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Effect of Bio and Mineral Fertilization on Yield and Quality of Sugar Beet in Newly Reclaimed Lands in Egypt

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A B S T R A C T

The objective of this investigation was to study the overall impact of biofertilization (control, Microbin, Rhizobacterin, Phosphorin and four combinations) and the mineral nitrogen fertilizer levels (0, 40, 80 and 120 kg N/fed.*) on yield and quality of sugar beet. This investigation was conducted during 2013/2014 and 2014/2015 seasons at the experimental at Kalabsho (31°25' E and 23°31' N), El-Dakhlia Governorate, Northeast Delta. A split plot design with four replications was used. Results indicated that, using only biofertilizer gave the lowest values of root length, root diameter, root fresh weight and top fresh weight/g as well as root and sugar yields. While, using bio fertilizer with mixed Microbeen + Rhizobacterin led to increase in values of mentioned rails on the other direction. Addition Phosphorin to any kind of bio fertilizers (Microbeen or Rhizobacterin) did not give any significant increase in all traits under study. Mineral nitrogen fertilizer at high levels 80 or 120 kg N/fed. have a significant increase in most characters under study. Generally, it could be concluded that application the mixture of Microbeen + Rhizobacterin + Phosphorien as biofertilizers and adding 120 kg N/fed. as a mineral fertilization for maximizing sugar beet productivity under the environmental conditions.

Introduction

Actinomycetales are gram-positive, mycelium-forming, The excessive use of chemical fertilizers causes ill side-effects such as leaching out and hence polluting underground water, destroying micro-organisms and friendly insects, making the crop more susceptible to the attack of pests and diseases. Reducing of soil fertility and irreparable damage to the overall system cannot be neglected. Numerous efforts are being exercised everywhere to combat the adverse consequences of chemical farming. In recent years, biofertilizers have emerged as a promising component of integrating nutrient supply system in intensive agriculture.

Therefore, attempts have been paid to the use biofertilizers as being most cheap and safe for agricultural application. They are extremely beneficial in enriching fertility soil with those micro-organisms, which fix atmospheric N and make plant nutrient more available. Many experiments were carried out to improve crop production of non-leguminous through treatment with associating nitrogen fixing bacteria, particularly *Azospirillum lipophorum* and phosphate dissolving bacteria (*Bacillus megatherium* var. *phosphaticum)* (Higazi *et al*., 1998).

In recent years, the trend is to explore the possibility of supplementing chemical fertilizers with more particularly biofertilizers of microbial origin at the same time minimizing the environmental pollution which resulted from mineral fertilizers and also to reduce its coasts (Abu El-Fotoh *et al*., 2000 and Cakmakci *et al*., 2001). Many studies with this respect were done*e.g.* Sprenat (1990) recorded that inoculation soil by *Azotobacter spp* caused solubilization of mineral nutrients and synthesis of vitamins, amino acids, auxins as well as gibberellins, which stimulate plant growth and induce high yields. El-Badry and El-Bassel (1993) and Favilli *et al*., (1993) found that inoculation sugar beet with *Azospirillum* caused a significant saving in nitrogen fertilizer (about 25-40 %). They also reported that a significant increase in root yield (from 2.8 to 6.0 t/fed) and sugar yield as a result of inoculation by *Azospirillum.* Butorac (1995) found that root yield, sugar % and sugar yield were the lowest with NPK + agar vital + waste water treatment, while root and sugar yields were the highest with waste containing N, P, K, Ca, Na, micronutrients and organic matter treatment. Sultan *et al*., (1999) and Bassal *et al*., (2001) recorded that inoculation of sugar beet seeds with *Azotobacter* in significantly increased TSS %, sucrose %, purity % and root as well as sugar yields/fed. Cakmakci *et al*., (2001) and Maareg and Badr (2001) reported that Syrialin caused an increase TSS %, sucrose %, purity % and sugar yield/fed. Kandil *et al*., (2002) confirmed that biofertilization treatments significantly increased root, top and sugar yields/fed. The highest means of previously mentioned characteristics were resulted from inoculation seeds of sugar beet with Rhizobacterin. Ramadan *et al*., (2003) showed that biofertilization treatments had significant effect on root, top and sugar yields/fed. On the other hand, bio-fertilization treatments exhibited in significant effect in sucrose % and purity %. Badawi *et al*., 2004 found that biofertilization treatments caused a significant effect on TSS %, sucrose %, purity %, root, top and sugar yields/fed. Rhizobacterin treatment produced the highest values of yield quality parameters, excluding TSS % (in the first and third seasons) and purity % (in the second season) as well as all yield characters in both seasons. Concerning application of the mixture of Rhizobacterin + Cerialine and Cerialine biofertilizer, its ranked after Rhizobacterin treatment, respectively with respecting their effect on quality and yield traits in both seasons. While, control treatment resulted in the lowest means ones.

On the other hand, nitrogen fertilizer levels caused significant differences in all yield and quality of sugar beet (El-Shafai, 2000; Gomaa *et al*., 2005; Leilah *et al*., 2005; Ramadan, 2005; El-Geddawy *et al*., 2006; Monreala *et al*., 2007; Seadh *et al*., 2007; Shewate *et al*., 2008; Zhang *et al*., 2009 and El-Sarag, 2009).

Abou-Amou *et al*., (1996) found that the application of 80 kg N/fed. resulted the highest values of purity (78.75 %). El-Hawary (1999) reported that fertilizing sugar beet with 90 kg N/fed. Recorded the highest values of sucrose %. El-Harriri and Gobarh (2001) pointed out that application of 110 kg N/fed. markedly increased TSS %.

Seadh (2008) showed that optimum means of sucrose and purity percentages were obtained from using 75 kg N/fed. in both seasons. Monreala *et al*., (2007) stated that the highest values of quality parameters were obtained from the lowest level of nitrogen (30 kg N/ha).

Aly *et al*., (2009) recorded that inoculation with *Azotobacter chroococcum* and *Bacillus megatherium* saved about 25 kg N/fed. of mineral fertilizer, which reduced the cost of production and the environmental pollution, in addition to the increase of sugar yield and recoverable sugar/fed. Furthermore, inoculation with *Azospirillum* increased sucrose content in sugar beet roots.. Also, Abou Zeid and Osman (2005); Shewate *et al*., (2008); Zhang *et al*., (2009); El-Sarag (2009) and Awad *et al*., (2013) found that bacterial inoculation of sugar beet seeds though caused insignificant increases in root quality and growth parameters. But it significantly increased root and sugar yields/fed. Bacillus inoculation along with 40 kg N/fed. gave root and sugar yields as those obtained by addition of 80 kg N/fed. Furthermore, Bacillus inoculation along with the addition of the full N dose 80 kg/fed. gave a significant increase which amounted to 18 and 39% in root and sugar yields, respectively compared to application of 80 kg/fed alone.

Abdelaa *et al*., (2015) application the mixture of Microbeen + Rhizobacterin+ Phosphorien produced the highest values of all studied characters in both growing seasons as compared with using each bio-fertilizer alone. It was followed by application the mixture of Microbeen + Rhizobacterin then application the mixture of Rhizobacterin + Phosphorien in the two growing seasons. Generally, it could be concluded that application the mixture of Microbeen + Rhizobacterin + Phosphorien as biofertilizers and adding 105 kg N/fed. as a mineral fertilization for maximizing sugar beet productivity under the environmental conditions of Kalabsho - El-Dakhlia Governorate.

Sugar beet under our conditions in Egypt need to more information about fertilization, bio fertilizers supply any crop with some needs from nitrogen or phosphorus. So, this study investigated the ratio of supplementary of bio fertilizer, with mineral to gave maximum yield and quality of sugar beet. Nitrogen application to sugar beet cultivation has been found essential for yield determination. This is because nitrogen has pronounced effects on growth and physiological processes of sugar beet, even to the extent of causing large changes in the physiological and chemical characteristics of yield at harvest. Root quality is a combination of all chemical and physical aspects of beet root which influence processing and hence yield of sugar and its product (Awad 2002).

The objective of this study was to determine the effect of biofertilization treatments and mineral nitrogen fertilizer levels on yield and quality characters of sugar beet under newly reclaimed lands.

Materials and Methods

Experimental site and the field experiment

Two field experiments were carried out at Kalabsho (31°25' E and 23°31' N), El-Dakhlia Governorate, Northeast Delta Egypt, during 2013/2014 and 2014/2015 seasons to deduce the effect of biofertilization treatments and mineral nitrogen fertilizer levels on yield and quality of sugar beet Farida. The field experiments were laid-out in a split plot design with three replications. In both seasons, each experiment included thirty-two treatments, eight bio fertilization treatments and four nitrogen levels. The main plots were assigned to the following eight biofertilization treatments: Without bio fertilization (control); Microbin; Rhizobacterin; Phosphorin; Microbin + Rhizobacterin; Microbin + Phosphorin; Rhizobacterin + Phosphorin and Microbin + Rhizobacterin + Phosphorin.

Microbin, Rhizobacterin and Phosphorin as commercial products were produced by Biofertilizer Unit, Agriculture Research Center (ARC), Giza, Egypt, which included free-living bacteria able to fix atmospheric nitrogen and phosphorus in the rhizosphere of soil. Microbin and Rhizobacterin treatments were done before first irrigation directly by mixing the recommended dose of each biofertilizer with fine clay as side-dress near from hills. Phosphorin treatment was carried out by slightly wet seeds by little quantity of water and mixed by phosphorin bioferilizer and then directly sown. The sub-plots were occupied with the following four mineral nitrogen fertilizer levels: 0.0 kg (control); 40; 80 and 120 kg N/fed.

Ammonium nitrate fertilizer in the forms (33.5%N) were applied as a side-dressing in two equal doses, one half after thinning (35 days from sowing) and the other before the third watering (70 days from sowing). Each experimental basic unit included 5 ridges, each 60 cm apart and 3.5 m length, resulted an area of 10.5 m^2 (1/400 fed.). The preceding summer crop was maize (*Zea mays*, L.) in both seasons. Soil samples were taken at random from the experimental field before soil preparation to measure the following chemical and physical soil properties as shown in Table 1.

The experimental field well prepared and then divided into the experimental units. Calcium super phosphate (15.5 % P_2O_5) at the rate of 200 kg/fed. was applied during soil preparation. Potassium fertilizer in the form of potassium sulphate (48 % K_2O) at the rate of 48 kg K_2O/fed. was applied before the first irrigation. Sugar beet was hand sown 3-5 balls/hill using dry sowing method on one side of the ridge in hills 20 cm apart at the first week of October in both seasons. Plants were thinned at the age of 35 days from planting to obtain one plant/hill (35000 plants/fed). Plants were kept free from weeds, which were manually controlled by hand hoeing at two times. The common agricultural practices for growing sugar beet according to the recommendations of Ministry of Agriculture were followed, except the factors under study.

Yield and Quality parameters

At harvest time (210 days from sowing): A sample of 10 roots was randomly taken to determine the following characters as described in Cooke and Scott (1993).

Root growth traits

1. Root length (cm).
2. Root diameter (cm).
3. Root fresh weight (g/plant).
4. Top fresh weight (g/ plant).

Root quality

1. Total soluble solids (TSS %) in roots was measured in juice of fresh roots by using Hand Refract meter.

2. Sucrose, %: It was estimated polarimertically on a lead acetate extract of fresh macerated roots according to Le Docte (1927).

3. Purity, %: It was determined as a ratio between sucrose % and TSS % of roots.

$$\text{Purity},\% = \frac{\text{Sucrose, \%}}{\text{TSS, \%}}$$

Productivity trails

1. Root yield and top yield (ton/fed.): Plants of sugar beet from each plot were harvested topped to determine root yield and top yield as ton/fed. on fresh weight basis.

2. Sugar yield (ton/fed.): It was calculated using the following equation

Sugar yield (t/fed) = Root yield (t/fed.) × Sucrose, %.

Data collected were subjected to the proper analysis of variance (ANOVA). Differences among treatments were evaluated by the least significant difference (LSD) at 5% level (Gomez and Gomez, 1984).

Results and Discussion

Effect on the crop properties

Root dimensions (length and diameter, cm)

Data indicated in Fig. (1) showed clearly that application of microbin or rhizobacterin or phosphorin a cone failed to exhibit significant increase in values of these traits while, addition all of them together recorded the highest values compared to control which gave the lowest values. This advantage due to the contribution of every one with other to gave the highest values.
Regarding to effect of mineral nitrogen on root length and root diameter, data in Fig. (2) showed that addition mineral nitrogen recorded the highest root diameter more than any kind of bio fertilizer at rate of 120 kg N/fed. Composed to any type of bio fertilizer. Whereas, combination between the three bio fertilizer the highest root length compared to high level of nitrogen 100 kg N/fed. Similar results were found by Awed, *et al*., (2012).

Root and top fresh weight g/plant

Root fresh weight and top fresh weight significantly affected bybio fertilizer and mineral fertilization in Fig. (3). Data tabulated indicated that the highest values of this traits resulted from effect of bio fertilizer resulted from addition combinations between three kind of bio fertilizer this was true compared to addition any one alone. These results are harmony with those obtained by Awad *et al*., (2013) and Abdelaal *et al*., (2015).

Regarding to effect of mineral nitrogen on top fresh weight and root fresh weight, data in Fig. (4) showed that addition of 120 kg N/fed had a significant increase values of these two traits more than any combinations between three bio fertilizers or any one alone. Similar finding were obtained by Badawi *et al*., (2004); Awad *et al*., (2012) and Awad *et al*., (2013). As for the interaction effect between two factors under study significant interactions were found in both seasons on two traits.

Effect on the quality properties

Total soluble solids, sucrose and purity percentage

The collected data in Fig. (5) indicated effect of bio and mineral fertilizers on total soluble solids in term (TSS), sucrose and purity percentages.

Table.1 Physical and chemical properties of the soil before planting

Soil analysis												
Mechanical properties					Chemical analysis							
Fine sand (%)	Coarse sand (%)	Silt , %	Clay, %	Texture	pH	Available nutrients, ppm						
						N	P	K	Fe	Mn	Zn	Cu
3.70	67.65	18.15	10.50	Loamy sand	7.35	27.0	10.9	97.75	3.36	0.88	2.18	0.49

Soluble cations meq/100 g soil				Soluble anions meq/100 g soil			
Ca^{++}	**Mg^{++}**	**Na^{+}**	**K^{+}**	**$CO3^{--}$**	**$HCO3^{-}$**	**Cl^{-}**	**$SO4^{--}$**
0.44	0.44	0.93	0.05	0.00	0.93	0.77	0.21

Table.2 Root and sugar yields/fed as affected by the interaction between bio-fertilization treatments and nitrogen fertilizer levels

Bio-fertilization	Characters							
	Root yield, (ton/fed.)				Sugar yield, (ton/fed.)			
	Nitrogen fertilizer levels, kg/fed							
	0	40	80	120	0	40	80	120
Control	8.89	12.80	17.45	22.36	1.37	2.02	2.53	2.39
Microbeen	10.05	14.45	19.77	25.29	1.69	2.09	2.59	2.40
Rhizobacterin	14.08	20.62	27.08	30.06	1.91	2.29	2.73	2.99
Phosphorien	9.64	13.92	19.08	25.02	2.00	2.53	2.70	2.91
Microbeen+ rhizobacterin	14.56	21.31	28.63	30.88	2.09	2.73	2.90	3.05
Microbeen+ phosphorien	14.27	21.14	28.19	30.78	2.14	2.77	3.05	3.27
Rhizobacterin+ phosphorien	14.51	21.15	28.45	30.82	2.27	2.89	3.10	3.39
Microbeen+ rhizobacterin+ phosphorien	16.61	22.85	28.98	31.21	2.39	3.10	3.22	3.41
F. test	*				*			
LSD at 5 %	1.43				0.26			

Fig.1 Effect of bio-fertilization fertilizer levels on root length and root diameter.

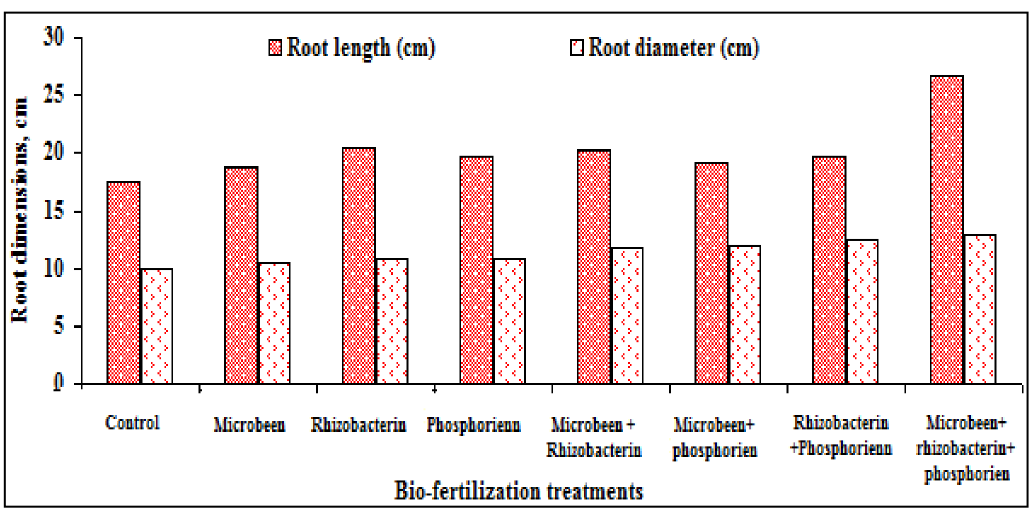


Fig.2 Effect of nitrogen fertilizer levels on root length and root diameter.

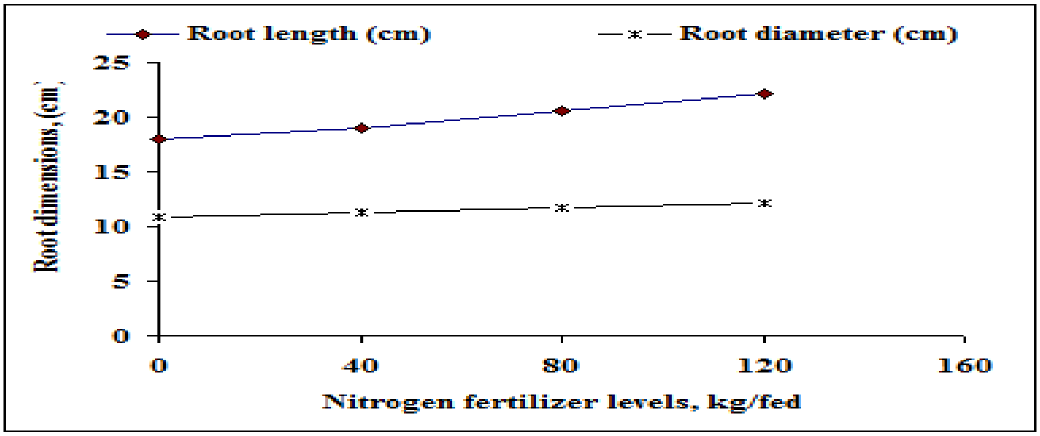


Fig.3 Effect of bio-fertilization fertilizer levels on root fresh and top fresh weights.

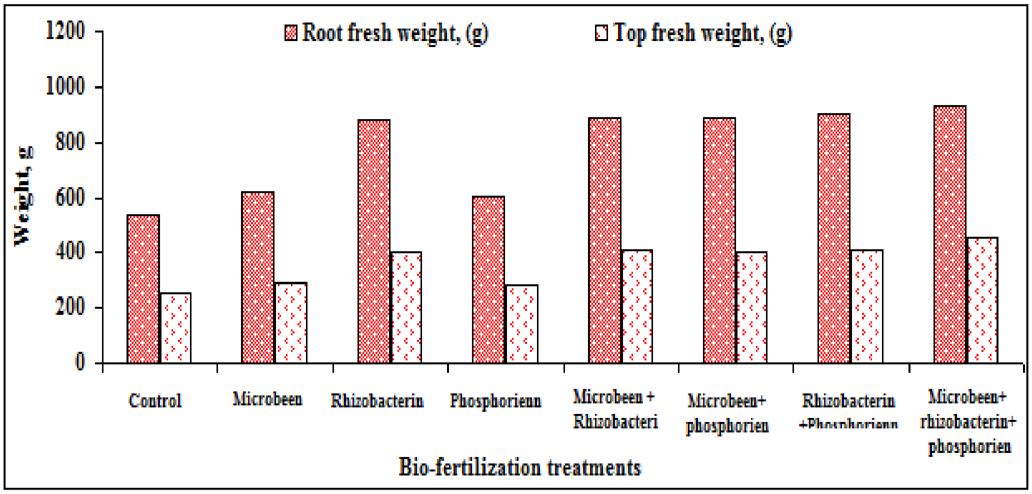


Fig.4 Effect of nitrogen fertilizer levels on root fresh and top fresh weights.

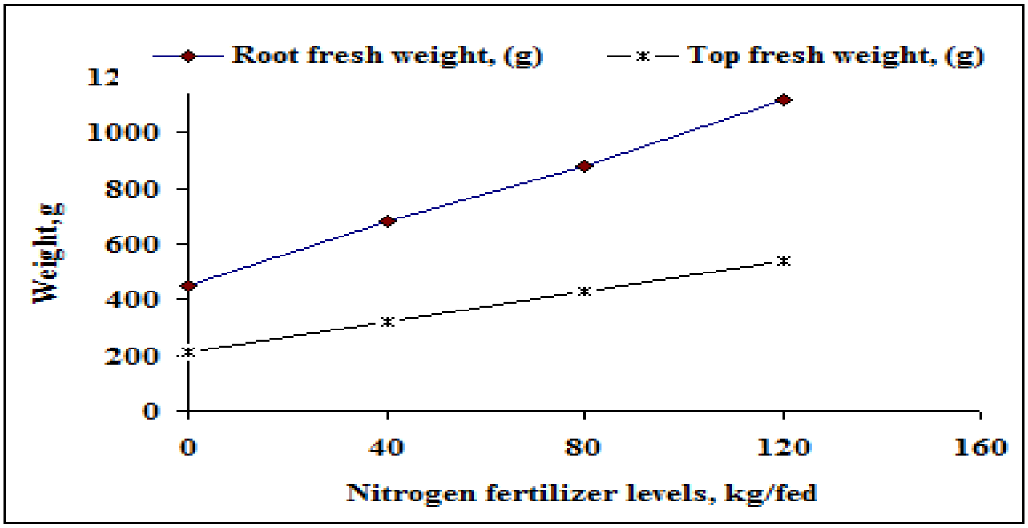


Fig.5 Effect of bio-fertilization fertilizer levels on total soluble solids (TSS), sucrose and juice purity

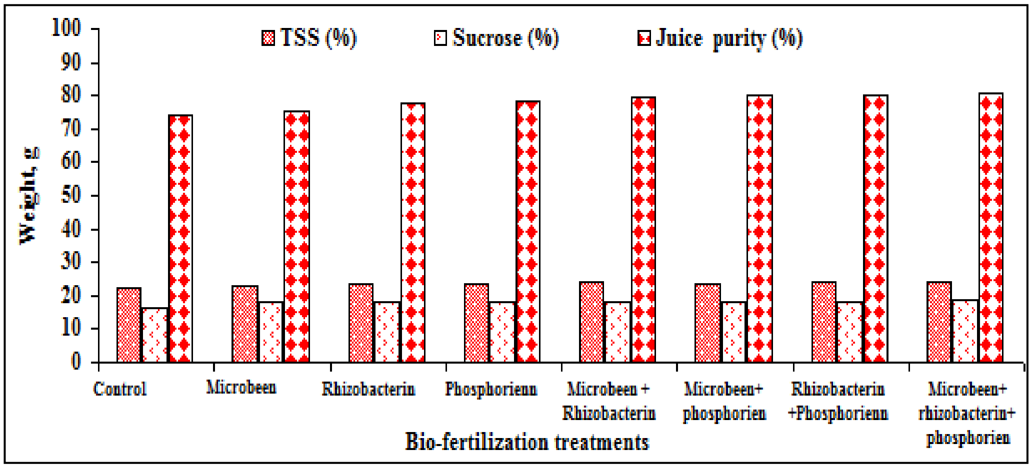


Fig.6 Effect of nitrogen fertilizer levels on total soluble solids (TSS), sucrose and juice purity

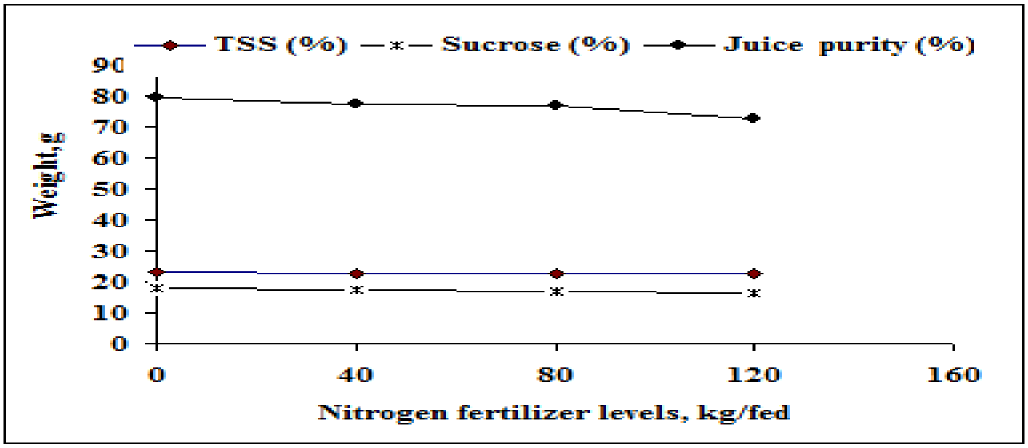


Fig.7 Effect of bio-fertilization fertilizer levels on root and sugar yields.

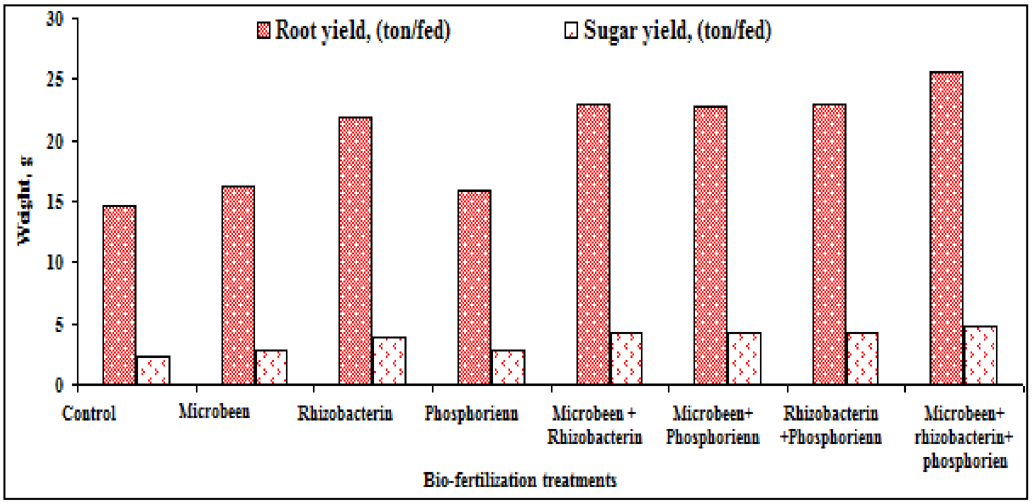
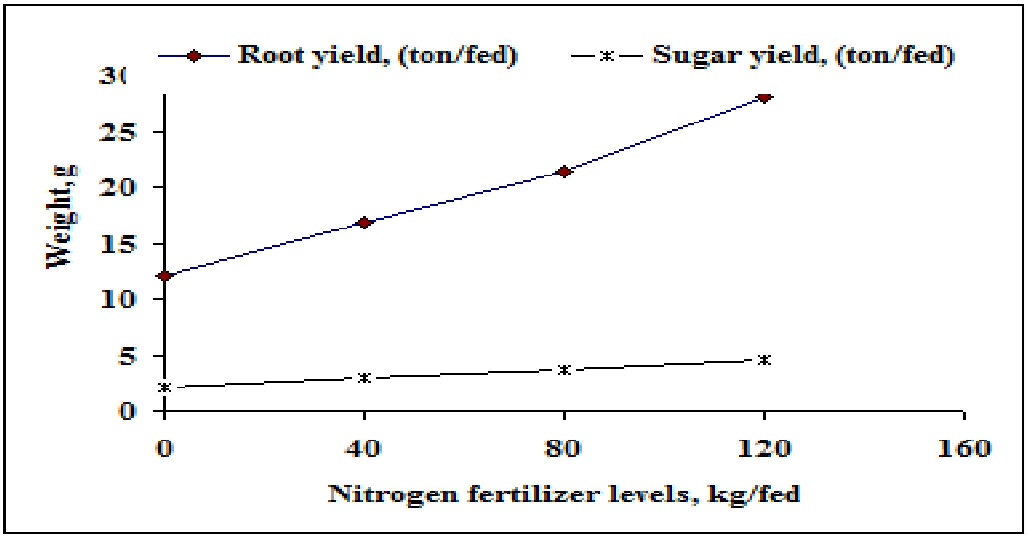


Fig.8 Effect of nitrogen fertilizer levels on root and sugar yields



Bio fertilizers advantage than mineral fertilizer and gave the highest values of these three characters.

The combination between the three kind of bio fertilizers gave lowest values compared to two kinds or kind of these bio fertilizers. This trend was found with every character from the three characters. These results had been reported by Maareg and Badr (2001)**,** Awad *et al*., (2012) and Awad *et al*., (2013).

Concerning to effect of mineral N on these three characters, data in Fig. (6) Indicated that the increase of nitrogen rate to 120 kg N/fed. caused the decrease of all values of quality characters. This trend due to the vital roll of nitrogen to increase water content of root which caused decrease mentioned quality parameters. Significant interaction effects were found between two factors under study on three characters under study

Root and sugar yields ton/fed

Data in Figs. (7) and (8) indicated that any bio fertilizer alone failed to gave the highest values whereas, with mixed any one with other gave advantage to this mixture than any one alone and completely to this addition the three bio fertilizers gave maximum values of root and sugar yields. Similar observations were recorded by Ramadan, (2005); El-Geddawy *et al*., (2006); Alaa *et al*., (2009)**;** Awad *et al*., (2012); Awad *et al*., (2013)and Abdelaal *et al*., (2015).

Mineral nitrogen fertilizer considered the main factor affecting on this two traits without any competition and recorded the highest yields compared to bio fertilizers which recorded the lowest ones. These findings are harmony with those obtained by Awad *et al*., (2012); Awad *et al*., (2013) and Abdelaal *et al*., (2015).

Effect of interaction

Data in Table (2) cleared showed that the interaction between both studied factors (biofertilization treatments and nitrogen fertilizer levels) had a significant effect on all studied characters. The effect of the interaction between biofertilization treatments × nitrogen fertilizer levels on root yield and was significant Table (2). The optimum treatment that produced the highest values of root yield was utilization the mixture of Microbeen + Rhizobacterin + Phosphorien beside mineral fertilizing beets plants with 120 kg N/fed, where its results was 31.2 ton/fed. It was followed by the treatment of using the mixture of Microbeen + Rhizobacterin and 120 kg N/fed with without any significant differences. Whereas, the lowest values of root yield 8.88 ton/fed and 1.36 ton/fed were resulted from control treatment of both factors (without biofertilization and nitrogen fertilizer). These findings are harmony with those obtained by Monreala *et al*., (2007), Seadh (2008), Awad *et al*., (2013) and Abdelaal *et al*., (2015).

In conclusion, generally, it could be recommended that fertilizing sugar beet with mixture of Microbeen + Rhizobacterin + Phosphorien and fertilizing with 120 kg N/fed increased root yield and yield component of sugar beet plants.

References

Abdelaal, Kh.A.A. and Sahar, F. Tawfik. 2015. Response of Sugar Beet Plant (Beta vulgaris L.) to Mineral Nitrogen Fertilization and Bio-Fertilizers. *Int .J. Curr. Microbiol. App. Sci.*, 4(9): 677-688.

Abou Zeid, M.Y. and M.S.H. Osman. 2005. Yield and quality of sugar beet as affected by bio and mineral fertilization. *Zagazig J. Agric. Res.*, 19(2): 58-75.

Abo-Amou, Z.N., M.S. EL-Yamani and A.A. EL-Leithy. 1996. Influence of different levels of N and K fertilization on sugar beet productivity and NPK uptake in salt affected soil. *J. Agric. Sci. Mansoura Univ.*, 21(2): 819-825.

Abu EL-Fotoh, H.G., A.A. Abd EL-Magid and R.E. Knany. 2000. Effect of biofertilization on sugar beet yield, quality and optimization of the chemical fertilizers. Proc. 9th Conf. of Agron., 1-2 Sept. 2000, MinufiyaUniv., II: 561-567.

AlaaI, Badr, N.M.M., Awad and Sahar, M., Ibrahim. 2009. Productivity and quality of sugar beet as affected by rates of potassium and some micronutrients under two locations. *Minufia J. Agric. Res.*, 34(6): 2131-2144.

Aly, M.H.A., Zeinab R.M. and A.M.H. Osman. 2009. Effect of seed inoculation and foliar application with *Azospirillum brasiliense* and/or *Bacillus megatherium* on productivity and quality of sugar beet. *Egypt. J. Appl. Sci.*, 24(2A): 56-70.

Awad, N.M. 2000. A study on the performance of two sugar beet planters one of them manufactured and developed to suit small holdings. Ph.D. Thesis, Ag. Mech. Dept., Fac. of Agric., Eng. Kafr El-Sheikh, TantaUniv.

Awad, N.M., Sahar, F. Tawfik and Sahr, M.I. Moustafa. 2012. Effect of plowing depth, sowing method and nitrogen fertilization on yield and quality of sugar beet. *J. Agric. Res. Kafr El-Sheikh Univ*., 38(4): 458-470.

Awad, N.M., S.F. Tawfik and S.M.I. Moustafa. 2013. Influence of foliar spray of some micronutrients and nitrogen fertilizer on productivity of sugar beet under newly reclaimed soils. *J. Agric. Res. Kafr El-Sheikh Univ*., 39(2): 181-194.

Badawi, M.A., Kandil, A.A., M.S. Sultan, A.N. Attia and S.E. Seadh. 2004. Effect of planting dates, biofertilization and NK combination levels on: II- Yield and quality of sugar beet. The 4th Scientific Conf. of Agric. Sci., 7-9 Dec. 2004, Fac. of

Agric. Assiut Univ., pp: 747- 762.

Bassal, S.A.A., A.A. Zohry and K.A. Douby. 2001. Effect of row and hill spacings and bio-mineral fertilization rates on sugar beet productivity. *J. Agric. Sci. Mansoura Univ.,* 26(9): 5217-5226.

Butorac, A. 1995. Respond of sugar beet to agrarvital and waste water fertilizing: II- Heavy metals toxic elements and born content in sugar beet root and leaf. *Poyjoprivredna Znanstrena Smotra,* 60(1): 81-94. C.F. CD ROM Computer System.

Cakmakci, R., F. Kantar and F. Sahin. 2001. Effect of N2-fixing bacterial inoculation on yield of sugar beet and barley. *J. Plant Nutrition and Soil Sci.,* 164(5): 527-531.

Cooke, D.A. and Scott, R.K. 1993. The sugar beet crops. Charman and Hall London.

El-Badry, M. and A. EL-Bassel. 1993. Improving sugar beet crop by inoculation with free-living nitrogen fixing bacteria. 6th Intern. Symp. on Nitrogen Fixation with non Legumes, Ismalia, Egypt.

El-Geddawy, I.H., A.M.A. El-Shafai and N.B. Azzazy. 2006. Yield and quality of some sugar beet varieties as affected by planting densities and nitrogen fertilization. *J. Agric. Sci. Mansoura Univ.,* 31(1): 43-54.

El-Harriri, D.M. and M.E. Gobarh. 2001. Response of growth, yield and quality of sugar beet to nitrogen and potassium fertilizers under newly reclaimed sandy soil. *J. Agric. Sci. Mansoura Univ.,* 26(10): 5895-5907.

El-Hawary, M.A. 1999. Influence of nitrogen, potassium and boron fertilizer levels on sugar beet under saline soil conditions. *J. Agric. Sci. Mansoura Univ.,* 24(4): 1573-1581.

El-Sarag, E.I. 2009. Maximizing sugar beet yield, quality and water use efficiency using some agricultural practices under North Sinai conditions, *Bull. of Fac. of Agric., CairoUniv.,* 60(2): 155-167.

El-Shafai, A.M.A. 2000. Effect of nitrogen and potassium fertilization on yield and quality of sugar beet in Sohag. *Egypt. J. Agric. Res.,* 78(2): 759-767.

Favilli, F., R. Pastorelli and A. Gori. 1993. Response of sugar beet to Azospirillum bacterization in field experiments. *Agric. Mediterr.,* 123: 281-285.

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

Gomez, K.N. and A.A. Gomez. 1984. Statistical procedures for agricultural research. John Wiley and Sons, New York, 2nd ed., 68 P.

Higazi. N.A., M. Fayez, G., Amin, H.M. Hamza, M. Abbas, H. Youssef and Monb. 1998. Dizotrophis associated with non-legume grown in sandy soils. In K. A. Malik; M. Sajjed Mizrza; J. K. Ladha. ed) Nitrogen fixation with non- legume. Klumer Academic publisher. Dordrecht. Boston. London. Pp: 209-222.

Kandil, A.A., M.A. Badawi, S.A. El-Moursy and U.M.A. Abdou. 2002. Effect of planting dates, nitrogen levels and biofertilization treatments on: IIYield, yield components and quality of sugar beet. *Beta vulgaris,* L.). *J. Agric. Sci. Mansoura Univ.,* 27(11): 257-7266.

Le Docte, A. 1927. Commercial determination of sugar beet in beet root using the Sachs Le Docte process. *Int. Sug. J.,* 29: 488-492.

Leilah, A.A., M.A. Badawi, E.M. Said,

M.H. Ghonema and M.A.E. Abdou. 2005. Effect of planting dates, plant population and nitrogen fertilization on sugar beet productivity under the newly reclaimed sandy soils in Egypt. *Sci. J. King Faisal Univ., Basic and Appl. Sci.*, 6(1): 95-110.

Maareg, M.E. and Sohir, T. Badr. 2001. Impact of three soil biofertilizers applied separately and in combinations with a nematicided on *Meloidogyne incognita* infecting sugar beet. *Egyptian J. Agronematol.*, 4(1-2): 1-9.

Monreala, J.A. E.T. Jiméneza; E. Remesala, R. Morillo-Velardeb, S. García-Mauriñoa and C. Echevarríaa. 2007. Proline content of sugar beet storage roots: Response to water deficit and nitrogen fertilization at field conditions. *Enviro. Exper. Bot.*, 60(2): 257-267.

Ramadan, B.S.H. 2005. Effect on Nitrogen fertilization and harvest date on yield, yield components and quality of sugar beet. *J. Agric. Sci. Mansoura Univ.*, 30(2): 773-783.

Ramadan, B.S.H., H.R. Hassan and Fatma, A. Abdou. 2003. Effect of mineral and biofertilizers on photosynthetic pigments, root quality, yield components and anatomical structure of sugar beet. Beta vulgaris L.) plants grown under reclaimed soils. *J. Agric. Sci. Mansoura Univ.*, 28(7): 5139-5160.

Seadh, S.E. 2008. Some factors affecting sugar beet productivity under newly reclaimed sandy saline soils. Proc. of the International Conf. IS – 2008 "Meeting the Challenges of Sugar Crop & Integrated Industries in Developing Countries", IAPSIT, Al Arish, Egypt, pp: 110-115.

Seadh, S.E., S. Farouk and M. I. El-Abady. 2007. Response of sugar beet to potassium sulfate under nitrogen fertilizer levels in newly reclaimed soils conditions. *African Crop Sci. Conf. Proc.*, 8: 147-153.

Shewate, S.R., P.V. Ghodke and A.S. Patil. 2008. Effect of nitrogen levels and varieties on sugar beet growth, yield and quality. Cooperative Sugar, 39(11): 29-33.

Sprenat, J.I. 1990. Nitrogen fixation organisms. P.S. Chapman & Hall, London.

Sultan, M.S., A.N. Attia, A.M. Salama, A.E. Sharief and E.H. Selim. 1999. Biological and mineral fertilization of sugar beet under weed control: ISugar beet productivity. Proc. 1st Intern. Conf. on Sugar and Integrated Industries Present & Future , 15-18 Feb. 1999, Luxor, Egypt, I: 170-181.

Zhang, J.X., L. Qiang, X. LiHua and G. YuZhu. 2009. Effects of nitrogen fertilization on fibrous root distribution and activity in high yield sugar beet. *Plant Nut. Fertilizer Sci.*, 15(4): 904-909.

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