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SUMMARY

The present investigation was carried out at El-Mataana Agriculture Research Station, farm, Qena governorate , Upper Egypt region during two successive plant cane crops growing seasons (2006/2007 and 2007/2008) to evaluate performance and stability of ten sugarcane genotypes under three planting dates and three interrow spacing. The harvesting date was after 12 months from planting .The ten sugarcane genotypes were G.84-47, G.95-19, G.95-21, G.98-24, G.98-28, G.99-103, G.99-165, Ph.8013 and Mex.2001/80 and G.T.54-9 (the commercial variety ,which was used as check variety). The three planting dates were Feb 20th, March20th, and April 20th, in 2006 and 2007, seasons. The three interrow spacing were 80, 100, and 120cm.

The experimental design was a split-split plot with three replications .The planting dates were allocated at random in the main plots while the interrow spacing were randomly distributed in the sub-plots and the sugarcane genotypes were randomly assigned to the sub-sub plots .The experimental unit area was 60m^2 (12m × 5m) and consisted of 15rows of 5m long at 80cm interrow spacing ,12 rows of 5m long at 100cm interrow spacing and 10 rows of 5m long at 120cm interrow spacing . Each row was planted with 12 of three budded cane setts. The recommended cultural practices of sugarcane were adapted throughout the tow growing seasons (2006/2007 and 2007/2008).

The collected data were subjected to proper statistical analysis of according to the procedures outlined by **Snedecor and Cochran (1981).** The comparison among means was done using LSD at 0.05 level of probability. Stability analysis was carried out using **Eberhart** and **Russell** model **(1966).**

The obtained results could be summarized as follows:

I - Performance of sugarcane genotypes under three planting dates and three interrow spacing.

a)- Cane yield and its contributing traits:

1- In both seasons, there was significant effect of planting dates on all studied traits, except its effect on number of millable cane /fed. was insignificant in first season only . In both seasons, the highest mean values of number of millable cane/fed., stalk length, stalk diameter, stalk weight and cane yield were recorded in Feb.20th. Delaying planting date from Feb.20th up to April 20th reduced the values of all traits.

2- In both seasons, the results revealed that the studied characters significantly differed as affected by interrow spacing. Higher values of number of millable cane/fed., stalk length and cane yield were recorded at 80 cm interrow spacing and the lowest values were recorded at 120 cm interrow spacing. Higher values of stalk diameter

and stalk weight were recorded at 120 cm interrow spacing and the lowest values were recorded at 80 cm interrow spacing.

3- There were significant differences among genotypes in all studied traits. In both seasons. the highest mean values of number of millable cane/fed. were recorded by G.95-21 genotype. The highest mean values of stalk length, stalk diameter, stalk weigh and cane yield, were recorded by G.99-103 genotype except in second season only, G.T.54-9 variety recorded the highest mean values of stalk length.

4- In both seasons, the interaction of planting dates×interrow spacing, planting dates×genotypes and interrow spacing×genotypes had significant effects on all studied traits.

5- In both seasons, the effects of all interaction among planting dates, interrow spacing and genotypes were significant. The obtained results indicated that G.95-21 genotype surpassed significantly the other genotypes in number of millable cane/fed. when it was grown at 80 cm interrow spacing in Feb.20th and March 20th planting dates in first and second seasons, respectively. G.99-103 genotype surpassed significantly the other genotypes in stalk weight in Feb.20th planting date at 120 cm interrow spacing in both seasons, as well as in stalk diameter in Feb.20th planting date at 120cm and 100 cm interrow spacing in first season and second season, respectively. Whereas, at 80 cm interrow spacing in Feb.20th planting date G.99-103 genotype surpassed the other tested genotypes in cane yield in both seasons and

in stalk length in first season while G.T.54-9 variety surpassed the other tested genotypes in second season in stalk length.

b) - Juice quality and sugar yield traits:

1- In both seasons, there were significant effect of planting dates on all studied traits except, their effect on sugar yield was insignificant in second season only. The highest mean values of Brix% were recorded in March 20th planting date. In first season the highest mean values of sucrose%, purity%, sugar recovery% and pol% were recorded in March 20$^{th.}$ and in second season in April 20th planting date. However, the highest mean values of sugar yield were recorded in March 20th planting date in both seasons.

2- In both seasons, the results revealed that the studied characters differed significantly as affected by interrow spacing except sucrose% and sugar recovery% were not significantly affected in second season only . Higher values of Brix% were recorded at 100 cm interrow spacing, while sucrose%, purity% and sugar recovery% recorded the highest mean values at 120 cm interrow spacing. The highest mean values of Pol% at 120 cm and 100 cm interrow spacing in first and second seasons respectively. The lowest values of these traits were recorded at 80 cm interrow spacing in both seasons except sugar recovery% was the lowest value was recorded at 100 cm in second season only. The highest mean values of sugar yield was at 80 cm interrow spacing, and the lowest values were recorded at 120 cm interrow spacing in both seasons.

3- In both seasons, there were significant differences among genotypes in all quality traits except the differences in purity% and sugar recovery% were not significant in first season only. G. 99-165genotype recorded the highest mean values of Brix%, sucrose%, sugar recovery% and pol% in second season only while Mex.2001-80 genotype recorded the highest mean values of purity%. G.T.54-9 variety recorded the highest mean values of Brix% and pol% in first season.G.98-24 recorded the highest values of sucrose%, purity% and sugar recovery% in first season. However, the highest mean values of sugar yield were recorded by G. 99-103 genotype in both seasons.

4- The interaction of planting dates × interrow spacing, planting dates x genotypes and interrow spacing × genotypes had significant effects on the all studied quality traits except purity% in second season which was not significantly affected by planting dates×genotypes interaction and sugar yield ton /fed. in first season which was not significantly affected by planting dates×interrow spacing . Brix%, sucrose%, purity% and sugar recovery% were not significantly affected by interrow spacing x genotypes in first season as well as pol% in second season.

5- In both season, the second order interaction (planting dates× interrow spacing ×genotypes) had significant effects on the all studied quality traits except sucrose% and sugar recovery% which were not significant in second season as well as purity% and sugar yield which were not significant in both season. In both season, the obtained results

indicated that G.98-24 genotype surpassed significantly the other genotypes in sucrose%, sugar recovery% and pol% when it was planted in March 20th planting date at 100 cm interrow spacing. However, G.95-19 and G.84-47 genotypes recorded the highest Brix% values in March 20th planting date at 100 cm interrow spacing in first and second seasons, respectively.

II -Stability analysis:

1-Stability analysis of cane yield and its components:

A- Combined analysis:

Combined analysis of variance of the genotypes over eighteen environments indicated that mean squares of environments, genotypes and their interaction were highly significant for stalk length, stalk diameter, number of millable cane/fed. and cane yield.

B- Joint regression:

The joint regression analysis of variance for stalk length, stalk diameter, stalk weight, number of millable cane/fed. and cane yield of the evaluated genotypes revealed that highly significant differences of E +(E$\times$G) for these traits were found.

Also, highly significant mean squares of pooled deviation of cane yield and its components were found .

C –Stability parameters:

The results of stability parameter indicated that:

1- All tested genotypes were not stable in stalk length.

2- All tested genotypes were not stable in stalk diameter.

3- Ph.8013, G.98-28 and Mex.2001-80 genotypes were stable in stalk weight while the other tested genotypes were not stable.

4- Ph.8013, G.98-28, G.99-103 and Mex.2001-80 genotypes were stable in number of millable cane while the other tested genotypes were not stable.

5- Ph.8013, G.98-28, G.84-47, G.98-24 and Mex.2001-80 genotypes were stable in cane yield while the other tested genotypes were not stable.

6- Values of (bi) of G.95-19 genotype was more than unity for all studied traits showing that this genotype could be well adapted under optimum planting date (Feb. 20^{th} and March 20^{th}) and optimum interrow spacing. while G.99–103 and G.84-47 genotypes had (bi) more than unity for number of millable cane /fed., stalk weight and cane yield ton/fed. Indicating that these genotypes should be planted in optimum planting date and optimum interrow spacing to obtained the highest values of number of millable cane, stalk weight and cane yield.

7- G.T.54-9 variety and ph.8013, G.98-28, G.99-165, G.98-24 and G.95-21 genotypes had (bi) less than unity for number of millable cane and cane yield indicated that these genotypes could be recommended for late planting date (April 20th) and unoptimum interrow spacing as well as Mex.2001-80 genotype for cane yield to obtained good values of these traits. Ph.8013, G.98-28, Mex.2001- 80, G.98-24 and G.95-21 genotypes had (bi) less than unity for stalk weight and Ph.8013, G.99-165 and G.84-47 genotypes had (bi) less than unity for stalk diameter and G.T.54-9 variety and G.99–103, G.84–47 and G.98 -24 genotypes had (bi) less than unity for stalk length, indicated that these genotypes could be adapted to late planting date (April 20th) and unoptimum interrow spacing to obtained good values of these traits. The other tested genotypes had (bi) values more than unity for all studied traits indicated that these genotypes should be planted in Feb. 20th or March 20th (optimum planting date) and optimum interrow spacing to produce optimum values.

8- The most desired genotype for stalk length, stalk diameter, stalk weight and cane yield ton /fed. was G.99-103 genotype which was higher than that of G.T.54 -9, the commercial cultivar, and higher than that of the other tested genotypes. In additional G.95-21 genotype which recorded the highest mean for number of millable cane/fed. among tested genotypes.

II - Stability analysis of quality and sugar yield traits:

A - Combined analysis:

The combined analysis of variance showed that mean squares due to genotypes (G) and environments (E) which expressed as combination of years, planting dates and interrow spacing were significant for Brix%, Sucrose%, Purity%, Pol%, Sugar Recovery% (quality traits). Also, the mean squares due to the G ×E interaction were significant for all quality traits and sugar yield.

B – Joint regression:

The joint regression analysis of variance for Brix%, Sucrose%, Purity%, Pol%, Sugar Recovery% (quality traits) and sugar yield, indicated that mean squares of E+ (E ×G) for all quality traits were highly significant**.** Genotypes x environments interaction (linear) were highly significant for Brix%, Pol%, and sugar yield. However genotypes ×environments interaction (linear) for Sucrose%, Purity% and Sugar Recovery%was insignificant. Furthermore, highly significant pooled deviation for studied quality traits and sugar yield was found.

C –Stability parameters:

The results of stability parameter indicated that:

1- G.98-28, G.99-165, G.98-24 and G.95-21 genotypes were stable in Brix% while the other tested genotypes were not stable.

2- G.T.54-9 variety and Mex.2001-80, G.98-24 and G.95-21 genotypes were stable in sucrose% while the other tested genotypes were not stable.

3- Ph.8013, G.98-28 and G.95-19 genotypes were unstable in purity% while the other tested genotypes were stable.

4- G.99-165 and Mex.2001-80 genotypes were stable in pol% while the other tested genotypes were not stable.

5- G.T.54-9 variety and G.99-165, Mex.2001-80, G.98-24 and G.95-21 genotypes were stable in sugar recovery% while the other tested genotypes were not stable.

6- Ph.8013, G.98-28, G.99 -165, Mex.2001-80 and G.98-24 genotypes were stable in sugar yield while the other tested genotypes were not stable.

7- Values of (bi) of G.T.54-9 variety and G.98-28, G.99-103, G.84-47 and G.95-21 genotypes were more than unity for Pol%, sugar yield ton/fed. and sucrose% showing that this genotypes could be well adapted under optimum planting date (Feb. 20th and March 20th) and optimum interrow spacing. as well as G.99-165 and G.95-19 genotypes for sugar yield ton/fed. and Ph8013 and G.98-24 genotypes for sucrose%. G.99–103, Mex.2001-80 and G.98-24 had (bi) genotypes were more than unity for Purity% and could be adapted to optimum planting date (Feb. 20th and March 20th) and optimum interrow spacing. Furthermore, Ph.8013,G.98-28 and G.99-103

genotypes and G.T.54-9 variety had (bi) more than unity for Brix% and could be adapted to optimum planting date and G.95-19, G.95-21, G.98-24, G.84-47 and Mex.2001-80 genotypes had (bi) more than unity for sugar recovery% and could be adapted to optimum planting date (Feb. 20th and March 20th) and optimum interrow spacing.

8- G.T.54-9 variety and G.99-165, G.84-47, Mex.2001-80, G.95-19 and G.95-21 genotypes had (bi) less than unity for Brix% indicated that these genotypes could be recommended for late planting date (April 20th) and unoptimum interrow spacing to obtained good values of this trait. G.99-165, G.95-19 and Mex.2001- 80 genotypes had (bi) less than unity for sucrose% and G.T.54-9 variety and Ph.8013,G.98-28, G.99 -165, G.95-21, G.95-19 and G.84 -47 genotypes had (bi) less than unity for purity% and G.99-165 genotype had (bi) less than unity for pol% and G.T.54-9 variety, Ph.8013,G.98-28, G.99 -165 and G.99-103 genotypes had (bi) less than unity for sugar recovery% and Ph.8013,G.98-24 and Mex.2001- 80 genotypes had (bi) less than unity for sugar yield indicated that these genotypes could be adapted to late planting date (April 20th) and unoptimum interrow spacing to obtained good values of these traits.

9- The most desired genotype for Brix%, sucrose% and Purity% were G.98–24 genotype which had were higher than that of G.T.54-9, the commercial cultivar, and higher than that of the other tested genotypes, as well as G.84-47 and Ph.8013 genotypes for Brix%,G.99-165 genotype, was the most desired genotype for Pol% and sugar

recovery% and G.98-24 and Mex.2001-80 genotypes for sugar recovery%. However, G.99-103 genotype was the most desired genotype for sugar yield ton/fed.

It could be concluded that sugarcane crop should be planted in Feb. 20th planting date at 80 cm interrow spacing to obtain the highest cane yield. However, to obtain the highest sugar yield, sugarcane crop should be planted in March 20th planting date at 80 cm interrow spacing .

Also, the results indicated that Ph.013, G.98-24, G.98-28 and Mex.2001-80 genotypes were stable under the eighteen environments used in this study. G.98-28 genotype should be recommended to Feb. 20th and March 20th planting date at 80 cm interrow spacing since it had regression coefficient (bi) more than unity while the other stable genotypes should be recommended to late planting date April 20th and wider interrow spacing (100 -120 cm) between cane rows since it had (bi) less than unity.