SUMMARY

Six field experiment were carried out during the two growing seasons (2001-2002 and 2002-2003) at three locations Kafre El-Sheikh Governorate (Sakha Experimental Station, ARC), Al-Dakahlia Governorate (Belkas province) and Al-Fayoum Governorate (Tamea district of Experimental Sugar Crops Research Institute, ARC) to study the effect of the harvesting dates (170, 190 and 210 days after sowing date 10th of October ± 3 days in each location) with eight sugar beet genotypes (Gloria, Kawemira, Pleno, Athospoly, Desprez mono N, Marathon, Del 936 and Posada) on yield of root and sugar and root characters and quality traits as well as determine the stability of the varieties by using Kang method (1993).

A split-plot design with 3 replications was used at three locations with harvest dates allocated in the main-plots, while genotypes occupied the sup-plots. The area of each sub-plot was 21m^2 (1/200 fed.) consisted of 6 ridges 7m in length, 50cm in width and spacing between hills were 20cm.

Agronomic cultural practices were carried out as usual optimum production at three locations.

The following characters were studied:-

A- Root characters:

1- Root length (cm).

2- Root diameter (cm).

3- Root fresh weight (Kg/ plant).

B- Top fresh weight (kg/ plant).

C- Quality traits:

1- Sucrose percentage.

2- Purity percentage.

3- Impurities (Na, K and alpha-amino-nitrogen percentages.)

4- Sugar loss to molasses percentage.

5- Extractable sugar percentage.

6- Extractability percentage.

D- Yield

1- Root yield (ton/fed).

2- Sugar yield (ton/fed.)

3- Top yield (ton/fed.).

E- Stability analysis:

The results could be summarized as follows:

I- Effect of season:

1- Mean value in the second season were mostly higher than the corresponding one in the first season for root weight, sodium %, root yield and sugar yield per feddan.

2- However, root diameter and potassium % was higher in the first season as compared to the second season.

II- Effect of location:

1- Mean squares associated with location were significant for all traits except, root length, top weight, sucrose%, extractable sugar percentage and top yield per feddan.

2- Kafr El-Sheikh location gave the greatest value of root diameter, root weight,, purity %, extractable sugar %, extractability %, root yield and sugar yield per feddan.

3- While, the lowest values of the above traits were obtained from Al-Fayoum location.

4- The highest value of sodium percentage, potassium % and sucrose loss to molasses % were produced from Al-Fayoum location followed by Al-Dakahlia location.

5- The interaction effect between location and season was significant on purity %, nitrogen %, sodium % and sucrose loss to molasses %.

III- Effect of harvest date:

1- Significant mean squares for harvest dates were obtained for all traits in the combined analysis.

2- Delaying in harvest dates up to 210 days from sowing significantly increased root length, root diameter, root weight, sucrose %, alpha amino nitrogen %, sucrose loss to molasses %, extractable sugar %, root yield and sugar yield per feddan.

3- The highest values of purity % and extractability % were obtained from harvest at 190 days after sowing.

4- Early in harvest date at 170 days after sowing gave the highest mean values of top weight, sodium %, potassium % and top yield per feddan.

5- Mean squares for the interaction between harvest dates and season were found to be significant in the root diameter, sucrose %, purity %, alpha amino nitrogen %, sucrose

loss to molasses %, extractable sugar %, and extractability %.

V- Varietal differences:

1- Marathon variety surpassed significantly the other varieties in root length, root diameter, root weight, root yield, sugar yield and top yield per feddan in the combined analysis.

2- Kawemira variety had the highest mean values of sucrose %, purity %, extractable sugar % and extractability %.

3- The highest values of alpha amino nitrogen % and sodium % were produced from Del 936 variety, while Athos poly variety gave the maximum mean values of potassium % and sucrose loss to molasses.

4- On the other hand, no significant differences were obtained between Desprez mono N, Marathon and Del 936 varieties in root diameter, sodium %, potassium % and top yield per feddan.

5- Mean square for the interaction between varieties and seasons were found herein to be significant for root diameter, sucrose %, purity %, alpha amino nitrogen %, sodium %, sucrose loss to molasses, extractable sugar % and extractability %.

IV- interaction effect:

A- Interaction effect between location and harvest date:

1- The interaction between harvest dates and location significantly affected sucrose %, purity %, alpha amino

nitrogen %, sodium %, potassium %, sucrose loss to molasses %, extractable sugar % and extractability %.

2- Kafr El-Sheikh location with harvested plants of sugar beet at 210 days after sowing gave the highest sucrose %, purity %, extractable sugar % and extractability %.

3- Al-Dakhlia location with harvested plants of sugar beet at 210 days after sowing gave the maximum percentages of alpha amino nitrogen % and sucrose loss to molasses %.

4- The highest sodium % was obtained from Al- Fayoum with harvested plants at 210 days from sowing, while Al-Fayoum with harvested plants at 170 days gave the maximum percentage of potassium.

5- The interaction effect among harvest date, location and season significantly affected purity %, alpha amino nitrogen %, sucrose loss to molasses %, extractable sugar %, and extractability % in the combined analysis.

B- Interaction effect between location and varieties:

1- The mean values of root diameter, root weight, sucrose %, alpha amino nitrogen %, sucrose loss to molasses %, extractable sugar %, extractability % and root yield/feddan were significantly affected by the interaction between location and varieties in the combined analysis.

2- Marathon variety cultivated in Al-Dakahlia location gave the highest values of root diameter, root weight, alpha amino nitrogen %, and root yield per feddan.

3- Gloria variety cultivated in Kafr El-Sheikh location gave the highest percentage of sucrose, extractable sugar % and extractability %.

4- The highest values of sodium and sucrose loss to molasses percentages were produced from Athos poly variety when cultivated in Al-Fayoum location.

5- The interaction between season x location x varieties showed a significant effect on root diameter, sucrose %, purity %, alpha amino nitrogen, sodium %, extractable sugar %, extractability % and sugar yield per feddan.

C- Interaction effect between harvest date and varieties:

1- There was a significant effect of the interaction between harvest date and sugar beet varieties in root diameter, sucrose %, purity %, alpha amino nitrogen %, sodium %, potassium %, sucrose loss to molasses, extractable sugar %, extractability % and sugar yield/feddan in the combined analysis.

2- The highest mean values of root diameter, alpha amino nitrogen % and sugar yield/feddan were produced from Marathon variety with harvested at 210 days after sowing.

3- Gloria variety when harvested at 210 days after sowing gave the maximum percentages of sucrose, purity, extractable sugar and extractability.

4- On the other hand, Athos poly variety harvested at 210 days after sowing gave the highest value of sucrose loss to molasses, while Desprez mono N variety when

harvested at 170 days after sowing produced the highest percentages of sodium and potassium.

5- The mean values of root diameter, sucrose %, purity %, alpha amino nitrogen %, potassium %, sucrose loss to molasses %, extractable sugar % and extractability % were significantly affected by the interaction between varieties, harvest date and season.

D-Interaction effect between location, harvest date and varieties:

1- There were significant differences of sucrose %, purity %, alpha amino nitrogen %, sodium %, potassium %, sucrose loss to molasses % and extractable sugar %.

2- The highest mean values of sucrose %, purity %, extractable sugar % and extractability percentage were produced from Gloria variety at Kafr El-Sheikh location with harvested after 210 days from sowing. While Gloria variety harvested at 170 days after sowing in Kafr El-Sheikh gave the minimum percentage of alpha amino nitrogen percentage and sodium percentage.

3- Marathon variety gave the highest value of sucrose loss to molasses in Al-Dakahlia location when harvested at 210 days after sowing.

4- The highest percentage of potassium was resulted from Desprez mono N variety harvested after 170 days in Al-Fayoum location.

5- It could be concluded that Kafr El-Sheikh surpassed the other location with delay harvest of sugar beet varieties

under study in sucrose percentage, root yield and sugar yield per feddan.

IIV- Stability analysis:

Analysis of variances showed significant difference between genotypes over all environments for root diameter, sucrose %, purity %, extractable sugar %, extractability % and sugar yield ton/feddan. The results suggested that the comparison between genotypes should be made in order to determine the best performing genotypes at a given environment.

Mean squares of environments genotypes and genotypes x environments (GE) interaction were highly significant for all the studied traits.

The results could be summarized as follows:

1- Kawemira, Desprez mono N, Marathon and Del 936 varieties were stable for root diameter over 18 environments by mean value and stability criterion (*Ysi*). The best genotypes for stability were Marathon followed by Del 936 and then by Desprez mono N in root diameter.

2- Three out of eight genotypes were stable for sucrose percentage. The favorite variety was Gloria variety followed by Kawemira and Posada varieties.

3- Five out of eight genotypes (Gloria, Kawemira, Desprez mono N, Marathon and Posada) were stable for purity percentage. The best variety for stability over 18 environments under study was Gloria followed by Posada and then by Kawemira.

4- Gloria, Kawemira, Posada and Desprez mono N varieties were stable in extractable sugar and extractability

percentages. The best varieties for stability over all environments under study for quality traits were Gloria, Kawemira and Posada variety.

5- Marathon variety surpassed all varieties in stability statistics by measuring sugar yield and stability criterion (Ysi), followed by Dell 936 and Posada varieties. The three varieties could be used for commercial production at any of the three locations under three harvesting dates under this study.

6- Generally, for sugar yield and quality traits the best variety Posada was stable.