SUMMARY

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The effect of four potassium fertilizer levels on growth, yield and some chemical composition and nutritive values of three fodder beet varieties (*Beta vulgaris* L.) was studied at Abis and Nubaria regions during 1993/94 and 1994/95 seasons.

The experimental design (at each region) was split plot with four replications. The three fodder beet varieties , namely Monovert, Rossessina and Brigadier were arranged at random in the main plots. Whereas the four levels of potassium fertilizer i.e., Zero, 48,96 and 144 Kg K_2O/fad in the form of potassium sulphate (48% K_2O) were arranged at random within the subplots. Results could be summarized as follows:-

A- Growth Characters:

1) Root length was significantly affected by varieties and potassium application. The Brigadier variety was superior to Monovert and Rossessina varieties in root length at Abis and Nubaria regions. Adding 48,96 and 144 kg K_2O/fad increased the root length by (15.19, 19.85 and 26.48 %, respectively) in Abis region and (7.71, 12.67 , and 17.42 %, respectively) in Nubaria region as compared with zero level of K_2O.

2) Root perimeter varied significantly from one variety to another, at Abis and Nubaria regions. Rossessina variety gave the highest value of root perimeter than Monovert and Brigadier in Abis region, while Brigadier variety had higher root perimeter followed by Rossessina and Monovert in Nubaria region. Application of potassium fertilization increase the root perimeter with each increased in potassium levels up to 144 kg K_2O/fad at Abis and Nubaria regions. The increases in root perimeter reached 15.54, 24.66 and 36.98 % in Abis region as well as

5.89 , 14.7 and 20.64% in Nubaria region by application of 48, 96 and 144 Kg K_2O/fad. respectively as compared with the control treatment. The interaction between varieties and potassium levels significantly affected root perimeter in Abis region only. The highest value of root perimeter (57.5 cm) was obtained from Rossessina given 144 Kg K_2O/fad.

3) Top weight/plant was significantly differed in different varieties at Nubaria region only. The tested varieties could be arranged according to the top weight/ plant in a descending order as follows: Monovert, Brigadier and Rossessina in Nubaria region, and Brigadier, Monovert and Rossessina in Abis region. Potassium significantly increased the top weight/plant at Abis and Nubaria regions, where the application of 144 Kg K_2O/fad, produced the highest top weight/plant (0.567 and 0.620 Kg) at Abis and Nubaria respectively.

4) Root weight/plant was significantly affected by varieties and application of potassium at Abis and Nubaria regions . The highest values of root weight (2.455 and 2.265 kg) were obtained by Brigadier and Monovert at Abis and Nubaria, respectively. With each increase in potassium application there was an increase in the weight of root (kg) plant, so the highest root weight/plant was associated with the higher level (144 Kg K_2O /fad).

5) Total plant weight was significantly differed in different varieties and potassium application at Abis and Nubaria regions. The maximum plant weight (2.955 and 2.848 kg) was obtained by Brigadier and Monovert at Abis and Nubaria regions, respectively. Application of potassium fertilization increased the plant weight of fodder beet with each increase in potassium levels up to 144 kg K_2O/fad. Plant weight increased by about (26.80, 44.69 and 82.32% at Abis); and (12.10,

24.06 and 38% at Nubaria) by the application of 48,96 and 144 Kg K_2O/fad, respectively, as compared with zero level of K_2O.

B- Yield and yield contributing

1- Fresh yield of tops tons/fad differed significantly in different varieties. Brigadier variety possessed superiority over Monovert and Rossessina varieties in fresh tops yield/fad in Abis and Nubaria regions. Potassium significantly affected fresh tops yield/fad in both regions . With each increase in potassium application there was an increase in the fresh tops yield/fad. The application, of 144 kg K_2O/fad. produced the highest fresh yield of tops/fad.

2- Fresh yield of roots tons/fad. significantly affected by varieties. The tested varieties could be arranged according to the roots yield/fad in a descending order as follows: Brigadier, Rossessina and Monovert at Abis and Nubaria regions. Addition of potassium significantly increased roots yield ton/fad Application of. 48,96 and 144 kg K_2O/fad. yielded (39.787, 41.806 and 48.756 tons/fad., respectively) and (43.817 , 45.307 and 53.342 , respectively at Abis and Nubaria regions , respectively. The roots yield tons/fad was significantly affected by the interaction of varieties X Potassium only at Abis region. The highest roots yield tons/fad (52.735 tons) was obtained from Brigadier variety fertilized with 144 kg K_2O/fad. whereas the lowest yield of roots tons/fad (34.222) was produced by the unfertilized Rossessina variety.

3- Total fresh yield (tops + roots) tons/fad. was significantly affected by varieties . Brigadier variety possessed superiority over Monovert and Rossessina varieties at Abis and Nubaria region. Total yield tons/fad was affected by potassium application levels at both regions, (Abis & Nubaria)each potassium increment over zero kg/fad was accompanied by a marked increase in total yield/fad. Potassium

levels, 0,48,96 and 144 kg K_2O/fad. yielded 51.100 , 54.250 , 59.290 and 64.957 tons/fad, at Abis region, and 52.800, 57.010, 64.773 and 69.513 tons/fad, at Nubaria region, respectively.

The total yield was significantly affected by the interaction of varieties X potassium in the 2nd season and combined analysis. The highest total yield 71.863 and 69.782 tons/fad was produced from Brigadier variety with 144 kg K_2O/fad in both 2nd season and the combined analysis., respectively.

4- Dry yield of tops tons/fad, was significantly differed in different varieties at Abis and Nubaria regions Brigadier variety possessed superiority over Rossessina and Monovert varieties in dry yield of tops/ Fad in Abis and Nubaria regions. Application of potassium fertilization increased dry yield of tops/fad of fodder beet with each increase in potassium rates up to 144 Kg K_2O/fad yield of dry tops/Fad. increased by about (25.916, 63.278 and 97.060% in Abis region) and 30.660, 60.606 and 94.029% in Nubaria region) by the application of 48, 96 and 144 Kg K_2O)/fad respectively,

The dry yield of tops was significantly affected by the interaction of varieties and potassium in the combined analysis. The highest yield 2.52 tons/fad was produced from Brigadier given 144 Kg K_2O/fad.

5- Dry yield of roots tons/fad was significantly affected by varieties and potassium application. Brigadier variety produced greater dry yield of roots/fad than Monovert and Rossessina varieties at Abis and Nubaria regions. Addition of potassium fertilizer up to 144 kg K_2O/fad significantly increased dry yield of roots/fad.

6- Total dry yield (tons/fad) was significantly affected by varieties and application of potassium fertilizer at Abis and Nubaria regions. Brigadier variety gave the highest dry yield/fad followed by Rossessina

and Monovert varieties in both regions. Generally potassium application caused a significant increase in total dry yield/fad. with each increase in potassium level .The highest total dry yield was obtained by the application of 144 Kg K_2O/fad.

C-Chemical composition and nutritive values.

Chemical Composition:

1- Percentage of crude protein (CP%) in plants was significantly affected by varieties and potassium application. Brigadier variety had the highest value of CP% in plants at Abis and Nubaria regions. Application of potassium fertilizer significantly increased CP% in plants. Zero, 48, 96 and 144 kg K_2O /fad resulted in 10.17, 11.04, 11.89 and 12.67 (CP%), at Nubaria region and 9.63, 10.37, 11.66 and 12.19 (CP%) at Abis region, respectively.

2- Percentage of crude fiber (CF%) in plant varied significantly from one variety to another, where Monovert variety produced the highest value of (CF %) in plants at Abis and Nubaria regions. Addition of potassium fertilizer decreased (CF%) in plants Zero, 48, 96 and 144 kg K_2O/fad. Resulted 9.34, 8.29, 7.82 and 7.13 (CF%), at Nubaria region, and 9.51, 8.70, 8.21 and 7.25, at Abis region, respectively.

Nutritive Values:

1- Digestible crude protein (DCP%) significantly affected by varieties . Brigadier variety possessed superiority over Monovert and Rossessina varieties in DCP% at Abis and Nubaria regions. Application of potassium up to 144 kg K_2O/fad. increased significantly DCP% Potassium at the levels, zero, 48, 96 and 144 produced 5.68, 6.40, 7.63 and 8.14 at Abis region; and 6.21, 7.98, 7.86 and 8.61 DCP% at Nubaria region, respectively.

2- Total digestible nutrients (TDN%) was affected by varieties only at Nubaria region. Rossessina variety surpassed Monovert and Brigadier varieties in (TDN%). Potassium fertilizer significantly increased the (TDN%) where the application of 144 kg K_2O. produced the highest TDN% at Abis and Nubaria regions.

Finally, from the summarized data it could be concluded that Brigadier is the best variety over Monovert and Rossessina to grow under Abis and Nubaria regions under Egyptian conditions as It is superior in fresh and dry of tops yield, roots yield and total yield/Fad and percentages of CP and DCP. Application of potassium fertilizer up to 144 kg K_2O/fad . improved the total fresh and dry yields/fad and quality of fodder beet plants.