variety Swarnamukhi. Swarnamukhi was taken as test variety and compared with local variety Kanakadurga. Results revealed that total cane height, milleable cane height, no. of internodes, no. of milleable internodes, internode length, cane weight were higher in Swarnamukhi variety which were the major yield attributing characters. On an average, mean yield of 115.7 t/ha were recorded in Swarnamukhi with 5.7% yield increase over Kankadurga (109.5 t/ha). Swarnamukhi was recorded 8.0% higher jaggery yield (12.2 t/ha) compared to local variety (11.3 t/ha). Net returns of 149959 and 129375 Rs.ha⁻¹ were recorded in Swarnamukhi and local variety, respectively. B: C ratio was significantly higher in Swarnamukhi (1.67) compared to local variety with 1.58.

Keywords: Economics, Redrot, Sugarcane, Swarnamukhi, Yield.

INTRODUCTION

Sugarcane is one of the most important commercial crops in India. Sugarcane contributes 60% of total sugar production in India. Major sugarcane growing states are Maharashtra, Karnataka, Tamil Nadu, Andhra Pradesh, Orissa, Telangana and Madhya Pradesh occupying 40% of the total area in the country (Govindaraj *et al.*, 2017). During 2019-20 Sugarcane crop was grown in an area of 86000 ha with production of 67 l.ha in Andhra Pradesh and area of 134 ha in Chittoor dt during 2021. Sugarcane suffers from different biotic and abiotic stresses like pests, diseases, drought, salinity, water logging which leads to deterioration of sugar quality and huge yield losses (Nair, 2011). In Chittoor dt, farmers go for late harvesting due to delayed orders from sugarcane mills. In these cases, farmers are facing losses due to reduction in sucrose content. Sugarcane requires more water through the crop growth period. But sugarcane is subjecting to water stress conditions which lead to yield loss of 30-70 percent (Appunu *et al.*, 2017). Apart from these sugarcane diseases like red rot also affects cane yield and juice yield. Red rot

of sugarcane is a dreadful and life threatening disease of sugarcane (Kumar *et al.*, 2018) and a major constraint of sugarcane production (Viswanathan *et al.*, 2008). So there was need to introduce new variety in Chittoor dt which tolerates biotic and abiotic stresses and gives higher yields and sucrose content even if the harvesting is delayed by one or two months. As a part of this an improved variety, Swarnamukhi developed by ARS, Perumallapalle was introduced in Chittoordt.

MATERIALS AND METHODS

Krishi Vigyan Kendra, Kalikiri conducted the On-Farm trials late *Rabi*/summer during the years 2020 and 2021 in order to assess the performance of improved variety Swarnamukhi. Sites were selected where there is red rot problem and low yields. Swarnamukhi was taken as test variety as this variety can tolerate various biotic and abiotic stresses and yields well than local varieties. Trials were conducted in gross area of 2.0 ha which involved five farmers' fields during 2020 as well as in 2021 in

Jogivariaplli, Chintalavaripalli and Kempalli villages of Sodem mandal. Soils of the study area are sandy loam in texture with low available nitrogen and phosphorus, high in potassium, deficit in zinc and iron. The On farm Trials were conducted in areas where sugarcane was the major crop grown round the year for jiggery preparation and foe nearby sugar factories. Plantings were done during the month of March-April. Atrazine 50% was used for weed management. Fertilizers supplying 90 kg Nitrogen, 40 kg

Phosphorus and 48 kg Potassium were applied to crop at 30 days after plating. Propping was done 4 times at regular intervals whenever required to prevent crop lodging. The data recorded on yield attributes and yield by cutting cane to the base. Jaggery yield was recorded by preparing jiggery in the field itself. Economics was calculated based on the prevailing prices of inputs and outputs during the year when trials were conducted.

Table 1. Salient features of Swarnamukhi and Kanakadurga.

Variety	Potential yield (t/ac)	Sugar percent	Pith in cane	in Arrowing	Tolerance to water logging	Tolerance to water stress	Tolerance to pests and diseases
2005 T 16 Swarnamukhi	44	18.8	No	Little	Tolerant	Tolerant	Resistant against red rot, smut, wilt. Susceptible to shoot borer. It is a good ratooner yielding good quality jaggery
Kanakadurga 83 V 15 Kanakadurga	48	19-20	No	Little	Tolerant	Tolerant	High yielding, high tilleringclone.Goodratoone r.Resistant to red rot and smut. Susceptible to post harvest deterioration.Gives good quality jaggery.

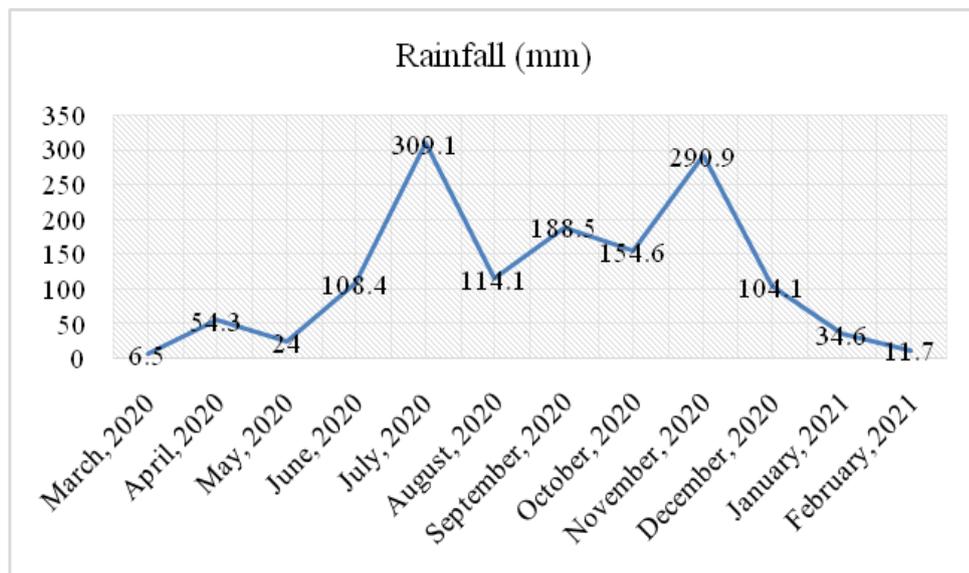


Figure 1. Rainfall pattern during crop growth period, 2020-21.

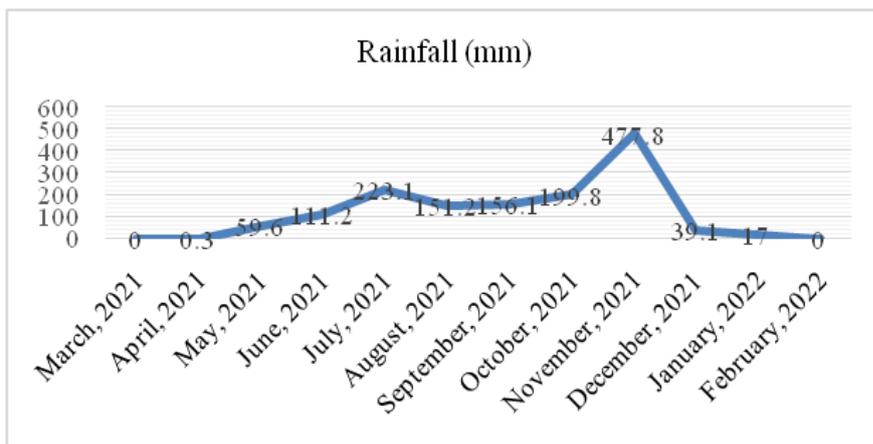


Figure 2. Rainfall pattern during crop growth period, 2021-22.

RESULTS AND DISCUSSION

Yield attributes like cane height, weight and internodes were significantly higher in Swarnamukhi variety (Table 3 and 4). Swarnamukhi recorded total cane length and milleable cane length of 319.5 and 311.1 cm on mean basis. Whereas, local variety recorded total and milleable cane length of 224.8 and 204.7 cm. Girth of the cane was more in local variety (9.1 cm) compared to Swarnamukhi (8.4 cm). Enentough girth was more in local variety;

Swarnamukhi was proved superior in terms of cane height, internodes and cane weight which were the major yield attributing characters. On an average, 27.7 and 24.8 internodes and milleable internodes were observed in Swarnamukhi; 23.0 and 20.2 internodes and milleable internodes were observed in local variety. Internode length was more in Swarnamukhi (5.4cm) compared to local variety (4.2 cm). Cane weight of 2.6 and 2.3 kg were recorded in Swarnamukhi and local variety.

Table 2. Yield attributes of Swarnamukhi and Kanakadurga.

Year	Total cane height (cm)		Milleable cane height(cm)		Girth (cm)		No. of internodes		No. of milleable internodes		Internode length (cm)	
	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2
2020-21	319.0	225.7	310.8	205.6	8.5	8.7	27.8	23.0	25.0	19.9	5.3	4.2
2021-22	320.0	223.8	311.3	203.8	8.3	9.6	27.5	23.0	24.5	20.5	5.4	4.1
Mean	319.5	224.8	311.1	204.7	8.4	9.1	27.7	23.0	24.8	20.2	5.4	4.2

T1: Swarnamukhi T2: Kanakadurga

Table 3. Cane Yield and Jaggery yield of Swarnamukhi and Kanakadurga.

Year	Cane weight (Kg)		Cane yield (t/ha)		Jaggery yield (t/ha)		Jaggery yield (kg)/tonne of cane	
	T1	T2	T1	T2	T1	T2	T1	T2
2020-21	2.6	2.3	121.3	110.0	12.3	10.8	101.4	98.2
2021-22	2.5	2.3	110.0	109.0	12.1	11.8	110.0	108.0
Mean	2.6	2.3	115.7	109.5	12.2	11.3	105.7	103.1

T1: Swarnamukhi T2: Kanakadurga

Table 4. Summary of one way ANOVA in comparing yield and B:C ratio of Swarnamukhi and local variety.

Particulars	Treatments	N	Mean	Std. Deviation	t-value	p-value
Cane yield	Swarnamukhi	5	115.7	2.92	2.30**	0.001
	Kanakadurga	5	109.5	1.58		
Jaggery yield	Swarnamukhi	5	12.2	0.48	2.30*	0.004
	Kanakadurga	5	11.3	0.26		
B: C ratio	Swarnamukhi	5	1.67	0.10	2.30*	0.03
	Kanakadurga	5	1.58	0.05		

*Significant at 5% level, **Significant at 1% level

Table 5. Economics of Swarnamukhi and Kanakadurga.

Year	Cost of cultivation (Rs./ha)		Gross returns (Rs./ha)		Net returns (Rs./ha)		B: C ratio	
	T1	T2	T1	T2	T1	T2	T1	T2
2020-21	2,25,000	2,25,000	306250	268750	81250	43750	1.36	1.20
2021-22	2,25,000	2,25,000	443668	440000	218668	215000	1.97	1.95
Mean	225000	225000	374959	354375	149959	129375	1.67	1.58

T1: Swarnamukhi T2: Kanakadurga

Perusal of the data presented in table 4 and 5 proved that there was significant difference in terms of cane yield during both the years and mean in Swarnamukhi and Kanakadurga varieties. Swarnamukhi has recorded highest cane yield compared to Kanakadurga. During 2020-21, cane yield of 121.3 t/ha was recorded in Swarnamukhi. Whereas, in Kanakadurga variety cane yield of 110.0 t/ha was recorded. During 2021-22 cane yield of 110.0 and 109.0 t/ha were recorded in Swarnamukhi and Kanakadurga varieties; respectively. On an average, mean yield of 115.7 and 109.5 t/ha were recorded in Swarnamukhi and Kanakadurga. When compared to local variety there was 5.7% increase in cane yield in Swarnamukhi. Yield is a dependent variable on various parameters like cane length, weight, girth, internodes etc., which were higher in Swarnamukhi that lead to higher yield in test variety compared to local variety. These findings are in conformity with Jayaprakash *et al.*, 2020. Significantly higher Jaggery yield was obtained in Swarnamukhi compared to local variety. On an average, Swarnamukhi was recorded 8.0% higher jaggery yield (12.2

t/ha) compared to local variety (11.3 t/ha). In Swarnamukhi variety, from one tonne of Sugarcane, 105.7 kg of Jaggery was produced. Whereas, in case of local variety from one tonne of Sugarcane, 103.1 kg of Jaggery was produced. Jayaprakash *et al.*, 2020 reported that Swarnamukhi recorded highest jaggery yield of 10.1 t/ha compared to check varieties. Jaggery colour and acceptability: Swarnamukhi is highly suitable for jaggery making; due to its golden yellow colour acceptability is also more compared to Kanakadurga (Figure 3 and Figure 4). These findings are in conformity with Jayaprakash *et al.*, 2020. Arrowing: Arrowing was observed in Swarnamukhi variety due to late harvesting. Whereas, in case of local variety no arrowing was observed. Eventhough arrowing was observed in Swarnamukhi variety there was no reduction of yield and sucrose content. Redrot: During the experiment no redrot incidence was observed in test variety. Whereas, in case of local variety minor incidence of redrot was observed i.e., only two to three plants were affected with redrot



Figure 3. Jaggery of Swarnamukhi



Figure 4. Jaggery of Kanakadurga

Based on the prevailing market prices cost of cultivation, gross returns, net returns and B:C ration are calculated and presented in table 6. Gross returns, net returns and B:C ratio were substantially higher compared to local variety (Table 6).Gross returns of 374959 Rs.ha⁻¹ were recorded in Swarnamukhi and 354375 Rs.ha⁻¹ in local variety. Net returns of 149959 and 129375 Rs.ha⁻¹ were recorded in Swarnamukhi and local variety, respectively. B: C ratio was significantly higher in Swarnamukhi (1.67) compared to local variety with 1.58. Higher net returns and B:C ratio in Swarnamukhi was due to higher cane and jaggery yields.

CONCLUSION

It has been concluded that cane yield and jaggery yield of Swarnamukhi (115.7 t/ha and 12.2 t/ha) and local variety (109.5 t/ha and 11.3 t/ha) and also B: C ratio which was 1.67 in Swarnamukhi and 1.58 in local variety has significant difference. Swarnamukhi variety as a good yielder and high suitability for jaggery making make it economically feasible to farmers.

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REFERENCES

- Appunu, C., Mohanraj, K., Hemaprabha, G., Anna Durai, A., Mahadevaiah, C., Vijayan Nair and Bakshi Ram (2017). Co - 06022 – A sugarcane early maturing and drought tolerant variety suitable for Tamil Nadu and Pondicherry. *Journal of Sugarcane Research*, 7 (2), 83-92.
- Govindaraj, G., Bhagyalakshmi, K.V., Alarmelu. S., Hemaprabha, G., Nagarajan R., Somarajan, K.G., Shanti, R.M., Mohanraj, K., Anna Durai, A., Revindra Kumar and Bakshi Ram (2017). Co-09004 (Amritha): New high sugar and early maturing variety released for cultivation in Peninsular zone. *Journal of Sugarcane Research*, 7(2), 174-176.
- Jayaprakash, M., Hemanth Kumar, M., Tagore, K.R., Sabitha, N., Prasada Rao, K., Madhavi Latha, L., Subba Rao, M., Hemalatha, T.M., Sarala, N.V., Nagamadhuri, K.V., Vajantha B. and Amaravathi Y. (2020). Swarnamukhi (Co T 10367) - A New Sugarcane clone for Andhra Pradesh. *International Journal of Current Microbiology and Applied Sciences*. 9(8), 1653-1660.
- Kumar, M., Misra, V., Singh, B.D., Mall, A.K. and Pathak, A.D. (2018). Incidence of red rot disease in sugarcane variety CoS 8436 in Bihar, India, 18 (SI), 182-186.
- Nair, N. V. (2011). Sugarcane varietal development programmes in India. An overview. *Sugar Technology*. 13, 275-280.
- Vishwanathan, R. and Samiyappan, R. (2008). Bio-formulation of fluorescent *Pseudomonas* spp. Induces systemic resistance against red rot disease and enhances commercial sugar yield in sugarcane. *Archives of Phytopathology and Plant Protection*, 41(5), 377-388.

