Research Article

Effect of Diammonium Phosphate (DAP) on flowers and bulb production of Tulip's cultivars

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Abstract

A research study entitled "Effect of Diammonium Phosphate (DAP) on flowers and bulb production of Tulip's cultivars" was conducted at Ornamental Nursery, Department of Horticulture, The University of Agriculture Peshawar-Pakistan. The results of the experiment showed that there was a significant effect on number of days to flowering (108.0) and leaf length (22.50 cm), when applied DAP at the rate of 3.0 g plot⁻¹, while maximum weight of the daughter bulbs (5.92 g) were also significantly affected by 6 g of DAP plot⁻¹. Among different tulip's cultivars Renown showed significant effect on number of days to flowering (121.79), leaf length (25.92 cm), number of flowers plant⁻¹ (1.00) and weight of daughter bulbs (6.42 g). As concerned to interaction, cultivar Renown showed maximum leaf length (28.33 cm) when 6 g of DAP plot⁻¹ was used. While the cultivars Apeldroom when treated with 6 g of DAP showed the maximum weight of daughter bulbs (7.60 g). The experimental results showed that among different cultivars of tulip, cultivar Renown showed best performance regarding flower production when treated with 3 g of DAP under the agro climatic conditions of Peshawar valley, Pakistan.

Keywords: *Bulbs Production; Cultivars; DAP; Tulip; Flowers*

Introduction

Tulip (*Tulipa gesneriana* L.) group of cultivated bulbous herb belongs to family Liliaceae. The Genus *Tulipa* consists of about 100 species. Tulip was originally a wild flower first discovered in central Asia and later on introduced to western part. Tulips are among the most popular of all garden flowers [1]. Tulip is made up principally of concentric fleshy scales adjoined to the compressed stem or bulb basal plate. A stem in the centre of the bulb emerges in the spring with the true leaves and single terminal flower. After the flower senescence, the leaves continue to photosynthesize and nourish the daughter bulbs adjacent to the stem base and just above the basal plate. The mother bulbs die

in late spring, but one to three daughter bulbs grow to maturity. In the garden bulbs are planted about 18 cm deep to protect them from freezing in the soil. When planted in pots, the "noses" can be placed above the soil line [2]. Organic manure as initial fertilizer give better results than inorganic fertilizer with regard to increase petal length, daughter bulb weight [3]. Nutrients such as nitrogen, phosphorus and potassium play a major role in the growth and development of plants [4]. These essential nutrient elements improve the chemical and biological properties of the soil, and therefore enhance higher yields of plants. Research by a number of authors [5, 6, 7] emphasized the need to supply nutrients to the

soil during the growth of plants to increase their quality or productivity.

Plant requires proper amount of nitrogen and phosphorous in the soil for its growth and development. When there is deficiency of these nutrients in soil so plant shows various symptoms like deficiency of nitrogen causes light-green or yellow leaves, while deficiency of phosphorous causes the leaves become dark green in color and patches appear on lower side of leaves. As DAP provides both the nitrogen and phosphorous for plant, nitrogen increases the vegetative growth of plant and phosphorous is responsible for the production of carbohydrates, cell division and root elongation in plant to absorb more water and nutrients from the soil and also loses the soil around bulbs to increase the bulb size of plant [8].

Materials and Methods

The experiment entitled "effect of Diammonium Phosphate (DAP) on flowers and bulb production of Tulip's cultivars" was conducted at Ornamental Nursery, Department of Horticulture, The University of Agriculture Peshawar-Pakistan during the year 2008-2009. The experiment was laid out in Randomized Complete Block Design (RCBD) with two factors, replicated three times. There were four bulbs planted per treatment and thus the total number of bulbs per replication was 64. Hence 192 bulbs of 4 tulip's cultivars were planted in this course of study. The experiment consisted of two factors as Diammonium Phosphate (DAP) levels (control, 3, 6, 9 g plot⁻¹) and tulip cultivars (Renown, Apleddroom, King's Blood and Queen of Night). The data were recorded on number of days to bulb sprouting, plant survival percentage,

leaf length (cm), number of days to flowering, number of flowers plant⁻¹ and weight of daughter bulbs (g).

Results and Discussion

Number of days to bulb sprouting

The highest number of days to bulb sprouting (78.67) was observed in cultivar Queen of Night, while least number of days to bulbs sprouting (42.00) was noted in cultivar Renown. An increase recorded in days to bulb sprouting with increasing DAP, because DAP serves as dual effect as it provides phosphorous for better root system and loosening of soil, so the bulbs produced more roots established firmly, so take more days to bulb sprouting, while nitrogen helps in vegetative growth after the root establishment. These results are in agreement with those of Salisbury and Ross [8] who stated that the provision of more phosphorous resulted in highest rate of root growth and development.

Plant survival percentage

DAP showed no significant effect on plant survival percentage, however higher survival percentage (83.33) was recorded on 6 g plot⁻¹. While increasing amount of nitrogen and phosphorous may have some adverse effects on plant survival. The results are in harmony with those of Salisbury and Ross [8] who stated that plants grown with excess nitrogen usually develops poor root system due to sugar translocation to roots as affected due to hormone imbalance.

Leaf length (cm)

Highest leaf length (25.92 cm) was recorded in cultivar Renown while the lowest leaf length (15.42 cm) was noted in cultivar Apleddroom.

Table 1: Number of days to bulb sprouting, plant survival percentage, leaf length (cm), days to flowering, number of flowers plant⁻¹ weight of daughter bulbs (g) of tulip's cultivars as affected by Diammonium Phosphate (DAP).

DAP (g plot ⁻¹)	Days to bulb sprouting	plant survival percentage	leaf length (cm)	days to flowering	number of flowers plant ⁻¹	weight of daughter bulbs (g)
0	59.83	75.00	17.17c	98.33b	0.75	4.58b
3	58.46	83.33	22.50a	108.00a	0.92	5.40ab
6	59.75	79.17	19.75b	89.46c	0.75	5.92a
9	63.92	75.00	17.17c	94.506c	0.75	4.41b
LSD (1%)	NS	NS	2.10	5.23	NS	1.22
Cultivars						
Renown	42.00c	95.83	25.92a	121.79a	1.00a	6.42a
Apeldroom	66.17ab	87.50	15.42c	108.04b	0.92ab	4.56b
King's blood	55.12bc	62.50	18.17b	72.21d	0.58c	4.81b
Queen of night	78.67a	66.67	17.08bc	88.25c	0.67bc	4.52b
LSD (1%)	14.46	NS	2.10	5.23	0.32	1.22
Interaction						
HA x N	NS	NS	4.20	10.45	NS	2.44

Mean values for DAP levels showed that highest leaf length (22.50 cm) was observed in plants received 3 g of DAP plot⁻¹, while least leaf length was recorded in plants received 9 g of DAP plot⁻¹. Comparing interaction, it is evident that more leaf length (28.33 cm) was found in cultivar Renown, fertilized with 3 and 6 g of DAP plot⁻¹, whereas the minimum leaf length (11.0 cm) was recoded in cultivar Apeldroom untreated with DAP. The data showed that leaf length was increased up to optimum DAP, while increasing further the leaf length is affected adversely due to increased concentration of nitrogen and phosphorous in DAP. DAP provides nitrogen for vegetative growth and phosphorous for root development and loosening of soil. As Salisbury and Ross [8] who stated that plant grown with excess nitrogen usually developed poor root system and abundant

phosphorous cause early maturity hence leaf length adversely affected by increasing DAP levels. Similarly Mynett *et al.*, [9] concluded that tulips planted every year in the third and fourth year of the experiment, there was decrease in leaf length of 30%.

Number of days to flowering

More number of days to flowering (121.79) was recorded for cultivar Renown while less number of days to flowering (72.21) was depicted in cultivar King's blood. 3 g of DAP plot⁻¹ showed the highest number of days to flowering (108.00) followed by untreated plant with DAP (98.33) while the lowest number of days to flowering (89.46) was observed in plants fertilized with 6 g of DAP plot⁻¹. As concerned interaction, cultivar Renown when fertilized with 9 g of DAP plot⁻¹ showed the highest number of

days to flowering (131.33) while minimum number of days to flowering (44.83) was noted in cultivar King's blood fertilized with 6 g of DAP plot⁻¹. DAP provides nitrogen for vegetative growth and phosphorous for root development and loosening of soil. DAP at optimum level provides optimum nitrogen and phosphorous for early flowering of tulip's cultivars. Whereas less DAP or increased DAP doses provide less or more nitrogen and phosphorous which badly affects the yield. The results are in agreement with those of Salisbury and Ross [8] who stated that excess nitrogen reduced root system of plant. Early flowering is achieved at an optimum dose of DAP.

Number of flowers plant⁻¹

The mean values revealed that more flowers (1.00) were found in cultivar Renown, followed by cultivar Apeldroom (0.92), while least number of flowers (0.58) was noted in cultivar King's blood. DAP showed no significant effect on flower production. The data showed significant difference among the tulip's cultivars.

Weight of daughter bulbs (g)

Highest weight of daughter bulbs (6.42 g) was noted in cultivar Renown, followed by cultivar King's blood (4.81 g), whereas the lowest daughter bulb weight (4.52 g) was recorded in cultivar Queen of night. More daughter bulb weight (5.92 g) was recorded in plants, fertilized with 6 g of DAP plot⁻¹, followed by 3 g of DAP plot⁻¹ (5.40 g) while the lowest daughter bulb weight (4.41 g) was immortalized in plants received 9 g of DAP plot⁻¹. As concerned interaction the highest daughter bulbs weight (7.60 g) was found in Apeldroom fertilized with 6 g of DAP plot⁻¹ while least daughter bulb

weight (2.18 g) noted in cultivar King's blood untreated with DAP. The increment in weight of daughter bulbs is due to the fact that DAP provides sufficient nitrogen and phosphorous at the optimum level, nitrogen improved their vegetative growth, hence increased the photosynthetic products formation so increased the weight of daughter bulbs and also phosphorous improved their root system so absorbed more nutrients and water from soil and hence increased the weight of daughter bulbs, while increased DAP, weight of daughter bulbs adversely affected may be due to physiological factors. Salisbury and Ross [8] stated that excess nitrogen usually reduces root system hence reduces the weight of daughter bulbs. Lou *et al.*, [3] reported that organic manure as initial fertilizer gave better results.

Conclusion

It is concluded from the experimental results that the cultivar Renown showed best performance regarding flower production when treated with 3 g of DAP under the agro climatic conditions of Peshawar valley, Pakistan. However, the higher bulb production was obtained when tulips cultivars were treated with 6 g of DAP.

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