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RESPONSE OF THREE SUGAR BEET CULIVARS TO MINERAL AND BIFERTILIZER NITROGEN TREATMENTS UNDER NEW LANDS CONDITIONS

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ABSTRACT

A field trial was conducted on 2018/2019 and 2019/2020 in a private farm in Kasassin Town, Ismailia Governorate, Egypt, to evaluate the effects of seed inoculation with nitrogen-fixing bacteria on growth, root system, sugar yield, and quality of sugar beet varieties (Cleopatra, Senderla and Capel) in sandy soil. Recently, there has been increasing interest in bioorganic fertilizers as a means of mitigating the negative impacts of intensive agricultural practices. Nitrogen-fixing microorganisms influence plant nutrition and also play a crucial role in biofertilization of crops as rhizosphere bacteria that promote plant growth. The experimental design used was randomized complete block with three replicates. All treatments in the current study (inoculation with nitrogen-fixing bacteria) increased yield and its attributes compared to the untreated treatment. The fertilization treatment of 100 kgN/fad + 900 g Cerialine produced the best root yield (43.91 ton/fad.) and the highest sugar yield (5.31ton/fad) in the second season. The highest root fresh weight (996.5) g/plant was obtained at 210 days with Senderla in the first season. Cleopatra with 100kgN/fad+900g Cerialine had the highest root and sugar yields of 44.86 and 5.87 ton/fad., respectively in the second season. In comparison to the control, fertilizing sugar beet with 100 kg N/fad., and seeds inoculating with 900 gm Cerialine significantly increased sugar beet growth, productivity and quality.

INTRODUCTION

The sugar beet crop is an important winter crop in Egypt's agricultural succession, in sandy soils. Although sugar beets can be grown profitably on cultivated soil, such as in northern Egypt, they are mainly grown on poor soils with high alkalinity and lime content. The sugar beet varieties showed significant differences in sugar content, root yield and juice quality, with the Farida and Toro varieties performing better than the Lola variety **(Gobarah *et al*., 2019)**. **Aly (2009)** found that Marathon variety had almost the highest root length, root fresh weight, root and sugar yield values. Additionally, the Kawimera variety outperforms other varieties in terms of extractable sugar, sucrose and extractable percentage. In order to select the sugar beet varieties with the highest yield and quality, it is necessary to evaluate them under Egyptian conditions, since sugar beet seeds are imported to Egypt. **Mohamed (2008)** discovered that the Montbianco variety was superior in all growth traits, top and root yields ton/fad., but the Gloria variety provided the highest

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purity, sucrose, sugar extraction, extractability percentages, and alkalinity coefficient). **El-Sheikh *et al.* (2009)** found that all parameters significantly differed between sugar beet varieties. Farida variety significantly improved juice quality (purity and sucrose) and sugar yield. The impurity contents of amino N%, K and Na showed the lowest values. According to **Abd El-Aal *et al.* (2010)**, there were significant differences in root mass and production efficiency between sugar beet cultivars. **Mohamed *et al.* (2012) and Mohamed and Yasin (2013)** found significant among differences in root size, sugar content and root yield/trends between sugar beet cultivars. According to **El-Mansuop *et al.* (2020)**, sugar beet variety has a significant impact on root length and fresh weight of sugar beet varieties. There were no significant differences in sugar yield among the tested varieties. According to **Ahmed *et al.* (2017)**, significant variations among sugar beet varieties in terms of root length, sugar and root yields/fad., as well as purity, sucrose, and impurities percentages. **Mohamed *et al.* (2018)** found that, with the exception of the Quality index and impurities (%). The Pyramid variety outperformed the other tested varieties in terms of root yield (ton/fad.). **Elsebai *et al.* (2019)** found that Sara sugar beet variety was superior to other tested varieties in terms of root and sugar yield (ton/fad).

Nitrogen is an essential component of the chlorophyll molecule, which plays an important role in the development of plant organs through the production of proteins. The goal of sugar beet nitrogen management is to provide adequate nitrogen during the early and mid- growing season to promote optimal plant growth and canopy development. The aim is to deplete the soil's nitrogen reserves at the end of the growing season to achieve optimal yield and quality. Nitrogen fertilizer has a significant impact on root production and root quality. **Kandil *et al.* (2002)** found that higher nitrogen levels resulted in significant increases in root length, fresh weight per plant and yield per mold in both seasons. According to **Ramadan and Nasser (2003)**, increased nitrogen application a decrease sucrose, purity and recoverable sugar content. Furthermore, they observed that an increase in nitrogen content resulted in a higher percentage loss of impurities (α-amino nitrogen, potassium, and sodium) and sucrose in the molasses. According to **Geweifel *et al.* (2006)**, increasing nitrogen content increased root and sugar yields while decreasing sucrose percentage. Increased nitrogen fertilizer use has had a significant impact on sugar beet yields and their composition. According to **Aboshady *et al.* (2011)**, increasing nitrogen fertilizer significantly increased root, sugar yield, sugar loss in molasses, alpha amino nitrogen content, K, and Na. However, the average values for purity, sucrose, sugar extractable, extractability percentages, and alkaline coefficient were found to be low in both seasons. Raising nitrogen level, according to **Osman (2011)**, led to increase root length, sugar and root yields/fad. However, as the nitrogen level increased above 80 kg N per fad, the purity and sucrose percentages decreased gradually. **Omar and Mohamed (2013) and Mekdad (2015)** discovered that increasing the N level increased root dimensions, root fresh weight/plant, sugar and root yields, as well as alfa amino N loss, K, and Na.

The use of biofertilizers in crop fields has been recommended as a source of plant nutrients and/or providing growing plants with better rhizosphere conditions through the release of a number of organic acids that stimulate root growth and development **(El Sebai *et al.*, 2019)**. Numerous studies on the use and influence of biofertilizers on productivity and quality of sugar beet will be conducted in the near future. In this regard, inoculating the seeds with *Azotobacter chroococcum* significantly increased sugar and root yields/fad. **(El-Dosouky and Attia,**

2004). Maareg and Badr (2001) reported that Cerialine caused an increase in sucrose, purity percentage and sugar yield/fad. The application of biofertilization treatments had a significant impact on the yields of roots, tops and sugar per fad., (**Kandil *et al.*, 2002; Badawi *et al.*, 2004; Amin, 2005; Mohamed, 2008; El-Hosry *et al.*, 2010; Omar and Mohamed, 2013**). Furthermore **Ramadan and Nasser (2003)** stated the seed inoculation with *Azotobacter* sp. led to increase root demintion, sugar, top, and root yields/fad., **Aly (2003)** cited that inoculation increased significantly root and sugar yields/fad., with respect to sugar beet quality and sucrose percentage. **(Sultan *et al.*, 1999)** reported that seed inoculation with Azotobacter in significantly led to increase root length and diameter, sucrose and purity percentages, sugar and root yeilds/fad. In comparison to single inoculation with OSU-140 or M-13. **Fikrettin *et al.* (2004)** discovered that the combination of all three strains, dual inoculation of N_2-fixing OSU-142 and P-solubilizing M-13, and/or dual inoculation N_2-fixing bacteria greatly boosted sugar beet yield components. Application of 90 kg N+ Cerialine or rizobacteren boosted root length, purity(%), and sugar, top, and root yields/fad, according to **Hilal (2005)**, but it also considerably decreased all contaminants alpha amino N, K, and Na. In order to increase the flow of plant nutrients and lessen the demand for chemical fertilizers, microorganisms are crucial in agriculture. Bacillus species, when used as biofertilizers, can potentially impact plant growth by producing plant growth hormones **(Hecht-Buchholz, 1998; Amer and Utkheda, 2000)**, the production of enzymes that regulate the amount of rhizobacteria that promote plant growth (**Kumar and Narula, 1999)**, excreting organic acids **(Kucey *et al.*, 1989; Whitelaw, 2000),** and providing carbon and nitrogen sources **(Biswas *et al.*, 2000).** Microorganisms that provide plants with a better balanced diet and suppress soil-borne diseases **(Fukui *et al.*, 1994; Belimov *et al.*, 1995).** This study examined the effects of inoculating seeds of some sugar beet varieties with nitrogen-fixing bacteria on production and quality.

MATERIALS AND METHODS

To determine the impact of inoculation sugar beet seed with nitrogen-fixing bacteria on growth, root quality, and yield of sugar beet varieties (Cleopatra, Senderla, and Capel), a field experiment was carried out during 2018/2019 and 2019/2020 seasons at a private farm in Al-Kassasin City, Ismailia Governorate, Egypt (latitude 30.34 N and longitude 31.56 E, m above sea level). The experimental soil site had sand (66, 74%), silt (13,14%), clay (21, 12%), soil pH (7.10, 7.13), organic matter (0.55, 0.57%), and $CaCO_3$ (22.43, 22.48%) present for both seasons.

The tested 12 treatments were fertilizing three sugar beet varieties with four fertilization treatments: ammonium nitrate 33.5% N (control), control +300 gm/fad Cerialine, control +600 gm/fad Cerialine and control + 900 gm/fad Cerialine. Corn and Sugar beet, were the preceding crops in the first and second seasons, respectively. Three replications of the randomised complete block design (RCBD) experiment were conducted. The plot size was 10 m^2 (1/400 fad.), with 4 rows measuring 5 m in length and 50 cm (between rows).

Seeds were planted on 15th November in both seasons. After a month, the plants have been thinned out 2 plants/hill and then singled out to 1 plant/hill. 45 days after the seeding date. Flood irrigation was used, with the experiment being irrigated immediately after seeding and then every 10-days using water pumped from a well. All other cultural practices were followed as per sugar beet recommendations. At harvest (210 days after sowing), ten randomly roots from each plot were selected, topped, cleaned, and weighed to measure the following growth characteristics:

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

Sugar beet yields were determined by uprooting all plants in each plot at harvest, separating them into roots and tops, and weighing them to estimate the following:

1. Root yield/fad. (ton).
2. Sugar yield/fad. (ton), which was calculated using the equation: Sugar yield = root yield/fad. (ton) x extractable sugar (%).

Statistical Analysis

Was conducted using a randomized complete block design, as described by **Snedecor and Cochran (1990)** with the SPSS computer program V.28 (2021). The least significant difference (LSD) was used to test the differences between treatment means at 5% level of probability.

RESULTS AND DISCUSSION

Vegetative Growth Characters

Root fresh weight (g/plant)

The results in Table 1 show that sugar beet varieties have significant effects on root fresh weight (g) at different growth stages. The highest root fresh weight (996.5) g/plant was obtained by Senderla cultivar after 210 DAS in the second season. This trend was also observed with Senderla variety recording the highest root fresh weights after 90, 130, and 170 DAS, which vested 385.97, 561.25, 811.66 and 996.5 g/plant respectively. These results were in harmony **El-Sayed and Yousif (2003), Ouda (2007), Hellal *et al.* (2018) and Mehran and Sadat (2013)**.

As shown in Table 2, the highest root fresh weights was observed after 210 days in the in the 1st and 2nd seasons recording 890.3 and 976.8 g/plant, using 100 kg nitrogen/fad. + 900 g Cerialine treatment. The increase in root fresh weight can be attributed to the role of biofertilization in free-living bacterial nitrogen fixation, which lowers rhizosphere soil pH, thereby increasing the availability of essential macro- and micronutrients and promoting growth and root weight. These results are consistent with the reported by **Bassal *et al.* (2001**) as well as **Mehran and Saadat (2013)**.

The interaction between sugar beet variety and biofertilization treatment was found to be significant at 90, 130, 170 and 210 DAS in both seasons, as shown in Table 3. The highest value of root fresh weight (210 DAS)were observed in the 1st and 2nd seasons for the interaction between Capel and 100 kg N/fad., + 900 g Cerialine, which were 968.9 and 990.2 g/plant, respectively.

Root yield (ton/fad.) and sugar yield (ton/fad.)

The results in Tables 4, 5 and 6 show the effect of sugar beet cultivar, biofertilization treatment and their interaction on root and sugar yield (ton/fad., after 210 DAS in the 1st and 2nd seasons.

The results in Table 4 indicate that different cultivars have a significant impact on root yield and sugar yield (ton/fad.) at harvest (210 DAS). Cleopatra variety had the highest root yield in the 1st and 2nd seasons, recording 37.89 and 38.27 ton/fad., respectively. Therefore, the maximum sugar yields in the 1st and 2nd seasons for the same variety were 4.77 and 4.90 ton/ fad., respectively yield. Furthermore, Capel had the lowest root yield (33.42 and 34.64 ton/fad.) and sugar production (3.24 and 3.87 ton/fad.) in both seasons. The increase in root and sugar production may be due to cultivar diversity, which can be attributed to increased root vegetative growth (length and diameter), top, root and sugar production/

Table 1. Fresh weight of roots (g/plant) of sugar beet varieties after 90, 130, 170 and 210 days after sowing in 2018/2019 and 2019/2020 seasons

Sugar beet variety	Days after sowing (DAS)							
	90	130	170	210	90	130	170	210
	2018/2019				2019/2020			
Capel	328.13	580.54	675.00	777.2	358.35	421.66	627.19	787.5
Senderla	370.13	682.58	745.8	825.0	385.97	561.25	811.66	996.5
Cleopatra	362.08	626.46	716.7	852.8	380.05	603.89	797.5	925.8
LSD at 0.05 level	0.45	0.68	0.71	0.88	0.37	0.77	0.79	0.92

Table 2. Effect of fertilization treatments on fresh weight of roots (g/plant) after 90, 130, 170 and 210 days after sowing in 2018/2019 and 2019/2020 seasons

fertilization treatment	2018/2019				2019/2020			
	Days after sowing (DAS)							
	90	130	170	210	90	130	170	210
100kg.N/fad	328.13	622.21	716.70	847.5	355.39	537.22	755.52	844.4
100kgN/fad+300g Cerialine	383.75	622.79	723.8	860.3	385.86	588.05	770.00	862.5
100kgN/fad+600g Cerialine	387.42	654.58	750.8	881.9	388.61	590.36	798.32	896.8
(100kgN/fad+900g Cerialine)	391.88	684.17	782.10	890.3	389.83	599.58	823.75	976.8
LSD at 0.05 level	1.05	1.48	1.53	1.73	1.40	1.53	1.58	1.64

Table 3. Influence of the interaction between fertilization treatments and sugar beet varieties on fresh weight of roots (g/plant) after 90, 130, 170 and 210 days after sowing in 2018/2019 and 2019/2020 seasons.

Treatment		2018/2019				2019/2020			
		Days after sowing (DAS)							
		90	130	170	210	90	130	170	210
Capel	**100 kg.N/fad**	310.8	550.8	825.00	888.9	316.3	577.2	800.6	938.30
	100 kgN/fad+ 300g Cerialine	320.5	568.3	841.7	935.6	328.4	580.6	855.4	954.40
	100kgN/fad+600g Cerialine	384.1	590.7	850.0a	955.60	386.6	595.3	888.3	965.00
	(100kgN/fad+900 g Cerialine)	395.8	600.5	891.70	968.90	398.0	605.6	904.4	990.20
Senderla	**100kg.N/fad**	291.6	465.8	625.0	800.0	308.5	483.3	637.8	824.40
	100kgN/fad+300g Cerialine	295.5	498.7a	655.0a	806.9	310.0	499.4	786.1	869.4
	100kgN/fad+600g Cerialine	330.0	519.5a	671.7	827.8	348.3	557.8	848.9	891.1
	(100kgN/fad+900 g Cerialine)	358.3	572.8	686.7	855.6	365.0	604.4	882.2	901.10
Cleopatra	**100kg.N/fad**	268.3	462.5	683.3	805.6	259.9	439.4	694.4	872.80
	100kgN/fad+300g Cerialine	333.3	541.0	696.7	883.3	267.7	522.2	700.0	944.40
	100kgN/fad+600g Cerialine	338.0	551.3	700.0	890.0	299.4	542.2	755.6	961.70
	100kgN/fad+900g Cerialine	353.8	566.3	716.7	902.2	302.9	561.7	782.2	984.40
LSD at 0.05 level		1.59	1.69	1.74	1.93	1.65	1.79	1.77	1.95

Table 4. Effect of Sugar beet varieties on root and sugar yields during the two successive seasons

Sugar beet variety	2018/2019		2019/2020	
	Root yield (ton/fad)	Sugar yield (ton/fad)	Root yield (ton/fad)	Sugar yield (ton/fad)
Capel	33.42	3.24	34.64	3.87
Senderla	35.34	3.72	36.49	4.07
Cleopatra	37.89	4.77	38.27	4.90
LSD at 0.05 level	0.63	0.55	0.64	0.63

increase. Analogus findings were previously obtained by **Saleh (2007), Abou Shady *et al.* (2008), Mehran and Saadat (2013) and El-Sarag (2018)**.

Results given in Table 5 show the significant effect of the fertilization treatments at the harvest day in both seasons. 100 kg N/fad., + 900g Cerialine treatment, resulted the highest value of root yield that was 39.44 and 43.91 ton/fad., respectively in both seasons and gave the highest sugar yields of 4.59 and 5.31 ton/fad., respectively in the 1st and 2nd seasons. The lowest root yield (35.08 ton/ fad.) and sugar yield (3.13 ton/fad.) resulted due to using 100kg.N/fad., in the 1st season. Same findings were obtained by **Maareg and Badr (2001) and Kandil *et al*. (2002)**.

The interaction between different varieties and fertilization treatments had a significant impact on root and sugar yields in both seasons (Table 6). In the first season, Cleopatra with the fertilization treatment rate of 100 kg N/fad. + 900g Cerialine produced the highest root and sugar yields, amounted as 43.32 and 5.51 ton/fad., respectively. In the second season, the same combination of Cleopatra variety with the fertilization treatment of 100 kg N/fad.+ 900 g Cerialine produced the highest root and sugar yields, valued 44.86 and 5.87 ton /fad., respectively. These findings align with that reported by **Khalil *et al.* (2018)**, **Shalaby *et al*. (2010), Azzazy *et al* (2007), Al-Jbawi (2000), Stevens *et al*. (2008), Seadh (2008), Okasha and Mubarak (2018), Okasha and Mubarak (2019), and Mubarak and Abd El Rahman (2020)**.

Juice quality at harvest

The results in Tables 7, 8, and 9 show the effect of sugar beet cultivar, fertilization treatment, and their interaction on purity, total soluble solids (TSS), and sucrose content at harvest in 2018/2019 and 2019/ 2020.

The results in Table 7 show Cleopatra had the highest purity, with TSS and sucrose of 93.27, 23.81 and 19.02% respectively in the first season and 93.37, 23.96 and 19.63% respectively in the second season. The same findings apply to **Nemeat-Alla *et al*. (2007), Abu Shadi *et al*. (2008) and El-Fadaly *et al*. (2020).**

Results given in Table 8 show the significant effect of the fertilization treatments at the harvest in two growing seasons. 100 kg N/fad., + 900 g Cerialine treatment gave the highest purity, TSS and sucrose valued 92.86, 22.71and 19.45% in the 2nd season. The same result obtained with **Sultan *et al*. (1999), Nour El-Din *et al.* (2002) and Saleh (2007).**

The interaction between sugar beet varieties and fertilization treatments on Purity, TSS and Sucrose % were significant in the 1st season and 2nd season (Table 9).

Table 5. Effect of fertilization treatments on root and sugar yields during the two successive seasons

Treatments / Seasons	2018/2019		2019/2020	
	Root yield (ton/fad)	Sugar yield (ton/fad)	Root yield (ton/fad)	Sugar yield (ton/fad)
100kg.N/fad	35.08	3.13	36.47	3.69
100kgN/fad+300g Cerialine	37.46	3. 92	40.77	4.44
100kgN/fad+600g Cerialine	38.21	4.04	41.83	4.96
100kgN/fad+900g Cerialine	39.44	4.59	43.91	5.31
LSD at 0.05 level	0.73	0.85	0.78	0.93

Table 6. Influence of the interaction between varieties and fertilization treatments on root and sugar yields during the two successive seasons

Treatments	/ Seasons	2018/2019		2019/2020	
		Root Yield (ton/fad)	Sugar Yield (ton/fad)	Root Yield (ton/fad)	Sugar Yield (ton/fad)
Capel	100kg.N/fad	34.84	4.03	36.71	4.60
	100kgN/fad+300g Cerialine	36.61	4.17	38.14	4.97
	100kgN/fad+600g Cerialine	37.75	4.73	39.53	4.87
	100kgN/fad+900g Cerialine	40.37	4.84	41.95	5.03
Senderla	100kg.N/fad	34.93	4.56	35.92	4.84
	100kgN/fad+300g Cerialine	35.29	4.77	36.94	4.85
	100kgN/fad+600g Cerialine	37.12	4.84	39.74	5.06
	100kgN/fad+900g Cerialine	39.04	4.92	41.36	5.33
Cleopatra	100kg.N/fad	38.92	4.06	39.35	4.59
	100kgN/fad+300g Cerialine	39.06	4.37	40.86	4.87
	100kgN/fad+600g Cerialine	42.40	5.11	43.02	5.29
	100kgN/fad+900g Cerialine	43.32	5.51	44. 86	5.87
	LSD at 0.05 level	0.80	0.93	0.90	0.95

Table 7. Effect of sugar beet varieties on purity, TSS and sucrose (%), in 2018/2019 and 2019/2020 seasons

sugar beet variety / Season	2018/2019			2019/2020		
	Purity (%)	TSS(%)	Sucrose %	Purity (%)	TSS (%)	Sucrose (%)
Capel	89.04	20.10	16.87	90.90	21.59	17.47
Senderla	91.66	22.77	18.95	91.98	22.16	19.17
Cleopatra	93.27	23.81	19.02	93.37	23.96	19.63
LSD at 0.05 level	0.33	0.55	0.65	0.45	0.61	0.68

Table 8. Effect of fertilization treatments on purity, TSS and sucrose (%) in 2018/2019 and 2019/2020 seasons

Treatments / Season	2018/2019			2019/2020		
	Purity (%)	TSS (%)	Sucrose (%)	Purity (%)	TSS (%)	Sucrose (%)
100kg.N/fad	90.21	20.15	15.56	91.74	20.25	15.99
100kgN/fad+300g Cerialine	91.86	21.42	16.72	92.09	21.58	16.98
100kgN/fad+600g Cerialine	92.24	21.96	18.40	92.33	22.10	18.77
(100kgN/fad+900g Cerialine)	92.72	22.66	19.06	92.86	22.71	19.45
LSD at 0.05 level	0.33	0.55	0.65	0.45	0.61	0.68

Table 9. Effect of the interaction between sugar beet varieties and fertilization treatments on purity, TSS and sucrose (%) in 2018/2019 and 2019/2020 seasons

Treatments	Seasons	2018/2019			2019/2020		
		Purity (%)	TSS (%)	Sucrose (%)	Purity (%)	TSS (%)	Sucrose (%)
Capel	100kg.N/fad	87.88	20.00	16.38	88.86j	20.73	16.38
	100kgN/fad+300g Cerialine	90.21	21.27	17.02	90.50	22.14	17.27
	100kgN/fad+600g Cerialine	91.11	21.94	18.36	91.40	22.28	18.53
	(100kgN/fad+900g Cerialine)	93.84	21.95	19.99	93.42	23.26	20.89
Senderla	100kg.N/fad	88.95	20.00	16.47	89.87	20.95	16.07
	100kgN/fad+300g Cerialine	90.37	21.77	17.82	91.84	21.16	17.33
	100kgN/fad+600g Cerialine	91.34	22.03	18.10	91.15	22.53	19.04
	(100kgN/fad+900g Cerialine)	92.97	22.28	19.42	92.63	23.29	21.08
Cleopatra	100kg.N/fad	90.57	20.09	16.50	91.12	20.01	16.16
	100kgN/fad+300g Cerialine	91.51	20.78	17.63	91.55	21.01	17.30
	100kgN/fad+600g Cerialine	92.93	21.95	18.14	93.24	22.27	19.29
	(100kgN/fad+900g Cerialine)	93.85	22.43	19.32	93.97	23.87	22.69
LSD at 0.05 level		1.38	1.58	1.08	1.48	1.30	1.18

The interaction between Cleopatra and 100 kg N/fad., + 900g Cerialine produced the highest value of each of purity, TSS and sucrose(%) were 93.97, 23.87 and 22.69% in the 2nd season compared with the others treatment.

The increase in fertilization rate per fad, resulting in higher yields of top, root and sugar, can be attributed to the positive effects of Cerialine on increasing the leaf area per plant, which in turn enhances photosynthetic activity. These findings align with previous studies conducted by **Abd El-Aal *et al.*, (2010), Ahmad *et al.* (2012), Osman *et al.* (2014), Aly *et al.* (2017), Abdel-Motagally (2015) and Zaki *et al.* (2018a)**.

Conclusion

It can be concluded that Cleopatra sugar beet variety treated with 100 kgN/fad+900g Cerialine, could be recommended for maximizing sugar beet productivity and juice quality under the environmental conditions of El-Kassasin region, Ismailia, Egypt.

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الملخص العربي

استجابة ثلاثة أصناف بنجر السكر لمعاملات التسميد المعدني والحيوي تحت ظروف الأراضي الجديدة

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أجريت التجربة الحقلية فى مزرعة خاصة بمدينة القصاصين بمحافظة الاسماعيلية - خلال الموسمين الزراعيين 2019/2018، 2020/2019 بهدف دراسة تاثير التلقيح بالبكتيريا المثبته للنيتروجين علي الصفات الانتاجية للأصناف بنجر السكر)كيلوباترا، سندريلا، كابل(في الاراضي الرملية ومدي اهمية التسميد الحيوي كجزء من الزراعة المستدامة. كان هناك تجدد الاهتمام بالأسمدة الحيوية كجزء من الممارسات الزراعية المستدامة للتخفيف من عيوب ممارسات الزراعة المكثفة. تعد الكائنات الحية الدقيقة المثبتة للنيتروجين مهمة في تغذية النبات مما يزيد من امتصاص النباتات للنيتروجين، وتلعب دورا مهما في تعزيز نمو النبات في التسميد الحيوي للمحاصيل. واستخدم تصميم قطاعات كاملة العشوائية في ثلاث مكررات بنظام المنشقة مرة واحدة. في هذه الدراسة جميع المعاملات بالتسميد الحيوي حسنت المحصول ومكونات المحصول عند مقارنتها بغير المعامل او الكنترول ، والبيانات المتحصل عليها توضح ان تلقيح بذور بنجر السكر بمعدل 900 جرام سيريلين مع 100 كجم نيتروجين/ للفدان ، ادي الي زيادة ملحوظة في النمو واالنتاجية لمحصول بنجر السكر بعدم المعاملة او الكنترول. ، وأوضحت البيانات أن صنف بنجر السكر كليوباترا المسمد بمعدل 900 جرام سيريلين مع 100 كجم نيتروجين/ للفدان يزيد محصول الجذور ومحصول السكر.

الكلمات االاسترشادية: البكتيريا المثبته للنيتروجين ، التسميد الحيوي ، اصناف بنجر السكر، الإنتاجية، التربة الرملية.

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