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LIST OF ABBREVIATIONS

| Symbol | Definition |
|-----------------|-----------------------------------|
| % | Percent |
| µg g-1 | Microgram Per Gram (ppm) |
| 1 st | First season |
| 2 nd | Second season |
| ANOVA | Analysis of Variance |
| FAO | Food and agriculture organization |
| KC | Potassium chloride |
| KS | Potassium sulfate |
| SDB | Silicate dissolving bacteria |
| C.F.U | Colony forming unite |
| G | Gram |
| Kg | killo gram |
| g cm-3 | Gram Per Cubic Centimeter |
| g fed-1 | Gram Per Fadden |
| g m-1 | Gram Per Meter |
| g plant-1 | Gram Per Plant |
| LSD | Least Significant Difference |
| N | Nitrogen |
| P | Phosphorus |
| K | Potassium |
| c.v | Variety |
| Ha | Hectare |

| | |
|------------|------------------------|
| Fed | Feddan |
| M T. ha | Metric. Ton Hectare |
| FRG | family readiness croup |
| Vit | Vitamin |
| F.W | fresh weight |
| D.W | dray weight |
| SK | Potassium sulphate |
| FK | Feldspar |
| B. compost | Banana compost |

5. Summary and Conclusion

Summary

Two field experiments were carried out at El-Bramoom Agricultural Research farm of Mansoura Horticultural Research station, Mansoura, Dakahlia Governorate, Egypt (+ 7m altitude, 30° 11- latitude and 28° 26- longitude), during the two successive summer seasons of 2014 and 2015. The experiments were designed to investigate the effects of nature potassium, and chemical potassium fertilizer treatments on plant growth, yield and its components, as well as chemical constituents and storability of tuber roots of sweet potato (*Ipomoea batatas*, L.) cv. beauregard.

Experimental design was randomized complete blocks with three replicates. The experiment included 18 treatments as follows:

- 1- Control (100% dose of K₂O, 100 kg/fed.)
- 2- 100% dose of feldspar (906 kg/fed.)
- 3- 100% dose of Banana compost (3.200 ton/fed).
- 4- *Bacillus circulans* bacteria (SDB, 16 L/fed.)
- 5- 50% dose of K₂O fed. + 50% dose of feldspar +SDB
- 6- 50% dose of K₂O fed. + 50% dose of feldspar
- 7- 50% dose of K₂O fed. + 25% dose of feldspar +SDB
- 8- 50% dose of kgK₂O fed. + 50% dose of Banana compost
- 9- 50% dose of K₂O fed. + 50% dose of Banana compost +SDB
- 10- 50% dose of K₂O fed. + 25% dose of Banana compost +SDB
- 11- 50% dose of K₂O fed. + 25% dose of feldspar+ 25% dose of Banana compost
- 12- 25% dose of K₂O fed. +50% dose of feldspar + SDB

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13- 25% dose of K₂O fed. + 50% dose of feldspar + 25% dose of Banana compost

14- 25% dose of K₂O fed. + 25% dose of feldspar + 50% dose of Banana compost

15- 25% dose of K₂O fed. + 25% dose of feldspar /fed. + Dose of 25% Banana compost/fed + SDB

16- 25% dose of K₂O fed. + 50% dose of Banana compost / fed +SDB

17- 50% dose of feldspar+ 50% dose of Banana compost +SDB

18- 50% dose of feldspar+ 50% dose of Banana compost

The obtained results could be summarized as follows:

1-Vegetative growth characteristics:

-The highest values of plant length, number of branches/plant and leaf area/plant (cm²) were recorded in case of the treatments T15 (25% dose of kgK₂O fed. +25% dose of feldspar /fed. +25% dose of Banana compost/fed + SDB).

-The highest values of plant fresh weight Plant, dry weight and leaves number/ plant were obtained by T15 (25% kgK₂O fed. + 25% feldspar/fed. +25% Banana compost / fed + SDB).

- The highest values of fresh weight of leave and fresh weight folige (gm)were found in treatment T15 (25%dose of K₂O fed. + 25% dose of feldspar/fed. +25% dose of Banana compost / fed + SDB).

The highest values of leaves dry weight of / plant (gm) and Folige dry weight of / plant (gm) were found in treatment (T15): 25% dose of K₂O fed. + 25% dose of feldspar/fed. +25% dose of Banana compost / fed + SDB.

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-Treatment (T15) gave the highest value as for Chlorophyll A, Chlorophyll B and total carotenoids in both seasons, while the other treatments gave the various values as for the previous characters but less than the values of T15 in both seasons.

2- Yield and its components:

Treatment T15 gave the highest value as for weight yield/plant and number of tuber /plant in both seasons, while T2 and T4 gave the lowest values of weight yield/plant in the first season, while T2 and T13 gave the lowest values of weight yield/plant in the second season. On the other hand, the other treatments caused less values as compared with T15 with some exceptions. Treatment (T15) gave the highest value as for marketable yield and total yield / fed and decreasing unmarketable yield in both seasons, while (T4) gave the lowest values for the two previous traits in both seasons.

3-Tuber root characters:

The highest values among treatments on average tuber roots weight (gm) were observed by T15 (25% kgK₂O fed. + 25% feldspar/fed. + 25% Banana compost / fed + SDB) followed by T12 (25% kgK₂O fed. + 50 % feldspar + SDB) in both seasons, while the lowest values were observed by T4 and T3 in the first season and T2 and T3 in the second season. The significant increase in average root length (cm) were observed by T1, T5, T10, T11, T12, T15, T16, T 17 and T18 in both seasons. The highest values of average root diameter (cm) were observed by T1, T12, T15 and T16 in both seasons, while less average root diameter was produced by T4 in both seasons.

4-N,P K contents of leaves and tubers:

The highest values of nitrogen of leaves were obtained by application of T3: (100% Banana compost) and T15 (25% kgK₂O fed. + 25% feldspar/fed. +25% Banana compost/fed + SDB) gave the highest values of N percentage on both seasons. But, T15 (25% kgK₂O fed. + 25% feldspar/fed. +25% Banana compost/fed + SDB) gave the highest value of P percentage,

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while the lowest values were obtained by T2 (100 % feldspar) and T16 (25% dose of K₂O fed. + 50% dose of Banana compost/fed +SDB) in both seasons. In addition, treatments T15 gave the highest value for K% followed by T14 in the first season and T11 in the second season. The highest significant values in nitrogen concentrations of tuber roots were obtained from the application of T3 (100% Banana compost) and T15 (25% kgK₂O fed. + 25% feldspar + 25% Banana compost + SDB), while the lowest values were observed by T4 followed by T2 and T11 in the first and second season, respectively. The highest significant values in phosphorus was observed by (T15) followed by (T12) in both seasons. On the other hand, (T2 and T4) gave the lower values of P content. As for K content in sweet potato tubers, the highest values were obtained by T11 (50% dose of K₂O fed. + 25% dose of feldspar+25%Banana compost). And T15 (25% dose of K₂O fed. + 25% dose of feldspar/fed. +25% dose of Banana compost / fed + SDB) in both season, while T2 and T4 gave rise to the lowest values in the first season and T4 produced the same results in second season.

5-Organic composition

The total carbohydrates, R-sugars %, N.R-sugars %, total sugar and carotenoids of sweet potato plants were positively responded to the studied treatments. However, the highest values of the previous parameters were recorded following application T15 (25% kgK₂O fed. + 25% feldspar/fed. +25% Banana compost / fed + SDB) in both seasons, while the lowest values were recorded following application of T2 (100 % feldspar) in both seasons. Total carbohydrates and carotenoids of sweet potato plants were positively responded to the studied treatments. However, the highest values were recorded following application of T15 (25% kgK₂O fed. + 25% feldspar/fed. +25% Banana compost / fed + SDB) in the both seasons, while the lowest values were recorded following application of T4: (SDB) in both seasons. The highest significant values of protein concentrations in tuber roots were obtained after application of the T3 (100% Banana compost) and T15 (2 5% kgK₂O fed. + 25% feldspar +25 banana compost +SDB) in both seasons. , while the lowest values of protein % were recorded

5. Summary and Conclusion

by T2 followed by T11 in the first season. But, in the second season T11 gave the lowest values. All treatments improved Vit C and Vit A content of sweet potato tubers. The highest values for Vit A and C were recorded by (T15) 25% kgK₂O fed. + 25% feldspar/fed. +25% Banana compost / fed + SDB in both seasons. ,while the lowest values were obtained in T2 (100% feldspar) for Vit C in both seasons. As for Vit A the lowest values were obtained by T2 in both seasons

6- Quality of tuber roots during storage period:

Data indicated that treatment 15 (25%dose ofK₂O fed. +25%dose of feldspar/fed. + 25%dose of Banana/fed + SDB) was the best among all treatments in reducing weight loss, decay and sprouting % over 120 days of storage ,that result was true for both seasons.

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Conclusion

Finally, it can be concluded that the application of 50 kgK₂O fed. in the form of potassium sulphate +226.5 kg feldspar/fed. + 800 kg banana compost /fed + inoculation with *Bacillus circulans* bacteria (silicate dissolving bacteria) was the best for vegetative growth and tuber yield of sweet potato. Moreover, the root quality and storability were also improved due to the previous treatment.