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Yield Response of Different Sugarcane Genotypes under Agro-climatic Conditions of Thatta

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Abstract: Performance of twelve sugarcane genotypes viz., Th-7, Th-9, Th-10, Th-12, Th-14, Th-18, Th-23, Th-27, Th-31, Th-32, Th-33 and Th-34 developed from local fuzz along with two check varieties BL-4 and BF-129 was studied in advance varietal selection trial at National Sugar Crops Research Institute, Thatta during 2000-2001. Data were recorded for cane girth, number of internodes/stalk, stalk height, millable cane m^{-2}, cane yield t $ha^{-1}$and brix percentage. On the basis of over all performance three genotypes namely Th-34, Th-10 and Th-33 were found promising and produced highest average cane yield 116, 115 and 112 t ha^{-1}, respectively against the check varieties BL-4 (110 t ha^{-1}) and BF-129 (98.5 t ha^{-1}). The average Brix values recorded for Th-10, Th-34 and Th-33 were 23.7, 23.2 and 22.9%, respectively against the check varieties BL-4 (21.8%) and BF-129 (22.8%). Thus it was concluded that genotypes Th-34, Th-10 and Th- 33 might prove best commercial varieties in future. How ever potential of these genotypes need to be tested in different environmental conditions to elicit substantial conclusions.

Key words: Sugarcane, fuzz, seedlings, genotypes, brix%, yield components, cane yield, Thatta, Pakistan

INTRODUCTION

Sugarcane (*Saccharum officinarum,* L.) is an important cash and industrial crop of Pakistan. The crop is grown on an area of about one million hectares with average cane yield of 47.6 t ha^{-1} [1] which is very low as compared to other cane growing countries of the world. This low yield may be attributed to many factors and the most important one are poor management practices[2], inadequate nutrients[3], consistency in traditional farming systems, natural climatic hazards and irrigation constrains[4]. Besides all these factors, inherently low cane and sugar yielding varieties and fewer provisions for evaluation and acclimatization of improved sugarcane varieties also play a distinct role. The average cane yield can be improved by adopting improved package of technology and developing high yielding varieties through different breeding techniques.

Sugarcane varieties are developed at sugarcane breeding institutions of the world through screening of large number seedlings raised from fuzz (true seed) obtained through breeding process. Sugarcane clones obtained from the same parents show heterogeneity in F^1 generation and the scientists exploit the variability in making selections[5]. Evaluation of cane varieties through hybridization is dependent on the climatic conditions of tropical countries[6].

The climatic conditions in Pakistan are not conducive to cane flowering in general. At local spots where plants flower, non-synchronization in genotypes reduces the possibility of hybridization[7]. There fore the efforts of sugarcane improvement mainly depend on imported or locally collected fuzz. Genetic selection for higher yield always play a major role in cane improvement; agronomic practices just trigger the inherent potential of varieties[8].

The main objective of the varietal development programme is to evaluate genetically improved varieties having high cane and sugar yield.

MATERIALS AND METHODS

Seedlings were raised from local fuzz of different sugarcane varieties in initial nursery stage at National Sugar Crops Research Institute experimental farm, Thatta. These seedlings were tested in subsequent clonal selection cycles (i.e. 1st, 2nd, 3rd and 4th cycles) and then in the preliminary yield trial, where selected clones were given Thatta numbers. After preliminary evaluation the selected genotypes were further tested in advance varietal selection trial for different years. The trial was conducted during 2000-2001 at NSCRI, farm, Thatta under randomized complete block design with four replications. Twelve sugarcane genotypes viz. Th-7, Th-9, Th-10, Th-12, Th-14, Th-18, Th-23, Th-27, Th-31, Th-32, Th-33 and Th-34 along

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with two commercial varieties BL-4 and BF-129 were planted. The planting was done in October 2000 by overlapping method using two budded sets. Plot size was 18 m^2, three rows of each genotype in six meters long furrows at one-meter row spacing were sown. The crop was fertilized @ 275-112-175 kg NPK ha^{-1}. All PK and 1/3 N was applied at the time of sowing while remaining 2/3 N was applied in two equal splits, first at the completion of germination and second at the time of earthling up. Uniform management and cultural operations, insect pest and disease control measures were adopted at appropriate stages. The data and observations pertaining to cane yield and its parameters were recorded. The data recorded was subjected to statistical analysis using MSTAT-C statistical programme[9].

RESULTS AND DISCUSSION

Data in Table 1 revealed that average millable canes m^{-2} were highest in genotypes Th-34 (22.2), Th-33 (21) and Th-10 (20.2), while minimum average millable canes m^{-2} were observed in check variety BF-129 (17.5) and Th-32 (17.7). Highest average stalk height was observed in genotype Th-10 (210 cm) followed by Th-34 (207.4 cm) and Th-33 (204.3 cm) and the lowest average stalk height was recorded in genotypes Th-14 (125.4 cm) and Th-23 (132.5 cm) against the check varieties BL-4 (201.4 cm) and BF-129 (160.3 cm). Maximum average cane girth was observed in genotype Th-10 (26.9 mm) followed by Th-33 (26.2 mm), BL-4 (26.7 mm) and Th-34 (25.7 mm). The minimum average cane girth was exhibited in Th-18 (22.8 mm), while the genotypes Th-14 and Th-27 were at par in average cane girth (24 mm) and also found lowest. As regard the number of internodes/stalk, genotype Th-10 (22.9) was at the top followed by Th-34 and Th-33, which gave 20.4, and 19.6 average number of internodes/stalk, respectively. The data presented in Table 1 further revealed that genotype Th-34 produced highest average cane yield 116 t ha^{-1} followed by Th-10 (115 t ha^{-1}) and Th-33 (112 t ha^{-1}). The lowest average cane yield was observed in genotypes Th-14 (90.5 t ha^{-1}), Th-23 (92 t ha^{-1}) and Th-12 (92.6 t ha^{-1}) against the check varieties BL-4 (110 t ha^{-1}) and BF-129 (98.5 t ha^{-1}).

Brix % (Total soluble solids) plays an important role in determining the sugar recovery % of the sugarcane. Field refractometeric brix is a good estimation of the sugar content in sugarcane[13]. Maximum brix value was observed in genotypes Th-10 (23.7%) followed by Th-34 (23.2%) and Th-9 (23.1%). While the genotypes Th-27 and Th-14 gave minimum brix value 20.2 and 20.7% respectively against the check varieties BL-4 (21.8%) and BF-129 (22.8%). Yield is a major parameter to find out the economic potential of a variety. The maximum cane yield in genotypes Th-34, Th-10 and Th-33 was may be due to the maximum cane girth, millable canes and height. Chaudhery[10] reported that increase in cane tonnage was due to combined effect of millable canes/ha, length of millable canes and weight of canes. Raman *et al.*[11] and Singh *et al.*[12] also reported number of millable canes as major yield contributing factor followed by cane height and girth. On the basis of overall performance of the genotypes in the trial it is concluded that Th-10, Th-33 and Th-34 may prove best commercial varieties in future. How ever the performance of these genotypes need to be tested under different agro-climatic conditions to draw out substantial conclusions.

Table 1: Mean performance of different sugarcane genotypes in advance varietal selection trial at NSCRI, farm Thatta during 2000-2001

Genotypes	Cane girth (mm)	No. of internodes/stalk	Stalk height (cm)	Millable canes m^{-2}	Cane yield (t ha^{-1})	Brix%
Th-7	25.6abcd	16.2e	184.7abcd	19.2ef	94.50fgh	22.2abc
Th-9	25.0abcd	17.6d	196.6abc	19.5ef	100.50def	23.1ab
Th-10	26.9a	22.9a	210.0a	20.2cd	115.00a	23.7a
Th-12	24.8bcde	17.9d	141.7bcd	18.0g	92.60gh	21.5bc
Th-14	24.0de	18.6cd	125.4d	19.0f	90.50 h	20.7c
Th-18	22.8e	19.1c	152.6abcd	19.7de	94.00fgh	21.7abc
Th-23	24.6cde	15.5e	132.5cd	18.0g	92.00gh	22.0abc
Th-27	24.0de	19.6bc	201.4ab	20.5bc	107.00bcd	20.2c
Th-31	25.5abcd	19.4bc	197.9ab	19.2ef	103.00cde	21.8abc
Th-32	26.0abcd	18.5cd	192.4abc	17.7g	97.30efgh	21.5bc
Th-33	26.2abc	19.6bc	204.3ab	21.0b	112.00ab	22.9ab
Th-34	25.7abcd	20.4b	207.4a	22.2a	116.00a	23.2ab
BL-4	26.7ab	19.2bc	201.4ab	19.7de	110.00abc	21.8abc
BF-129	25.1abcd	19.4bc	160.3abcd	17.5g	98.50efg	22.8ab
CV %	4.27	3.26	18.81	1.86	3.79	4.87
LSD 1 %	2.06	1.17	64.5	0.69	7.36	2.06

Means followed by the same letters do not differ significantly at 1 % level of probability

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