Assiut J. Agric. Sci., (49) No. (1) 2018 (10-26) ***ISSN: 1110-0486***
Website:*www.aun.edu.eg/faculty_agriculture/journals_issues_form.php* ***E-mail:ajas@aun.edu.eg***

Effect of Yeast Rates and Potassium Fertilization on Yield and Quality of Some Sugar Beet Varieties

Teama, E.A.; G.R. El-Nagar; E.A. Ali and T.A.A. Ahmed

Agronomy Dept., Fac. Agric., Assiut Univ., Egypt

Received on: 22/3/2018 **Accepted for publication on:** 2/4/2018

Abstract

A field experiment was conducted at the Agronomy Department Experimental Farm, Agriculture Faculty, Assiut University, Egypt. During 2015/2016 and 2016/2017 seasons to study the effect of yeast rates and potassium fertilization on yield and quality of some sugar beet varieties. The experiment was laid out in randomized complete block design (RCBD) using strip split plot arrangement with three replications. Yeast foliar application rates (0,1,2 and 3 kg fed. $^{-1}$) was arranged horizontally, while potassium fertilization levels (12.5, 25 and 37.5 kg K_2O fed.$^{-1}$) were distributed in vertically, as well as sugar beet varieties (kawemira, Romulus and Glorius) were arranged in sub plots. The obtained results revealed that yeast foliar application at the rate of 3.0 kg wet yeast fed.$^{-1}$ recorded the highest significant mean values of root length, root diameter, single root weight, root yield fed.$^{-1}$, pol percentage, sugar recovery percentage and recoverable sugar yield (ton fed.$^{-1}$) traits in the two growing seasons. Furthermore, the obtained results detected that the studied potassium fertilization levels had a significant effect in the all studied traits in the two growing seasons in favor of 37.5 kg K_2O fed.$^{-1}$. Here too, kawemira sugar beet variety gave the highest mean values of previous traits in both seasons. In addition, the obtained results revealed that the all first and second order interactions involved in this respect had a significant influence on all studied traits. Moreover, kawemira sugar beet variety which sprayed with 3 kg yeast fed.$^{-1}$ and fertilized with 37.5 kg K_2O fed.$^{-1}$ produced the maximum mean values of all studied traits in both seasons.

Keywords: *Sugar Beet, Potassium Fertilization, yeast levels.*

Introduction

Total sugar production in Egypt (from sugarcane and sugar beet) is about 2.249154 million tons which provide 69.63 % self-sufficiency. The annual raw sugar imports are about 986 thousand tons which costing approximately 481 million dollars. On the contrary, the annual raw sugar exports are about 360 thousand tons which generating approximately 168.5 million dollars (FAO, 2018). So, increasing the productivity of sugar in Egypt is a must.

Sugar beet became one of the important sugar crops; its roots are processed into white sugar, pulp and molasses for food, feed or industrial applications and are rarely used as a raw commodity. Sugar beet plays a prominent role for sugar production, about 58.9 of locally sugar production, (CCSC, 2013). So, it is of great importance to improve sugar production, by several agricultural practices such as cultivate suitable sugar beet genotype and spray it by prop yeast rate and fertilized with optimum potassium fertilization dose.

Yeasts synthesize antimicrobial and other useful substances required for plant growth from amino acids and sugars secreted by bacteria, organic matter and plant roots (Boraste *et al*., 2009). Saccharomyces cerevisiae is considered as a new promising plant growth promoting yeast for different crops. Recently, it became a positive alternative to chemical fertilizers safely used for human, animal and environment (Omran, 2000). A growing number of studies indicate that plant root growth may be directly or indirectly enhanced by yeasts in the rhizosphere (Cloete *et al*., 2009).

Potassium plays an important role in photosynthesis, protein synthesis, translocation of assimilates, increasing plant growth and yield as well as translocation of sugars and carbohydrates (Tawfik and Mostafa., 2010).

Many investigators stated that the sugar beet genotypes were varied significantly with regard to growth, yield and its components as well as quality traits (Ahmad *et al*., 2012 and Ahmad *et al*., 2017).

So, the objective of this investigation was to evaluate the response of some sugar beet genotypes to foliar spray by different yeast rates as well as the application of potassium fertilization.

Materials and Methods

Experimental site description:

A field experiment was carried out at the Agronomy Department Experimental Farm, Faculty of Agriculture, Assiut University, Egypt during 2015/2016 and 2016/2017 season to study the effect of yeast rates and potassium fertilization on yield and quality of some sugar beet varieties.

Table 1. **Some physical and chemical properties of the experiment soil site**

Properties	2015/2016 Season
Clay %	40.60
Silt %	45.00
Sand %	14.40
Texture grade	Silty Clay
pH	8.10
EC (m. mohs.cm)	0.765
Saturated pout	77.60%
K	13.96
K	200
P	11

Table 2. Chemical analysis of yeast (*Saccharomyces cerevisiae)*

Amino acid ppm/L		Mineral ppm/L		General composition %	
Aspartic	166	**Fe**	150	**Protein**	46.18
Threonine	54	**K**	628	**Carbohydrates**	46.59
Serine	62	**Na**	120	**Ash**	6.53
Glutamic	574	**Mg**	620	**Fats**	0.65
Glycine	50	**Ca**	664	**Water**	64.18
Alanin	170	**Mn**	21	**Growth regulators ppm/L**	
Valine	89	**Cu**	29	**GA3**	626
Isoleucine	64	**P**	12500	**IAA**	123
Leucine	163	**S**	13500	**ABA**	566
Tyrosine	39	**Zn**	170	**Cytokines**	60
Phenylalanine	38	**Mo**	30	**Vitamins (Mg/100g)**	
Histadine	45	**Si**	13500	**B1**	2.23
Lysine	131	**--**	**--**	**B2**	1.33
Arginine	46	**--**	**--**	**B6**	1.25
--	**--**	**--**	**--**	**B12**	0.15

Experimental treatments and design:

The experiment was laid out in randomized complete block design (RCBD) using strip split plot arrangement with the three replications. Yeast foliar application (0,1,2 and 3 kg fed. $^{-1}$ wet yeast) was arranged in horizontally, while potassium fertilization levels (12.5, 25 and 37.5 kg K_2O fed.$^{-1}$) were distributed in vertically, as well as sugar beet varieties (kawemira, Romulus and Glorius) were arranged in sub plot. The experimental unit area was 10.5m^2 consisted of five rows, 60cm with and 3.5m length (1/400 fed). The chemical analysis of yeast was presented in Table 2.

Cultural practices:

Sugar beet seeds were sown in hills 20cm a part on September 17th and 23th in 2015/2016 and 2016/2017 seasons, respectively. Seedlings were thinned at the four-leaf stage to one plant per hill. Calcium super phosphate was added at the rate of 200 kg/fed (30kg P_2O_5) during soil preparation. Nitrogen was applied in the form of urea (46 % N) at the rate of 200 kg/fed. at two equal doses, the first half was applied after thinning anther second hafe after one month later. The preceding summer crop was maize in both seasons. All other recommended cultural practices for sugar beet crop were done according to the recommendations of the ministry of Agriculture.

Measured traits:

The following traits were recorded at harvest.

A- Yield attributes traits:

At harvest (210 days after planting) five guarded plants from each experiment unit were taken and root length (cm), root dimeter (cm), single root weight (kg plant^{-1}) traits were determined.

B- Roots yield (ton fed^{-1}): Each experimental unit plants were harvested then roots were separated, weighted then transformed into roots yield (ton fed^{-1}).

C- Quality parameters:

A sample of 20 kg of roots were chosen at random from each experiment unit to determined root quality in Sugar and Integrated Industries Company Laboratory at Abu Korkas Sugar Factory then, the following traits were determined:

1- Pol (%): Juice sugar content of each treatment was determined by means of an Automatic Sugar Polarimetry according to A.O.A.C. (1995).

2 - Sugar recovery (%): was determined using the follow formula which described according to Reinefeld *et al.* (1974) as follows:

Sugar recovery (%)= Pol- 0.29- 0.343(K+ Na)- 0.094(Alpha-amino N) where Pol, K and Na refer to sucrose %, Potassium and Sodium in mill equivalent/100.

D- Recoverable sugar yield (ton fed.$^{-1}$): It was determined by multiplications of root yield (ton fed.$^{-1}$) by sugar recovery percentage (%).

Statistical analysis:

All collected data were analyzed with analysis of variance (ANOVA) Procedures using the SAS Statistical Software Package (v.9.2, 2008). Differences between means were compared by LSD at 5% level of significant (Gomez and Gomez, 1984).

Results and Discussions

A- Yield attributes traits:

The recorded Data in Tables 3, 4 and 5 reveal that there were significant differences in root length (cm), root diameter and single root weight traits of sugar beet among the studied yeast rates in both seasons. It could be denoted that the highest mean values of root length (44.23 and 49.54 cm, root diameter (11.66 and 10.61cm) and single root weight (2.07 and 1.97 kg) in both season, respectively. were recorded with the application of yeast by the rate of 3.0 kg /fed. compared with the others yeast rates. These results might be attributed to spray application of yeast, which considered as a natural source of cytokines and its stimulated effect on cell division and enlargement as well as synthesis of protein nucleic acid and chlorophyll. Similar trend was observed by Gomaa *et al.* (2005) and Mohamed (2012).

Furthermore, the application of potassium fertilizer to sugar beet plants exerted a significant influence on root length and diameter as well as single root weight traits in the two growing seasons. The highest mean values of root length (45.18 and 50.17cm), root diameter (11.95 and 10.77 cm and single root weight (2.18 and 2.02 kg) in the first and second season, respectively. were recorded when potassium was applied at the rate of 37.5 kg K_2O/fed. This increase in on the mentioned traits influenced by potassium fertilization could be attributed to the important role of potassium in physiological processes in the plant such as translocation of sugars and carbohydrates. That associate with accumulation carbohydrates, which trans located from leaves to developing roots. These results are in agreement with those obtained by Ferweez and Abo El-Wafa (2004), Ahmed (2005) and Tawfik and Mostafa(2010).

Also, the presented data in Tables 3,4 and 5 revealed that root length, root diameter and single root weight traits were significantly differed by the tested sugar beet varieties in the two growing seasons. Kawamera sugar beet variety produced the highest mean values of root length (47.52 and 50.52cm), root diameter (12.63 and 11.18 cm) and single root weight (2.48 and 2.15 kg in the first and second seasons, respectively. The differences between the sugar beet varieties in root length could be due to the variation in the gene make–up and its response to the environmental conditions. These results are in confirmity with those reported by Fadel (2002), Azzazy (2004) El.Taweel *et al.* (2004), Osman (2005), khalifa (2009), Ahmad *et al*. (2012) and Ahmad *et al*.,(2017).

Furthermore, the all involved interactions in this respect had a significant influence on root length, root diameter and single root weight traits in the two growing seasons. Thus, the highest mean values of root length (50.16 and 45.80cm), root diameter (13.67 and 11.60 cm and single root weight (2.94 and 2.58 kg) in the first and second season, respectively. Were obtained from Kawemira sugar beet variety, which sprayed with 3.0 kg wet yeast /fed. and fertilized with 37.5 K_2O/fed.

B- Roots yield (ton/fed.)

The data as shown in Table 6 reveal that roots yield fed.$^{-1}$ trait was affected significantly by the tested yeast rates in both seasons, where, the roots yield trait was increased gradually by increasing yeast rates in both seasons. The highest mean values of roots yield (27.70 and 28.32 ton/ fed. in the first and second season, respectively. were recorded when the yeast was applied at the rate of 3.0 kg /fed. This is to be logic, since the same yeast rate gave the highest mean values with regard to root diameter, root length and single root weight traits as mentioned before Tables 3.4 and 5 and consequently produced the maximum roots yield fed.$^{-1}$. These results are in a good line with those reported by El-Tarabily (2004), Shahin *et al* (2004) and Gomaa *et al.,* (2005).

Here too, roots yield was affected significantly by potassium fertilization levels in both seasons. The roots yield was increased gradually by increasing potassium fertilization levels in the two growing seasons. The highest mean values of roots yield (27.70 and 29.06 ton/fed. in the first and second seasons, receptivity. Were recorded when the potassium was applied at the rate of 37.5 K_2O/fed. This is to be expected, since the same potassium fertilization level gained the highest mean values with regard to root diameter (cm), root length, single root weight traits as mentioned before and consequently produced the maximum roots yield fed.$^{-1}$. These result are in agreement with those stated by Ferweez and Abo El-Wafa (2004) and Tawfik and Mostafa(2010).

Moreover, roots yield was significantly differed by the tested sugar beet varieties in the two growing seasons. Kawemira sugar beet variety produced the maximum roots yield (28.84 and 30.75 ton/fed.) followed by Glorius variety (26.80 and 27.90 ton/fed.) then Romulus variety (25.00 and 25.06 ton/fed). in the first and second seasons, respectively. This is to be logic since the same sugar beet variety gave the highest mean values with regard to root diameter, root length and single root weight and consequently produced the maximum roots yield. The previous results are in accordance with those reported by

Salami and Saadat (2013) and Ahmad *et al*. (2017).

Here too, the obtained data in Table 6 focus that the all first and second all order interactions had a significant influence on roots yield fed.$^{-1}$ in both seasons. The highest roots yield (31.01 and 33.00 ton/fed.) in the first and second season, respectively.Were obtained from Kawemira variety with 37.5 K_2O/fed. and 3.0 kg wet yeast/fed.

C- Quality traits:

The results as shown in Tables7 and 8 reveal that pol and Sugar recovery percentage**(**%) traits were affected significantly by yeast application rates in both seasons. The pol and sugar recovery percentages traits were increased gradually by increasing yeast rates in both season. The highest mean values of pol percentage (17.91 and 18.00 %) and sugar recovery percentage trait (15.03 and 15.15 %) in the first and second seasons, respectively. were recorded when the yeast was applied by the rate of 3.0 kg wet yeast/fed. These results may be attributed to the effect of yeast which considered a natural source of cytokines and has stimulated effect on cell division and enlargement as well as synthesis of protein nucleic acid and chlorophyll and consequently increased carbohydrate synthesis and transfer it to sugar in sugar beet roots. Similar trend was observed by El-Tarabily (2004), Shahin *et al.* (2004) and Gomaa *et al.* (2005).

Concerning the effect of potassium fertilization levels on pol and sugar recovery percentage traits, data in Tables 7 and 8 point outpol and Sugar recovery percentages were affected significantly by potassium application in both seasons. The Sugar recovery percentages was increased gradually by increasing potassium rates in the two growing seasons. The highest mean values of pol percentage (18.09 and 18.19%) and sugar recovery percentage (15.14 and 15.22 %) in the first and second seasons, respectively. Were confirmed when the potassium was applied at the rate of 37.5 K_2O/fed. This increase may be due to the role of potassium which plays significant roles viaenhancement the photosynthetic products translocation from the source leaves to the sink organs, which subsequently increase the sugar percentage in the sugar beet roots. These results are in accordance with those obtained by Ferweez and Abo El-Wafa (2004), Ahmed (2005), Tawfik and Mostafa (2010) and Salami & Saadat (2013).

Regarding, the effect of studied sugar beet varieties, the presented data in Tables7and 8 focus that pol and sugar recovery percentage were significantly differed by studied sugar beet varieties in both seasons. Kawemira sugar beet variety produced the maximum mean values of pol percentage (18.16 and 18.61%) and sugar recovery percentages (15.43 and 15.38%) in the first and second seasons, respectively. The difference among the three sugar beet varieties of sugar recovery percentage could be due to the variation in the gene make–up and its response to the environmental conditions. Similar findings were confirmed by Fadel (2002), Azzazy (2004), Osman (2005) and Ahmad *et al*. (2017).

Concerning the interactions effects on pol and sugar recovery percentages traits, the presented data in Tables7 and 8 shows that the all first and second order interactions had a significant effect on pol and sugar recovery percentages traits in both season. Kawemira sugar beet variety which sprayed with 3.0 kg wet yeast/fed. under 37.5 K_2O/fed. produced the highest mean values of pol percentage (19.97 and 19.45 %) and sugar recovery percentage (16.49 and 15.76% in the first and second season, respectively.

D-Recoverable sugar yield (ton fed.$^{-1}$):

The presented Data in Table 9 reveal that recoverable sugar yield was affected significantly by yeast application in both seasons. The recoverable sugar yield was increased gradually by increasing yeast rates in both season. The highest recoverable sugar yield (4.10 and 4.29 ton/fed) in the first second seasons, respectively. were recoded when the yeast was applied at the rate of 3.0 kg wet yeast/fed. This is to be expected, since the same wet yeast rate gave the highest mean values with regard to roots yield/fed. and pol% and sugar recovery (%) traits and consequently produced the highest mean values with regard to sugar yield in both seasons. These results are in harmony with those mentioned by El-Tarabily (2004), Shahin *et al.* (2004) and Gomaa *et al.* (2005).

Also, recoverable sugar yield was affected significantly by potassium fertilization levels in both seasons. The recoverable sugar yield was increased by increasing potassium fertilization levels in both season. The highest recoverable sugar yield (4.20 and 4.43 ton/fed) in the first and second seasons, respectively. Were recorded when the potassium was applied at the rate of 37.5 K_2O/fed. This is to be logic since the same potassium level gave the highest mean values with regard to roots yield/fed and pol (%) and sugar recovery (%). The previous results are in accordance with those reported by Ferweez and Abo El-Wafa (2004), Ahmed (2005), Tawfik and Mostafa(2010) and Salami and Saadat (2013).

Here too, recoverable sugar yield was significantly differed between the studied sugar beet varieties in the both seasons. Thus, kawemira sugar beet variety surpassed the other tested varieties in this respect and recorded the highest mean values of recoverable sugar yield. Which were (4.45 and 4.73 ton/fed). in the first and second seasons, respectively. This is to be logic since the same sugar beet variety gave the highest mean values with regard to root yield/fed and pol percentage (%) and sugar recovery (%). These results are confirmed with those obtained by Fadel (2002), Azzazy (2004), Osman (2005) and Ahmad *et al*., (2017).

Also, the data in Table 9 reveal that the all first and second order interactions had a significant effect on recoverable sugar yield fed.$^{-1}$ trait in the two growing seasons. The highest mean values of Sugar yield (5.11 and 5.20 ton/ fed) in the first and second seasons, respectively. Were obtained from kawemira variety, which sprayed by 3.0 kg yeast fed^{-1} and fertilized with 37.5 K_2O/fed.

Conclusion

From the obtained results the investigators could be recommended to planting kawemira sugar beet variety and sprayed it by 3.0 kg yeast fed.$^{-1}$ with 37.5 kg k_2O fed.$^{-1}$ to achieve the maximum recoverable sugar yield under the Assiut conditions.

References

Ahmed, A. F. (2005). Effect of potassium, magnesium and boron on sugar beet yield and quality grown in the newly reclaimed soils. M. Sc., Thesis, Fac. of Agric. Minia Univ., Egypt.

Ahmad I., B. Ahmad, Sh. Ali, M. Kamran, H. Fang and B. Bileg-jargal (2017). Nutrients management strategies to improve yield and quality of sugar beet in semi-arid regions, Journal of Plant Nutrition, 1-7.

Ahmad, S., Zubair; M; Iqbal, N. Cheema; N. M. and Mahmood, K. (2012). Evaluation of sugar beet hybrid varieties under Thal-Kumbi soil series of Pakistan. Int. J. Agric. Biol. 14: 605–608.

A.O.A.C. (1995). Association of Official Analytical Chemists. Official methods of analysis, 16thEd. AOAC International, Washington, D.C., USA.

Azzazy, N. B. (2004). Yield and quality of some sugar beet varieties as affected by water quality and nitrogen fertilization. Egyptian J. of Agric. Res., 82(4): 1733- 1745.

Boraste A; Vamsi KK; Jhadav A, KhairnarY; Gupta N; Trivedi S; Patil P; Gupta G; Gupta M, Mujapara AK; and Joshi B (2009). Bio-fertilizers: A novel tool for agriculture. Int. J. Microbiol. Res. 1(2):23-31.

CCSC (2010). Central Council for Sugar Crops. Ann. Report, Ministry of Agric., Egypt. (In Arabic).

Cloete K; Valentine A; Stander M; Blomerus L; and Botha A (2009). Evidence of symbiosis between the soil yeast Cryptococcus laurentii and a sclerophyllous medicinal shrub, Agathosmabetulina (Berg.) Pillans. Microb. Ecol. 57:624632.

El-Tarabily, K.A. (2004). Suppression of *Rhizoctioniasolani*, diseases of sugar beet by antagonistic and plant growth promoting yeasts. J. of Appl. Microbiology, (96):69-75.

El-Taweel, M.F.; B. M. Abou El-Maged and KH. A. Aboushady (2004). Response of some sugar beet cultivars to growth regulator treatments. J. Agric. Sci. Mansoura Univ., 29 (10): 5503-5513.

Fadel, A.M.E. (2002). Effect of sowing dated and nitrogen fertilization levels on some sugar beet varieties in Middle Egypt. M.Sc. Thesis, Fac. Agric., Al-Azhar Univ., Egypt.

FAO statistical pocketbook. (2018). Food and Agriculture Organization of the United Nations, Rome, 2018 Cited from www.fao.org/publications.

Ferweez, H. and A. M. Abo El-Wafa, (2004). Enhancing productivity, quality and profitability of sugar beet (*Beta vulgaris* L.) using optimal level and addition time of potassium fertilizer under middle Egypt conditions. Assiut J. Agric. Sci., 35 (3): 107-126.

Gomaa, A. M.; H. Ferweez and A. M. Abo El-Wafa (2005). Maximizing yield, quality and profitability of sugar beet using nitrogen at different sowing dates under Middle Egypt conditions. Assiut J. Agric. Sci. 36(3): 39-56.

Gomez, K.A. and A.A. Gomez (1984). Statistical Procedures for Agriculture Research. A Wiley – Inter Science Publication, John wiley sons, lnc. New York, USA.

Khalifa, Y. A. M. M (2009). Sugar beet response to planting methods under different irrigation systems. Ph. D. Thesis, Agron. Dept., fac. Agric., Assiut Univ.

Mohamed, E. A. (2012). Effect of some agricultural and biological treatments on sugar beet production. Ph. D., Thesis, Fac. of Agric. Assiut Univ., Egypt.

Omran, Y.A. (2000). Studies on histophysiological effect of hydrogen cyanamide (Dormex) and yeast application on bud fertility, vegetative growth and yield of "Roumi Red"' grape cultivar. Ph.D. Thesis, Fac. of Agric. Assiut Univ. Egypt.

Osman, A. M. H. (2005). Influence of nitrogen and potassium fertilization on yield and quality of two sugar beet varieties. Egypt. J. Agric. Res., 83(3): 1237- 1254.

Reinfeld, E.; A.E.M. Merich; G. Baumgarten; C. Winner and U. Besis (1974). Zur Voraussage des melassezyu cherus aus Ru beanalysen. Zucker (27): 2-15. The Sugar beet Crop, D.A. Cooke and R.K. Scott, (ed.). 1st ed. Chapman and Hall (World Crop Series). London, U.K.

Salami M. and S. Saadat (2013). Study of potassium and nitrogen fertilizerlevels on the yield of sugar beet in jolge cultivar. Journal of Novel Applied Sciences, 2(4):94–100.

SAS institute (2008). The SAS System for Windows, release 9.2. Cary NC: SAS institute.

Shahin, A.H.; S.A. El-Desouky; L.M. Saif and A. M. Osman (2004). Effect of foliar nutrition and paclobutrazol on sugar beet yield and quality (*Beta vulgaris, L.*) yield components and juice quality. Egypt. J. Agric. Res., 82(3): 1269-1283.

Tawfik S. F. and S. M. I. Mostafa (2010). Nitrogen and potassium fertiization in relation to qualitative and quantitative traitsof two sugar beet varities. J. of Agric. Res. Kafr El-Sheikh Univ., 38(4):489–504.

تأثير الرش الورقي بالخميرة والتسميد البوتاسي على المحصول والجودة لبعض أصناف بنجر السكر

المهدي عبد المطلب طعيمه ، جمال راجح النجار، السعدي عبد الحميد على وطه عمرو عبد العزيز احمد
قسم المحاصيل- كلية الزراعة- جامعة أسيوط

الملخص:

تم اجراء تجربة حقلية بالمزرعة البحثية لقسم المحاصيل – كلية الزراعة – جامعة أسيوط خلال موسمي ٢٠١٥-٢٠١٦ و٢٠١٦-٢٠١٧ لدراسة تأثير الرش الورقي بالخميرة والتسميد البوتاسي على المحصول والجودة لبعض أصناف بنجر السكر. نفذت التجربة بتصميم القطاعات كاملة العشوائية بترتيب الشرائح المنشقة مرة واحدة بثلاث مكررات حيث رتب الرش الورقي بمعدلات مختلفة من الخميرة (٠و١ و٢ و٣ كجم للفدان) راسيا بينما تم وضع التسميد البوتاسي (١٢,٥و٢٥ و٣٧,٥ كجم أكسيد البوتاسيوم للفدان) افقيا في حين تم وضع أصناف بنجر السكر (كاوميرا وريمولاس وجلوريا) في القطع المنشقة. وتشير النتائج الي ان الرش الورقي بمعدل ٣ كجم خميرة للفدان ادي للحصول علي اعلي قيم معنويه لمتوسطات صفات طول الجذر وقطر الجذر ووزن الجذر ومحصول الجذور للفدان ونسبة السكروز ونسبة السكروز القابل للاستخلاص وكذلك محصول السكر المستخلص للفدان لكلا موسمي الدراسة. كما تشير النتائج كذلك الي التأثير المعنوي لمستويات السماد البوتاسي على كل الصفات محل الدراسة لصالح المعدل ٣٧,٥ كجم أكسيد البوتاسيوم للفدان لموسمي الدراسة. كما تفوق الصنف كاوميرا معنويا عن باقي الأصناف محل الدراسة واعطي اعلي قيم لمتوسطات الصفات سابقة الذكر خلال موسمي الدراسة. بالإضافة الي معنوية جميع التفاعلات محل الدراسة في هذا الصدد حيث تم الحصول علي اعلي متوسط لقيم تلك الصفات من زراعة الصنف كاوميرا والرش الورقي بمعدل ٣ كجم خميرة للفدان وتسميده بمعدل ٣٧,٥ كجم أكسيد البوتاسيوم.