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DETERMINATION OF OPTIMUM PLANTING TIME FOR TUBEROSE [AGAVE AMICA (MEDIK.) THIEDE & GOVAERTS] UNDER THE HARRAN PLAIN CONDITIONS

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ABSTRACT

The aim of the present work was to determine of optimum planting time and some agricultural charasteristics of tuberose [Agave amica (Medik.) Thiede & Govaerts] under southeastern Anatolian conditions of Turkiye. In the research, 7 planting times were tried with 15-day intervals, starting from 1 March to 1 June. The experiment was run in the summer growing sessions of 2022 and 2023 in Southeastern Anatolian conditions according to Randomized Complete Block Design with three replications. Results showed that statistically significant difference between planting times was noted at P<0.001 level. The following parameters including sprout duration (10-70 days), first flowering time (24 June-14 August), second flowering time (16-22 October), first flowering period (29-82 days), second flowering period (53-57 days) vegetation time (210–244 days), the plant height (29.90-43.10 cm), number of spikes per plant (1-2 number/plant), rootstock tuber circumference lenght (9.40-14.10 cm), number of new tubers (12.0-14.5) and new tuber circumference lenght (3.5-6.20 cm) will investigated. JMP-SAS software will use for statistical analyses. It was also seen that tuberose had a potential to adapt to Harran Plain ecological conditions. According to the results of this research, the highest datas were obtained from 15 April planting in southeastern Anatolian conditions.

Keywords: Tuberose, Agave Amica, Polianthes, Polianthes Tuberosa, Tuber, Flower

1. INTRODUCTION

Tuberose [Agave amica (Medik.) Thiede & Govaerts] belongs to the Asparagaceae family and is a perennial and tuberous plant. There are 275 Agave species distributed in the world. While tuberose was previously classified in the genus Polianthes, it has been included in the Agave genus since 2024 Anonymous. (2025). It is one of the important plants that has spread from Mexico to the world since the 16th century Alan et al. (2007). It is reported that the Aztecs cultivated the Tuberose plant for about 600 years Anonymous. (2025). Tuberose has an unnatural distribution in the flora of Turkiye. Although it has been cultivated in limited

quantities for a long time, tuberose cultivation has not reached the desired level due to reasons such as lack of research on it and the limitation of production by collecting it from nature. Tuberose is one of the most demanded plants in the cosmetic industry because the essential oil obtained from its flower is among the most preferred scents. Tuberose, one of the rare plants that can adapt to the climate of the Southeastern Anatolia Region, can be brought into agriculture by determining field cultivation techniques. The first step in determining the cultivation techniques of a plant is to determine its planting time. This study was conducted to determine the most suitable planting time for tuberose plants.

2. MATERIALS AND METHODS

Tubers of the tuberose plant (Agave amica 'Single') with a circumference of 8-10 cm were used as material in the research. This study was carried out with 3 replications according to the randomized complete block trial design in the 2022 and 2023 summer crop growing periods in order to determine the optimum planting time for the Tuberose plant. In the study, the effects of 7 different planting times (1 March, 15 March, 1 April, 15 April, 1 May, 15 May and 1 June) were investigated. The tubers were stored in a temperature and humidity controlled storage environment (16 °C temperature and 65% relative humidity) until planting time. The trial area was made ready for planting by plowing deeply with a plow, applying fertilizer, and processing with a cultivator and rototiller. 40 kg/da of compound fertilizer [13.24.12 +10 (SO3) +1 Fe+0.5 Zn] was applied to the trial area. 5 kg/da foliar fertilizer (20.10.10+Trace elements) was applied to the trial area for three times (at the beginning of flowering, two weeks after fully flowering and two months after fully flowering). The tubers were planted by hand at a density of 30x15 cm and a depth of 10 cm. Irrigation and weed control were carried out when necessary, after planting and during the later stages of vegetation. Scent off gel (cat and dog repellent) was applied to the trial area to prevent dogs from damaging it. Phenological observations were taken throughout the vegetation period, and after the above-ground parts of the plants were completely dried, the tubers were harvested manually and the necessary measurements were made in the laboratory environment. In the research, the following observations were taken in each parcel:

Plant Height (cm): The area from the soil surface to the tip of the leaves of 20 randomly selected plants was measured in cm and their average was taken.

Number of Flower Stalks per Plant (number/plant): The number of flower stalks in 20 plants randomly selected from the plots was counted and their average was calculated in terms of number.

Rootstock Tuber Circumference (cm): After 20 plants were harvested in each plot, the new tubers were separated and dried in the shade for 48 hours, the circumference values of the rootstock tubers were measured in cm and their average was taken.

Number of New Tubers (number/plant): The number of new tubers obtained from 20 harvested plants was determined as a number and their average was taken.

New Tuber Circumference (cm): The circumference of all new tubers obtained from 20 harvested plants was measured in cm after drying in the shade for 48 hours and their average was taken.

3. FINDINGS AND DISCUSSION

3.1. PHENOLOGICAL OBSERVATIONS

Table 1 shows the phenological observation results determined in the study carried out to determine the effect of different planting times in tuberose. When the determined sprouting date values of tuberose tubers are examined, it is seen that the earliest sprout dates were obtained on 24.06.2022 (15 April planting) for first year and 26.06.2023 (15 April planting) for second year. It has been determined that sprout times vary between 10-70 days depending on the difference in planting times. It was determined that the earliest sprout was achieved in the tuberose plant when planted on April 15, and that there was a negative relationship between earlier plantings and sprout date. The values reported by Asif et al. (2001), Kumar et al. (2011), Kumar et al. (2012), Ranchane et al. (2013) and the values obtained in this study are similar.

When the times required for sprouting obtained in the study are examined, it is seen that the earliest sprouting was obtained from planting on April 15th and the latest sprouting was obtained from planting on March 1st. The data obtained from the research reveals that the most suitable planting time for the tuberose plant is April 15, and the sprouting period is delayed in plantings made before this date. There was a negative relationship between earlier plantings and sprout durations.

When the first flowering time and duration values are examined in Table 1, it is seen that there was no first flowering in the 1 and 15 March plantings in both years. The first flowering dates were determined as 24 June-14 August and 26 June-12 August, respectively, depending on the years. The earliest first flowering was obtained from planting on April 15 in both experimental years.

The second flowering dates obtained in the research were 16-18 October and 20-22 October, respectively, depending on the years. Unlike the first flowering period, flowering was also observed in the 1 and 15 March plantings. In terms of the second flowering date values obtained in this study, Hussain et al. (2014) found similar values in Pakistan.

The first flowering period determined for tuberose considering different planting times changed between 29-82 days in the first year and 30-80 days in the second year. The longest first flowering period was detected in planting on 15 April in both experimental years. The first flowering period was not observed in the plantings made between 1 and 15 March. This may be due to late sprouting of the tubers due to exposure to low temperatures.

The second flowering period determined for tuberose considering different planting times changed between 53-57 days in the first year and 52-55 days in the second year. No difference was detected between planting times in terms of the second flowering period values obtained in the experiment.

When the vegetation periods of tuberose are examined, it is seen that the highest values (244) belong to 15 April planting and the lowest values belong to 1 June planting (197) in both years.

3.2. PLANT CHARACTERISTICS

3.2.1. PLANT HEIGHTS

As shown in Table 2, there was no statistically significant difference between years and replications. However, statistically significant differences at the 1% level

were detected between tuberose planting times in terms of the examined characteristics. In both years, the highest plant heights were detected in 15 April planting (43.10 cm) and the lowest plant heights (29.90 cm) detected in 1 March planting. Plant height values obtained in this study are similar to the values of Bahar (1992) and Ahmed et al. (2009). Plant height values obtained from the experiment were lower than Kumar et al. (2011), Kumar et al. (2012), Devi et al. (2017), Safeena et al. (2019), Asif et al. (2001), Ranchane et al. (2013), Hussain et al. (2014)and Deka, & Talukdar (2017). It can be said that the reason for this is that the studies were carried out on plants that were left in the field without being harvested for several years.

3.2.2. NUMBER OF FLOWER STALK PER PLANT

As seen in Table 2, the number of flower stalk per plant values varied between 1.00-2.00 number/plant, based on the combined values of two years. The plants produced a single flower stalk in the 1 and 15 March plantings, while two flower stalks were produced in the other plantings in both years of the experiment. It can be said that this situation is due to the shortening of the vegetation period or the exposure of the tubers to cold. It was determined that the values obtained from this study were similar to the values of Tehranifar and Akbari (2012) and Alan et al. (2007). The values obtained from the experiment were lower than the values of Asif et al. (2001), Ahmed et al. (2009), Krishnamoorthy (2014) and Devi et al. (2017). The reason for the difference between the values may be the difference in the planting technique, the chemicals applied and the variety.

3.2.3. ROOTSTOCK TUBER CIRCUMFERENCES

When Table 2 has examined, rootstock tuber circumference values varied between 9.40-14.10 number/plants, based on the combined values of two years. In both years, the highest values were detected in 15 April planting and the lowest values detected in 1 March planting. In general; 15 April and 1 May plantings showed similar properties. There was a negative relationship between earlier plantings and rootstock tuber circumferences. Our values were found to be higher than the values reported by Deka & Talukdar (2017). The values obtained from the experiment were lower than the values of Bahar (1992) and Prakash et al. (2006). This difference may be due to differences in genotype, ecological conditions and cultivation techniques.

3.2.4. NUMBER OF NEW TUBERS

As seen in Table 2, tuber numbers per plant values varied between 12.00-14.50 number/plant, based on the combined values of two years. In both years, the highest number of flowers per plant were detected in 15 April-1 May plantings and the lowest tuber numbers per plant (12.00 number/plant) detected in 15 March plantings. In general; 15 April, 1 May and 15 May plantings showed similar properties. The values obtained in the study were found to be lower than the values reported by Krishnamoorthy (2014). However, the values we obtained were found to be higher than Tehranifar and Akbari (2012) and similar to Bahar (1992), Asif et al. (2001), Prakash et al. (2006), Ahmed et al. (2009), Ranchane et al. (2013). This difference may be due to differences in tuber size, genotype, ecological conditions and cultivation techniques.

3.2.5. NEW TUBER CIRCUMFERENCE

When Table 2 has examined, new tuber circumference values varied between 3.50-6.20 number/plants, based on the combined values of two years. In both years, the highest values were detected in 15 April-1 May plantings and the lowest values detected in 1 March planting. In general; 15 April, 1 May and 15 May plantings showed similar properties. There was a negative relationship between earlier plantings and new tuber circumferences. Our values were found to be similar to the values reported by Bahar (1992), Asif et al. (2001) and Deka & Talukdar (2017). The values obtained from the experiment were lower than the values of Prakash et al. (2006). This difference may be due to differences in genotype, ecological conditions and cultivation techniques.

4. CONCLUSION

It was also seen that all experimental materials had a potential to adapt to Harran Plain ecological conditions. According to the results of this research, the highest yields were obtained from 15 April planting in southeastern Anatolian conditions. It can be said that in future studies on tuberose in the region, planting frequency studies should be carried out using different varieties.

CONFLICT OF INTERESTS

None.

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