STUDIES ON THE EFFECT OF SOME CULTURAL TREATMENTS ON THE GROWTH AND FLOWERING OF NARCISSUS

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INTRODUCTION

Narcissus tazetta (Family Amaryllidaceae) plants are among the world's oldest cultivated flowers. They are native to Europe, Asia and North Africa and they spread with civilization to the four corners of the earth. In the garden they are planted in front of the perennial border or shrubbery or evergreens, and the plants are also used in the rockery. Besides, their cut-flowers are of special value for their beauty and pleasing aroma.

It is reasonable to assume that successful production of the narcissus plant must be associated with the suitable soil moisture and the optimum irrigation requirments during the growth period. It is also necessary to determine the most suitable plant spacing and fertilizers. These studies would undoubtedly lead to better production of narcissus plants in Egypt.

REVIEW OF LITERATURE

Nutrition:

Parker (1935) observed that the application of fertilizers immediately before planting narcissus bulbs might result in a decrease of flower yield in the first season in comparison with the unfertilized bulbs.

Stuart (1947) referred to the importance of potassium presence in the fertilizer that increased the yields of narcissus bulbs and flowers. While, Jenkins and Stuart (1949) reported that the fertilizer treatments did not significantly affect the narcissus bulb and flower yields during the first season. However, in the second year, the plots that received either no fertilizers or only 250 pounds of fertilizer per acre produced fewer flowers than those receiving the high amounts of fertilizers. He concluded that the best yields of early flowers and of bulbs resulted from the use of either 1500 pounds per acre of a 4-12-4 fertilizer or 750 pounds per acre of a 4-12-4 fertilizer plus a side application of 30 pounds of available nitrogen.

Hewitt and Miles (1955) studied the effects and excesses of some mineral nutrients on the growth of daffodil and tulip bulbs in sand culture. They concluded that the deficiency of nitrogen, calcium and magnessium resulted in a decrease of King Alfreed daffodils bulb weight in the first year. The deficiency of phosphorus was more marked in the second year, but that of potassium was apparent in the third year. Horton (1958) revealed that the high levels of potassium increased growth and bulb yield of narcissus, when it was supplied with both nitrogen and phosphorus. He worked later (1959) with narcissus, tulip and iris and found that the treatments containing potassium gave the largest flowers, strongest stems and heaviest weights of bulbs, than the nitrogen and phosphorus treatments. Lees (1961) found that potash was again shown to be of importance for narcissi and tulips, giving a greater number of flowers and an increase in bulb weight over the control. Top-dressings of sulphate of amonia were of no benefit to narcissi.

Jersey (1962) demonstrated that daffodils and irises in unfertilized soil gave as good results as those grown in plots receiving heavy applications of organic manures or fertilizer. Skalska (1970) found in 3 years, that Carlton narcissi did not respond markedly to NPK fertilization. No difference in the time or duration of flowering or the number of flowers per plant were seen between plants grown from bulbs of the 2nd or 4th size grades which had received no N, P or K and those which had been given different nutrient ratios and doses. Angeliev and Nikolova (1971) studied the effect of mineral fertilizers of narcissus, tulip and hyacinth applied as dressings of 200 kgs. ammonium nitrate, 250 kgs. superphosphate and 150 kgs. potassium sulphate per hectar in various combinations and their results showed that the highest dry matter content of the tulip was obtained with triple the rate of ammonium nitrate and superphosphate and 150 kgs. of potassium sulphate per hectar. The highest dry matter of narcissus bulbs was obtained with double the ammonium nitrate rate.

Some other investigators found that fertilization affected the vegetative and flower growth of ether bulbs. Among those, Tsukamoto and Fujioka (1957) applied 4 levels of N, P, and K in solution to bulblets of Hippeastrum hybridum to determine the best fertilizer treatment for bulb production. They concluded that the best results were obtained with either 300 p.p.m. each of N, P and K or 225 p.p.m. N, 150 p.p.m. P and 300 p.p.m. K. Badran et al. (1972) with amaryllis found that the application of fertilizers at the high rates of N and P with or without potassium increased the vegetative growth, flowering and bulb yield of the different size bulb plants and the nitrogen resulted in increasing the number of leaves.

Amaki and Hagiya (1961) studied the effect of ammonium sulphate, calcium superphosphate and potassium sulphate on the growth and the yield of bulbs of William Pit tulip variety grown in a sandy soil. They found that plant heights tended to increase with the application of the three nutrients.

Amin and Watson (1953) found that a medium level of nutrient solution containing 100 p.p.m. each of nitrogen, potassium and calcium, and 50 p.p.m. of magnessium, and 20 p.p.m. of phosphorus, produced early flowering and rapid growth of hyacinthus plants. El-Kadi _et al._ (1979) found that different levels of N and P had no significant effects on freesia shoot development, flowering, number of leaves, number of florets per spike and length and weight of spike. Both N and P fertilizers significantly increased the weight of the new corms. The smallest corms wer associated with no addition of nitrogen. The highest fresh and dry weights of leaves were obtained by applying the highest P level with any of three N levels. And they also pointed out that raising the levels of N and P in the soil increased both the percentages and the total amounts of N, P and K in the different parts of the plant. In general, the highest level of N in combination with either the two levels of phosphorus gave the highest mineral content in the different organs. Nitrogen and phosphorus fertilization increased the mineral content of the new corms and potassium was accumulated in the new corms.

Watson (1951) stated that the rate of 25 p.p.m. nitrogen, 5 p.p.m. of phosphorus and 15 p.p.m. of potassium gave the best results of flower production and top growth of cyclamen.

The investigations on the effect of different combinations of N, P and K on the growth of gladiolus was probably more than any other flowering bulbous crop. Stuart and Mclellan (1951) found that flower production by Picardy gladiolus was more than three times as much with 1600 pounds of 5:10:5 as no fertilization. Guttay and Krone (1957) found that 4:16:16 fertilization formula produced the highest percentage of blooming plants as well as the shortest rate opening of florets. It was shown by Woltz (1959) that increasing the levels of N and K_2O applied to Picardy and Valeria gladiolus resulted in increasing the average percentage of N and K respectively in the corms. Ksugi and Kondo (1962), Hassan (1964), Skalska (1970) and Elquesnii (1968) studied the effect of N, P and K on gladiolus and they gave many results concerning the influence of different ratios on the yield of gladiolus. The results obtained by Ksugi (1961) showed that increasing the phosphorus level increased both phosphorus and nitrogen absorption.

Spacing:

Hoar (1951) observed the preference of planting 3 rows, 3 to 4 inches apart on ridges with 12 narcissus bulbs planted per foot of ridge and 28 inches between ridges in comparison with the standard flat or dutch bedding system in which 5 or 6 rows 7 to 9 inches apart were planted with bulbs about three bulb diameters apart. Rees, et al. (1968) reported that with the density range of 2 to 14 narcissus plants per square foot, the flower number increased from 2 to 12 per square foot and the stem length from 29 to 35 cms. The total bulb yield per unit area increased with density from 171 to 696 gms per square foot, and the weight in each of the 4 commercial bulb grades also increased when the ratio of the between - row distance to the within row distance was increased.

Rasmussen (1964) found that in four season's trials the highest yield of tulips were obtained at a planting density of 500 bulbs (10 cms. size) per 10 square meters. Differences in yield between this spacing and that with 400 bulbs however were small, and the wider spacing was recommended for practical purposes. The increase in growth of individual bulbs was greater at the wider spacings. Stoffert (1965) reported that reduced spacing slightly increased the ratio length/weight of tulip stem and the time taken to flower. Loeser and Essig (1967) found that with three spacings of tulips : 8 x 5 cms, 8 x 7 cms. and

8 x 10 cms., there were no differences in the flowering time, stem length, flower size or flower losses.

Meredith and Sheehan (1965) found with anemone, that there was a main effect of spacing on the number of flowers produced and flower diameter, Flower production per acre increased and flower diameter declined, with each reduction in spacing. Stem length was unaffected by spacing.

Butterfield (1954) reported that large gladiolus corms were usually planted from 4 to 6 inches apart in the row. If double rows were used, then the corms would be planted only 3 to 4 inches apart, so that they were staggered or spaced alternately in the double row. The fertility of the ground, as well as the conditions of the soil at planting time, were factors to consider in relation to the spacing of bulbs. Skalska (1965) found with begonia that the spacing had no significant effect on the size of the harvested tubers. For commercial begonia production it was recommended to use wide spacing between the rows and closer spacing within the rows.

Martin (1930) found that the distance between the potato seed pieces increased the yields decreased, but the percentage of the prime tubers increased within the wider spacing. The returns per acre however, were in favour of the 9-inch as compared with the 15-inch spacing. Hassan *et al*. (1973) found that although, planting distances of 35 cms. resulted in more spikes per tuberose plant, planting at 15 cms. apart seemed to be more economical. With an average of 1.3 and 1.5 spikes per plant for the 15 and 35 cms. treatments respectively, the 15 cms. planting distance produced almost twice the number of spikes.

Irrigation:

The Ministery of Agriculture of Canada (1954) reported that irrigation increased the number and grade of bulbs of iris by 37%, of tulips by 42%, of hyacinths by 60% and of daffodils by 207%. The average amounts of water applied each season were 4.3 in. for daffodils and iris, 3.3 in. for tulips and 3.0 in. for hyacinths. But, no appreciable difference in storage quality was found between irrigated and non-irrigated bulbs. Kraayenga (1960) stated that irrigation of tulips was generally necessary from the week before flowering until five to six weeks after flowering. Koopes (1962) stated that irrigation of Rose Copeland tulips increased bulb yields by 25-52% compared with non-irrigated fields. The most favourable period for irrigation was for one week before flowering to about four weeks after flowering. Van Der Valk and Scheneveld (1963) showed that keeping soil moist increased the yield of tulips compared with no irrigation in both clay and loam soils.

Toussaint (1968) proposed 14-day irrigation intervals for better crop of tulips in sandy soil.

Oszkinisowa (1970) found that the soil moisture requirement of tulips varied with growth stage and the highest requirment was during the rooting stage. Reppo and Zaletaeva (1973) pointed out that moisture deficiency shortened the growing period of tulips and increased bulb production but decreased bulb size and total weight. Irrigation prolonged the flowering period and enhanced plant and flower size and bulb quality.

Sheehan and Joiner (1964) found that when the interval between watering of Lilium longiflorum was greater than 3 days, there was a reduction in stem length, number of flowers and flower size which reduced the economic value of the crop.

Halevy and Richter (1963) reported that the corms produced by gladiolus plants grown under dry soil conditions were smaller and the plants were shorter in the following season than were produced by corms which developed under conditions of adequate soil moisture. Sasse (1963) found that each increase in soil moisture content increased the gladiolus corm diameter and weight but the differences between the medium and high moisture treatments were not significant. Shillo and Halevy (1965) found that the