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THE INFLUENCE OF FERTILIZATION SYSTEMS AND SOME WEED CONTROL TREATMENTS ON THE YIELD AND QUALITY OF SUGAR BEET AND ASSOCIATED WEEDS.

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ABSTRACT

Field experiments were conducted at a private farm located at Abu Qurqas, El-Minia, Egypt, during the 2018/2019 and 2019/2020 seasons. The aim of this research was to assess the impact of the effect of fertilization systems and weed control treatments, on yield and quality of sugar beet as well as associated weeds. A randomized complete block design (RCBD) was used, in a split plot arrangement and replicated three times. The main-plots were devoted for fertilization systems, while the weed control treatments were randomly located in the sub plots, in both seasons. Results confirmed that, fertilization systems exhibited a significant effect on most studied traits in both seasons, except TDW (g/m^2) in both seasons; RSY (ton/ fed); SR%; LS% and QZ% in the first season. Weed control treatment had a high significant effect on all studied characteristics except α - amino-N% in both seasons, K% in 1^{st}, Na% and SR% in 2^{nd} one, all weed control treatments, except un-weeded, decreased dry weight of total - leaved weeds, b_2 and b_3 out-yielded other weed control treatments for root, sugar yields and quality.

Generally, it could be summarized that fertilization sugar beet by50% from recommended chemical nitrogen + red yeast with Tegro 27.4% or Safari 50 % WG 12 g/fed. to maximize the productivity and quality of sugar beet yield.

Keywords: sugar beet, fertilization system, weed control, yield and quality.

INTRODUCTION

Sugar beet (*Beta vulgaris* L.) is one of the most important and strategic industrial crops in the world, It is a crucial crop for people since it provides sucrose and serves as a source of animal feed. This crop's significance originates from its capacity to thrive in saline and alkaline soils, give a high rate of sugar recovery, and use less water than sugarcane **(Abdelaal and Sahar, 2015; Sohier, 2001)**. In addition, sugar beet leaves the land in good shape for the next summer's grain harvest because it is the cycle's largest cash crop. It consequently became Egypt's primary source of sugar production **(Amr and Ghaffar, 2010)**. Egypt had 617000 fed of total sugar beet cultivation, which produced around 67.7% (1.8 million tonnes) of the nation's total sugar production **(FAOStat, 2020).**

Fertilization system became one of the critical process which facing the policy maker and growers as a result to the increase in fertilizer's prices from one side and their pollution from the other side. According to research by **Mahmoud *et al.* (2022)**, increasing nitrogen fertilizer levels from 75 to 90, 105, and 120 kg N/fed resulted in a substantial drop in root yield, sugar yield/fed, and quality in both seasons.

(Nemeat Alla *et al.*, 2015) pointed out that sugar beet plants had a significant increase in root dimensions due to the increase in the additional rates of nitrogen up to 100 kg N/fed. Also, increasing nitrogen application from 60 up to 100 kg N/fed led to positive response in the extractable sugar %, potassium %, α-amino nitrogen %, sucrose %, extractable sugar %, sugar loss to molasses % and root, top and sugar yields in both seasons, whereas the same rates significantly decreased purity %. Increasing number of yeast application caused to significant increase values of root dimensions, root/top ratio, sodium %, potassium %, α-amino nitrogen %, sucrose %, extractable sugar %, sugar loss to molasses % and top and sugar yields in both seasons, meanwhile, decreased purity %. **(Ahmed and Naeem (2021)** showed that increasing nitrogen levels increased root length, diameter, root and foliage fresh weights/plant, and root and foliage yields/ha. on contrary decreased quality parameters including sucrose and total soluble solid (TSS) percentages.

The adoption of organic farming methods is expanding quickly worldwide in an effort to protect the environment and human health, which are at risk due to the improper application of chemical fertilizers and pesticides **(Agamy *et al.*, 2013)**. N-fixing bacteria is economically important to modern agriculture as they can partially replace the cost of mineral fertilizers so lower production costs and reduce environmental pollution, while ensuring high yields **(Abou-Zeid and Osman, 2005 and Aly *et al.*, 2009),** increasing nitrogen fertilizer rates significantly increased yield characters i.e., roots, top, biological and sugar yields (ton/ fed) , some quality parameters, total soluble solids (T.S.S) and sucrose concentrate in root juice .Moreover, bio-fertilizer treatments gave the maximum of roots, top, biological and sugar yields (ton/ fed) and increased of some quality parameters **(Abd El-Azeem *et al.*, 2018).** Yeasts synthesis antimicrobial and other useful substances required for plant growth from amino acids and sugars secreted by bacteria, organic matter, and plant roots. Bio-fertilizers are thought of as a low cost, effective, and renewable source of plant nutrients to supplement chemical fertilizers. For several crops, Saccharomyces cerevisiae is regarded as a new, promising yeast that promotes plant growth **(Boraste *et al.*, 2009).** Recently, it became a positive alternative to chemical fertilizers safely used for human, animal and environment **(Omran, 2000). Nagib *et al.*, (2022)** concluded that applying red yeast as a promising biofertilizer with chemical nitrogen fertilizer at different application rates could be recommended because it significantly increased the microbial biomass and, achieved a highly significant yield, while reducing chemical fertilizers consumption. Numerous researchers asserted that yeasts in the rhizosphere may either directly or indirectly promote plant root growth **(Nassar *et al.*, 2005; El-Tarabily and Sivasithamparam, 2006 and Cloete *et al.*, 2009).**

Concerning, weeds are considering one of the most agricultural problems in sugar beet fields. Where cause losses in yield and quality, the total yield losses of sugar beet yield from weed competition which varied from 26 to 100% **(May 2001).** The total potential losses from weeds would be between 50 and 100% of the potential crop yield **(Deveikyte and Seibutis 2008).** Weeds left in beet crops can make harvesting more difficult and costly, interfere with clamping and affect processing if taken into the factory **(Cioni and Maines 2011).** The amount of photosynthetic radiation reaching the crop can be decreased by weed growth that is dense above the sugar beet canopy. Consequently, weed management is a crucial part of sugar beet cultivation. The monocots are less significant than dicot weeds in many sugar beet growing regions **(Soroka and Gadzieva, 2006).** Hand weeding is slow and too expensive for extensive operations. So, it is necessary to seat about a cheap and economical method of weed control. Chemical weed control programs offer a possibility of realizing this end. A variety of post-emergence herbicide mixtures must be used to control the various weed species in the sugar beet crop **(Scepanovic 2007, Deveikyte and Seibutis, 2006). Chitband *et al*. (2014)** reported that desmedipham + phenmedipham + ethofumesate, tank mixtures for satisfactory weed control and reduction *Portulaca oleracea, Solanum nigrum, Amaranthus retroflexus* and *Chenopodium album.* **Nagib (2016)** stated that weed control treatments exhibited significant effect on dry weight of slight, broad and total weeds (g/m^2) at 90 and 120 days ages in both seasons. The hand hoeing twice gave the lowest dry weight of narrow, wide and total -leaved weeds in the first season, While Harness +one hand hoeing and Razor golde +one hand hoeing were the best treatments where recorded the minimum dry weight of broad and total weeds at 90 and 120 days in the second season. **(Abd El-Hamed,2019)** indicated that all weed control treatments reduced significantly the fresh weight of annual broadleaf and grassy weeds in the two surveys at 70 and 120 DAS in both seasons. In 2015/16 season at 70 DAS, Cross (Phenmedipham + ethofumesate + metamitron) at 2.5 kg/fad., Goltix plus (metamitron + ethofumesate) at 1.5 L/fad, Harness (acetochlor) at 0.75 L/fad. and hand hoeing twice, greatly reduced total weeds by 91.6, 78.7, 77.9 and 77.7%, respectively.

The main objectives of this study were evaluate the effect of different combinations of chemical nitrogen fertilizer levels and yeast or red yeast as a bio fertilizer and some weed control treatments on sugar beet productivity, quality and associated weeds in Minia Governorate, Egypt**.**

MATERIALS AND METHODS

Two filed experiments were conducted at a private Farm located at Abu Qurqas, El-Minia Governorate, Egypt. latitude of 28º18'16" N and longitude of 30º34'38"E and altitude of 49 m above sea level during the two successive seasons of 2018/2019 and 2019/2020, to investigate the effect of three bio- fertilizer systems (BFS)i.e., 100% from recommended chemical nitrogen (a_1), 50% from recommended chemical nitrogen + yeast(a_2) and 50% from recommended chemical nitrogen + red yeast (a_3) and five weed control treatments (WCT) i.e., **Harness 84 % EC** at the rate of 500 cm^3/fed. after planting and before the first irrigation followed by hand hoeing after one month later (b_1), **Tegro 27.4% EC** at the rate of 1L/fed applied at 2:3 leaves sugar beet plants followed by hand hoeing after one month later(b_2) , **Safari 50 % WG** at the rate of 12 g/fed. applied at 2:3 leaves sugar beet plants followed by hand hoeing after one month later(b_3), Hand hoeing twice at 30 and 60 days from planting(b_4) and Un-weeded (b_5) on yield and quality of sugar beet as well as associated weeds. A randomized complete block design (RCBD) was used, in a split plot arrangement and replicated three times. Fertilization system treatments assigned to the main plots. The sub-plots were devoted to weed control treatments, each sub-plot area was 10.5m^2 (3.5 × 3m), included 5 ridges (60cm. between the ridges) and the ridge long was 3.5m and sugar beet cultivar "Hossam" was sown in 15th and 20th of October in 2018 and 2019, respectively. Harvesting date was in 15th and 20th of April in 2019 and 2020, respectively. The preceding summer crop was maize (*Zea mays* L.) in both seasons. Before seeding, the experimental soil underwent mechanical and chemical investigation, as shown in Table (1).

Phosphorus fertilizer was added during land preparation at the rate of 30 kg P_2O_5 /fed in the form of calcium super phosphate 15.5% P_2O_5. Ammonium nitrate (33.5% N) as chemical N fertilizer was used, N-fertilizer was divided into two equal doses, the first dose after thinning and the second was applied after one month later. The amounts of the commercial fertilizer were calculated according to each nitrogen level in different fertilization system. With the initial nitrogen dose, potassium was supplied at a rate of 50 kg K_2O/fed in the form of potassium sulphate (48% K_2O). The Ministry of Agriculture's advice for growing sugar beet was followed, along with the other customary agricultural techniques the treated plots were inoculated with *saccharomyces cerevisiae and Xanthophyllomyces dendrorhous* (formerly Phaffia) strain: NRRL Y-17269 [VKM Y-2268] supplied by American Type Culture Col lection (ATCC) Manassas, VA 20108 USA - agriculture microbiology department- Minia university of 30 days after sowing (DAS), just before the 2nd irrigation, the second dose was applied 60 DAS. The inoculants contained a minimum of 3 × 10^9 mL^{-1} viable cells.

The recorded data:

I-Weeds characters:

Weeds were hand pulled from one square meter chosen at random in each

sub plots at 60, 90 and 120 days from planting to record the following traits: -
Total annual weed dry weight, g/m2 (TDW).

A steady weight was achieved after seven days of air drying followed by 48 hours of oven drying at 70 degrees Celsius. For each group, the dry weight of the weeds (g/m2) was noted.

II- Sugar beet characters:

II-1- Yield and yield components:

The three guarded ridges of each sub plots were harvested then topped, cleaned and weighted in kg, then it was converted into tons/fed. to estimate:

1- Root yield, ton/ fed. (RY).
2- Recoverable sugar yield/fed, ton. (RSY) = root yield/fed (ton) x sugar recovery %.
3- Losses sugar yield, ton/fed. (LS) = root yield (ton/fed) x loss sugar%.

II-2- Yield quality:

A sample of 20 kg of sugar beet roots from each sub plot were taken and sent to Egyptian sugar &Integrated industries company Limited Laboratories at Abu Qurqas, El-Minia Governorate, Egypt. to estimate the following parameters:

1-Sucrose percentage (Pol%). Sugar content was estimated in fresh samples of sugar beet root by means of an Automatic Sugar Polarimetric. According to the method of **Mc Ginnus (1971).**
2- Loss of sugar to molasses% (LS %) = sucrose % - recoverable sugar %.
3- Impurities content, *i.e.*, α-amino-N%, Na% and K% were determined as meq /100 g beet according to **A.O.A.C. (2005).**
4- Alkalinity coefficient (A C) was calculated according to the following equation: Alkalinity coefficient (A C) = K + Na/ α-amino-N.
5- Sugar recovery percentage (SR%):

Corrected sugar content (white sugar) of roots was calculated by linking the root non-sugar K, Na and α- amino (expressed as milliequivalents /100g of root) according to **Harvey and Dotton (1993).** as follows:

SR% = pol – [0.343× (K +Na) +0.094× α-amino-N +0.29]

Where:

SR%= corrected sugar content (% per beet) or extractable white sugar.

Pol= Sucrose %.

6-(Qz %) Quality percentage: Q_z= (SR%/ pol%) x100.

Statistical analysis:

According to Gomez and Gomez (1984), all data were statistically analysed using the analysis of variance (ANOVA) technique for the split-plot design with three replications using the "MSTAT-C" computer software package. The least significant differences (L.S.D.) test was used to compare the treatment means at the 5% level of probability.

REULTS AND DISCUSSION

I-Effect of fertilization system on weeds, yields of root, sugar and quality parameters:

I-1-Effect of fertilization system on weeds and root, sugar yields/ fed.:

The results in Table 2 showed that fertilization system had no significant effect on dry weight of (TDW) (g/m^2) and recovery sugar yield/fed. (RSY) in both seasons and first season, respectively, high significant effect on root and sugar yields/fed. in the first and second seasons, respectively, and significant effect on root yield/fed. (RY) in the second one. The highest root yield of 25.45 and 25.36 ton/fed. was cleared by fertilization system 50% from recommended chemical nitrogen + red yeast (a_3) in the 1st and 2nd seasons, respectively, without significant deference with a_2 in the first season. Meanwhile, fertilization system 100% from recommended chemical nitrogen (a_1) surpassed the other two fertilization systems a_2 and a_3 for sugar yield of 3.98 ton/fed. in the second season. These obtained results may be due to the fact that, yeast + red yeast (as a bio-fertilizer) increased of root characteristics in addition to increase in growth traits which reflected in increases of root yield (ton/fed.). These results coincided with those obtained by **Abou-Zeid and Osman, (2005), Aly *et al.*, (2009), Abd El-Azeem *et al.*, (2018) and Mahmoud *et al.*, (2022)**

I-2-Effect of fertilization system on quality parameters:

The results in Table 2 showed that all studied quality traits were significantly and high significantly affected by fertilization system, in both seasons, except Pol.% (sucrose%), SR% (sugar recovery%), LS% (loss of sugar to molasses%) and QZ (quality index%) in the first season. Fertilization system $a_1$cleared higher preferable commercial values of quality characteristics as Pol. % and SR% (without significant differences with a_2 in second season), lower values of LS of 0.66in first season and 0.77 ton/fed.(equally with a_2) in second season , Na% of 1.09% in the first season and ∞- amino-N% of 1.03% in second season, meanwhile, lower values of AC(2.00 and 5.29) and K% (4.93 and 4.53%) , higher values of α-amino-N% (3.22 and 1.52%) and LS (0.72 and 0.82 ton/fed.) in the first and second seasons, respectively, were cleared by a_3 as well as a_2 fertilization system revealed the lowest values of ∞-amino-N% (3.05%)in the first season ,Na%(3.08%) and LS%(3.07%)in the second season. These results are in agreement with those obtained by **Nassar *et al.*, (2005), Cloete *et al.*, (*2009*) Nemeat Alla *et al.*, (2015), Ahmed and Naeem (2021) and Mahmoud *et al.*, (2022)**.

II-Effect of weed control treatments on weeds, root, sugar yields and quality parameters:

II-1-Effect of weed control treatments on weeds and root, sugar yields/ fed.:

The results involved in Table 3 revealed that weed control treatments possessed highly significant effect on dry weight of total annual weeds (g/m^2), root yield and sugar yield (ton/fed.) in both seasons. All weed control treatments decreased dry weight of total - leaved weeds compared to un-weeded (b_5) without significant variance between them, (b_1) decreased dry weight of total-leaved weeds by(99.49 and 99.38%) , (b_2) by (99.34 and 99.43%), (b_3) by (99.07 and 99.53%) and (b_4) by(99.47 and 99.55%) as compared to control (b_5) in the first and second seasons, respectively, on contrary , control treatment (b5) gave highest dry weight of total - leaved weeds of (535.07 and 527.58 g/ m^2) in the first and second seasons, respectively. This effect of weed control treatments could be due to the role of herbicides and hoeing on prevent germination, inhibition growth and eradication of weeds.

Regarding, the effect of weed control treatments on root and sugar yields (ton / fed.), it was concluded that root and sugar yields (ton/fed.) were high significantly affected in both seasons. Hand hoeing twice at 30 and 60 days from planting (b_4) surpassed the other weed control treatments for root yield (RY) of 31.76 and 31.29 (ton/fed.) in the first and second seasons, respectively, without significant deference with (b_2) in the second season, and for sugar yield of 5.44 ton/fed. in the first season without significant deference with b_2 and b_3, 4.75 ton /fed. in the second season without significant deference with b_1, b_2 and b_3, respectively. Such effect can be due to the role of herbicide in decreasing weed competition and hoeing the sugar beet fields is very important not only for weed control but also to create suitable environmental conditions which increasing the sugar beet growth, which reflected in increase average of root yield, either gross and recoverable sugar yield (ton/fed.) and decrease losses sugar yield. These results are in agreement with those obtained by **May (2001), Scepanovic (2007), Deveikyte and Seibutis (2006), Chitband *et al*. (2014) and Nagib (2016)**.

II-2-Effect of weed control treatments on quality parameters:

The effect of weed control treatments was high significant on LS (ton/fed.), AC and Qz % in both seasons, Pol%, SR% and Na% in the first season, LS% and K% in the second one and significant on LS% and Pol% in the first and second season, respectively as shown in Table 3. Weed control treatment b_3 without significant deference with(b_1 , b_2 and b_4) observed the highest Pol % of 20.43 , corrected sugar content (SR %) of 17.64% in the first season and LS % of 3.19% in the second season ,while b_5 without significant deference with(b_3) and b_1 without significant deference with (b_2 , b_3 and b_4) cleared highest LS % of 3.19% and Pol % of 18.66% in the first and second seasons, respectively, as well as b_4 and b_5 recorded favorable values for LS % of 2.73 and 2.97% in the first and second seasons, respectively. On contrary, b_5 recorded lowest Pol% of 18.85 and 17.99%, loss sugar yield (LS) of 0.06 and 0.07 ton/fed. in the first and second seasons, respectively, Qz % of 84.79 in the first season, K% of 4.13%, AC of 5.11 in the second season and highest Na% of 1.72% in the first season. Concerning, b_4 resulted the highest values for loss sugar yield of 0.87 ton/fed. in the first season and 0.98 ton/fed. in second season without significant deference with b_2 and b_3. Moreover, b_2 cleared the lowest Na% of 1.16% in the first season and highest K% of 4.85% without significant deference with b_1, b_3 and b_4 in the second season.

Regarding, The highest values for AC of 2.11 and 7.39 were occurred by b_5 without significant deference with b_3, b_4 and by b_3 without significant deference with b_1, b_2 and b_4 in the first and second seasons, respectively. Meanwhile, b_1 obtained the lowest AC of 1.95 in the first season. Moreover, b_2 (without significant deference with b_1, b_3 and b_4 in first season) and b_5(without significant deference with b_1 in second season) resulted the favorable Qz % of 86.39 and 83.46% respectively, however the lowest Qz % of 82.60% was achieved by b_2 in the second season without significant deference with b_3 and b_4 in the second season. These results are in the same line with those obtained by **Soroka and Gadzieva (2006)**, **Chitband *et al*.**

(2014), **Nagib (2016) and Abd El-Hamed (2019)**

III- Effect of the interaction between fertilization system and weed control treatments on yield and quality of sugar beet as well as associated weeds.

III-1- Effect of the interaction between fertilization system and weed control treatments on weeds and root, sugar yields/ fed.:

Data presented in Table 4 cleared that, the interaction effect was significantly on RSY in the first season only. The highest RSY of 5.63(ton/fed.) cleared by $a_3 \times b_1$ without significant deference with $a_1 \times b_4$, $a_2 \times b_2$, $a_2 \times b_3$, $a_2 \times b_4$, $a_3 \times b_2$ and $a_3 \times b_3$. On the other hand, $a_1 \times b_5$ recorded the lowest RSY of 0.32 (ton/fed.) without significant deference with $a_2 \times b_5$ and $a_3 \times b_5$ in the first season.

III-2- Effect of the interaction between fertilization system and weed control treatments on quality parameters:

Influence of the interaction effect between fertilization system and weed control treatments on quality parameters was highly significant effect on Qz % in both seasons and on Na% and AC in the first one, significantly on LS% in both seasons, Pol%, LS and SR% in the first season as well as K% in the second one. The highest Qz % of 96.38and 84.15% were detected by $a_1 \times b_2$ in the first season and $a_1 \times b_4$ (without significant deference with $a_1 \times b_1$, $a_1 \times b_3$ and $a_3 \times b_5$) in the second season, respectively, while $a_1 \times b_5$ (without significant deference with $a_2 \times b_5$) and $a_3 \times b_2$(without significant deference with $a_3 \times b_1$, $a_3 \times b_2$ and $a_3 \times b_4$) recorded lowest Qz % of 84.08 and81.61% in the first and second seasons ,respectively. Moreover $a_2 \times b_3$ showed the highest SR% of 18.13% (without significant deference with $a_1 \times b_1$, $a_1 \times b_3$, $a_1 \times b_4$, $a_2 \times b_2$, $a_2 \times b_4$, $a_3 \times b_1$, $a_3 \times b_2$ and $a_3 \times b_3$), while $a_2 \times b_5$recorded lowest SR % of 15.62% (without significant deference with $a_1 \times b_5$, $a_3 \times b_4$ and $a_3 \times b_5$) in the first season. In addition, $a_3 \times b_5$ gave lowest AC of 1.88 (without significant deference with $a_1 \times b_1$, $a_1 \times b_2$, $a_1 \times b_4$, $a_2 \times b_1$, $a_2 \times b_2$, $a_3 \times b_1$ and $a_3 \times b_2$) in the first season. The favorable Na% of 0.83 and K% of 3.87% was cleared by $a_1 \times b_2$ (without significant deference with $a_1 \times b_1$, $a_1 \times b_3$ and $a_1 \times b_4$) and $a_3 \times b_5$ (without significant deference with $a_2 \times b_5$) in the first and second seasons, respectively. Moreover, the favorable LS % of 2.65 and 2.91% were cleared by $a_1 \times b_4$(without significant deference with $a_1 \times b_1$, $a_1 \times b_2$, $a_1 \times b_3$, $a_2 \times b_1$, $a_2 \times b_2$, $a_2 \times b_4$, $a_3 \times b_3$, $a_3 \times b_4$ and $a_3 \times b_5$) and $a_2 \times b_5$(without significant deference with $a_1 \times b_4$ and $a_3 \times b_5$) in the first and second seasons ,respectively, meantime, The best Pol % of 20.93% was achieved by $a_2 \times b_3$ (without significant deference with $a_1 \times b_1$, $a_1 \times b_3$, $a_1 \times b_4$, $a_2 \times b_4$, $a_3 \times b_1$, $a_3 \times b_2$and $a_3 \times b_3$),meanwhile, $a_2 \times b_5$ recorded the lowest Pol % of 18.50% (without significant deference with $a_1 \times b_5$, $a_3 \times b_4$, $a_3 \times b_5$). Concerning, $a_3 \times b_1$recoeded greatest RSY of 5.63(ton/fed.) in the first season (without significant deference with $a_1 \times b_4$, $a_2 \times b_2$, $a_2 \times b_3$, $a_2 \times b_4$, $a_3 \times b_2$ and $a_3 \times b_3$), on the other hand $a_1 \times b_5$ gave the lowest LS of 0.06 (ton/fed.) in the first season without significant deference with $a_2 \times b_5$ and $a_3 \times b_5$.

Table (1). Physical and chemical properties of the experimental soil.

Soil chemical properties	Value	Soil physical properties	Value
pH (1:2.5 water)	7.7	Total P (g kg $^{-1}$)	0.56
$CaCO_3$ (g kg^{-1})	17.9	Mineral N (mg kg $^{-1}$)	58.46
CEC (cmol$_c$ kg^{-1})	37.87	F.C. %	42.45
EC (dS m^{-1} at 25 ^{0}C)	1.35	W.P %	13.78
OM (g kg $^{-1}$)	28.61	Sand %	28.9
Total N (g kg $^{-1}$)	1.29	Silt %	32.8
Organic N (g kg $^{-1}$)	0.76	Clay %	38.3
Organic C/N ratio	24.31	Soil texture	Clay loam

Table (2): Effect of fertilization system on yield and quality of sugar beet as well as associated weeds at harvest in 2018/2019 and 2019/2020 seasons.

A- fertilization system	TDW	RY	Pol. %	RSY	LS	SR %	LS %	impurities %			AC	Q_Z %
								K %	Na %	∞- amino-N%		
2018 /2019 season												
a_1	110.15	24.25	19.84	4.21	0.66	17.07	2.76	5.27	1.09	3.11	2.05	83.72
a_2	111.05	24.93	19.87	4.35	0.68	17.10	2.76	4.98	1.39	3.05	2.09	83.03
a_3	108.29	25.45	19.97	4.41	0.72	17.18	2.79	4.93	1.49	3.22	2.00	82.15
F-test	NS	**	NS	NS	**	NS	NS	**	**	*	*	NS
LSD $_{0.05}$	-	0.68	-	-	0.01	-	-	0.18	0.10	0.12	0.06	-
2019 /2020 season												
a_1	102.82	24.52	19.23	3.98	0.77	16.10	3.13	4.81	3.19	1.03	8.24	86.04
a_2	110.05	24.72	18.09	3.72	0.77	15.02	3.07	4.65	3.08	1.36	6.28	86.05
a_3	110.35	25.36	17.77	3.70	0.82	14.60	3.17	4.53	3.45	1.52	5.29	85.99
F-test	NS	*	**	**	**	**	**	*	**	**	**	**
LSD $_{0.05}$	-	0.63	0.38	0.13	0.03	0.35	0.06	0.18	0.10	0.26	0.89	0.34

TDW=Dry weight of total annual weeds (g/m2); RY= Root yield/fed (ton); RSY = Recoverable sugar yield/fed (ton); LS = Loss in sugar yield/fed (ton); SR% = Sugar recovery %; LS% = Loss in sugar yield %; AC= Alkalinity coefficient and QZ% = Quality index%.

Table (3): Effect of some weed control treatments on yield and quality of sugar beet as well as associated weeds at harvest in 2018/2019 and 2019/2020 seasons.

B- weed control treatments	TDW	RY	Pol. %	RSY	LS	SR %	LS %	impurities %			AC	Q_Z %
								K %	Na %	α-amino-N %		
2018 /2019 season												
b_1	2.71	29.71	20.10	5.16	0.81	17.36	2.74	5.07	1.19	3.21	1.95	86.38
b_2	3.55	30.66	20.21	5.35	0.84	17.46	2.75	5.16	1.16	3.11	2.03	86.39
b_3	4.98	30.12	20.43	5.32	0.84	17.64	2.79	5.13	1.31	3.09	2.09	86.34
b_4	2.82	31.76	19.86	5.44	0.87	17.14	2.73	5.03	1.23	3.08	2.04	86.24
b_5	535.07	2.15	18.85	0.34	0.06	15.99	2.86	4.92	1.72	3.15	2.11	84.79
F-test	**	**	**	**	**	**	*	NS	**	NS	**	**
LSD $_{0.05}$	11.18	0.88	0.60	0.24	0.01	0.59	0.09	-	0.13	-	0.08	0.60
2019 /2020 season												
b_1	3.27	30.07	18.66	4.66	0.95	15.51	3.15	4.75	3.20	1.38	6.89	83.10
b_2	2.99	30.78	18.21	4.63	0.97	15.05	3.17	4.85	3.22	1.16	7.29	82.60
b_3	2.46	29.80	18.65	4.60	0.95	15.46	3.19	4.83	3.30	1.16	7.39	82.87
b_4	2.38	31.29	18.31	4.75	0.98	15.17	3.14	4.76	3.21	1.29	6.34	82.79
b_5	527.58	2.37	17.99	0.36	0.07	15.01	2.97	4.13	3.27	1.53	5.11	83.46
F-test	**	**	*	**	**	NS	**	**	NS	NS	**	**
LSD $_{0.05}$	16.01	0.81	0.49	0.17	0.03	-	0.08	0.23	-	-	1.15	0.44

TDW=Dry weight of total annual weeds (g/m2); RY= Root yield/fed (ton); RSY = Recoverable sugar yield/fed (ton); LS = Loss in sugar yield/fed (ton); SR% = Sugar recovery %; LS% = Loss in sugar yield %; AC= Alkalinity coefficient and QZ% = Quality index%.

Table (4): Effect of the interaction between fertilization system and weed control treatments on yield and quality of sugar beet as well as associated weeds in 2018/2019 and 2019/2020 seasons.

interaction of A x B	TDW	RY	Pol. %	RSY	LS	SR %	LS %	impurities %			AC	Q_Z %
								K%	Na %	α-amino-N %		
2018/2019 season												
$a_1 \times b_1$	1.76	28.60	19.90	4.92	0.77	17.19	2.71	5.34	0.85	3.19	1.94	86.38
$a_1 \times b_2$	6.45	30.21	19.77	5.16	0.81	17.08	2.69	5.31	0.83	3.12	1.97	96.38
$a_1 \times b_3$	5.30	29.04	20.30	5.10	0.81	17.52	2.78	5.51	0.90	3.07	2.08	86.32
$a_1 \times b_4$	2.70	31.35	20.46	5.58	0.83	17.81	2.65	5.06	0.98	3.05	1.98	87.05
$a_1 \times b_5$	534.53	2.05	18.76	0.32	0.06	15.77	2.99	5.13	1.88	3.10	2.26	84.08
$a_2 \times b_1$	2.81	29.27	19.56	4.94	0.79	16.87	2.69	5.04	1.11	3.09	1.99	86.25
$a_2 \times b_2$	2.24	30.69	20.27	5.40	0.82	17.61	2.67	4.96	1.14	3.05	2.00	86.84
$a_2 \times b_3$	3.63	30.32	20.93	5.50	0.85	18.13	2.81	4.97	1.54	3.03	2.15	86.59
$a_2 \times b_4$	3.96	32.34	20.07	5.59	0.89	17.31	2.76	4.93	1.44	3.05	2.09	86.19
$a_2 \times b_5$	542.61	2.05	18.50	0.32	0.06	15.62	2.88	5.01	1.71	3.05	2.20	84.40
$a_3 \times b_1$	3.56	31.25	20.83	5.63	0.88	18.02	2.81	4.82	1.61	3.33	1.93	86.51
$a_3 \times b_2$	1.98	31.09	20.60	5.51	0.90	17.71	2.89	5.20	1.52	3.17	2.12	85.96
$a_3 \times b_3$	6.03	30.98	20.06	5.35	0.86	17.28	2.78	4.91	1.49	3.17	2.02	86.13
$a_3 \times b_4$	1.81	31.59	19.07	5.15	0.87	16.30	2.77	5.11	1.27	3.12	2.04	85.13
$a_3 \times b_5$	528.07	2.33	19.30	0.39	0.06	16.58	2.72	4.61	1.57	3.31	1.88	85.89
F-test	NS	NS	*	*	*	*	*	NS	**	NS	**	**
$LSD_{0.05}$	-	-	1.03	0.41	0.02	1.03	0.16	-	0.23	-	0.14	1.04
2019/2020 season												
$a_1 \times b_1$	4.52	29.48	19.62	4.86	0.93	16.48	3.14	4.93	3.14	0.84	9.65	83.99
$a_1 \times b_2$	2.16	30.40	18.97	4.80	0.96	15.80	3.16	5.01	3.12	0.92	9.02	83.32
$a_1 \times b_3$	1.71	28.60	19.80	4.74	0.92	16.58	3.22	5.07	3.24	0.86	9.70	83.75
$a_1 \times b_4$	1.82	31.86	19.24	5.16	0.97	16.19	3.05	4.49	3.20	1.29	6.20	84.15
$a_1 \times b_5$	503.89	2.24	18.53	0.35	0.07	15.45	3.08	4.55	3.24	1.27	6.66	83.37
$a_2 \times b_1$	2.20	29.56	18.57	4.57	0.92	15.47	3.10	4.67	3.04	1.76	5.70	83.29
$a_2 \times b_2$	4.34	31.02	17.90	4.60	0.95	14.83	3.07	4.80	3.00	1.10	7.14	82.86
$a_2 \times b_3$	1.98	29.63	18.30	4.50	0.92	15.20	3.10	4.81	3.06	1.17	6.79	83.06
$a_2 \times b_4$	1.49	30.92	17.90	4.56	0.98	14.75	3.15	5.01	3.04	1.09	7.42	8238
$a_2 \times b_5$	540.22	245	17.80	0.36	0.07	14.87	2.93	3.98	3.26	1.66	4.35	83.55
$a_3 \times b_1$	3.11	31.18	17.80	4.55	1.00	14.60	3.20	4.66	3.41	1.52	5.31	82.01
$a_3 \times b_2$	2.47	30.93	17.77	4.49	1.01	14.51	3.27	4.75	3.53	1.45	5.72	81.61
$a_3 \times b_3$	3.68	3116	17.84	4.55	1.01	14.59	3.24	4.60	3.61	1.45	5.69	81.80
$a_3 \times b_4$	3.85	31.10	17.80	4.53	1.00	14.57	3.23	4.76	3.39	1.51	5.41	81.85
$a_3 \times b_5$	538.64	2.42	17.63	0.36	0.07	14.72	2.91	3.87	3.32	1.67	4.31	83.47
F-test	NS	NS	NS	NS	NS	NS	*	*	NS	NS	NS	**
$LSD_{0.05}$	-	-	-	-	-	-	0.14	0.39	-	-	-	0.75

TDW=Dry weight of total annual weeds (g/m2); RY= Root yield/fed (ton); RSY = Recoverable sugar yield/fed (ton); LS = Loss in sugar yield/fed (ton); SR% = Sugar recovery %; LS% = Loss in sugar yield %; AC= Alkalinity coefficient and QZ% = Quality index%.

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الملخص العربي

تأثير أنظمة التسميد وبعض معاملات مكافحة الحشائش على محصول وجودة بنجر السكر والحشائش المصاحبة له

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أقيمت تجربتان حقليتان بمزرعة خاصة – أبو قرقاص – المنيا – مصرخلال موسمى الزراعة 2018 / 2019 و 2019/ 2020 بهدف دراسة تأثير ثلاث نظم تسميد (100% من التسميد الأزوتى المعدنى الموصى به ، 50% من التسميد الأزوتى المعدنى الموصى به+ الخميرة و50 % من التسميد الأزوتى المعدنى الموصى به+ الخميرة الحمراء) وخمس معاملات مقاومة حشائش(هارنس 84% 500 سم3/ف ، تجرو 27.4% 1 لتر/ف، سفارى 50% 12 جم /ف ، العزيق مرتين و الكنترول) على محصول بنجر السكر وجودته وصفات الحشائش المصاحبة نفذت التجربتان في تصميم القطاعات كاملة العشوائية في ترتيب القطع المنشقة مرة واحدة في ثلاث مكررات ، حيث خصصت القطع الرئيسية لنظم التسميد ، بينما وزعت معاملات مقاومة الحشائش عشوائيا" في القطع الشقية وأكدت النتائج ما يلى :

أظهرت نظم التسميد تأثيرا" معنويا" على معظم صفات الدراسة فيما عدا الوزن الجاف للحشائش الكلية جم /م2 في كلا الموسمين ، السكر المستخلص (طن/ف)، النسبة المئوية للسكر الأبيض، النسبة المئوية للسكر المفقود في المولاس و معامل الجودة في الموسم الأول . أعطى نظام التسميد الثالث أعلى محصول جذور (طن /ف) في كلا الموسمين ،أقل نسبة ألفا أمينو نيتروجين في الموسم الأول وأقل نسبة صوديوم ، أقل نسبة مئوية للسكر المفقود في الموسم الثانى ، بينما أعطى نظام التسميد الأول القيم المفضلة لصفات الجودة في الموسم الثانى.

أظهرت معاملات مقاومة الحشائش تأثيرا" عالى المعنوية على جميع صفات الدراسة عدا ألفا أمينو نيتروجين في كلا الموسمين ، النسبة المئوية للبوتاسيوم في الموسم الأول ، النسبة المئوية للصوديوم والنسبة المئوية للسكر الأبيض في الموسم الثانى، جميع معاملات مقاومة الحشائش أدت إلى خفض الوزن الجاف للحشائش الكلية مقارنة بمعاملة الكنترول دون فروق معنوية بينهم في كلا الموسمين ، المعاملة الثانية والثالثة تفوقتا على باقى معاملات مقاومة الحشائش لصفات الجودة وحاصل الجذور والسكر (طن/ ف).لم يظهر التداخل بين نظم التسميد ومعاملات

مقاومة الحشائش تأثيرات معنوية على الوزن الجاف للحشائش الكلية ومحصول الجذور للفدان في كلا الموسمين ، تأثر السكر المستخلص (طن/ف) ومعظم صفات الجودة معنويا" في الموسم الأول ، وأعطى التفاعل أ1 × ب 2وكذلك أ1 × ب4أفضل معامل جودة 96,38 و 84.15 % في الموسم الأول والثانى على الترتيب

عموما": تحت ظروف هذه الدراسة يمكن التوصية بتسميد محصول بنجر السكر بمعدل 50% من التسميد الأزوتى المعدنى الموصى به مع الخميرة الحمراء ومقاومة الحشائش باستخدام تجرو 27.4% 1 لتر/ف أو سفارى 50% 12 جم /ف لتعظيم الإنتاجية والجودة لبنجر السكر تحت ظروف محافظة المنيا .