J. of Plant Production, Mansoura Univ., Vol. 16 (1):1 - 5, 2025

Journal of Plant Production

Journal homepage & Available online at: www.jpp.journals.ekb.eg

Effect of Different Planting Dates on the Productivity and Quality of Sugar Beet and its Relationship to Nitrogen Fertilization Levels

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ABSTRACT

A study was carried out in the Dakahlia Governorate of Egypt's Kafr Allam Village, Miniat El-Nasr District, during the 2021/2022 and 2022/2023 seasons to evaluate the effect of nitrogen fertilizer rates (50, 75, and 100 kg N/fed) on productivity and quality of sugar beet grown under different planting dates (1st September 1st October, and 1st November). With three replications, the field experiment was conducted using a randomized full-blocks design using a split-plot method. (RCBD). Three planting dates were assigned to the main plots, while the subplots were allocated three nitrogen fertilizer amounts. Regarding the diameter and length of the roots, the percentages of K, Na, alpha-amino nitrogen, sucrose, and quality, When sugar beet was seeded on October 1st, the greatest values were recorded. Each feddan's root, top, and sugar yields were optimized, while the root-to-top ratios were the lowest in both seasons. In both seasons, the highest possible values of root and leaf fresh weights/plant, root length and diameter, K, Na, and Alfa-amino nitrogen percentages, as well as root and top yields/fed, were achieved at a nitrogen fertilizer amount of 100 kg N/fed. The lowest values of root/top ratio, sucrose, and quality, and sugar yield/fed. To reduce nitrogen fertilizer levels and environmental pollution with nitrite while maintaining the highest yield components, root quality parameters, and root, top, and sugar yields/fed, it may be recommended to plant sugar beets on October 1st and fertilize with 75 kg N/fed under the ecological circumstances.

Keywords: sugar beet, planting dates, nitrogen fertilizer levels, productivity, quality.

INTRODUCTION

Together with sugar cane (*Sacchurum officinarum* L.), In Egypt and many other countries, sugar beet (Beta valgaris var. saccharifera L.) is a significant sugar crop. Sugar beet is significant in agriculture as it is used to manufacture a number of items in addition to sugar. Sugar beet has lately acquired relevance as a winter crop in Egypt's agricultural rotation, growing in calcareous, low, salty, alkaline, and rich soils. As a result, sugar beet has emerged as Egypt's primary crop for sugar production. In the 2021/2022 season, the total planted area was approximately 604104 Fadden, and the total yield exceeded 13.557 million tons of roots at an median of 22.442 tons/feddan (FAO,2024).

Climate change is altering plant yield, especially sugar beet agriculture, particularly in Egypt. Changing the planting date is one among the most typical changes in sugar beet cultivation. As a consequence, the planting date is recognized as one of the most crucial aspects impacting growth, yield, juice composition, and quality. Determining sowing to a significant degree on the current climatic conditions and ecological habitats may produce a reliable statement about the effect of climatic circumstances on growth and productivity. Sowing sugar beet at several dates would stretch the supply period of root yield to sugar producers, assuring a longer working season and enhanced sugar production. Therefore, the best strategy for increasing sugar beet yields and quality is to plant them at the right time based on local environmental circumstances (Awadalla et al., 2022). According to Khan et al. (2020), yields and quality indicators differed considerably among planting dates (first October, eleventh October, twenty-first October, first November, and eleventh November). The study of sowing dates found that the 11th of October performed better than all other sowing dates. Awadalla et al. (2022) found that the evaluated planting dates (30 September, 15 October, and 30 October) had a significant impact on the following parameters: root length, root diameter, root fresh weight, sucrose percentage, purity percentage, root and sugar yields in both seasons, and salt percentage in the first season. Mohammed and Xaraman (2023) revealed that early planting on October 1st had a higher value for all of the investigated features when compared to other planting dates (16th and 31st October). Ibrahim et al. (2024) discovered that planting dates had a large influence on sugar beet yield and quality indicators, including sucrose%, Root yield, sugar loss yield, and recovered sugar yield, Na%, K%, α-amino-N%, quality index%, and sugar loss yield. The highest yields of recoverable sugar and roots were obtained from cultivation on October 16. On August 17, early culture yielded the lowest Na%, K%, and α-amino-N% values and the maximum sucrose content during the two growth seasons.

Nitrogen (N) element is essential to a number of plant metabolic activities., including photosynthesis and cell division, and it is an essential component of chlorophyll, protein synthesis, amino acids, nucleotides, phytohormones, nucleic acids, cytokinins, and coenzymes that activate amino acid production (Wang *et al*., 2021). As a consequence, nitrogen has been recognized as one of the most limiting components for sugar beet growth, productivity, and quality. It was responsible for enhancing aboveground vegetative growth and optimizing root growth and extractable sucrose content (Kandil *et al*., 2020; Zarski *et al.*, 2020; Gomaa *et al*., 2022; Abdel-Moneam *et al*., 2023; Elmasry and Al-Maracy, 2023; Badr *et al*., 2024). However, many studies have found that high-rate N fertilizer application causes massive growth of aboveground parts (leaves and crowns), which inhibits the translocation of photosynthetic assimilates from these aboveground parts to storage tubers, resulting in a significant

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DOI: 10.21608/jpp.2025.346498.1423

decrease in sugar beet yield and sucrose concentration. Fertilizing sugar with high levels of N can increase impurities like α-amino-N, -K, and -Na, leading to decreased storage root quality (Wang *et al.*, 2011; Elwan and Helmy, 2018; Mohamed, Hanan *et al*., 2019; Kandil *et al*., 2021; Abdel-Moneam *et al*., 2023; Elmasry and Al-Maracy, 2023; Badr *et al*., 2024). Furthermore, excessive nitrogen fertilizer is costly to farmers and the environment as it enhances the threat of nitrate leaching, pollutes groundwater, and destroys soil quality. In contrast, the under-application of N fertilizer could result in considerably decreased sugar beet output (De Koeijer *et al*., 2003). As a consequence, correct nitrogen fertilizer application by plant N status monitoring could play a crucial role in regulating nitrogen fertilization and preserving sugar beet yield via precision agriculture.

Thus, The aim of this research was to investigate how various planting dates and nitrogen fertilizer concentrations affected the quality and productivity of sugar beets in the Miniat El-Nasr District of the El-Dakahlia-Governorate, Egypt.

MATERIALS AND METHODS

On a particular farm in the Dakahlia Governorate of Egypt's Kafr Allam Village, Miniat El-Nasr District, a study experiment was carried out, during the 2021/2022 and 2022/2023 seasons. The main goal of this study was investigating how nitrogen fertilizer amounts affect sugar beet yield and quality under different sowing date conditions.

Three replicates of A Randomized Complete Block Design (RCBD) were used for the split-plot setup of the field experiment. Three sugar beet planting dates were assigned to the main plots: early planting on September 1st, intermediate planting on October 1st, and late planting on November 1st.

Three different nitrogen fertilizer levels were applied to the subplots., one higher and one lower than the prescribed dosage, in addition to the necessary dose for sugar beets, which was 50, 75, and 100 kg N/fed (66.6, 100.0, and 1.33% from the recommended nitrogen fertilizer dose). Two equal doses of urea (46.0% N) nitrogen fertilizer were used as a dressing on the side: 1/2 prior to the 3rd watering (35 days afterward planting) and the other 1/2 afterward thinning (70 days after planting).

Each 9.6 m^2 subplot had four rides, each measuring 4 m in length and 60 cm apart. The previous crop was maize and rice in the first and second seasons respectively. Prior to soil preparation, From the experimental field, soil samples were randomly selected and taken between 0 and 30 cm below the soil's surface. The chemical and physical parameters of the soil were measured using the method described by Page *et al*. (1982), as shown in Table 1.

Table 1. shows the mechanical and chemical evaluations of the experimental soil locations for the 2021/2022 and 2022/2023 seasons.

Soil properties	2021/2022 season	2022/2023 season
Mechanical analysis:		
Clay %	57.17	56.88
Silt %	33.37	33.58
Sand %	9.46	9.54
Texture	Clayey	Clayey
Chemical analysis:		
pH	7.88	7.82
EC, dS m^{-1} (25 °C)	1.01	1.05
$CaCo_3$ %	4.74	4.72
percentage of organic matter	1.93	1.98
Available nitrogen, ppm	35.91	36.35
Available potassium, ppm	6.55	7.05
Available phosphorus, ppm	308.34	310.25

After two plowings, the experimental field was leveled, compacted, ridged, and separated into units of experimentation. At a rate of 150 kg/fad, calcium superphosphate (15.5% P_2O_5) was supplied to the soil. On one side of the slope, sugar beet seeds were manually spread using the dry sowing technique, three to five seeds per hill, with hills 20 cm apart at the designated planting dates. As soon as the plots were sown, they were watered. To acquire one plant per hill (35,000 plants per fad), plants were clipped 35 days after planting. Throughout the growing season, plants were hand-hoed as required to maintain them fully free of weeds. Except for the characteristics being studied, every other farming method used to grow sugar beet adhered to the Ministry of Agriculture's guidelines. Sugar-beet plants were harvested 210-day afterward establishing in together seasons.

Data recorded:

Five plants were selected at random from the outside ridges of each subplot at maturity (210 days after planting) in order to measure quality parameters the fresh weights of the roots and leaves (g/plant), the root:top ratio, the root length, and the root diameter (cm), among other yield indicators.

In the Bilkas District of the Dakahlia Governorate, the Dakahlia Sugar Company Laboratories tested every evaluated root quality attribute of sugar beet. Every quality parameter that was examined, specifically the percentages of potassium (K) and sodium (Na) in sugar beet roots, were tested using flamephotometry in compliance with ICUMSA (1994). Sugar beet roots' α-N percentage (%) was established using the fluorometric OPA-method (Burba and Georgi, 1976). According to Carruthers and Oldfield (1960), An extract of freshly macerated lead acetate sugar beet roots was used to polarimetrically measure the sucrose percentage (%) in the roots. The Carruthers and Oldfield (1960) method was used to determine the sugar beet root juice's quality percentage (%).

At harvest time (210 days after planting), plants produced from each sub-plot'stwoinner ridges were collected and cleaned. After being removed and weighed in kilograms, the roots and tips were converted to yield estimates (t/fed). yield of sugar (t/fed). It was computed by multiplying the sucrose percentage by the yield of the roots.

The split-plot design analysis of variance (ANOVA) approach, which was suggested by Gomez and Gomez (1984), was used to statistically evaluate all collected data. According to Snedecor and Cochran (1980), The least significant difference (LSD) technique was used to examine differences in treatment means at the 5% level of probability. The analysis of variance (ANOVA) method and the computer program "MSTAT-C" were used for all statistical analyses.

RESULTS AND DISCUSSION

Effect of planting dates:

The study's findings unequivocally demonstrated that the dates of planting—September 1st for early planting, October 1st for intermediate planting, and November 1st for late planting had a significant effect on the yield components, such as root length and diameter, and fresh weights of the roots and leaves per plant (Table 2), quality parameters such as the percentages of sucrose and sodium (Na) in sugar beet root juice (Table 3) and sugar yields/fed (Table 4) in both seasons, while the quality percentages of sugar beet root juice, potassium (K), alfa amino nitrogen (α-N), and root/top ratio were not significantly impacted by planting dates in either season.

In addition to the highest quality fractions in roots of sugar-beet, roots, top, and sugar yields/fed, planting sugar beet on October 1st, the intermediate planting date, generated the largest levels of potassium (K), sodium (Na), alpha-amino nitrogen (α-N), sucrose, fresh weights of roots and leaves per plant, as well as the diameter and length of the roots. In both seasons, the root/top ratio was at its lowest. The first of September was the second-best date for planting in both seasons. Late planting (1 November) produced the highest root/top ratio values in both seasons and lowest fresh weights of roots and foliage per plant, root diameter and length, potassium (K), sodium (Na), alpha-amino nitrogen (α-N), sucrose, and quality percentages in sugar beetroot roots, root, top, and sugar yields/fed.

The temperature, relative humidity, duration of the day, and light intensity throughout this period are examples of the seasonal environmental conditions, are responsible for the improvements in yield components and quality parameters as well as the higher root and sugar yields per fed of sugar beet resulting from the intermediate planting date of October 1st. Rapid germination, establishment, vegetative growth, and development are made possible by these circumstances, thereby enhancing growth, yield components, and quality parameters.

Table 2. Averages of root and foliage fresh weights/plant, root/top ratio, root length and root diameter of sugar beet at harvesting as affected by planting dates and nitrogen fertilizer levels as well as their interaction during 2021/2022 and 2022/2023 seasons.

Characters Treatments		Root fresh weight (g/plant)		Foliage fresh weight (g/plant)		Root/top ratio		Root length (cm)		Root diameter (cm)	
		2021/2022	2022/2023	2021/2022	2022/2023	2021/2022	2022/2023	2021/2022	2022/2023	2021/2022	2022/2023
A. Planting dates:											
1st September		900.4	878.4	451.0	452.9	1.99	1.95	33.85	33.25	11.04	11.31
1st October		948.4	970.2	492.0	499.3	1.93	1.94	34.22	33.32	11.59	11.51
1st November		880.6	847.3	401.2	391.5	2.25	2.18	31.38	31.95	10.70	10.67
F. test		38.2	36.1	36.4	37.1	NS	NS	0.35	0.33	0.24	0.26
B. Nitrogen fertilizer levels:											
50 kg N/fed		858.4	862.8	414.1	419.6	2.12	2.10	32.41	32.46	10.49	10.71
75 kg N/fed		911.7	896.1	445.3	451.3	2.07	1.99	33.01	32.66	11.13	11.20
100 kg N/fed		959.3	937.0	484.8	472.8	1.98	1.98	34.02	33.41	11.72	11.58
LSD at 5 %		35.4	34.9	31.2	32.6	NS	NS	0.31	0.27	0.30	0.27
C. Interaction:											
1st September	50 kg N/fed	846.1	834.3	441.3	439.4	2.11	1.98	33.38	33.00	9.76	10.93
	75 kg N/fed	884.7	890.3	452.8	458.9	1.95	1.94	33.49	33.03	11.08	11.30
	100 kg N/fed	970.5	910.5	458.9	460.3	1.92	1.92	34.70	33.72	12.29	11.70
1st October	50 kg N/fed	860.7	937.1	458.8	475.2	1.96	1.97	34.04	33.16	11.18	10.76
	75 kg N/fed	970.8	956.8	496.1	493.0	1.94	1.94	34.18	33.22	11.78	11.82
	100 kg N/fed	1013.8	1016.8	521.1	529.8	1.88	1.92	34.45	33.59	11.81	11.95
1st November	50 kg N/fed	868.4	817.0	342.2	344.2	2.57	2.41	29.83	31.23	10.53	10.44
	75 kg N/fed	879.8	841.3	387.0	402.1	2.29	2.09	31.38	31.72	10.51	10.49
	100 kg N/fed	893.6	883.5	474.3	428.3	1.88	2.06	32.93	32.92	11.08	11.09
LSD at 5 %		61.4	59.1	54.0	55.8	0.38	0.40	0.54	0.46	0.56	0.47

Table 3. Averages of potassium (K), sodium (Na), Alfa-amino nitrogen (α-N) and sucrose & quality percentages in sugar beet roots at harvesting as affected by planting dates and nitrogen fertilizer levels as well as their interaction during 2021/2022 and 2022/2023 seasons.

Characters Treatments		K(%)		Na(%)		α-N(%)		Sucrose(%)		Quality(%)	
		2021/2022	2022/2023	2021/2022	2022/2023	2021/2022	2022/2023	2021/2022	2022/2023	2021/2022	2022/2023
A. Planting dates:											
1st September		3.06	3.09	2.21	2.49	3.71	3.17	17.16	16.44	85.50	84.90
1st October		3.14	3.17	2.25	2.56	3.82	3.41	17.81	17.14	85.85	85.24
1st November		2.85	2.96	2.16	2.41	3.28	3.02	16.47	16.37	85.84	84.65
F. test		NS	NS	0.06	0.10	NS	NS	0.55	0.50	NS	NS
B. Nitrogen fertilizer levels:											
50 kg N/fed		2.55	2.78	2.03	2.22	3.27	2.97	18.37	17.34	88.15	86.82
75 kg N/fed		3.00	3.01	2.20	2.50	3.72	3.25	16.98	16.56	85.72	84.99
100 kg N/fed		3.49	3.44	2.40	2.74	3.82	3.37	16.09	16.04	83.33	82.98
LSD at 5 %		0.17	0.20	0.04	0.07	0.35	0.32	0.45	0.43	0.66	0.72
C. Interaction:											
1st September	50 kg N/fed	2.49	2.76	2.01	2.19	3.50	2.96	18.90	17.23	88.28	86.70
	75 kg N/fed	2.86	2.98	2.18	2.60	3.75	3.24	16.72	16.22	85.74	84.50
	100 kg N/fed	3.60	3.34	2.51	2.69	3.85	3.30	15.70	16.01	83.69	83.01
1st October	50 kg N/fed	2.73	2.95	2.12	2.34	3.52	3.31	19.06	17.73	88.43	87.31
	75 kg N/fed	3.16	3.13	2.28	2.65	3.90	3.35	17.31	17.23	85.32	84.97
	100 kg N/fed	3.81	3.63	2.37	2.87	4.06	3.57	17.21	16.46	83.80	83.03
1st November	50 kg N/fed	2.45	2.62	1.96	2.12	2.79	2.65	17.14	17.07	87.75	86.45
	75 kg N/fed	2.99	2.92	2.14	2.25	3.24	3.12	16.91	16.25	86.09	85.50
	100 kg N/fed	3.07	3.34	2.34	2.68	3.81	3.29	15.36	15.66	82.49	82.91
LSD at 5 %		0.30	0.40	0.07	0.12	NS	NS	0.90	0.85	NS	NS

Table 4. Averages of root, top and sugar yields/fed at harvesting as affected by planting dates and nitrogen fertilizer levels as well as their interaction during 2021/2022 and 2022/2023 seasons.

Characters		Root yield (t/fed)		Top yield (t/fed)		Sugar yield (t/fed)	
Treatments		2021/2022	2022/2023	2021/2022	2022/2023	2021/2022	2022/2023
A. Planting dates:							
1st September		27.866	30.802	16.522	18.354	4.785	5.040
1st October		28.330	33.529	17.393	18.482	5.040	5.747
1st November		26.520	28.655	15.254	17.213	4.362	4.708
F. test		0.489	0.462	0.324	0.318	0.173	0.188
B. Nitrogen fertilizer levels:							
50 kg N/fed		26.822	30.484	15.377	17.003	4.714	5.161
75 kg N/fed		27.766	31.105	16.588	18.050	4.939	5.293
100 kg N/fed		28.128	31.397	17.205	18.996	4.533	5.041
LSD at 5 %		0.428	0.417	0.327	0.313	0.150	0.131
C. Interaction:							
1st September	50 kg N/fed	27.633	30.442	15.267	17.425	4.364	4.908
	75 kg N/fed	27.787	30.625	16.900	18.773	5.373	5.245
	100 kg N/fed	28.177	31.338	17.400	18.865	4.620	4.967
1st October	50 kg N/fed	27.526	33.468	16.467	17.225	4.898	5.533
	75 kg N/fed	28.305	33.501	17.797	18.863	5.201	5.934
	100 kg N/fed	29.158	33.617	17.915	19.358	5.020	5.773
1st November	50 kg N/fed	24.763	27.541	14.397	16.358	4.216	4.681
	75 kg N/fed	27.359	29.187	14.567	16.515	4.625	4.743
	100 kg N/fed	27.439	29.238	16.800	18.766	4.244	4.701
LSD at 5 %		0.740	0.723	0.646	0.623	0.239	0.227

These conclusions were reliable with those published by Khan *et al.* (2020), Awadalla *et al.* (2022), Enikiev *et al.* (2022), Mohammed and Xaraman (2023), and Ibrahim *et al.* (2024).

Impact of quantities of nitrogen fertilizer:

Significant impacts on sugar beet, alfa amino nitrogen (α-N), potassium (K), sodium (Na), sucrose, root length and diameter, and fresh weights of roots and leaves per plant and quality percentages (Table 2), potassium (K), sodium (Na), alfa amino nitrogen (α-N), sucrose, and quality percentages of sugar beet root juice (Table 3), and roots, top, and sugar yields/fed (Table 4) were detected by statistical analysis of the data collected covers the subjects of comprehensible yields/fed, quality factors, and yield components.

Greater percentages of alpha-amino nitrogen (α-N), potassium (K), sodium (Na), root length and diameter, and fresh weights of roots and leaves per plant in sugar beet root juice, root and top yields/fed, and lower root/top ratio, sucrose and quality percentages of sugar beet roots, and sugar yield/fed were the results of increasing nitrogen fertilizer to 100 kg N/fed (1.33% of the recommended dose). In terms of its impact on yield components and quality parameters, as well as roots and sugar beet yields/fed, fertilizing sugar-beet plants with 75 kg-N/fed (100.0% of the recommended nitrogen fertilizer dose) came in second place after fertilizing with 1.33% of the recommended nitrogen fertilizer dose. This method also produced the highest sugar yield/fed values in both seasons. Reduced fresh weights of roots and foliage per plant, root length and diameter, proportions of potassium (K), sodium (Na), and alpha-amino nitrogen (α-N) in sugar beet root juice, and root and top yields per feeding, and higher root/top ratio, sucrose, and quality percentages of sugar beet roots were the results of fertilizing sugar beet plants with 50 kg N/fed (66.6% of the recommended nitrogen fertilizer dose).

Because nitrogen is essential for the production of metabolites, the activation of enzymes, and the improvement of root length, diameter, and fresh weight—and ultimately, root and sugar yields per unit area—it is possible to explain the increases in yield components and yield characteristics brought about by nitrogen fertilization.

In addition to increasing root size, including weight and diameter, and increasing the amount of water and non-sucrose chemicals in the tissue, over-application of nitrogen can also result in a decline in quality parameters. such as proteins and alpha-amino acids, which causes the sucrose content and purity percentage of roots to drop. According to Wang *et al*. (2011), Elwan and Helmy (2018), Nemeata Alla *et al*. (2018), Mohamed, Hanan *et al*. (2019), Kandil *et al*. (2020), Zarski *et al*. (2020), Kandil *et al*. (2021), Gomaa *et al*. (2022), Abdel-Moneam *et al*. (2023), Elmasry and Al-Maracy (2023), and Badr *et al*. (2024), these results corroborated the findings.

Effect of interaction:

Root and foliage fresh weights per plant, root-to-top ratio, and root length and diameter were the yield components most impacted by the planting dates and amounts of nitrogen fertilizer. (Table 2). They also had an impact on quality indicators such as the sugar beet's potassium (K), sodium (Na), alfa-amino nitrogen (α-N), and sucrose content, root juice (Table 3), in addition to sugar, root, and top yields per feddan (Table 4) in both seasons. However, neither season's planting dates had a substantial impact on the quality percentages of sugar beet root juice.

Planting sugar beet at an intermediate planting date (1st October) and fertilizing with 100 kg N/fed (1.33% of recommended nitrogen fertilizer dose) resulted in the highest values of root and foliage fresh weights/plant, root length and diameter, potassium (K), sodium (Na), and Alfa-amino nitrogen (α-N) percentages of sugar beet root juice, root and top yields/fed, and the lowest values of root/top ratio (Tables 2, 3, and 4). Sugar beet planted on an intermediate planting date (1st October) and fertilized with 75 kg N/fed (100.0% of the required nitrogen fertilizer dosage) had the maximum sugar yield/fed and after the treatment, it was the second-best interaction treatment. in both seasons. Planting sugar beet late (1st November) and fertilizing with 50 kg N/fed (66.6% of recommended nitrogen fertilizer dose) occasioned in the lowest sugar-beet root-juice, root, top, and sugar yields/fed values, as well as the lowest root:top ratio values in both seasons, as well as the lowest values of fresh weights of roots and foliage per plant, root length and diameter, potassium (K), sodium (Na), and alpha-amino nitrogen (α-N) proportions.

CONCLUSION

From this study we can recommend that planting sugar beet on October 1st and applying 75 kg N/fed for obtain the highest root, foliage and sugar yields per fed yield and for reducing nitrogen fertilizer levels and environmental pollution under the environmental circumstances at Miniat El-Nasr District, Dakahlia Governorate, Egypt.

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تأثير مستويات التسميد النيتروجيني على إنتاجية وجودة بنجر السكر تحت مواعيد زراعة مختلفة

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الملخص

أجريت تجربة بحثية في قرية كفر علام، مركز منية النصر، محافظة الدقهلية، مصر، خلال موسمي 2022/2021 و2023/2022 لدراسة تأثير مستويات السماد النيتروجيني (50 و75 و100 كجم نيتروجين/فدان) على إنتاجية وجودة بنجر السكر المنزرع تحت ظروف مواعيد زراعة مختلفة (1 سبتمبر و1 أكتوبر و1 نوفمبر). أجريت التجربة الحقلية بنظام القطع المنشقة في تصميم القطاعات الكاملة العشوائية (RCBD) في ثلاث مكررات. تم تخصيص القطع الرئيسية لمواعيد الزراعة، بينما خصصت القطع الشقية لمستويات السماد النيتروجيني. أسفرت زراعة بنجر السكر في 1 أكتوبر عن أعلى القيم لصفات الوزن الطازج للجذور والعرش/نبات، وطول الجذر وقطره، والنسبة المئوية للبوتاسيوم والصوديوم وألفا أمينو نيتروجين والسكروز والجودة، محصول الجذر والعرش والسكر/فدان وأقل القيم لنسبة الجذر إلى العرش في كلا الموسمين. أدت زيادة مستوى التسميد النيتروجيني حتى 100 كجم نيتروجين/فدان للحصول على أعلى القيم لصفات الوزن الطازج للجذور والعرش/نبات، طول الجذر وقطره، والنسبة المئوية للبوتاسيوم والصوديوم وألفا أمينو نيتروجين ، محصول الجذور والعرش/فدان، فضلاً عن أقل القيم لنسبة الجذور إلى العروش، النسبة المئوية للسكروز والجودة ومحصول السكر/فدان في كلا الموسمين.يمكن التوصية بزراعة بنجر السكر في الأول من الأول من أكتوبر والتسميد بـ 75 كجم نيتروجين/فدان تحت الظروف البيئية لمنطقة منية النصر، محافظة الدقهلية، مصر وذلك لتقليل مستوى التسميد النيتروجيني والحفاظ على أعلى محصول من الجذور والعرش والسكر/فدان وأفضل صفات الجودة للجذر .