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Evaluation of mid late sugarcane (*Saccharum officinarum* L.) genotypes for yield & yield attributing characters

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Abstract
The current study was exhibited at Guru Ghasi das Research Station, IGKV, Kawardha (Kabirdham), C.G. in cropping season 2017-18 to evaluate mid late sugarcane genotypes for yield & yield attributing traits. The twenty genotypes and four checks *viz.* Co-86032, Co-99004, Co-8014 and Co-8636 of mid late set of sugarcane were assessed in the RCBD design with 3 replications for their yield and quality parameters. The sugarcane genotypes were collected from Central Sugarcane Research Station (MPKV), Padegaon (Maharashtra). Stem height, single cane weight, nodes length, yield and other quality parameters *viz.*, Brix %, purity % and sucrose % observations were taken during the experiment period. Entry Co 13013 (153.04 t/ha) after that Co 13009 (150.13 t/ha), CoN 13074 (147.16 t/ha) and CoM 13074 (146.25 t/ha) exhibited maximum yield. All these entries were seen to be much better than the best check Co-99004 (113.10 t/ha) and showed good performance in respect of sugarcane yield and yield properties as compared to the checks.

Keywords: Evaluation, sugarcane, yield traits, purity %

Introduction
In India Sugarcane (*Saccharum officenarum* L.) is a significant agro modern harvest. In the world, after Brazil, India is the second biggest sugar producer. Sugarcane is cultivated in different agro climatic environments in all the sugarcane rising countries of the world. India is the world's most exclusive user and the second most noteworthy sugar producer. Lower efficiency, low sugar recovery and high cost of production are important difficulties for sugarcane crop. Variety plays an important role in expanding and declining per unit area sugarcane yield, while use of low quality sugarcane varieties adversely affects sugarcane production (Mian, 2006) [1]. There are many reasons behind low cane yield however developing of low yielding varieties are one of them. Subsequently, there is a need to introduce better high yielding varieties (Chattha and Ehsanullah, 2003) [2].
Varieties assume an essential part in deciding the yield, while, cultural practices and climatic component help to investigate their intrinsic potential. Planting of improved sugarcane varieties is the only solution to the problem of low yield and sugar recovery (Chattha *et al*., 2006) [2]. The amount of variability present in the germplasm collection of any crop determines the limit of progress that can be achieved through selection. The precise information on the nature and degree of genetic diversity present in the breeding material helps the plant breeder to initiate any effective selection program. The planning and success of sugarcane crop improvement programme mainly depends on genetic variability and its magnitude present in a population. When considering the effects of genotype on yield variations, it is instructive to simulate the consequences for variation in yield of a number of factors, each of which may be controlled by both genotypic and environmental causes. Variability is thus, the important prerequisite for further genetic improvement in any crop plants. Keeping in view the evaluation of mid late sugarcane genotypes for yield & yield contributing traits was conducted with twenty genotypes with four standard checks under the different agro-climatic conditions of Kabirdham.

Material and Methods
The experiment consisted of twenty genotypes of mid late set of sugarcane obtained from Central Sugarcane Research Station (MPKV), Padegaon (Maharashtra). Four varieties *viz.* Co86032, Co99004, Co 8014 and Co 8636 were used as checks.

The experiment was, conducted at the Research Farm of S.K. College of Agriculture & Research station, IGKV Kawardha, Kabirdham (C.G.). The genotypes were grown in the completely Randomized block design (RCBD) with three replications with a plot size of 24 m^2. The genotypes were raised with all recommended agronomical practices. Two or three bud Sets were planted in a single row system with an overlapping arrangement. The performance of yield and yield attributing traits were noted at maturity. Observations were taken on plant height, single cane wt., length of nodes, diameter of cane and yield (Qtl per hectare) and other quality characters *viz.* brix percentage, sucrose percentage, juice percentage and purity percentage. Sugar quality analysis was performed by following Spencer and Meade (1963) [17]. The data on sugarcane yield and yield traits were statistically analyzed using ANOVA and LSD test was applied to categorize the superiority of the means of different varieties as suggested by Gomez and Gomez (1984) [4].

Results and Discussions

The yield of mid late set of sugarcane genotypes were found significantly superior over checks for their performance. The results of mid late set of sugarcane genotype presented in Table-1 revealed that the highest cane yield was recorded in the genotype CO-13013 (153.04 t/ha) after that CO-13009 (150.13 t/ha), Co-13074 (147.16 t/ha) and CoM-13074 (146.25 t/ha) and lowest was observed in the genotype PI-13132 (43.11 t/ha). Top four genotypes were seen significantly superior over the best check CO-99004 (113.10 t/ha). The results concerning cane height shown that the maximum cane height was recorded in the genotype CO-13013 (385.1cm) after that check CO-99004 (361.1 cm) and COSnk-13103 (352.9 cm) and least was observed in the genotype COT-13366 (268.9 cm). None of the genotype was seen significantly superior over the best check Co-99004 (361.1 cm). In case of node length, the greatest node length was seen in the check Co-99004 (16.55 cm) after that CoSnk-13103 (15.33 cm) and check CO-8014 (15.10 cm) and least was observed in the genotype CoSnk-13105 (11.50 cm). None of the genotype was found significantly superior over the best check Co-99004 (16.55 cm). The highest single cane weight (kg) was recorded in the genotype CON-13073 (2.950 Kg) after that genotype CON-13074 (2.850 Kg) and check Co-99004 (2.620 Kg) and least was observed in the genotype Co-13006 (1.480 Kg). None of the genotype was seen as essentially better over the best check Co-99004 (2.620 Kg). The outcomes in regards to cane diameter (cm) revealed that the sugarcane genotype CON-13074 (3.58 cm) remained on top after that genotype Co-13014 (3.43 cm) and check CO-99004 (3.39 cm) and least was observed in the genotype Co-13006 (2.62 cm). None of the genotype was seen as significantly better over the best check Co-99004 (3.39 cm). This proposed that all sugarcane entries were heritably variable and a significant quantity of diversity found among them, therefore, these sugarcane entries would respond positively to selection. It is known that sugarcane varieties are significantly affected by genetic makeup (El-Geddaway, *et al*., 2002) [3].

The variation is found in sugarcane yield and yield attributing traits due to their different genetic makeup (Varghese *et al*., 1985 and Mali and Singh, 1995) [19, 7]. Memon *et al*., (2005) [9] and Panhwar, *et al*., (2008) [11] identified incredible diversity among the sugarcane entries for cane yield and yield traits.

The results of quality parameters in mid late set of sugarcane genotypes presented in Table-2 showed that the highest cane Brix % was recorded in the entry COSnk-13105 (22.99%) after that CO-13020 (22.72%) and COSnk-13106 (22.59%) and least was observed in the entry CON-13074 (16.42%). The results regarding Purity %, the highest Purity % was recorded in the entry CO-13009 (86.27%) after that CO-13013 (86.15%) and CO-13011 (85.03%) and least was observed in the entry CON-13074 (77.95%). In case of Juice Extraction %, the greatest Juice extraction % was seen in the entry CO-13018 (65.44%) after that COM-13082 (64.65%) and PI-13131 (64.28%) and least was noted in the entry CO-13006 (48.64%). As regards the sucrose percent in Juice, highest was seen in the entry COSnk-13105 (13.75) after that COSnk-13106 (13.69) and CO-13020 (13.53) and least was noted in the entry CON-13074 (9.77).

Table 1: Revealed that the highest cane yield

Entries	Plant height (cm.)	Nodal length (cm).	Weight of single cane (kg)	Diameter (Cm)	Cane yield (t/ha)
CO-13005	318.9	12.52	1.92	2.99	131.40
CO-13006	335.7	13.36	1.48	2.62	109.92
CO-13008	345.9	13.97	2.11	3.00	133.91
CO-13009	351.4	13.47	2.55	3.32	150.13
CO-13011	302.7	13.17	1.85	3.08	95.73
CO-13013	385.1	12.88	2.53	3.10	153.04
CO-13014	312.4	13.56	2.45	3.43	138.90
CO-13016	297.0	13.24	2.02	3.18	102.22
CO-13018	277.3	14.15	1.64	2.90	101.49
CO-13020	330.0	14.08	2.15	3.13	124.46
COM-13082	339.0	13.46	2.10	2.97	146.25
CON-13073	320.4	12.26	2.95	3.30	144.19
CON-13074	338.4	11.7	2.85	3.58	147.16
COSnk-13103	352.9	15.33	1.73	2.75	105.84
COSnk-13104	301.7	13.76	1.99	3.12	125.03
COSnk-13105	288.5	11.5	2.14	3.19	101.86
COSnk-13106	308.5	13.64	1.72	2.98	102.11
COT-13366	268.9	11.93	1.74	3.03	85.74
PI-13131	275.0	14.16	1.71	3.02	98.30
PI-13132	304.4	13.62	1.91	3.07	43.11
CO-86032	323.3	14.68	1.99	2.95	106.49

CO-99004	361.1	16.55	2.62	3.39	113.10
CO-8014	325.4	15.1	2.09	2.98	104.07
CO-8036	335.8	13.07	2.24	3.24	103.09
Mean	320.82	13.54	2.10	3.10	115.31
CD at 5%	38.75	1.52	0.63	0.27	31.28
CV %	5.98	5.56	14.81	4.31	13.42

Table 2: Data of quality parameters of Midlate set of Sugarcane genotypes

Entries	Juice Extraction %	Brix %	Sucrose % in Juice	Purity %
CO-13005	51.17	19.60	11.35	82.50
CO-13006	48.64	19.50	10.73	81.69
CO-13008	57.53	20.50	12.70	84.73
CO-13009	57.62	17.70	11.16	86.27
CO-13011	56.09	18.04	10.74	85.03
CO-13013	57.86	20.50	12.77	86.15
CO-13014	54.05	20.08	11.17	79.30
CO-13016	59.90	20.90	12.50	81.05
CO-13018	65.44	21.48	12.91	81.72
CO-13020	62.28	22.72	13.53	83.10
COM-13082	64.65	19.60	11.93	79.80
CON-13073	60.81	20.04	12.00	81.24
CON-13074	62.12	16.42	9.77	77.95
COSnk-13103	61.72	22.18	12.73	81.83
COSnk-13104	63.81	20.54	12.27	80.96
COSnk-13105	61.68	22.99	13.75	83.78
COSnk-13106	63.39	22.59	13.69	81.94
COT-13366	61.97	19.32	11.52	79.97
PI-13131	64.28	20.42	12.17	80.51
PI-13132	63.35	21.29	13.26	81.82
CO-86032	64.21	21.79	13.46	82.29
CO-99004	61.23	22.00	13.41	82.50
CO-8014	62.32	20.49	12.56	80.72
CO-8036	62.82	21.29	13.13	81.59

Conclusion

It was seen that in midlate set of sugarcane genotypes CO-3013 (153.04 t/ha) after that CO-13009 (150.13 t/ha), Co-13074 (147.16 t/ha) and CoM-13074 (146.25 t/ha) were seen as essentially better over the best check CO-99004 (113.10 t/ha). Stem height, single cane weight, length of nodes, brix % and sucrose % were play an important part for sugarcane yield. For satisfactory performance of the potentiality of chosen genotypes of mid late set of sugarcane should be more evaluated under potential area for identification as best cultivars for general cultivation.

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