

Effect of Diamonium Phosphate (DAP) Fertilization in Different Doses On Bulb and Flower of Narcissus

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Abstract: *Narcissus tazetta* bulbs were fertilized at 0, 4, 8 and 12 kg/da with DAP (diamonium phosphate) and the effects on bulb growth and flower quality criteria were studied. The highest dose applied in fertilization, 12 kg/da, yielded 3.93 bulb efficiency, 36.82 mm of bulb diameter, 212.45 mm of flower height, 18.38 mm of bunch height, 5.56 mm of stem thickness and 196.85 mm of leaf length, while the highest value of average bunch number, 2.69, was obtained at 0 kg/da of fertilization dose and the highest main bulb weight of 27.68 g was yielded at 4 kg/da.

Key words: Diamonium Phosphate % Fertilization % Bulb % Flower % Narcissus

INTRODUCTION

It is known that, new bulb formation period of most of the geophytes grown in wild environment is quite long and the formation rate is very low [1]. It has been stated that, natural vegetative reproduction of narcissi, which are attractive with their magnificent odors and large usage areas, is so slow that they give 1.6 sister bulbs annually [2]. It has been reported that, bulb size of *Narcissus tazetta* is L 20-60 x (20-) 25-50 mm, plant height is 15-65 cm, bunch number is 2-10 (-15) and leaf length (14-)20-75cm [3]. Bulbs are originated from Mediterranean and require sunny and warm places. Its flowers are valuable due to the characteristics of magnificent odor, early cut flower and strength. Leaves are affected negatively if they are subject to frost in cold places and rarely flower [4].

Germination may take 3 years in poor nutritious compost. In this case, additional fertilizing is required. Diluted liquid nutrient is ideal. It is used as enriched by half and half and introduced together with watering. The most suitable N:P:K ratio for bulbous plants may be 12:10:27 or similar amounts. Additional potassium fertilizing helps bulb growth [5]. Because unburned organic compost may damage, it should be avoided. Bulbs in open area may be feed with bone powder in fall and with ash in spring. There is no need to overfeed the bulbs grown in pot. However, weak-solution applications such as low-nitrogen composts used for tomatoes may be useful during active growth. It has been reported that, this type of composts are given at 3 or 4 doses between

February and May. Water is important in growth period rather than nutrition [6].

Most of the bulbs require slightly acidic soil. Soil should contain average nutrition value. High nitrogen content causes leaf overgrown, weak flowing and more bulb division. Color and leaf size is a good indicator for compost level. Bone powder is good compost for bulbs due to its high phosphorus content. 1360.8-1814.4 g is ideal for an area of 100m². Bone powder sometimes may be insufficient from the point of view of nitrogen. Well burned compost or one of inorganic composts should be added in addition to bone powder. Bone powder should be used in 6:12:6 N:P:K in calcareous soils and as 5:10:5 N:P:K in sandy soils [7]. There are some suggestions for fertilizing geophytes, however, it has been reported that, there is no need to fertilize narcissi [8].

The effects of different field and DAP fertilizer doses applied on *Hyacinthus orientalis* 'Blue Jacket, Carnegie, City of Haarlem and Jan Bos' varieties from the geophytes, which are useful in cut flower and arrangements, on some flower criteria were studied. According to this, stem thickness of 9.920 mm at the lowest fertilizer dose, 0 kg/da and 10.247 mm at the highest fertilizer dose, 4 kg/da was obtained. Floret number averages ranged between 24.054 at the highest fertilizer dose, 8 kg/da and 24.933 at the lowest fertilizer dose, 0 kg/da [9]. In a study in which the effects of N, P and K in various doses and combinations on flower quality and corm growth of *Gladiolus* were studied, it was reported that, K and N combinations yielded the best result in corm

efficiency and all combinations of N, P and K had no statistical meaning for spike length [10]. It was reported that, the best ratio was obtained from 1:3:4 in 1000 kg/ha N:P:K mixture after the fertilizing for *Narcissus incomparabilis* cv. Carbineer and it affected positively plant length and bulb weight [11].

According to Gülser [12], DAP (di ammonium phosphate) application should be done due to nitrogen and phosphorus deficiencies in test field. Accordingly, it was tried to determine the effects of the compost dose suitable for narcissi in application of diamonium phosphate in various doses on bulb and plant growth.

MATERIALS AND METHODS

Material of the study is sister bulbs of *N. tazetta* reproduced in the same season from Izmir-Mordo-an. The test was established according to the ‘random blocks trial pattern’ as triplicate. 25 of narcissi bulbs existed in each block. The distance between plantation rows and depth were 15 cm. DAP doses were specified as 0, 4, 8 ve 12 kg/da and it was applied in November 2003 in open area together with bulb planting. Vegetative growth was observed in February 2004 for the first time and flowering did not occur in subsequent months. Flowering was observed in April 2005 for the first time in a couple of plants. All data obtained and evaluated are those from which the bulbs flowered in April 2006.

According to the results of the analyses from the soil sample taken from the depth of 20 cm, it was determined that, the test field was sandy, with slight alkali reaction close to neutral, without salt, medium-calcareous, with low organic material, nitrogen and phosphorus content, respectively (Table 1). Under these conditions, the effects of the compost applied on bulblet number reproduced by the bulb, bulb weight after pulling out, bulb diameter, plant height, cluster number, cluster length, stem thickness and leaf length were observed. The data obtained were evaluated and analyzed statistically according to 6.12 version of SAS program [13].

RESULTS AND DISCUSSION

As seen in Table 2, young bulbs could flower only in the 3rd year after planting and could reproduce averagely 1.65 bulblets after pulling out in July 2006. These data are consistent with the reports of Staikidou *et al.* [2] Although the highest bulblet number 3.93 was obtained in the highest dose of compost, 12 kg/da, the difference between the averages were not meaningful and put in the same group with the others. The difference between bulb weights after uprooting was not statistically significant. Accordingly, the average values range from the lowest value of 21.61 g in the compost dose of 8 kg/da to the highest value of 27.68 g in the compost dose of 4 kg/da. The highest bulb diameter was also obtained from the

Table 1: Soil characteristics of test field

| Depth (cm) | Texture | pH | Salt (%) | Lime (%) | Organic Matter (%) | Nitrogen (%) | Phosphorus (ppm) |
|------------|---------|-----|----------|----------|--------------------|--------------|------------------|
| 0-20 | Sandy | 7.6 | 0.007 | 8.80 | 1.79 | 0.0525 | 3.70 |

Table 2: The Effect of Fertilizing on Bulb Growth

| Dose | Bulblet number | Bulb weight(g) | Bulb diameter (mm) |
|-------------|----------------|----------------|--------------------|
| | NS | NS | NS |
| 0 kg/da DAP | 3.20±0.26 | 22.64±1.30 | 33.87±0.86 |
| 4 kg/da DAP | 3.43±0.17 | 27.68±5.49 | 33.31±1.55 |
| 8 kg/da DAP | 3.33±0.29 | 21.61±2.84 | 35.09±1.55 |
| 12 kg/daDAP | 3.93±0.73 | 26.66±2.29 | 36.82±1.17 |
| MEAN | 3.48±0.20 | 24.65±1.63 | 34.77±0.69 |

NS: Non-Significant

Table 3: Flower Quality Criteria

| Dose | Plant height (mm) | Flower number | Flower height (mm) | Stem thickness (mm) | Leaf length (mm) |
|--------------|-------------------|---------------|--------------------|---------------------|------------------|
| | NS | NS | NS | NS | NS |
| 0 kg/da DAP | 197.59±12.63 | 2.69±0.06 | 18.26±1.47 | 5.08±0.25 | 159.49±0.13 |
| 4 kg/da DAP | 186.11±13.16 | 2.43±0.30 | 17.11±0.22 | 5.30±0.33 | 175.18±4.64 |
| 8 kg/da DAP | 197.19±11.12 | 2.54±0.25 | 16.69±1.48 | 5.00±0.27 | 166.88±9.98 |
| 12 kg/da DAP | 212.45±9.31 | 2.55±0.05 | 18.38±0.70 | 5.56±0.23 | 196.85±3.17 |
| MEAN | 197.05±5.83 | 2.55±0.10 | 17.54±0.55 | 5.21±0.13 | 172.58±6.12 |

NS: Non-Significant

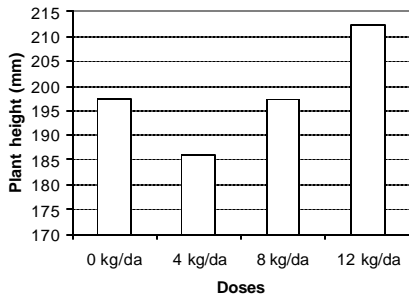


Fig. 1: Plant heigh values based on doses

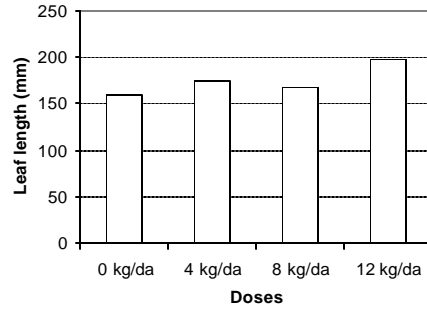


Fig. 5: Leaf length values based on doses

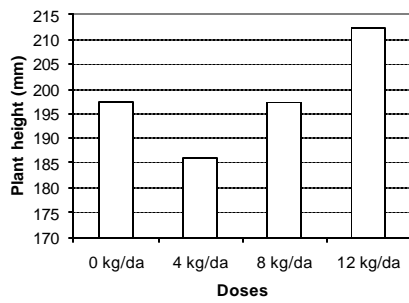


Fig. 2: Flower number values based on doses

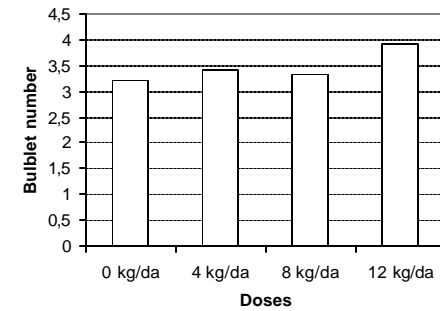


Fig. 6: Bulblet number values based on doses.

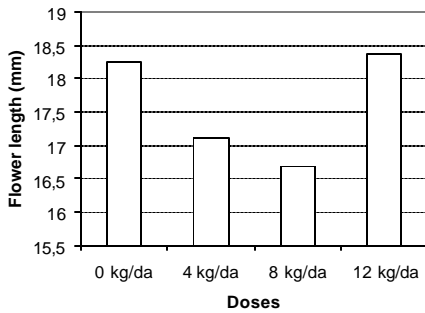


Fig. 3: Flower height values based on doses

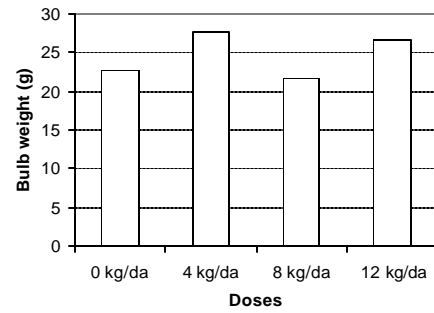


Fig. 7: Bulb weight values based on doses

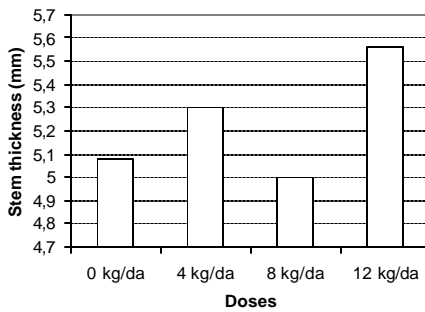


Fig. 4: Stem thickness values based on doses

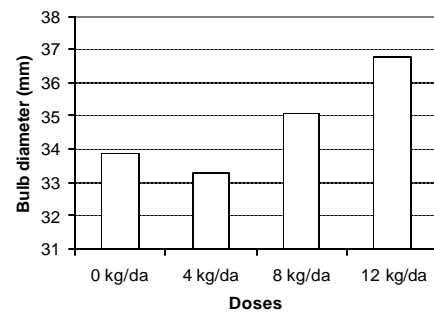


Fig. 8: Bulb diameter values based on doses

highest dose, 12 kg/da, like bulblet number and it was 36.82 mm. Based on these data, it was observed that, DAP fertilizer in the dose of 12 kg/da with the highest N and P ratio affected positively bulb reproduction and growth. The data about bulb sizes are similar to those reported by Davis [3.]

Plant height, which is one of the most important factors in cut flower criteria, was found as 212.45 mm in the highest dose, 12 kg/da. As seen in Table 3 (Fig 1), the lowest value in averages of plant height, 186.11 mm, was obtained in 4 kg/da compost dose, while the averages obtained from other compost doses were put in the same group. Higher plant height compared with the minimum plant height for *N. tazetta*, which was reported by Davis [3], indicates positive effects of phosphorus on plant growth. 12 kg/da compost dose containing higher phosphorus compared with the others caused the height of the plant increase. Flower number (Fig 2) which is important especially in cut flowers, was found as 2.55 and any statistical variations were not observed. The highest average flower number was obtained in 0 kg/da and this situation was explained by variety characteristic. Davis [3] reported that, the number of the flowers of *N. tazetta* is 2-10(-15).

The obtained data is 12 kg/da as 18.38 mm similar to the finding of the researcher. The same situation was determined in the study of Türko-lu and Çi- [9] on hyacinths and the highest number of floret was obtained in 0 kg/da DAP compost dose. Another cut flower criterion, flower height (Fig 3) was obtained from.

This situation indicates positive effects of high phosphorus content. Stem thickness, which is important for vase lifecycle, was obtained as average of 5.56 mm in 12 kg/da. The highest stem thickness finding of Türko-lu and Çi- [9], (Fig 4), was obtained in 4 kg/da DAP dose. The effect of fertilizing on leaf growth was examined and it is seen that, 12 kg/da dose caused the height of 196.85 mm length. It is seen that, this compost dose promotes vegetative growth compared with 0 kg/da compost dose (Fig 5,6). The findings are consistent with the reports on leaf sizes by Davis [3]. Higher nitrogen levels increased bulb reproduction as well as leaf growth as reported in Anonymus[7].

Although all doses applied have not statistical meaning for the specified criteria, 12 kg/da DAP fertilizing had positive effects on sister bulb reproduction, bulb

diameter (Fig 7,8), flower height, cluster length, stem thickness and leaf length. The reason was explained that, it affected positively flower and leaf growth due to the highest doses of phosphorus and nitrogen ratio compared with the other doses.

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