# Effect of planting dates on growth and productivity of cucumber hybrids under the conditions of Minia Governorate.

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**ABSTRACT:**

The experiment was conducted in a private research farm in the open field under Bani Mazar city, Minia Governorate conditions. during two successive seasons, 2020 and 2021 to study the effect of three planting dates, 5th, 15th and 25th August, and six hybrids of cucumber (Bahi, Mayadine, Hayel, El-Joker, Madin, and Raider) and their interaction on vegetative growth, flowering, and yield components. The results indicated that the main stem length significantly increased in Hybrid Madin when planted on August, 25. Mayadine hybrid was the earliest in flowering and harvesting compared to the other hybrid in the first planting date (August, 5). El-Joker Hybrid recorded the highest sex ratio when grown on August, 25. Fruit yield per plant (kg) and the No. of fruits per plant were associated with the hybrids of Mayadine, Hayel and El-Joker when grown on August 25. Moreover, the high content of phosphorous, potassium and dry matter was in the Hayel cucumber hybrid when it was planted in the third sowing date (August 25). In general, the results recommended that the Hayel hybrid was most suitable for cultivation in the open field on August 25, as it was superior in yield and nutritional values of fruits under the conditions of Minia Governorate.

**Keywords***:* Cucumber hybrids; Planting dates; yield; phosphorus; potassium and dry matter.

## INTRODUCTION

Cucumber (*Cucumis sativus* L.) is one of the most common and popular vegetables in the family *Cucurbitaceae* and is a major vegetable crop worldwide and ranks as the fourth most cultivated vegetable in the world after tomatoes, brassica and onions (Wehner and Guner, 2004, Wehner, 2007).

The total area of cucumber cultivation in Egypt reached 39,237 feddans, with a total local production of 367,000 tons (CAPMAS 2017/2018).

Climate change, caused by human activities, is increasing temperatures that affect cultivated fields and crop production (Chakraborty and Newton, 2011).

Cucumber yield is influenced by genetic and environmental factors, and is therefore variable according to the growing season and region (Staub and Bacher 2004).

The response of the hybrid cucumber to different planting dates varied according to many factors such as the adaptability of the hybrid to different growing conditions, climate change, genetic composition, and its ability to quickly adapt to this environment (Eifediyi and Remison, 2009).

Hence, it was found that there are significant differences between the hybrids in terms of the number of fruits per plant and the total weight of the fruit per hectare. The highest fruits, yield per hectare were obtained in April planting and the Ashley hybrid was consistently higher than other hybrid crops (Eifediyi and Samson, 2009).

Early harvesting is one of the important criteria for obtaining better prices in the market for higher profitability. Therefore, it was found that the average days of cucumber fruit ripening during August planting ranged from 40 to 54 days which was found to be about 15 days earlier compared to the March planting times (Gautam, 2008). Another study of cucumbers found that the hybrid 'Calypso' had the first yield value followed by the 'M21' hybrid, the 'Wisconsin SMR 18' hybrid and the 'WI 2757' hybrid (Wehner ant Guner, 2004).

This study was conducted to investigate the effect of different planting dates on the yield and fruit quality of six different hybrids of cucumber.

## MATERIAL AND METHODS

The experiment was carried out in a private research Farm in the open field under Minia Governorate conditions, during two successive seasons, 2020 and 2021 to study the effect of three planting dates, 5th, 15th and 25th August and six hybrids of cucumber (Bahi, Mayadine, Hayel, El-Joker, Madin, and Raider) and their

interaction on vegetative growth, flowering, and yield components.

Cucumber seeds were obtained from Samtrade Company, Vitazad Egypt Company, Gaara Company, and Fine Seeds Company. The trial site is located at an altitude of 43 m above sea level, latitude 28°30'43.4"N and longitude 30°47'37.3"E, with clay loam soil in texture. The physical and chemical properties of the experimental soil and the chemical analyses of the irrigation were analyzed in the Soil, Water & Environment Research Institute at the Agriculture Research Center, Giza, Egypt, and the obtained results are tabulated in Tables (1) and (2). The mean climate conditions at the experimental location were recorded during the two seasons of the investigation as shown in Table (3), and these records were obtained from Central Laboratory for Agriculture climate.

Hybrid cucumber seeds were sown directly in the open field with three planting dates (5, 15, 25 August) in the first and second seasons, respectively.

The experimental design was complete randomized blocks with 3 replicates, each replicate consisted of 3 rows, each row was 3.5 m long and 1 m wide. The distance plants were 30 cm with a total area of 10.5 $m^2$/plot.

Surface irrigation, fertilization, pest control and other practices were performed whenever it was necessary according to recommendations of the Ministry of Agriculture, Egypt in the commercial production of cucumber.

**Data recorded:**

**Vegetative Characteristics**

Main of stem length (cm): it was measured with a ruler

No. of leaves per plant: it was calculated as the average number of functioning leaves per plant

**Flowering Characteristics**

Earliness of flowering (day): it was calculated as the number of days from sowing the seed to the opening of the first male and female flower.

Sex ratio (%): It was calculated according to the following formula:

Sex Ratio = No. of female flower/ No. of total flower× 100

**Yield Characteristics**

Earliness of harvesting (day): it was calculated as the number of days from sowing date to start the harvesting

Yield per plant (kg): it was measured by a Balance Sensitive scale (Mettler Pc 4000) and calculated by the weight the fruits of the experimental unit cumulatively from the beginning of the harvest until the end of the growing season and divided by the number of plants of the experimental unit

No. of fruit per plant: it was calculated by counting the fruits of the experimental unit cumulatively from the beginning of the harvest until the end of the growing season and divided by the number of plants of the experimental unit.

**Chemical Characteristics**

Phosphorus content in fruit (mg/100g): it was determined by AOAC method (2005).

Potassium content in fruit (mg/100g): it was determined calorimetrically by the standard AOAC method (2000).

Dry mater content in fruit (%): it was determined by estimating the loss in sample of fruit fresh weight after drying for four hours at 105$^o$C and then at 70$^o$C in a drying oven, according to the following formula:

D.M.% = Sample dry weight/ Sample fresh weight× 100

**Statistical analysis:**

The obtained data were subjected to a statistical analysis using the XLSTAT statistical package (Version 2018, Excel Add-ins soft SARL, New York, NY, USA). Analysis of variance was conducted as outlined by Steel & Torrie (1980).

**RESULTS**

**Vegetative characteristics**

***Main stem length (cm):***

Data in Table (4 A) clearly showed that the cucumber hybrid significantly affected main stem length (cm) in both seasons. Madin cucumber hybrid was the tallest hybrids in stem length with values of (177.11 and 177.88 cm) in the first and second season, respectively. While Mayadine cucumber hybrid was the shortest in stem length with values (148.22 and 153.00 cm) for this trait in the first and second season, respectively.

Concerning the three planting dates, data illustrated in Table (4 A) revealed that planting dates significantly affected main stem length

cm in both seasons. The highest values for this trait (175.94 and 176.44 cm) were produced by the third planting date (August, 25) in the first and second season, respectively, while the lowest values for this trait (162.11 and 166.16 cm) were obtained from the first planting date (August, 5) in the first and second season respectively.

Regarding the interaction between the two studied factors, data in Table (4 A) showed that the interaction significantly affected this trait in both seasons. The highest main stem length (180.33 and 180.66 cm) was when planting on the third date (August 25), with the Madin cucumber hybrid. While the lowest main stem length ((137.33 and 141.66 cm) was when planting on the first date (August, 5) with the Mayadine cucumber hybrid.

***No. of leaves per plant:***

Data in Table (4 B) clearly showed that the cucumber hybrid did not significantly affected no. of leaves per plant in both seasons.

Concerning the three planting dates, data illustrated in Table (4 B) revealed that planting dates significantly affected no. of leaves per plant only in the first season. The highest value for this trait (21.27 cm) was produced by the first planting date (August, 5) in the first season, while, the lowest value for this trait (19.5 cm) was obtained from the third planting date (August, 25) in the first season.

Regarding the interaction between the two studied factors, data in Table (4 B) showed that the interaction did not significantly affect this trait in both seasons.

**Flowering characteristics**

***Earliness of flowering:***

Data in Table (5 A) clearly showed that the cucumber hybrid significantly affected earliness of flowering in both seasons. Madin cucumber hybrid gave the highest values (37.44 and 37.22 day) for this trait in the first and second seasons, respectively. While the Mayadine cucumber hybrid recorded the lowest values (31.66 and 31.55 day), in the first and second seasons, respectively.

Planting dates significantly affected the earliness of flowering in both seasons Table (5 A). The highest values for this trait (35.83 and 35.72 day) were produced by the second planting date (August, 15) in the first and second seasons respectively, while the lowest values for this trait (34.66 and 34.16 day) were obtained from the third planting date (August, 25) in the first and second seasons respectively.

Regarding the interaction between the two studied factors (cucumber hybrids and planting dates), data in Table (5 A) showed that the interaction significantly affected this trait in both seasons. The second planting dates (August, 15) achieved the highest values (38.33 and 38.00 day) with the Madin and El-Joker cucumber hybrids in the first and second seasons respectively, while the first planting dates (August, 5) gave the lowest values (30.66 and 31.66 day) with the Mayadine cucumber hybrid in the first and second seasons respectively.

***Sex ratio (%):***

Data in Table (5 B) clearly showed that the cucumber hybrid significantly affected Sex ratio % in both seasons. El-Joker cucumber hybrid gave the highest percentage (95 %) for this trait in the first and second seasons, while the Raider cucumber hybrid recorded the lowest percentage (78%), in the first and second seasons.

Planting dates significantly affected sex ratio % in both seasons Table (5 B). The highest percentage for this trait (87 %) were produced by the third planting date (August, 25) in the first and second seasons, while, the lowest percentage for this trait (80 %) was obtained from the first planting date (August, 5) in the first and second seasons.

Regarding the interaction between the two studied factors (cucumber hybrids and planting dates), data in Table (5 B) showed that the interaction significantly affected this trait in both seasons. The third planting dates (August, 25) achieved the highest percentages (97 %) with El-Joker cucumber hybrid in the first and second seasons, while the first planting dates (August, 5) gave the lowest percentages (76 %) with the Bahi cucumber hybrid, in the first and second season.

**Yield characteristics**

***Earliness of harvesting:***

Data in Table (6 A) clearly showed that the cucumber hybrid significantly affected Earliness of harvesting in both seasons. El-Joker cucumber hybrid gave the highest values (44.00 and 43.22 day) for this trait in the first and second seasons respectively, while the Mayadine cucumber hybrid recorded the lowest values (37.33 and 37.30 day),in the first and second seasons respectively.

Concerning planting dates, data illustrated in (Table 6 A) revealed that planting dates significantly affected earliness of harvesting in

both seasons. The highest values for this trait (42.00 and 41.83 day) were produced by the second planting date (August, 15) in the first and second seasons respectively, while the lowest values for this trait (40.50 and 40.00 day) were obtained from the third planting date (August, 25) in the first and second seasons respectively.

Regarding the interaction between the two studied factors (cucumber hybrids and planting dates), data in Table (6 A) showed that the interaction significantly affected this trait in both seasons. The first planting dates (August, 5) achieved the highest values (45.33 and 44.00 day) with the El-Joker and Maydine cucumber hybrid in the first and second seasons respectively. In addition, the first planting dates (August, 5) gave the lowest values (36.33 and 36.00 day) with the Mayadine cucumber hybrid, in the first and second seasons respectively.

***Yield per plant (kg):***

Data in Table (6 B) clearly showed that the cucumber hybrid significantly affected yield per plant (kg) in both seasons. Hayel cucumber hybrid gave the highest values (2.49 and 2.46 kg) for this trait in the first and second seasons respectively, while the Madin cucumber hybrid recorded the lowest values (2.16 and 2.18 kg), in the first and second seasons respectively.

Concerning planting dates, data illustrated in (Table 6 B) revealed that planting dates significantly affected yield per plant (kg) in both seasons. The highest values for this trait (2.54 and 2.51 kg) were produced by the third planting date (August, 25) in the first and second seasons respectively, while the lowest values for this trait (2.20 and 2.21 kg) were obtained from the first planting date (August, 5) in the first and second seasons respectively.

Regarding the interaction between the two studied factors (cucumber hybrids and planting dates), data in Table (6 B) showed that the interaction significantly affected this trait in both seasons. The third planting dates (August, 25) achieved the highest values (2.68 and 2.61 kg) with the Hayel cucumber hybrid in the first and second seasons respectively, while the first planting dates (August, 5) gave the lowest values (1.93 and 1.98 kg) with the Madin cucumber hybrid in the first and second seasons respectively.

***No. of fruits per plant:***

Data in Table (6 C) clearly showed that the cucumber hybrid significantly affected No. of fruits per plant in both seasons. Mayadine cucumber hybrid gave the highest values (21.72 and 21.61) for this trait in the first and second seasons., while the Madin and Bahi cucumber hybrids recorded the lowest values (19.00 and 19.67), in the first and second seasons respectively.

Concerning planting dates, data illustrated in (Table 6 C) revealed that planting dates significantly affected yield per plant (kg) in both seasons. The highest values for this trait (22.14 and 22.11) were produced by the third planting date (August, 25) in the first and second season, respectively, while the lowest values for this trait (19.79 and 20.35) were obtained from the first planting date (August, 5) in the first and second seasons respectively.

Regarding the interaction between the two studied factors (cucumber hybrids and planting dates), data in Table (6 C) showed that the interaction significantly affected this trait in both seasons. The third planting dates (August, 25) achieved the highest values (22.67) with the Mayadine and El-Joker cucumber hybrids in the first and second seasons respectively, while the first planting dates (August, 5) gave the lowest values (19.00 and 19.67) with the Madin and Bahi cucumber hybrids in the first and second seasons respectively.

**Chemical characteristics:**

***Phosphorus content in fruit:***

Data in Table (7 A) clearly showed that the cucumber hybrid significantly affected phosphorus content in fruit in both seasons. Hayel cucumber hybrid gave the highest values (6.28 and 6.22) for this trait in the first and second seasons, while the Bahi cucumber hybrid recorded the lowest values (5.84 and 5.83) in the first and second seasons respectively.

Concerning planting dates, data illustrated in (Table 7 A) revealed that planting dates significantly affected phosphorus content in fruit in both seasons. The highest values for this trait (6.33 and 6.31) were produced by the third planting date (August, 25) in the first and second seasons respectively, while the lowest values for this trait (5.80 and 5.75) were obtained from the first planting date (August, 5) in the first and second seasons respectively.

Regarding the interaction between the two studied factors (cucumber hybrids and planting dates), data in Table (7 A) showed that the interaction significantly affected this trait in both seasons. The third planting dates

(August, 25) achieved the highest values (6.60 and 6.55) with the Hayel cucumber hybrids in the first and second seasons respectively, while the first planting dates (August, 5) gave the lowest values (5.64 and 5.60) with the Bahi cucumber hybrid in the first and second seasons respectively.

***Potassium content in fruit:***

Data in Table (7 B) clearly showed that the cucumber hybrid significantly affected potassium content in fruit in both seasons. Madin and Hayel cucumber hybrids gave the highest values (56.03 and 56.43) for this trait in the first and second seasons respectively, while the El-Joker and Raider cucumber hybrids recorded the lowest values (55.31 and 50.09) in the first and second seasons respectively.

Concerning planting dates, data illustrated in (Table 7 B) revealed that planting dates significantly affected potassium content in fruit in both seasons. The highest values for this trait (56.15 and 55.74) were produced by the third planting date (August, 25) and second planting date (August, 15) in the first and second seasons respectively, while the lowest values for this trait (55.62 and 53.15) were obtained from the first planting date (August, 5) and third planting date (August, 25) in the first and second seasons respectively.

Regarding the interaction between the two studied factors (cucumber hybrids and planting dates), data in Table (7 B) showed that the interaction significantly affected this trait in both seasons. The third planting dates (August, 25) achieved the highest values (57.25 and 56.43) with the Hayel cucumber hybrid in the first and second seasons respectively, while the first planting dates (August, 5) gave the lowest values (55.20 and 54.70) with the Bahi cucumber hybrid, in the first and second seasons respectively.

***Dry Matter content in fruit:***

Data in Table (7 C) clearly showed that the cucumber hybrid significantly affected dry matter content in fruit in both seasons. Hayel cucumber hybrid gave the highest values (4.24 and 4.19) for this trait in the first and second seasons respectively, while the Raider cucumber hybrid recorded the lowest values (3.89 and 3.83), in the first and second seasons respectively.

Concerning planting dates data illustrated in (Table 7 C) revealed that planting dates significantly affected potassium content in fruit in both seasons. The highest values for this trait (4.18 and 4.11) were produced by the third planting date (August, 25) in the first and second seasons respectively, while the lowest values for this trait (3.88 and 3.82) were obtained from the first planting date (August, 5) in the first and second seasons respectively.

Regarding the interaction between the two studied factors (cucumber hybrids and planting dates), data in Table (7 C) showed that the interaction significantly affected this trait in both seasons. The third planting dates (August, 25) achieved the highest values (4.40 and 4.30) with the Madin cucumber hybrid in the first and second season respectively, while the first planting dates (August, 5) gave the lowest values (3.70 and 3.65) with the Bahi and Mayadine cucumber hybrids, in the first and second seasons respectively.

## DISCUSSION

The results of this study showed that there were significant differences among Hybrids when planted on the different dates in some vegetative characteristics (main stem length and No. of leaves per plant, flowering characteristics (earliness of flowering and sex ratio), yield characteristics (earliness of harvesting, fruit yield per plant and No. of fruits per plant) and fruit nutritional values (P, K and dry matter content in fruit). The results indicated that the main stem length significantly increased in Madin and Hayel Hybrids when planted on August, 25, beside the fact that the differences did not reach the significant in No. of leaves per plant. Also, Mayadine hybrid was earlier in flowering and harvesting than other hybrids at the 5$^{th}$ August planting date. El-Joker Hybrid exerted the highest sex ratio when grown on August, 25. Moreover, fruit yield per plant and No of fruits per plant were correlated with Mayadine, Hayel and El-Joker Hybrids when grown on August, 25. In addition, the contents of phosphorus, potassium and dry matter in fruits resulted from Hayel Hybrid when planted on August, 25. These differential growths and yield characteristics of cucumber have been reported by researchers in different parts of the world (Eifediyi and Samson, 2009 and Nwofia *et al*., 2015). In all cases, these results may be due to the performance of different hybrids influenced by the planting dates and environmental conditions and as such is variable depending upon growing season and region (Maynard, 2007 and Staub and Bacher, 2004). Hence, the differences in vegetative and yield characteristics can be attributed to the genetic composition of the used Hybrids and the Hayel Hybrid may have

been quicker in adapting to the environment than the other Hybrids. In other words, the variation in the data of tested characteristics might have been due to the specific combing ability of different hybrids, environment factors throughout planting dates, inherent properties, hormonal factors and vigor of the crop (Ahmed *et al*., 2004; Sharma and Bhattarai, 2006, Gautam *et al*., 2008 and Patel *et al*., 2013). From another point of view, there are some important geographical factors that affect the climate and these factors combined to influence directly or indirectly the growing plant. Temperature is one of the most important climatic factors, due to its impact on other elements (Qadir, 2016). Therefore, the suitable environmental conditions throughout the development of cucumber growth stages push the plants to good growth and high yield production. If we have a look at our results found that the Hayel hybrid was the most suitable for planting in the open field on August, 25 as it was the superior one in yield production and fruit nutritional values under Minia Governorate conditions and these results may be due to the fact that hybrid was able to grow under environmental conditions which are reflected on the size of the plant in the field such as stem length and No. of leaves and therefore had a strong source to sink relationship which resulted in high yields as No. of fruits per plant and fruit yield per plant experienced in the hybrid, beside the improve in fruit nutritional values as the contents of phosphorus, potassium and dry matter (Sharma and Bhattarai, 2006).

From the mentioned results, it is our opinion that Hayel hybrid was the most suitable for planting in the open field on 25$^{th}$ August as it was the superior one in yield production and fruit nutritional values under Minia Governorate conditions.

## CONCLUSION

Under Minia Governorate conditions of this experiment, it can be concluded that cucumber hybrids Mayadine, Hayel and El-Joker recorded the highest yield and No. of fruits per plant when sown in 25$^{th}$ August.

## REFERENCES

Ahmed, M., Hamid, A., Akbar, Z. 2004: Growth and yield performance of six cucumber (*Cucumissativus* L.) cultivars under agro-climatic conditions of Rawalakot, Azad Jammu and Kashmir [Pakistan]. *International Journal of Agriculture and Biology, 6 (2), 396-399*.

Annual bulletin of statistical crop area and plant production 2017/2018 Central authority for public mobilization and statistics - CAPMAS (Arab Republic of Egypt) Ref No. 71-22122-2018 Pp 44. www.capmas.gov.eg

Association of official analytical chemist (AOAC), 2000: Official methods of analysis 7th ed. Washington D.C. 1026p.

Association of official analytical Chemist (AOAC). 2005: Official method of analysis 18th ed. Washington D.C. 1045.

Chakraborty, S., Newton, A.C. 2011: Climate change, plant diseases and food security: an overview. Plant Pathology, 60(1), 2-14.

Eifediyi, E.K., Remison, S.U. 2009: Effect of time of planting on the growth and yield of five varieties of cucumber (Cucumis sativus L.). Report and Opinion, 1(5), 81-90.

Gautam, I.P., Upadhya, K.P., Chaudhary, J.N., Khan, A.H., Timilsina, C.K., Rars, L. 2008: Evaluation of cucumber genotypes for open field and plastic house in the Western Hills of Nepal. Agricultural resea agricultural research for poverty rch for poverty alleviation and livelihood enhancement, 27, 182.

Maynard, L. 2007: Cucurbit crop growth and development. In University of Purdue Conference Proceedings, Indiana, United States of America. Disponible en Linea: https://www. agry. purdue. Edu/CCA/2007/2007/Proceedi ngs/Liz% 20Maynard-CCA% 20proceedings% 201_KLS. Pdf.

Nwofia, G.E., Amajuoyi, A.N., Mbah, E.U. 2015: Response of three cucumber varieties (Cucumis sativus L.) to planting season and NPK fertilizer rates in lowland humid tropics: sex expression, yield and inter-relationships between yield and associated traits. International Journal of Agriculture and Forestry, 5(1), 30-37.

Patel, J.K., Vijay, B., Devi, S., Prasad, V.M., Rangare, S. B. (2013). Performance of cucumber (Cucumis sativus L.) hybrids in agro-climatic conditions of Allahabad. HortFlora Research Spectrum, 2(1), 50-55.

Qadir, H.A.R.A. 2016: The impact of environmental factors on growing vegetables in Minia Governorate, Egypt. International Journal of Research in Social Sciences, 6(12), 392-418.

Sharma, M.D., Bhattarai, S.P. 2006: Performance of cucumber cultivars at low hill during summer-rainy seasons. J. Inst. Agric. Anim. Sci., 27: 169-171.

Shinde, S.J., Barkule, S.R., Borade, R.S. 2018: Effect of climate change variability and adaptation on performance of F hybrids of Cucumber in kharif Season under Konkan agro climatic

condition of Maharashtra. Journal of agriculture research and technology, 43(1), 209-2013.

Staub, J.E., Bacher, J. 2004: Cucumber as a processed vegetable (chapter six). Vegetable crops Research, USDA, University of Wisconsin Madison,WI. Pp 129-193.

Steel, R.G.D., Torrie, J.H. 1980: Principles and procedures of statistics, a biometrical approach (No. Ed. 2). McGraw-Hill Kogakusha, Ltd.

Wehner, T.C., Guner, N. 2004: Growth stage, flowering pattern, yield and harvest date prediction of four types of cucumber tested at 10 planting dates. Acta Horticulturae,.637, 223-227 ISHS.

Wehner, T.C. 2007: Cucumbers, watermelon, squash and other cucurbits. Encyclopedia of Food and Culture, 474-479

**Table 1:** Physical and chemical analysis of the field experimental soil during 2020 and 2021 seasons.

| Season | Soil Constituents | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Physical Prosperities | | | | | | Chemical Prosperities | | | | | | |
| | Sand % | Silt % | Clay % | Texture | EC (ds/m) | pH | Cations mg/l | | | | Anions mg/l | | |
| | | | | | | | $Ca^{++}$ | $Mg^{++}$ | $Na^{++}$ | $K^{++}$ | $CaCO_3$ (%) | $Cl^-$ | $So_4^{--}$ |
| 2020 | 28.20 | 30.70 | 40.10 | Clay loan | 1.06 | 7.8 | 31.71 | 9.67 | 2.42 | 2.09 | 2.08 | 25.72 | 32.5 |
| 2021 | 29.89 | 29.87 | 41.15 | Clay loan | 1.07 | 7.77 | 31.10 | 9.7 | 2.53 | 2.82 | 2.10 | 25.65 | 32.5 |

**Table 2:** The chemical analyses of the irrigation water during 2020 and 2021 seasons.

| Chemical analyses | EC (ds/m) | pH | $Ca^{++}$ | $Mg^{++}$ | $Na^{++}$ | $K^{++}$ | $CaCO_3$ (%) | $Cl^-$ | $So_4^{--}$ |
|---|---|---|---|---|---|---|---|---|---|
| 2020 | 2.84 | 7.65 | 4.90 | 5.35 | 17.96 | 0.26 | 5.47 | 14.89 | 8.11 |
| 2021 | 2.86 | 7.66 | 4.92 | 5.35 | 17.96 | 0.27 | 5.47 | 14.89 | 8.12 |

**Table 3:** Climate conditions at the experimental location during 2020 and 2021 seasons

| Months | Temperature (°C) | | | | Relative Humidity (%) | | Wind Speed (m/s) | | Rainfall (mm) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2020 | | 2021 | | 2020 | 2021 | 2020 | 2021 | 2020 | 2021 |
| | Max | Min | Max | Min | | | | | | |
| August | 39.6 | 26.2 | 40.0 | 25.8 | 43 | 33 | 6.6 | 6.2 | N-E | N-E |
| September | 39.4 | 25.8 | 36.9 | 24.1 | 54 | 39 | 7.4 | 7.1 | N-E | N-E |
| October | 36.1 | 21.6 | 34.7 | 19.8 | 54 | 43 | 6.1 | 5.9 | 0.4 | 0.3 |
| November | 28.5 | 16.5 | 27.9 | 14.5 | 60 | 50 | 6 | 7 | 0.1 | 0.3 |

*NE= Non existent

**Table 4:** Effect of planting dates, hybrids and their interaction on cucumber main Stem length (cm) and number of leaves during the two seasons of 2020 and 2021.

| | A-Main stem length - 2020 season | | | | B-Number of leaves - 2020 season | | | |
|---|---|---|---|---|---|---|---|---|
| | 05-Aug | 15-Aug | 25-Aug | Mean | 05-Aug | 15-Aug | 25-Aug | Mean |
| Bahi | 171.66 | 170.33 | 178.00 | 173.33 | 22.33 | 20.33 | 20.00 | 20.88 |
| Mayadine | 137.33 | 148.00 | 159.33 | 148.22 | 22.66 | 22.33 | 21.66 | 22.22 |
| Hayel | 159.66 | 172.33 | 180.00 | 170.66 | 21.33 | 21.66 | 21.66 | 21.55 |
| El-Joker | 166.66 | 176.66 | 179.33 | 174.22 | 22.33 | 22.33 | 18.66 | 21.11 |
| Madin | 172.66 | 178.33 | 180.33 | 177.11 | 20.33 | 19.66 | 17.66 | 19.22 |
| Raider | 164.66 | 171.00 | 178.66 | 171.44 | 18.66 | 18.33 | 17.33 | 18.11 |
| Mean | 162.11 | 169.44 | 175.94 | | 21.27 | 20.77 | 19.5 | |
| L.S.D at 5% | Hybrid (A) | 2.64 | | | Hybrid (A) | 1.07 | | |
| | Planting date ( B) | 1.60 | | | Planting date ( B) | 0.63 | | |
| | Interaction (A X B) | 4.58 | | | Interaction (A X B) | 1.85 | | |
| | A-Main stem length - 2021 season | | | | B-Number of leaves – 2021 season | | | |
| | 05-Aug | 15-Aug | 25-Aug | Mean | 05-Aug | 15-Aug | 25-Aug | Mean |
| Bahi | 173.00 | 174.00 | 177.00 | 174.66 | 23.66 | 20.66 | 21.66 | 21.55 |
| Mayadine | 141.66 | 154.66 | 162.66 | 153.00 | 21.66 | 21.33 | 22.00 | 21.55 |
| Hayel | 165.66 | 177.00 | 180.00 | 174.22 | 21.33 | 21.66 | 20.33 | 21.44 |
| El-Joker | 173.00 | 178.33 | 179.33 | 176.88 | 22.33 | 22.33 | 22.00 | 21.22 |
| Madin | 175.66 | 177.33 | 180.66 | 177.88 | 19.33 | 20.33 | 20.00 | 21.33 |
| Raider | 168.00 | 176.33 | 179.00 | 174.44 | 17.66 | 19.33 | 18.00 | 18.33 |
| Mean | 166.16 | 172.94 | 176.44 | | 21 | 20.94 | 20.66 | |
| L.S.D at 5% | Hybrid (A) | 2.71 | | | Hybrid (A) | 0.25 | | |
| | Planting date ( B) | 3.03 | | | Planting date ( B) | 0.13 | | |
| | Interaction (A X B) | 4.69 | | | Interaction (A X B) | 0.43 | | |

**Table 5:** Effect of planting dates, hybrids and their interaction on cucumber earliness of flowering (day) and sex ratio (%) during the two seasons of 2020 and 2021.

| | A-Earliness of flowering - 2020 season | | | | B-Sex ratio - 2020 season | | | |
|---|---|---|---|---|---|---|---|---|
| | 05-Aug | 15-Aug | 25-Aug | Mean | 05-Aug | 15-Aug | 25-Aug | Mean |
| Bahi | 32.00 | 33.66 | 32.66 | 32.77 | 76% | 80% | 84% | 80% |
| Mayadine | 30.66 | 32.66 | 31.66 | 31.66 | 81% | 86% | 88% | 85% |
| Hayel | 36.00 | 36.00 | 35.33 | 35.77 | 77% | 90% | 92% | 87% |
| El-Joker | 37.66 | 38.00 | 36.33 | 37.33 | 91% | 97% | 97% | 95% |
| Madin | 37.66 | 38.33 | 36.33 | 37.44 | 77% | 86% | 85% | 83% |
| Raider | 34.66 | 36.33 | 35.66 | 35.55 | 78% | 79% | 78% | 78% |
| Mean | 34.77 | 35.83 | 34.66 | | 0.80 | 0.86 | 0.87 | |
| L.S.D at 5% | Hybrid (A) | 0.52 | | | Hybrid (A) | 0.02 | | |
| | Planting date ( B) | 0.48 | | | Planting date ( B) | 0.02 | | |
| | Interaction (A X B) | 0.91 | | | Interaction (A X B) | 0.04 | | |
| | A-Earliness of flowering – 2021season | | | | B-Sex ratio - 2021season | | | |
| | 05-Aug | 15-Aug | 25-Aug | Mean | 05-Aug | 15-Aug | 25-Aug | Mean |
| Bahi | 32.33 | 33.33 | 32.66 | 32.44 | 76% | 80% | 84% | 80% |
| Mayadine | 31.66 | 32.33 | 31.66 | 31.55 | 81% | 86% | 88% | 85% |
| Hayel | 35.66 | 36.33 | 35.33 | 35.55 | 77% | 90% | 92% | 87% |
| El-Joker | 37.00 | 38.00 | 36.33 | 36.77 | 91% | 97% | 97% | 95% |
| Madin | 37.00 | 37.66 | 36.33 | 37.22 | 77% | 86% | 85% | 83% |
| Raider | 34.33 | 36.66 | 35.66 | 35.55 | 78% | 79% | 78% | 78% |
| Mean | 34.66 | 35.72 | 34.16 | | 0.80 | 0.86 | 0.87 | |
| L.S.D at 5% | Hybrid (A) | 0.45 | | | Hybrid (A) | 0.02 | | |
| | Planting date ( B) | 0.85 | | | Planting date ( B) | 0.02 | | |
| | Interaction (A X B) | 0.78 | | | Interaction (A X B) | 0.04 | | |

**Table 6:** Effect of planting dates, hybrids and their interaction on cucumber earliness of harvesting (day), yield per plant (Kg) and fruit number / plant during the two seasons of 2020 and 2021.

| | A-Earliness of harvesting – 2020 season | | | | B-Yield per plant kg – 2020 season | | | | C-Fruit number /plant – 2020 season | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 05-Aug | 15-Aug | 25-Aug | Mean | 05-Aug | 15-Aug | 25-Aug | Mean | 05-Aug | 15-Aug | 25-Aug | Mean |
| Bahi | 37.67 | 39.67 | 38.67 | 38.67 | 2.09 | 2.24 | 2.48 | 2.27 | 19.83 | 21.00 | 21.83 | 20.89 |
| Mayadine | 36.33 | 38.00 | 37.67 | 37.33 | 2.40 | 2.44 | 2.64 | 2.46 | 20.83 | 21.83 | 22.67 | 21.72 |
| Hayel | 42.00 | 42.67 | 41.00 | 41.89 | 2.29 | 2.48 | 2.68 | 2.49 | 20.00 | 21.50 | 22.50 | 21.39 |
| El-Joker | 45.33 | 44.67 | 42.00 | 44.00 | 2.33 | 2.42 | 2.62 | 2.48 | 20.23 | 21.67 | 22.67 | 21.52 |
| Madin | 44.33 | 44.67 | 42.00 | 43.67 | 1.93 | 2.21 | 2.33 | 2.16 | 19.00 | 20.67 | 21.17 | 20.28 |
| Raider | 41.33 | 42.33 | 41.67 | 41.78 | 2.16 | 2.29 | 2.46 | 2.30 | 18.83 | 20.83 | 22.00 | 20.56 |
| Mean | 41.17 | 42.00 | 40.50 | | 2.20 | 2.34 | 2.54 | | 19.79 | 21.25 | 22.14 | |
| L.S.D at 5% | Hybrid (A) | 0.53 | | | Hybrid (A) | 0.06 | | | Hybrid (A) | 0.39 | | |
| | Planting date ( B) | 0.53 | | | Planting date ( B) | 0.13 | | | Planting date ( B) | 0.73 | | |
| | Interaction (A X B) | 0.91 | | | Interaction (A X B) | 0.10 | | | Interaction (A X B) | 0.67 | | |
| | A-Earliness of harvesting – 2021 season | | | | B-Yield per plant kg – 2021 season | | | | C-Fruit number /plant – 2021 season | | | |
| | 05-Aug | 15-Aug | 25-Aug | Mean | 05-Aug | 15-Aug | 25-Aug | Mean | 05-Aug | 15-Aug | 25-Aug | Mean |
| Bahi | 38.33 | 39.33 | 38.00 | 38.56 | 2.07 | 2.24 | 2.40 | 2.23 | 19.67 | 20.33 | 21.50 | 20.50 |
| Mayadine | 36.00 | 38.67 | 37.33 | 37.30 | 2.34 | 2.47 | 2.55 | 2.44 | 20.83 | 21.33 | 22.67 | 21.61 |
| Hayel | 41.33 | 42.67 | 39.33 | 41.11 | 2.26 | 2.45 | 2.61 | 2.46 | 20.67 | 21.17 | 22.17 | 21.33 |
| El-Joker | 43.67 | 44.00 | 42.00 | 43.22 | 2.35 | 2.43 | 2.61 | 2.45 | 20.75 | 21.17 | 22.67 | 21.53 |
| Madin | 44.00 | 43.67 | 41.67 | 43.11 | 1.98 | 2.17 | 2.38 | 2.18 | 19.83 | 20.33 | 21.67 | 20.61 |
| Raider | 40.00 | 42.67 | 41.67 | 41.44 | 2.24 | 2.29 | 2.49 | 2.34 | 20.33 | 20.50 | 22.00 | 20.94 |
| Mean | 40.56 | 41.83 | 40.00 | | 2.21 | 2.34 | 2.51 | | 20.35 | 20.81 | 22.11 | |
| L.S.D at 5% | Hybrid (A) | 0.51 | | | Hybrid (A) | 0.07 | | | Hybrid (A) | 0.13 | | |
| | Planting date ( B) | 0.72 | | | Planting date ( B) | 0.08 | | | Planting date ( B) | 0.19 | | |
| | Interaction (A X B) | 0.89 | | | Interaction (A X B) | 0.12 | | | Interaction (A X B) | 0.23 | | |

**Table 7:** Effect of planting date, hybrids and their interaction on cucumber earliness of plant chemical characteristics (Phosphorus mg/100g, potassium mg/100g and Dry Matter) during the two seasons of 2020 and 2021.

| | Phosphorus content - 2020 season | | | | Potassium continent - 2020 season | | | | DMC - 2020 season | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 05-Aug | 15-Aug | 25-Aug | Mean | 05-Aug | 15-Aug | 25-Aug | Mean | 05-Aug | 15-Aug | 25-Aug | Mean |
| Bahi | 5.64 | 5.79 | 6.09 | 5.84 | 55.20 | 55.35 | 55.75 | 55.43 | 3.70 | 3.95 | 4.10 | 3.91 |
| Mayadine | 5.70 | 5.85 | 6.25 | 5.93 | 55.40 | 55.55 | 56.00 | 55.65 | 3.73 | 3.95 | 4.10 | 3.93 |
| Hayel | 6.05 | 6.20 | 6.60 | 6.28 | 56.70 | 56.85 | 57.25 | 56.93 | 4.27 | 4.15 | 4.30 | 4.24 |
| El-Joker | 5.75 | 5.90 | 6.30 | 5.98 | 55.13 | 55.26 | 55.53 | 55.31 | 3.86 | 4.05 | 4.20 | 4.04 |
| Madin | 5.92 | 6.07 | 6.47 | 6.15 | 55.80 | 55.95 | 56.35 | 56.03 | 3.90 | 4.25 | 4.40 | 4.18 |
| Raider | 5.75 | 5.83 | 6.30 | 5.96 | 55.50 | 55.65 | 56.05 | 55.73 | 3.81 | 3.85 | 4.00 | 3.89 |
| Mean | 5.80 | 5.94 | 6.33 | | 55.62 | 55.76 | 56.15 | | 3.88 | 4.04 | 4.18 | |
| L.S.D at 5% | Hybrid (A) | 0.05 | | | Hybrid (A) | 6.55 | | | Hybrid (A) | 0.07 | | |
| | Planting date ( B) | 0.11 | | | Planting date ( B) | 6.17 | | | Planting date ( B) | 0.15 | | |
| | Interaction (A X B) | 0.08 | | | Interaction (A X B) | 11.35 | | | Interaction (A X B) | 0.12 | | |
| | Phosphorus content - 2021 season | | | | Potassium continent - 2021 season | | | | DMC - 2021 season | | | |
| | 05-Aug | 15-Aug | 25-Aug | Mean | 05-Aug | 15-Aug | 25-Aug | Mean | 05-Aug | 15-Aug | 25-Aug | Mean |
| Bahi | 5.60 | 5.75 | 6.15 | 5.83 | 54.70 | 54.85 | 55.25 | 54.93 | 3.68 | 3.90 | 4.05 | 3.88 |
| Mayadine | 5.65 | 5.80 | 6.23 | 5.89 | 55.30 | 55.45 | 55.85 | 55.53 | 3.65 | 3.90 | 4.05 | 3.87 |
| Hayel | 6.00 | 6.11 | 6.55 | 6.22 | 56.20 | 56.35 | 56.76 | 56.43 | 4.21 | 4.10 | 4.25 | 4.19 |
| El-Joker | 5.70 | 5.85 | 6.25 | 5.93 | 55.00 | 55.15 | 55.55 | 55.23 | 3.80 | 3.95 | 4.10 | 3.95 |
| Madin | 5.90 | 6.05 | 6.45 | 6.13 | 55.60 | 57.13 | 56.15 | 56.29 | 3.86 | 4.15 | 4.30 | 4.10 |
| Raider | 5.70 | 5.85 | 6.25 | 5.93 | 55.40 | 55.55 | 39.33 | 50.09 | 3.75 | 3.80 | 3.95 | 3.83 |
| Mean | 5.75 | 5.90 | 6.31 | | 55.36 | 55.74 | 53.15 | | 3.82 | 3.97 | 4.11 | |
| L.S.D at 5% | Hybrid (A) | 0.14 | | | Hybrid (A) | 0.10 | | | Hybrid (A) | 0.06 | | |
| | Planting date ( B) | 0.07 | | | Planting date ( B) | 0.19 | | | Planting date ( B) | 0.13 | | |
| | Interaction (A X B) | 0.12 | | | Interaction (A X B) | 0.16 | | | Interaction (A X B) | 0.10 | | |

# تأثير مواعيد الزراعة على النمو والإنتاجية لهجن الخيار تحت ظروف محافظة المنيا

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**الملخص العربي**

تم اجراء التجربة بمزرعة بحثية خاصة في الحقل المكشوف بمركز بني مزار محافظة المنيا بمواعيد زراعة خلال موسمي 2020،2021 لدراسة تأثير ثلاثة مواعيد زراعة هي 5، 15، 25 أغسطس وستة هجن من الخياروقد ضمت الهجن التالية (باهي، ميادين، هايل، الجوكر، مدين ورايدر) والتفاعل بينهما على صفات النمو الخضري والزهرى والمحصول. ولقد أشارت النتائج الى وجود زيادة معنوية في طول الساق الرئيسية لصالح الهجين مدين عند زراعته في 25 أغسطس بجانب عدم وجود فرق معنوي في عدد الأوراق لكل نبات. بالإضافة الى ذلك كان الهجين ميادين الأبكر في التزهير والمحصول المبكر عن الهجن الأخرى في موعد 25 أغسطس، وعلى الجانب الاخر وجدا ان الهجين الجوكر قد حقق أعلى نسبة مئوية جنسية عند زراعته في 25 أغسطس. علاوة على ذلك فقد أرتبط المحصول وعدد الثمار/ نبات بالهجن ميادين وهايل والجوكر خلال الزراعة في 25 أغسطس. كما كانت العناصر الغذائية المتحصل عليها في الثمار من الفوسفور والبوتاسيوم والمادة الجافة لصالح هجين هايل عند زراعته في 25 أغسطس. بشكل عام اتضح من النتائج ان هجين هايل هو الأنسب للزراعة في الحقل المكشوف في 25 أغسطس حيث سجل اعلى انتاج في المحصول والقيمة الغذائية للثمار تحت ظروف محافظة المنيا.

**الكلمات الاسترشادية:** هجن الخيار، مواعيد الزراعة، المحصول، الفسفور، البوتاسيوم، المادة الجافة.