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INFLUENCE OF PLANTING AND HARVEST DATES ON THE PRODUCTIVITY AND STORAGE ABILITY OF TWO SWEET POTATO CULTIVARS TO FACE THE CLIMATE CHANGES.

1-GROWTH AND PRODUCTIVITY

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ABSTRACT

Sweet potato as one of the most important tuber crops of tropical and sub-tropical countries, was chosen as a model to study the effect of climate change in the form of high temperatures on crop production. Two sweet potato cultivars (Menofia and Mabrouka) were planted in two different dates [23 April (the current recommended planting date) and 29 July (scenario planting date for climate change)] and harvested after 155 and 169 days. Planting in April caused a significant higher number of storage roots per plant, higher total and unmarketable yield, and greater physical characters of storage roots than those obtained from July planting date. Climate change, by shifting planting date to hot month, adversely affected growth, physical characters of storage roots and yield characters as compared to the recommended planting date. Menofia "showed significantly higher values of yield characters, higher carotenoids and dry matter as compared to "Mabroka", while "Mabrouka" significantly surpassed "Menofia ' in the most vegetative growth characters. Harvesting sweet potato at 169 days after planting led to significant vigorous vegetative growth, greater yield accompanied with a significant increase in storage roots characters as compared with those harvested after 155 days.

Keywords: Cultivars, Harvesting Dates, Planting Dates, Storage Roots, Sweet Potato, Climate change

INTRODUCTION

For global food security, sustainable development, and the eradication of poverty, climate change is a serious issue. Additionally, heat stress brought on by rising temperatures is an issue for agriculture in many parts of the world, particularly in recent years **(Birch et al., 2012)**. Temporary or ongoing exposure to high temperatures causes physiological, morpho-anatomical, and biochemical changes in plants that have an impact on their growth and development and reduce yields **(Wahid et al., 2007; Hancock et al., 2014).** sweet potato (*Ipomoea batatas* (L.) Lam.), is a member of the Convolvulaceae family of root vegetables. Sweet potatoes are cultivated on about 7.4 million hectares around the world **(FAOSTAT, 2022)** with an average yield of about 12.1 tons per hectare. In Egypt's sweet potato crop was grown on an area of over 13154 ha in 2020, producing roughly 450985 tons **(FAOSTAT, 2022).** Throughout the growing season, warm air temperatures (between 24 and 35 °C) are ideal for sweet potato growth. Sweet potatoes need soil that is between 16 and 29 degrees Celsius and air that is between 18 and 35 degrees Celsius to grow well **(Romero & Baigorria, 2008).** At mid- and late-season high temperatures (35°/27° and 40°/32° C) encouraged more shoot but less root growth, which had an impact on the final storage root production. Up to 30°/22°C, storage root biomass grew as the temperature rose; however, at 35°/27°C and 40°/32°C, it decreased by 11% and 90%, respectively **(Gajanayake et al., 2015).** When it's not raining and the temperature is higher than 5°C, sweet potatoes should be harvested **(Mbah & Okoro, 2015).** Sweet potatoes are used as the primary food source in many nations due to their high nutritional value, short growth cycle, and capacity for survival in a variety of agro-ecologies, marginal lands, and water stress conditions. They are also highly productive and adaptable due to their short growth cycle **(Sawicka et al., 2018; Marczak, et al., 2020).**

The timing of planting is important for plant growth and increasing crop and vegetable yield. This is accomplished by giving plants the ideal climatic conditions (temperatures, light intensity, irrigation, etc.), which increases the overall yield or profit. Crops may also be produced at times that are near to the ideal times in an effort to increase their prices and yield **(Dash et al., 2018).** Researchers are compelled by climate change to examine the effects of such change on the production of various crops and select new planting dates to prevent any harm to the plants. According to **EL-Anany (2021)**, more research is still needed on sweet potato plants in order to extend the time that the crop is available on the market without compromising the quality of the storage roots. This necessitates researching the ideal planting dates for crops to appear at ideal times while simultaneously providing for as much storage time as is practical. Additionally, choosing a good planting date for sweet potatoes should ensure a good harvesting date that results in a high yield and great quality. Prior research has demonstrated the significance of sweet potato harvesting date on final yield and chemical and physical traits (**Wees et al., 2016;**

Ojimelukwe et al., 2018, Bararyenya et al., 2020; Rosero et al., 2020). The right time to harvest a crop, however, varies depending on the variety and the local climate. While some genotypes exhibited early onset and a rise in bulking, others exhibited late initiation **(Wees et al., 2016; Ojimelukwe et al., 2018, Bararyenya et al., 2020; Rosero et al., 2020).**

The objective of the current study is to ascertain the impact of climate change in the form of high temperatures (through planting in July, which is a scenario planting date for climate change) and harvest dates on growth, yield, and quality of two sweet potato cultivars.

Materials and Methods

Two experiments were conducted in two years (2019 and 2020) at Agricultural Experimental Station, Faculty of Agricultural, Cairo University, Giza. Each experiment included three factors, the main plot was two different planting dates (on April, 23 and July, 29), and the sub plot was two cultivars; namely Mabrouka and Menofia, while the sub-sub plot was two different harvest dates (after 155 and 169 days from planting the stem cuttings in the field). Middle stem cuttings 30 cm long were planted in rows at a distance of 25 cm apart. Each plot consisted of 5 rows, each row was 4 m in length and 70 cm in width. Each plot area was (14 m^2). Cultural practices of sweet potato production were carried out as recommended by the Egyptian Ministry of Agriculture. The Central Laboratory for Agricultural Climate (CLAC), ARC provided the climatic data of the Agricultural Experimental Station, Faculty of Agricultural, Cairo University, Giza. area as shown in (Fig. 1).

Recorded data

At harvest date (after 155 and 169 days from planting the stem cuttings), at first, five plants were randomly harvested from different five rows in each plot, to record the vegetative growth characters, chlorophyll reading and number of storage roots per plant. Thereafter, all plants in each plot were harvested to estimate the roots yield traits.

A-Vegetative growth parameters

Plant length, number of branches, leaves number, leaf area, fresh weight of leaves and stem and Chlorophyll reading. Chlorophyll reading was measured in the most recently fully expanded leaf of the four central plants in each plot using a SPAD-501 plus Minolta Chlorophyll Meter. Samples of 100 grams were taken from roots, leaves and stems were taken and dried in oven at 70 ^{0}C for three days until a constant weight, to determine the dry matter of leaves, and stem.

B-Physical root characters

The harvested 5 plants from each plot were taken to assess the following traits:

- **Number of storage roots per plant**

Physical characters of marketable storage roots (>150 g), namely, average fresh weight of roots (g), length and diameter (cm) of 10 storage roots.

- **Dry matter of storage roots:** as previously described.

C-Yield traits

Storage roots harvested from the remained plants in the five rows of each plot were weighed. Thereafter, harvested tubers of sweet potato were classified according to average weight of storage tubers into two size classes:

- >150 g - marketable yield of tubers,
- <150 g - non-marketable yield of tubers.

- Total yield/fed of storage roots was calculated as summation of marketable and non-marketable yield of 4 rows, then they were calculated as ton/fed.

D-Chemical constituents and quality:

Chemical constituents of storage roots were analyzed at the end of harvest as follows:

1. Concentrations of N, P, K, Ca, Fe and Zn in sweet potato storage roots were determined in the dried materials at harvest. The determinations were carried out as described by **Kalra (1998)** using the modified-micro-Kjeldahl method for total nitrogen, the chlorostannous molybdophosphoric blue color method for phosphorus, the flame photometer apparatus (CORNING M 410, Germany) for potassium, while for calcium, iron and zinc determinations, Atomic Absorption Spectrophotometer with air-acetylene, fuel (Pye Unicam, model SP-1900, US) was used.
2. **Carbohydrates** were determined calorimetrically as described by **Duboies *et al*. (1956).**
3. **Carotenoids** were extracted by N,N-dimethylformamide from storage roots. Thereafter, they were determinate according to the methods of **Moran (1982).**

RESULTS

Effect of planting dates, cultivars, harvest dates and their interactions on the vegetative growth of sweet potato plants

The effects of cultivars, planting dates, harvest dates and their interactions on vegetative growth of sweet potato plants are shown in Tables 1 and 2. About planting date, planting sweet potato stem cutting in April showed significantly greater values of all vegetative growth traits (plant length, leaves number, leaves fresh weight, leaf area, chlorophyll reading and stems fresh weight) in both seasons and number of branches in the first season, as compared with planting in July.

"Mabrouka" significantly surpassed "Menofia ' in number of leaves, leaves area, leaves fresh weight, stems fresh weight, and leaves chlorophyll reading in both seasons, regardless planting date, as well as in number of branches in the first planting date in the second season, and leaf area in the first date in both seasons. In contrast, the length of the plants of "Menofia" was significantly greater than those in "Mabrouka" in both seasons, regardless planting date.

All vegetative growth characteristics (plant length, number of leaves per plant, fresh weight of leaves, number of branches, stems fresh weight and leaf area), and leaves chlorophyll reading were greater at the second harvest date (169 days after planting) than those of the first one (155 days after planting). These results were recorded within both cultivars and at both planting dates in

both seasons, with significant differences in the most of traits.

Concerning interaction among planting dates, cultivars and harvest dates, "Menofia " grown in the first planting date and harvested in the second date showed the tallest plants in both seasons , and highest number of branches in the first season, while "Mabrouka" grown at the first planting date and harvested in the second date showed the highest number of branches in the second season as well as the greatest leaves number and fresh leaves weight, leaves area, leaves chlorophyll reading and stems fresh weight in both seasons.

Effect of planting dates, cultivars, harvest dates and their interactions on marketable, unmarketable and total yield

As shown in Table 3, cultivars, planting dates, harvest dates and all their interactions had significant effect on yield and all yield components. Concerning planting date, growing sweet potato in the second planting date (July) caused a significant increase in marketable yield in the first season, but a significant lower unmarketable and total yield in both seasons as compared with those grown in the first planting date (April).

"Menofia " significantly exceeded "Mabrouka" in marketable and total yield in both planting dates and in unmarketable yield in the first planting date in both seasons. On the contrary, the unmarketable yield was higher in "Mabrouka" comparing to "Menofia " in the second planting date.

Harvesting sweet potato, 169 days after planting produced significantly greater unmarketable and total yield as compared with harvesting after 155 days; these results were true in both planting dates and both cultivars in both seasons. On the other hand, harvest dates showed no influence marketable yield in both cultivars, but the second harvesting date in the first planting date, and the first harvest date in the second planting showed a significant a higher marketable yield in the first season.

The interaction among the three studied factors revealed that "Menofia " was significantly superior to “Mabrouka” all yield traits, where it showed the highest value of marketable yield in the second harvest of the second planting date in the first season and in the first harvest of the first planting date in the second season, as well as the greatest unmarketable and total yield in the second harvest of the first planting date in both seasons.

Effect of planting dates, cultivars, harvest dates and their interaction on physical characters of storage roots:

The effects of cultivars, planting dates, harvest dates and their interactions on vegetative growth are shown in (Table 4). Concerning planting dates, plants grown in the first planting date had greater values of all storage roots physical characters (length, diameter, fresh weight) and number of storage roots per plant as compared to those grown in the second planting date.

"Mabrouka" significantly surpassed "Menofia" in storage roots diameter and storage roots fresh weight in both planting dates and in storage roots length in the second planting date in both seasons. On the other hand, storage roots number per plant was significantly

higher in "Menofia " as compared with "Mabrouka" in both planting dates.

Plants harvested after 169 days led to a significant increase in storage roots diameter and storage roots fresh weight as compared with those harvested after 155 days. These findings were true in both planting dates and in both cultivars. Also, plants harvested after 169 days led to longer storage roots in "Menofia " in the second season and in "Mabrouka" in both seasons as well as higher number of storage roots per plant in "Mabrouka" in the second season. On the other hand, plants harvested in the second harvest date and produced planted in the second planting date showed significant increase in storage roots length in both seasons and in storage roots number per plant in the second season.

Concerning the interaction among cultivars, planting date and harvest date, the longest storage roots was produced by "Menofia " grown in the first planting date and harvested in the first date in both seasons and in "Mabrouka" grown in any planting date and harvested in the second date in both seasons.

The greatest storage roots diameter and fresh weight were observed in "Mabrouka" grown in the first planting date and harvested in the second date. The highest number of storage roots per plant was recorded in "Menofia " grown in the first planting date regardless harvest date.

Effect of planting dates, cultivars, harvest dates and their interaction on dry matter of leaves, stems and storage roots

As presented in Table (5) the data cleared the effect of planting dates, cultivars, harvest dates and their interaction on dry matter of leaves, stems and storage roots. With regard to planting date, the greater leaves dry matter was achieved in plants grown in the second planting date as compared with those grown in the first planting date in both seasons, while the greater stems dry matter was achieved in plants grown in the first planting date as compared with those grown in the second planting date in the second season, but there were no significant differences between both planting dates concerning storage roots dry matter.

Leaves dry matter was significantly higher in "Menofia " as compared to "Mabrouka" in both planting dates, while stems and storage roots dry matter were significantly higher in "Mabrouka" as compared to "Menofia " in the first planting date and only in the second planting date concerning stems dry matter in the second season.

Harvested plants after 169 days had greater leaves and stems, storage roots dry matter than those harvested after 155 days within any planting date and within any cultivar.

Concerning the interaction among planting date, cultivars and harvest date, the greatest leaves dry matter was achieved in Menofia cultivar grown in the second planting date and harvested after 169 days. On the other hand, the greatest dry matter of stems and storage roots was achieved in Mabrouka cultivar grown in the first planting date and harvested after 169 days.

Effect of planting dates, cultivars, harvest dates and their interaction on chemical components of storage roots

Effect of planting dates, cultivars, harvest dates and their interaction on chemical components of storage roots is shown in Table 6 and 7. All treatments had no any significant effect on the mineral and carbohydrates content of storage roots. On the other hand, the effect of planting dates, harvesting dates and cultivars as well as their interactions on carotenoids contents of storage roots were significant in both seasons. Plants grown at the planting first date (in April) had a higher carotenoids content as compared with those cultivated at the second planting date (in July). "Menofia "contained higher carotenoids as compared with "Mabrouka". The interaction of planting date and cultivars on carotenoid content was significant. "Menofia " surpassed "Mabrouka" in carotenoid content in April planting in both seasons.

Plants harvested 169 after planting had a higher carotenoids content as compared to those harvested 155 after planting. These results were also registered in both cultivars and at the first planting date (April), while the differences between the two harvesting dates were not significant at the second planting date (July).

The interaction among planting dates, cultivars and harvesting dates was significant. Menofia " grown in the first planting date (April) and harvested late 169 after planting had the greatest content of carotenoids, while the lowest content was detected in also in the same cultivar, i. e.,"Menofia " but grown in the second planting date (July) and harvested early 155 after planting.

DISCUSSION

Planting sweet potato in April showed significantly greater values of all vegetative growth traits (plant length, number of branches number of leaves, leaves fresh weight, leaf area, chlorophyll reading and stems fresh weight) as compared with planting in July. These results might be due to favorable climatic conditions during April planting.

The vegetative growth in the first planting date was vigorous throughout the plant growth. Thereafter, when the temperature was decreased in September, this forced the plants to produce good storage roots. In contrast, the high temperature during second planting date caused weak vegetative growth throughout the plant life. These findings are in line with those of **Mishra et al. (2019)**, who compared among three planting dates (9 August, 20 July, and 30 July) on the yield of sweet potatoes and found that planting on August 9 gave the highest yield which was attributed to the lower temperatures during this planting as compared to the other two planting dates. In the present study, the maximum and minimum temperature of 1st and 2nd date of planting were 42.24^{0}C and 15.60^{0}C and 42.68^{0}C and 14.40^{0}C in the first season, where they were 42.24^{0}C and 4.49 ^{0}C and 42.68^{0}C and 7.37^{0}C in the second season. Similar findings were recently published by **EL-Anany (2021)**, who found that planting in the first month of April recorded significantly the highest values for all vegetative features, followed by planting in the first month of June and planting in the first month of August. The compatibility and appropriateness of environmental

elements (temperature and humidity) for the cultivation process and the beginning of growth that led to the increase in some features may be the cause of the growth intensifying during the first date (chlorophyll, leaf area, stem and leaves fresh weight). These outcomes align with what was observed by **El-Anany (2021).**

Planting sweet potato cutting in July caused a significantly lower total and unmarketable yield in both seasons as compared with those grown in April. The higher total and unmarketable yield in April planting date was accompanied with significant increase in the values of all physical characters of storage roots and number of storage roots per plant results may the first planting date. Similarly, marketable yield of storage roots was higher in July planting in the first season, as compared with April planting. The higher value of total yield and the dimensions of storage roots may be due to the favorite weather conditions prevailed during root formation in April planting. In contrast, the low storage yield in July planting, may be unfavorite weather conditions prevailed the rainy weather and mild temperatures during root formation in November and December, where the temperatures were 26.60˚C/24.25˚C, and 26.27˚C/27.14˚C, in the first and second season, respectively). These conditions encouraged producing new leaves and delayed formation and enlargement of root. The high yield of planting in April is consistent with the findings of **El-Anany (2021)**, who discovered that planting in April recorded significantly higher values for all vegetative features than planting in June or August. The same findings of **Mishra et al., (2019), Meena (2020) and Allolli et al., (2011)** were attributed to the compatibility of climatic conditions with requirements of sweet potato plants. However, **Mishra et al., (2019)** discovered that the lowest yield was attained following periods of intense rain. Similar to this, **Rosero et al. (2020)** showed that while there is an increase in dry matter in longer harvests (in orange fleshed sweet potato genotypes up to 120 DAP), the presence of preharvest rain is still a factor.

"Mabrouka" significantly surpassed "Menofia ' in the most vegetative growth characters, leaves chlorophyll reading, physical characters of storage roots, and unmarketable yield. In contrast, " Menofia "showed significantly higher values of plant length, marketable and total yield than those in "Mabrouka". The superior performance of " Menofia "over "Mabrouka" in marketable and total yield could imply that this cultivar was more suitable than the other one for cultivation in Giza. Also, these differences among cultivars are attributed to genetical factors. The current findings are consistent with those reported by **Marzouk et al., (2011), Gharib et al., (2019)** in Egypt, **Gebremeskel et al., (2018)** in Ethiopia and Researchers from Turkey **(Karan & Sanli, 2021),** and Bangladesh **(Hossain et al., 2022)** who observed that sweet potato cultivars varied greatly in vegetative development, physical and chemical properties of storage roots, and yields. A significant difference in total yields between sweet potato cultivars was noticed, and this difference increased as root weight and leaf photosynthesis

increased. Similar to how the dry matter of the sweet potato's leaf, stem, and storage roots varied by variety **(Lewthwaite & Triggs 2000).**

All vegetative growth characters and leaves chlorophyll reading were greater at the second harvest date (169 days after planting) than those of the first one (155 days after planting). Also, harvesting sweet potato 169 days after planting (second harvest date) led generally to vigorous vegetative growth and significantly greater yield marketable, unmarketable and total yield) a companied with a significant increase in storage roots characters (diameter length and fresh weight) as compared with those harvested after 155 days (first harvest day). These results confirmed the findings of **Emam & Attia (2010), Wees et al. (2016), and Bararyenya et al. (2020)**, who noted that sweet potatoes need to grow for a longer time to produce a higher yield of store roots. Furthermore, **Emam & Attia (2010)** found that by postponing the harvest, average root weight, root length, and root diameter steadily grew, increasing total and marketable. **Lewthwaite & Triggs (2000) and Emam & Attia (2010)** observed that postponing harvest time resulted in increased root dry matter accumulation. **Marwaha (1998)** noted that the dry matter content increases more slowly as growth matures because the principal storage roots' growth is mostly performed by cell elongation, which results in a relatively modest accumulation of dry matter and may begin after vegetative growth stops. **Rosero et al. (2020)** recorded a rise in the dry matter content in harvests that lasted longer (in orange fleshed genotypes up to 120 DAP).

Concerning effect of planting dates, cultivars, harvest dates and their interaction on chemical components of storage roots revealed that treatments had no any significant effect on the mineral and carbohydrates content of storage roots, while they had significant effect on carotenoids contents of storage roots. Plants grown at the first date planting (in April) had a higher carotenoids content as compared with those cultivated at the second planting date (in July).

"Menofia "contained higher carotenoids as compared with "Mabrouka". This result was also noticed in April planting in both seasons. Several researchers recorded variation in carotenoids content in the roots of different sweet potato cultivars (**Mitra et al., 2010; Kalu et al., 2017, Azure et al., 2017).** Plants harvested 169 after planting had a higher carotenoids content as compared to those harvested 155 after planting. These results were also registered in both cultivars and at the first planting date (April). Similar results were reported by **Azure et al. (2017).** However, when **Mitra et al.., (2010)** compared among harvested three harvesting dates, namely, 90, 105 and 120 d after planting, in Fifteen potential cultivars of orange fleshed sweet potato, they found that carotene content tended to increase only up to 105 DAP. On the other hand, **Kalu et al. (2017)** indicted that there was significant interaction between harvesting dates and cultivars, where the sweet potato cultivars reacted differently to the different harvesting dates.

The interaction among planting dates, cultivars and harvesting dates was

significant. "Menofia " grown in the first planting date (April) and harvested late 169 after planting had the greatest content of carotenoids, while the lowest content was detected in also in the same cultivar, i. e.,"Menofia " but grown in the second planting date (July) and harvested late 155 after planting. The present results revealed that "Menofia" is significantly affected by the different planting and harvesting dates.

Conclusion: Sweet potato development and yield characteristics are negatively impacted by climate change by moving planting dates to hot months. In addition to choose the right cultivar, there are additional agricultural methods that should be used to combat climate change in order to promote healthy vegetative development and prevent very late harvests during rainy or extremely cold weather that would negatively impact the yield and quality. It is strongly recommended to harvest crops later to ensure a bigger yield and better quality of storage roots both at harvest and while being stored.

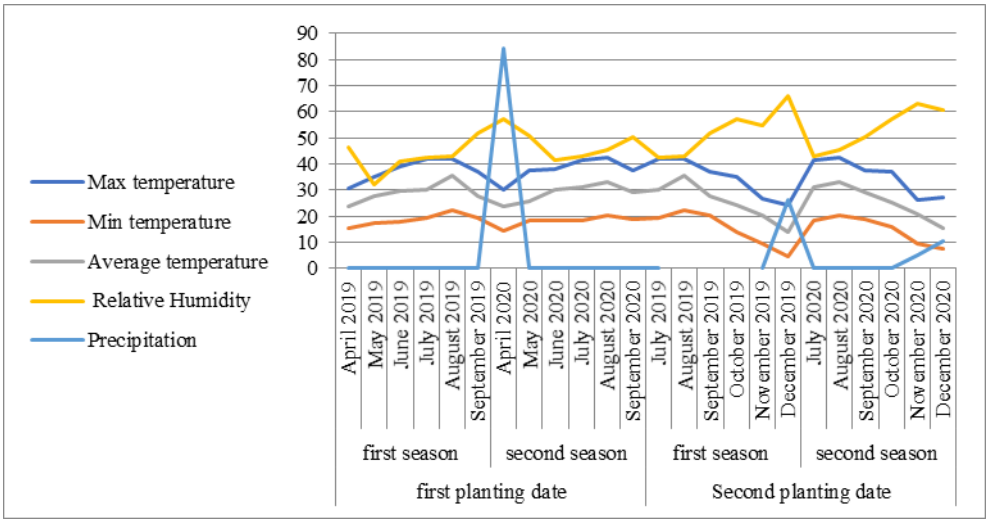

Fig. 1: Monthly minimum, maximum and average temperature, (°C), average relative humidity (%) and precipitation.

Table 1. Effect of planting dates, cultivars, harvest dates and their interactions on vegetative growth characters of sweet potato

Planting date	Cultivars	Harvest date	Plant length (cm)		Number of branches		Leaves number		Leaves fresh weight (gm.)	
			First season	Second season	First season	Second season	First season	Second season	First season	Second season
23 April			163 a	151.67 a	12.33 a	9.08 a	184.33 a	177.42 a	226.83 a	221.58 a
27 July			155.33 b	148.08 b	10.08 b	8.92 a	81.42 b	77.17 b	138.83 b	132.75 b
LSD			3.95	0.61	1.06	N.S	2.95	2.72	3.30	3.34
	Munofia		166 a	152.33 a	11.33 a	8.00 b	126.83 b	121.58 b	122.75 b	115.58 b
	Mabroka		152.33 b	147.42 b	11.08 a	10.00 a	138.92 a	133.00 a	242.92 a	238.75 a
LSD			1.79	2.18	N.S	1.64	1.29	3.99	3.94	3.74
23 April	Munofia		173.17 a	152.83 a	12.83 a	7.50 b	180.50 b	172.83 b	149.33 c	142.83 c
	Mabroka		152.83 c	150.50 b	11.83 a	10.67 a	188.17 a	182.00 a	304.33 a	300.33 a
27 July	Munofia		158.83 b	151.83 b	9.83 b	8.50 b	73.17 d	70.33 d	96.17 d	88.33 d
	Mabroka		151.83 c	144.33 c	10.33 b	9.33 ab	89.67 c	84.00 c	181.50 b	177.17 b
LSD			4.3	0.86	1.2	2.07	4.18	3.84	5.02	4.72
		1	156.25 b	147.25 b	10.25 b	8.25 b	118.67 b	114.67 b	163.33 b	157.92 b
		2	162.08 a	152.50 a	12.17 a	9.75 a	147.08 a	139.92 a	202.33 a	196.42 a
LSD			1.17	0.43	1.15	0.67	2.87	1.51	3.25	2.51
	Munofia	1	163 b	149.50 b	9.83 c	6.83 b	117.50 c	113.17 c	120.00 d	110.50 d
		2	169 a	155.17a	12.83 a	9.17 a	136.17 b	130.00 b	125.50 c	120.67 c
	Mabroka	1	149.5 d	145.00 c	10.67 bc	9.67 a	119.83 c	116.17 c	206.67 b	205.33 b
		2	155.17 c	149.83 b	11.50 b	10.33 a	158.00 a	149.83 a	279.17 a	272.17 a
LSD			1.65	0.61	1.63	0.94	3.10	2.14	4.87	3.55
23 April		1	159.5 b	150.0 c	10.67 b	8.00 b	171.33 b	16.00 b	199.83 b	195.50 b
		2	166.5 a	153.33 a	14.00 a	1017 a	197.33 a	188.83 a	253.83 a	247.67 a
27 July		1	153 c	144.50 d	9.83 b	8.50 b	66.00 d	63.33 d	126.83 d	120.33 d
		2	157.67 b	151.67 b	10.33 b	ab9.33 b	96.83 c	91.00 c	150.83 c	145.17 c
LSD			1.65	0.661	1.63	0.94	4.11	2.14	4.61	3.55
23 April	Munofia	1	168.67 b	150.33 c	10.00 c	5.67 c	174.00 c	168.00 c	145.00 e	138.00 f
		2	177.67 a	155.33 a	15.67 a	9.33 a	187.00 b	177.67 b	153.67 d	147.67 e
	Mabroka	1	150.33 ef	149.67 de	11.33 bc	10.33 a	168.67 c	164.00 c	254.67 b	253.00 b
		2	155.33 d	151.33 b	12.33 b	11.00 a	207.67 a	200.00 a	354.00 a	347.67 a
27 July	Munofia	1	157.33 d	148.67 cd	9.67 c	8.00 b	61.00 g	58.33g	95.00 f	83.00 h
		2	160.33 c	150.00 c	10.00 c	9.00 ab	85.33 e	82.33 d	97.33 f	93.67 g
	Mabroka	1	148.67 f	140.33 f	10.00 c	9.00 ab	71.00 f	68.33 f	158.67 d	157.67 d
		2	155 df	148.33 e	10.67 bc	9.67 ab	108.33 d	99.67 d	204.33 c	196.67 c
LSD			5.82	0.86	2.31	1.33	5.80	3.03	6.50	50.3

Table 2. Effect of planting dates, cultivars, harvest dates and their interactions on chlorophyll reading and area of leaves and stems fresh weight of sweet potato.

Planting date	Cultivars	Harvest date	Leaf area		Chlorophyll		Stems fresh weight	
			First season	Second season	First season	Second season	First season	Second season
23 April			28.67 a	25.98 a	43.82 a	37.36 a	834.50 a	824.17 a
27 July			11.80 b	10.55 b	36.83 b	32.56 b	757.42 b	749.08 b
LSD			1.45	1.63	2.35	2.68	8.09	3.03
	Munofia		17.33 b	15.96 b	37.74 b	31.99 b	570.1 b	556.2 b
	Mabroka		23.14 a	20.57 a	42.90 a	37.93 a	1021.8 a	1017.1 a
LSD			2.08	3.75	2.08	3.75	4.29	1.94
23 April	Munofia		23.25 b	21.74 b	41.27 b	34.22 b	642.7 b	628.7 c
	Mabroka		34.09 a	30.22 a	46.37 a	40.50 a	1026.3 a	1019.7 a
27 July	Munofia		11.42 c	10.18 c	34.22 c	29.77 c	497.5 c	483.7 d
	Mabroka		12.19 c	10.92 c	39.43 b	35.35 b	1017.3 a	1014.5 b
LSD			2.06	2.30	3.33	3.80	11.44	4.29
		1	17.86 b	16.72 b	39.43 b	33.32 b	758.67 b	749.50 b
		2	22.61 a	19.81 a	41.21 a	36.60 a	833.25 a	8.23.75 a
LSD			1.14	1.61	1.14	1.61	1.44	1.5
Munofia		1	15.76 c	14.33 c	37.15 c	30.00 d	501.0 c	484.3 d
		2	18.91 b	17.58 b	38.33 bc	33.98 c	639.2 b	628.0 c
Mabroka		1	19.96 b	19.12 b	41.72 b	36.63 b	1016.3 a	1014.7 b
		2	26.31 a	22.03 a	44.085 a	39.22 a	1027.3 a	1019.5 a
LSD			2.27	1.64	2.27	1.64	4.4	2.12
23 April		1	25.81 b	24.30 b	42.80 a	37.10 a	760.67 b	753.17 b
		2	31.53 a	27.66 a	44.83 a	37.62 a	908.33 a	895.17 a
27 July		1	9.92 d	9.15 d	36.07 b	29.53 b	756.67 b	745.83 c
		2	13.69 c	11.95 c	37.58 b	35.58 a	758.17 b	752.33 b
LSD			1.84	1.99	1.84	1.99	2.75	2.12
23 April	Munofia	1	21.76 d	19.72 d	40.70 bc	33.60c	504.7 d	490.7 d
		2	24.74 c	23.75 c	41.83 bc	34.83 bc	780.7 c	766.7 c
	Mabroka	1	29.85 b	28.87 b	44.90 b	40.60 a	1016.7 b	1015.7 b
		2	38.33 a	31.57 a	47.83 a	40.40 a	1036.0 a	1023.7 a
27 July	Munofia	1	9.77 f	8.94g	33.60 d	26.40 d	497.3 d	478.0 e
		2	13.07 e	11.42 f	34.83 d	33.13 c	497.7 d	489.3 d
	Mabroka	1	10.07 f	9.36 fg	38.53 cd	32.67 c	1016.0 b	1013.7 b
		2	14.30 e	12.49 e	40.33 c	38.03 ab	1018.7 b	1015.3 b
LSD			2.27	2.32	2.27	2.32	2.88	3.00

Table 3. Effect of cultivars, planting dates, harvest dates and their interaction marketable, unmarketable and total yield (ton/fed) of storage roots of sweet potato

Planting date	Cultivars	Harvest date	Marketable yield		Unmarketable yield		Total yield	
			First season	First season	First season	Second season	First season	Second season
23 April			5333.3 b	6420.6 a	7698.4 a	7055.6 a	13032 a	13476 a
27 July			6801.6 a	6047.6 a	5127.0 b	5869.0 b	12012 b	11833 b
LSD			355.69	N. S	278.51	713.17	328.50	705.47
	Munofia		6992.1 a	8349.2 a	6944.4 a	6555.6 a	13937 a	14905 a
	Mabroka		5142.9 b	4119.0 b	5881.0 b	6369.0 a	11107 b	10405 b
LSD			2.08	3.75	1005.6	3261.0	790.40	N.S
23 April	Munofia		5873.0 b	8650.8 a	10397 a	8619.0 a	16270 a	17270 a
	Mabroka		4793.7 c	4190.5 b	5000 c	5492.1 c	9794 c	9683 d
27 July	Munofia		8111.1 a	8047.6 a	3492 d	4492.1 d	11603 b	12540 b
	Mabroka		5492.1 b	4047.6 b	6762 b	7246.0 b	12421 b	11127 c
LSD			2.06	2.30	1052.8	1574.9	827.19	1008.6
		1	6063 a	6579.4 a	5650.8 b	5849.2 b	11714 b	11738 b
		2	6071 a	5888.9 a	7174.6 a	7075.4 a	13329 a	13571 a
LSD			1.14	1.61	N. S	N.S	384.77	604.79
Munofia		1	7127.0 a	8428.6 a	6365.1 b	5761.9 b	13492 b	14190 b
		2	6857.0 a	8269.8 a	7523.8 a	7349.2 a	14381 a	15619 a
Mabroka		1	5000.0 b	3349.2 b	4936.1 c	5936.5 b	9937 c	9286 d
		2	5285.7 b	4888.9 ab	6825.4 ab	5801.6 a	12278 b	11524 c
LSD			2.27	1.64	1060.0	3358.6	843.78	855.30
23 April		1	5000.0 d	6222.2 a	6936.5 b	6381 b	11937 bc	12603 b
		2	5666.7 c	6619.0 a	8460.3 a	7730.2 a	14127 a	14349 a
27 July		1	7127.0 a	5555.6 a	4365.1 d	5317.5 c	11492 c	10873 c
		2	6476.2 b	6539.7 a	5888.9 c	6420.6 b	12532 b	12791b
LSD			1.84	1.99	570.53	N.S	473.26	855.30
23 April	Munofia	1	69206 b	9428.6 a	9270 b	8063.5 ab	16190 a	17492 a
		2	4825.4 c	7873.0 abc	11524 a	9174.6 a	16349 a	17048 a
	Mabroka	1	3079.4 d	3015.9 d	4603 e	4698.4 ef	7683 d	7714 d
		2	6507.9 b	5365.1 abcd	5397 d	6285.7 cd	11905 bc	11651 c
27 July	Munofia	1	7333.3 b	7428.6 abcd	3460 f	3460.3 f	10794 c	10889 c
		2	8888.9 a	8666.7 ab	3524 f	5523.8 de	12413 b	14190 b
	Mabroka	1	6920.6 b	3682.5 cd	5270 de	7174.6 bc	12190 bc	10857 c
		2	4063.5 c	4412.7 bcd	8254 c	7117.5 bc	12651 b	11397 c
LSD			2.27	2.32	1188.4	4749.814	669.30	1209.6

Table 4. Effect of cultivars, planting dates, harvest dates and their interaction on the physical characters of storage roots of sweet potato at harvest

Planting date	Cultivars	Harvest date	Storage roots Length (Cm)		Storage roots diameter (Cm)		Storage roots fresh weight (g)		Number of storage roots per plant	
			First season	Second season	First season	Second season	First season	Second season	First season	Second season
23 April			25.75 a	22.42 a	7.88 a	6.80 a	549.08 a	511.67 a	4.67 a	3.92a
27 July			17.92 b	16.42 b	5.50 b	5.12 b	388.33 b	376.17 b	3.42 b	3.08 b
LSD			2.28	1.25	1.00	0.49	22.39	6.14	0.80	0.61
	Munofia		21.42 a	18.17 b	5.55 b	4.73 b	325.17 b	293.75 b	5.17 a	4.42 a
	Mabroka		22.25 a	20.67 a	7.83 a	7.19 a	612.25 a	594.08 a	2.92 b	2.58 b
			N.S	0.62	1.02	1.11	29.50	7.86	0.62	0.36
23 April	Munofia		27.67 a	22.00 a	6.27 b	5.37 b	387.67 c	333.67 c	6.17 a	5.00 a
	Mabroka		23.83 ab	22.83 a	9.48 a	8.23 a	710.50 a	689.67 a	3.17 c	2.83 c
27 July	Munofia		15.17 c	14.33 c	4.83 c	4.08 c	262.67 d	253.83 d	4.17 b	3.83 b
	Mabroka		20.67 b	18.50 b	6.27 bc	6.15 b	514.00 b	498.50 b	2.67 c	2.33 c
LSD			3.22	1.76	1.42	0.70	31.67	8.68	1.13	0.87
		1	20.17 b	18.25 b	5.88 b	5.02 b	379.92 b	357.17 b	3.67 a	3.25 b
		2	23.50 a	20.58 a	7.5 a	6.89 a	557.50 a	530.67 a	4.42 a	3.75 a
	LSD		1.97	1.34	0.42	0.45	15.30	5.58	N.S	0.43
	Munofia	1	20.83 ab	16.83 c	5.17 c	4.13 c	273.83 d	245.17 d	4.83 a	4.33 a
		2	22.00 ab	19.50 b	5.93 b	5.32 b	376.50 c	342.3 c	5.50 a	4.50 a
	Mabroka	1	19.50 b	19.67 b	6.58 b	5.91 b	486.0 b	469.17 b	2.50 b	2.17 c
		2	25.00 a	21.67 a	9.07 a	8.47 a	738.50 a	719.00 a	3.33 b	3.00 b
	LSD		2.78	1.9	1.07	0.63	21.64	7.89	1.12	0.61
23 April		1	25.67 a	22.83 a	7.17 b	6.21 b	444.5 b	404.00 c	4.33 ab	3.83 a
		2	25.83 a	22.00 a	8.58 a	7.38 a	653.67 a	619.33 a	5.00 a	4.00 a
27 July		1	14.67 c	13.67 c	4.58 c	3.83 c	315.33 c	310.33 d	3.00 c	2.67 b
		2	21.17 b	19.17 b	6.42 b	6.40 b	461.33 b	442.00 b	3.83 bc	3.5 a
	LSD		2.78	1.90	1.09	0.63	27.01	7.89	1.12	0.61
23 April	Munofia	1	29.67 a	22.67 a	6.13 cde	4.90 d	334.33 e	280.00 g	6.00 ab	5.33 a
		2	25.67 b	21.33 a	6.40 cd	5.93 c	441.00 d	387.33 e	6.33 a	4.67 a
	Mabroka	1	21.67 c	23.00 a	8.20 b	7.52 b	554.67 c	528.00 c	2.67 d	2.33 c
		2	26.00 a	22.67 a	10.77 a	8.93 a	866.33 a	851.33 a	3.67 cd	3.33 b
27 July	Munofia	1	12.00 e	11.00 c	4.20 f	3.37 e	213.33 f	210.33 h	3.67 cd	3.33 b
		2	18.33 c	17.67 b	5.47 de	4.80 d	312.00 e	297.33 f	4.67 bc	4.33 a
	Mabroka	1	17.33 d	16.33 b	4.97 ef	4.30 de	417.33 d	410.33 d	2.33 d	2.00 c
		2	24.00 ab	20.67 a	7.37 bc	4.80 d	610.67 b	586.67 b	3.00 d	2.67 bc
LSD			3.94	2.69	1.4	0.89	30.60	11.16	1.58	0.86

Table 5. Effect of cultivars, planting dates, harvest dates and their interaction on dry matter of leaves, stems and storage roots of sweet potato.

Planting date	Cultivars	Harvest date	leaves dry matter (%)		stems dry matter (%)		Storage roots dry matter (%)	
			First season	Second season	First season	Second season	First season	Second season
23 April			17.16 b	16.02 b	11.56 a	11.03 a	27.51 a	26.17 a
27 July			18.23 a	17.37 a	11.17 a	10.29 b	27.89 a	27.20 a
LSD			0.27	0.35	N.S	0.44	N.S	N.S
	Munofia		18.36 a	17.24 a	10.86 b	10.11 b	26.81 b	25.65 b
	Mabroka		17.03 b	16.16 b	11.87 a	11.21 a	28.59 a	27.71 a
LSD			N.S	0.62	0.95	0.19	0.84	0.75
23 April	Munofia		17.70 b	16.79 b	10.96 b	10.47 b	25.43 c	23.85 c
	Mabroka		16.63 c	15.26 c	12.15 a	11.59 a	29.58 a	28.48 a
27 July	Munofia		19.02 a	17.69 a	10.76 b	9.75 c	28.18 ab	27.45 ab
	Mabroka		17.43 b	17.05 b	11.59 ab	10.83 b	27.59 b	26.95 b
LSD			0.39	0.5	0.88	0.63	1.56	1.47
		1	17.02 b	15.94 b	10.68 b	10.02 b	26.67 b	25.62 b
		2	18.37 a	17.45 a	12.05 a	11.30 a	28.73 a	27.74 a
LSD			1.97	1.34	0.41	0.22	0.32	0.31
	Munofia	1	18.00 b	16.56 c	10.26 c	9.32 c	25.57 c	24.22 c
		2	18.72 a	17.92 a	11.45 b	10.90 b	28.04 ab	27.08 b
	Mabroka	1	16.04 c	15.33 d	11.10 bc	10.72 b	27.77 b	27.02 b
		2	18.03 ab	16.99 b	12.64 a	11.70 a	29.41 a	28.41 a
LSD			2.78	1.9	0.58	0.31	0.45	0.45
23 April		1	16.36 c	15.22 c	10.97 b	10.46 c	26.01 c	25.10 c
		2	17.97 b	16.83 b	12.14 a	11.60 a	29.00 a	27.23 ab
27 July		1	17.68 b	16.66 b	10.39 b	9.58 d	27.32 bc	26.15bc
		2	18.78 a	18.07 a	11.95 a	11.00 b	28.45 ab	28.25 a
LSD			2.78	1.90	0.58	0.31	0.70	0.45
23 April	Munofia	1	17.19 de	15.96 d	10.53 cd	9.88 d	23.53 c	21.70 d
		2	18.20 bc	17.62 bc	11.39 c	11.06 bc	27.33 b	26.00 c
	Mabroka	1	15.53 f	14.49 e	11.42 c	11.04 bc	28.50 b	28.49 a
		2	17.73 cd	16.04 d	12.89 a	12.13 a	30.67 a	28.47 a
27 July	Munofia	1	18.81 ab	17.16 c	10.00 d	8.76 e	27.61 b	26.75 bc
		2	19.23 a	18.21 a	11.51 bc	10.73 bc	28.75 ab	28.16 ab
	Mabroka	1	16.55 e	16.16 d	10.78	10.39 cd	27.04 b	25.55a
		2	18.2 bc	17.93 ab	12.40 ab	11.27 b	28.15 b	28.34 ab
LSD			0.82	0.43	0.90	0.63	2.06	1.46

Table 6. Effect of cultivars, planting dates, harvest dates and their interaction on nitrogen, phosphorus, and potassium content of storage roots of sweet potato.

Planting date	Cultivars	Harvest date	N%		P %		K%	
			First season	Second season	First season	Second season	First season	Second season
1			1.72 A	1.74 A	0.34 A	0.35 A	2.72 A	2.73A
2			1.72 A	1.73 A	0.36 A	0.36 A	2.73 A	2.74 A
LSD			NS	NS	NS	NS	NS	NS
	Munofia		1.71 A	1.71 A	0.34 A	0.34 A	2.71 A	2.72 A
	Mabroka		1.73 A	1.75 A	0.36 A	0.37 A	2.73 A	2.74 A
LSD			NS	NS	NS	NS	NS	NS
1	Munofia		1.71 A	1.72 A	0.33 A	0.34 A	2.71 A	2.72 A
	Mabroka		1.74 A	1.76 A	0.35 A	0.36 A	2.73 A	2.74 A
2	Munofia		1.71 A	1.71 A	0.35 A	0.35 A	2.72 A	2.73 A
	Mabroka		1.73 A	1.75 A	0.37 A	0.38 A	2.74 A	2.75 A
LSD			NS	NS	NS	NS	NS	NS
		1	1.72 A	1.73 A	0.35 A	0.35 A	2.73 A	2.72 A
		2	1.73 A	1.74 A	0.36 A	0.36 A	2.72 A	2.74 A
LSD			NS	NS	NS	NS	NS	NS
	Munofia	1	1.70 A	1.70 A	0.34 B	0.34 A	2.72 A	2.71 A
		2	1.71 A	1.72 A	0.35 AB	0.34 A	2.70 A	2.73 A
	Mabroka	1	1.73 A	1.75 A	0.36 AB	0.36 A	2.74 A	2.74 A
		2	1.74 A	1.76 A	0.37 A	0.37 A	2.73 A	2.75 A
LSD			NS	NS	0.03	NS	NS	NS
1		1	1.72 A	1.73 A	0.34 A	0.34 A	2.74 A	2.72 A
		2	1.73 A	1.74 A	0.35 A	0.35 A	2.70 A	2.74 A
2		1	1.71 A	1.72 A	0.36 A	0.36 A	2.72 A	2.73 A
		2	1.72 A	1.73 A	0.36 A	0.37 A	2.73 A	2.74 A
LSD			NS	NS	NS	NS	NS	NS
1	Munofia	1	1.70 A	171 A	0.32 B	0.33 A	2.73 A	2.7 A
		2	1.72 A	172 A	0.35 AB	0.34 A	2.68 A	2.73 A
	Mabroka	1	1.73 A	175 A	0.35AB	0.35 A	2.74 A	2.73 A
		2	1.74A	176 A	0.36 AB	0.36 A	2.72 A	2.74 A
2	Munofia	1	1.70 A	170 A	0.35AB	0.34 A	2.71 A	2.72 A
		2	1.71 A	171 A	0.35 AB	0.35 A	2.72 A	2.73 A
	Mabroka	1	1.72 A	1.74 A	0.36A	0.37 A	2.73 A	2.74 A
		2	1.74 A	1.75 A	0.37 A	0.38 A	2.74 A	2.75 A
LSD			NS	NS	**0.04**	NS	NS	NS
LSD			NS	NS	**0.04**	NS	NS	NS

Table 7. Effect of cultivars, planting dates, harvest dates and their interaction on calcium, iron, zinc, carbohydrate and carotenoid content of storage roots of sweet potato

Planting date	Cultivars	Harvest date	Ca %		Fe %		Zn %		Carotenoid (mg/g)		Carbohydrate (%)	
			First season	Second season	First season	Second season	First season	Second season	First season	Second season	First season	Second season
1			0.09 A	0.12 A	71.03 A	71.04 A	40.83 A	40.53 A	0.91 A	1.53 A	22.19 A	22.99 A
2			0.09 A	0.13 A	71.98 A	72.15 A	40.42 A	40.4 A	0.51 B	0.68 B	21.76 A	21.68 A
LSD			NS	NS	NS	NS	NS	NS	0.14	0.37	NS	NS
	Munofia		0.08 A	0.11 A	70.28 A	70.5 A	38.55 A	38.78 A	0.80 A	1.25 A	21.34 A	22.07 A
	Mabroka		0.09 A	0.14 A	72.72 A	72.68 A	42.7 A	42.14 A	0.63 B	0.96 B	22.61 A	22.6 A
LSD			NS	NS	NS	NS	NS	NS	0.48	0.08	NS	NS
1	Munofia		0.09 A	0.11 A	69.6 A	70.06 A	38.35 A	38.17 A	1.18 A	1.94 A	21.8 A	22.71 A
	Mabroka		0.09 A	0.13 A	72.45 A	72.01 A	43.3 A	42.89 A	0.65 B	1.12 B	22.58 A	23.26 A
2	Munofia		0.08 A	0.11 A	70.95 A	70.95 A	38.75 A	39.4 A	0.41 C	0.57 C	20.88 A	21.42 A
	Mabroka		0.09 A	0.15 A	73 A	73.35 A	42.1 A	41.4 A	0.62 B	0.80 BC	22.64 A	21.94 A
LSD			NS	NS	NS	NS	NS	NS	0.20	0.52	NS	NS
		1	0.09 A	0.12 A	71.33 A	71.09 A	39.78 A	39.88 A	0.56 B	0.93 B	21.95 A	22.01 A
		2	0.09 A	0.14 A	71.68 A	72.1 A	41.47 A	41.04 A	0.87 A	1.28 A	21.99 A	22.65 A
LSD			NS	NS	NS	NS	NS	NS	0.16	0.27	NS	NS
	Munofia	1	0.09 A	0.1 A	70 A	70.01 A	38 A	38.37 B	0.61 BC	0.88 B	21.4 A	21.77 A
		2	0.08 A	0.12 A	70.55 A	71 A	39.1 A	39.19 AB	0.99 A	1.63 A	21.28 A	22.36 A
	Mabroka	1	0.09 A	0.13 A	72.65 A	72.17 A	41.55 A	41.39 AB	0.51 C	0.98 B	22.51 A	22.26 A
		2	0.09 A	0.15 A	72.8 A	73.2 A	43.85 A	42.9 A	0.75 B	0.94 B	22.7 A	22.94 A
LSD			NS	NS	NS	NS	NS	4.25	0.23	0.38	NS	NS
1		1	0.09 A	0.11 A	70.6 A	70.51 A	40.25 A	40.17 A	0.68 B	1.16 B	22.21 A	22.76 A
		2	0.09 A	0.13 A	71.45 A	71.56 A	41.4 A	40.89 A	1.15 A	1.90 A	22.17 A	23.21 A
2		1	0.09 A	0.12 A	72.05 A	71.66 A	39.3 A	39.58 A	0.44 C	0.70 C	21.7 A	21.27 A
		2	0.09 A	0.14 A	71.9 A	72.64 A	41.55 A	41.2 A	0.59 BC	0.67 C	21.82 A	22.1 A
LSD			NS	NS	NS	NS	NS	NS	0.23	0.38	NS	NS
1	Munofia	1	0.09 A	0.1 A	68.6 A	69.5 A	37.8 A	37.82 A	0.85 B	1.22 B	21.88 A	22.54 A
		2	0.08 A	0.12 A	70.6 A	70.62 A	38.9 A	38.52 A	1.51 A	2.66 A	21.72 A	22.88 A
	Mabroka	1	0.09 A	0.12 A	72.6 A	71.53 A	42.7 A	42.52 A	0.51 CD	1.10 BC	22.54 A	22.98 A
		2	0.09A	0.14 A	72.3 A	72.5 A	43.9 A	43.25 A	0.78 BC	1.14 B	22.61 A	23.54 A
2	Munofia	1	0.08 A	0.1 A	71.4 A	70.52 A	38.2 A	38.92 A	0.36 D	0.54 D	20.91 A	21 A
		2	0.08 A	0.12 A	70.5 A	71.38 A	39.3 A	39.87 A	0.46 CD	0.59 CD	20.84 A	21.84 A
	Mabroka	1	0.09 A	0.14 A	72.7 A	72.8 A	40.4 A	40.25 A	0.51 CD	0.85 BCD	22.49 A	21.54 A
		2	0.09 A	0.16 A	73.3 A	73.9 A	43.8 A	42.54 A	0.72 BC	0.74 BCD	22.79 A	22.35 A
LSD			NS	NS	NS	NS	NS	NS	0.33	0.53	NS	NS

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الملخص العربي

تأثير مواعيد الزراعة والحصاد على الإنتاجية والقدرة التخزينية لصنفين من أصناف البطاطا الحلوة لمواجهة التغيرات المناخية

1- النمو والإنتاجية

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تم اختيار البطاطا كأحد أهم المحاصيل الدرنية في البلدان الاستوائية وشبه الاستوائية، كنموذج لدراسة تأثير تغير المناخ على شكل درجات الحرارة عالية على محصول البطاطا وجودته. تم زراعة صنفين من البطاطا الحلوة (المنوفية والمبروكة) في تاريخين مختلفين [23 أبريل (تاريخ الزراعة الحالي الموصي به) و29 يوليو (تاريخ الزراعة المحاكي لتغير المناخ)] وتم حصادهما بعد 155 و169 يومًا. تسببت الزراعة في أبريل في تسجيل عدد أكبر من جذور التخزين لكل نبات، وزيادة في المحصول الكلى وغير القابل للتسويق، وفي جميع الصفات الطبيعية لجذور التخزين مقارنة بتلك التي تم الحصول عليها من تاريخ الزراعة في يوليو، حيث يؤثر تغير المناخ، بتحويل تاريخ الزراعة إلى الأشهر الحارة ، سلبًا على صفات النمو والإنتاجية للبطاطا الحلوة . أظهر الصنف "المنوفية" قيمً أعلى لصفات المحصول، وارتفاع مادة الكاروتينات والمادة الجافة وأظهرت قابلية تخزين جيدة مقارنة بـ "مبروكة"، بينما تفوق الصنف "مبروكة" على "المنوفية" بشكل ملحوظ في أكثر صفات النمو الخضري، أدى حصاد البطاطا بعد 169 يومًا من الزراعة عمومًا إلى نمو خضري أقوي وزيادة معنوية في المحصول القابل للتسويق وغير القابلة للتسويق والكلى، مصحوبا بزيادة معنوية في خصائص الجذور مقارنة بتلك التي تم حصادها بعد 155 يومًا.

الكلمات المفتاحية: الأصناف، مواعيد الحصاد، مواعيد الزراعة، جذور التخزين، البطاطا، التغيرات المناخية.