Journal of Sugarcane Research
https://doi.org/10.37580/JSR.2019.2.9.184-186

SHORT COMMUNICATION

PROMISING GENETIC STOCKS IDENTIFIED FROM MULTILOCATION VARIETAL EVALUATION TRIALS OF INSTITUTE-INDUSTRY COLLABORATIVE PROGRAMME IN TAMIL NADU

G. Hemaprabha*, C. Appunu, K. Mohanraj and Bakshi Ram

Abstract

Twenty elite sugarcane Co canes were tested in mutlilocation trials at 10 locations of Tamil Nadu under Institute-Industry collaborative programme. These genotypes were evaluated under randomized block design with three replications; yield and quality contributing parameters were recorded at 240, 300 and 360 days after planting. Analysis revealed the superiority of Co 13001 for early sucrose accumulation potential at 240 days and Co 14016 for good ratoonability potential with high cane yield through increased millable cane population.

Keywords: Multilocation trial, Co canes, Co 13001, Co 14016, sucrose, ratoonability

With an objective of enhancing sugar productivity in Tamil Nadu, a collaborative varietal testing programme was started during 2016 through Institute-Industry Participatory Approach with the collaboration of South India Sugar Mills Association (SISMA), Chennai, Tamil Nadu. The trial was programmed during 2017-19 for testing twenty promising genotypes (Co 0238, Co 0240, Co 06031, Co 09004, Co 11015, Co 13001, Co 13003, Co 13006, Co 13014, Co 13018, Co 13020, Co 13021, Co 14008, Co 14016, Co 14026, Co 15005, Co 15007, Co 15021, Co 16001 and Co 16002). These were evaluated at ICAR-Sugarcane Breeding Institute (SBI), Coimbatore and nine sugar factory locations of Tamil Nadu in a randomized block design with three replications for two plant and one ratoon crops (2017-18 and 2018-19). The sugar factory locations were Bannari Amman Sugars Ltd., Sathyamangalam, Ponni Sugars Ltd., Erode, Kothari Sugars and Chemicals Ltd., Sathamangalam, V V Sugars Pvt Ltd., Perambalur, Thiru Arooran Sugars Ltd., Tirumandangudi, Dharani Sugars and Chemicals Ltd., Polur, EID Parry (India) Ltd., Nellikuppam, Rajshree Sugars and Chemicals Ltd., Mundiambakkam and Sakthi Sugars Ltd., Sivaganga. From the concluded trial, Co 11015 was found to combine high yield and quality across the zone and was released for the state of Tamil Nadu for commercial cultivation with suitability for harvest from 8-12 months, while few other entries showed superior performance in specific locations. A careful and thorough analysis of multilocation data showed the superiority of a few clones for specific cane yield /juice quality traits in more than three locations. In this paper, we report the performance of two such clones *viz*., Co 13001 and Co 14016. The clone Co 13001 was found to have early sucrose accumulation potential at 240 days. Co 14016 exhibited good ratooning potential with high cane yield through increased millable cane population (NMC).

G. Hemaprabha, C. Appunu, K. Mohanraj and Bakshi Ram
ICAR-Sugarcane Breeding Institute, Coimbatore-641007, Tamil Nadu, India
*Corresponding author: ghemaprabha1@gmail.com
Submitted: 23 March 2020 ; Accepted: 4 May 2020

Table 1. Mean performance of Co 13001 for sucrose % at 240 days

Centres	Co 13001			Co 16001			Co 86032		
	IP crop	IIP	Mean	IP crop	IIP	Mean	IP crop	IIP	Mean
ICAR-SBI	17.24	21.00	19.12	15.70	19.72	17.71	15.61	18.88	17.24
BAS	17.26	19.64	18.45	17.01	19.53	18.27	15.36	17.62	16.49
EID Parry	18.85	17.87	18.36	18.25	17.43	17.84	18.23	16.57	17.40
Kothari Sugars	16.20	16.18	16.19	15.88	13.95	14.92	15.08	15.76	15.42
Sakthi Sugars	13.68	13.82	13.75	13.06	13.23	13.15	15.67	14.48	15.07
Mean	16.65	17.70	17.17	15.98	16.77	16.38	15.99	16.66	16.32

Co 13001 (Co 740 x CoT 8201)

The clone exhibited a high sucrose of 19.12% at ICAR-SBI, Coimbatore at 240 days. The performance of this clone was compared with an already registered genetic stock (SBI2007-291) for high early sucrose accumulation (Hemaprabha, 2012) with INGR No.14011 assigned by ICAR-NBPGR, New Delhi. This clone was subsequently elevated to Co status as Co 16001. Co 13001 was also compared with the standard Co 86032. The clone showed superior juice quality at 240 days in five test locations viz., at ICAR-Sugarcane Breeding Institute, Coimbatore, Bannari Amman Sugars Ltd., Sathyamangalam, EID Parry (India) Ltd., Nellikuppam, Kothari Sugars and Chemicals Ltd., Sathamangalam and Sakthi Sugars Ltd., Sivaganga and performed better than Co 16001 at 240 days in both plant crops (2017-18 and 2018-19). Its mean performance in two plant crops at five centres as provided in Table 1 revealed its superiority with an improvement of 4.82% over Co 16001 and 5.21% over Co 86032. Hence Co 13001 qualified as a clone with short duration. Most of the Co varieties released were of early or midlate/late maturing in nature (Hemaprabha et al. 2017). Therefore, Co 13001 would be new source for developing short duration maturity genotypes.

.

Co 14016 (Co 86032 x Co 86011)

This entry is characterized by excellent field stand and high cane population with synchronous tillering. Its performance in plant crop and its ratoon crop at four centres in Tamil Nadu is considered for assessing its yield and ratoonability potential (Table 2). In the plant crop (2017-18) at four locations Bannari Amman Sugars

Table 2. Mean performance of Co 14016 for cane yield (t/ha), NMC ('000/ha) and sugar yield (t/ha)

Centres	Co 14016						Co 86032					
	Cane yield t/ha		NMC ('000/ha)		CCS yield t/ha		Cane yield t/ha		NMC ('000/ha)		CCS yield t/ha	
	IP crop	Ratoon	IP crop	Ratoon	IP crop	Ratoon	IP crop	Ratoon	IP crop	Ratoon	IP crop	Ratoon
BAS	176.90	172.36	93.60	129.60	23.48	22.44	156.10	148.98	82.59	112.0	20.33	19.56
DSCL	143.99	97.48	105.88	120.30	19.20	12.43	132.00	88.46	78.57	84.20	17.90	12.43
EID Parry	107.77	120.72	104.63	91.50	14.81	16.38	91.32	80.79	86.97	72.80	11.97	11.09
RSCL	192.38	171.28	126.57	145.20	22.11	19.52	130.98	125.63	90.33	101.30	16.85	16.01
Mean	155.26	140.46	107.67	121.64	19.90	17.69	127.60	110.97	84.62	92.59	16.76	14.77

Journal of Sugarcane Research
https://doi.org/10.37580/JSR.2019.2.9.184-186

Ltd., Sathyamangalam (BAS), Dharani Sugars and Chemicals Ltd. Polur (DSCL), EID Parry (India) Ltd., Nellikuppam and Rajshree Sugars and Chemicals Ltd., Mundiambakkam (RSCL), mean cane yield was 155.26 t/ha against 127.60 t/ha in the best standard and the ruling variety Co 86032 with an improvement of 21.67%. Its high cane yield was contributed mainly by increase in NMC of 107670/ha in comparison with 84620/ha of NMC was the most effective selection criterion for selecting better ratooning and high yielding clones in sugarcane under different abiotic stresses as this character recorded the highest genotypic coefficient of variation (GCV) heritability, expected genetic advance, higher correlations and direct effects with sugar yield, higher inter-environmental correlations and relative response values near unity (Ram and Hemaprabha, 1997, 2001). The high cane yield was translated to high sugar yield of 19.90 t/ha in Co 14016 over 16.76 t/ha in Co 86032 registering an improvement of 18.73% at these test locations. In the ratoon crop (2018-19), Co 14016 recorded a mean cane yield of 140.46 t/ha against 110.96 t/ha in Co 86032 with a remarkable improvement of 26.59% thus exhibiting high ratoonability. In the ratoon crop as well, NMC was the main character for high cane yield with 121640/ha while Co 86032 recorded 92590 canes/ha with a notable improvement of 31.39%. It could be seen that NMC in the ratoon crop registered 12.97% improvement over its plant crop. It is thus evident that Co 14016 has superior ratoonability combined with high cane yield and sugar yield. This trait has more relevance for improving sugarcane productivity and profitability of sugarcane farmers of the state.

Both Co 13001 and Co14016 flower at Coimbatore condition and can be used as potential donors for early high sucrose and high ratoonablity respectively.

References

Hemaprabha G (2012) 2007-291 - A clone with early high sucrose and red rot resistance. SBI NEWS 32(2): 1.

Hemaprabha G, Mohanraj K, Alarmelu S, Ram B (2017) Relative performance of Coimbatore canes (Co canes) for major component traits of yield and quality and an analysis of their genealogies to measure genetic gain over a century of sugarcane breeding at ICAR Sugarcane Breeding Institute. In International Symposium on Sugarcane Research Since Co 205: 100 Years and Beyond (SucroSym 2017), 98-102, Sugarcane Breeding Institute, Coimbatore, India.

Ram B, Hemaprabha G (1997) Correlation and path analysis in interspecific progenies in sugarcane (*Saccharum* spp.). Indian Journal of Agricultural Research 31(1): 23-27.

Ram B, Hemaprabha G (2001) Nature and pattern of genetic divergence of sugar yield and its components in interspecific progenies of sugarcane (*Saccharum* sp. hybrids). National Journal of Plant Improvement 3: 92-95.