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RESEARCH ARTICLE :

Growth and bulb production in daffodil cv. tunis as affected by planted bulb weight, nitrogen application time and deheading

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SUMMARY : A field experiment was conducted during 2009-10 and 2010-11 to study the effect of planted bulb weight, nitrogen application time and deheading on growth and bulb production in daffodil cv. Tunis. Planted bulb weight at 15.00 t/ha registered 30.30 and 50.47 per cent higher bulb yield than 12.50 and 10.00 t/ha planted bulb weight, respectively. Number of leaves, leaf dry weight, leaf area/ plant, number of bulbs and total yield of bulbs/ha were also highest at 15.00 t/ha planted bulb weight, however, weight of bulbs/plants was higher at 10.00 t/ha. Days to sprouting remained unaffected by planted bulb weight. Nitrogen application in two splits one each at 1st Week of March and April significantly improved all growth characters, yield attributes and yield than other application timings. Nitrogen application in 1st week of March and April (two equal splits) increased the total bulb yield by 9.88 and 21.56 per cent over its application in single split at 1st Week of March and two splits in 2nd Week of November and 1st Week of March, respectively. Deheading at tight bud stage produced significantly higher growth characters, yield attributes and yield than no deheading. The bulb yield increase with deheading treatment was to the tune of 5.14 per cent higher over no deheading.

KEY WORDS :
Planted bulb weight, nitrogen application time, Deheading, growth and yield, Daffodil

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BACKGROUND AND OBJECTIVES

Daffodils, symbolizing 'Friendship', are the most important early spring blooming flowers for their unmatched beauty and fragrance. They are used in bouquets, mixed spring arrangements and other decorations. Quality bulb production in daffodils is essential for producing more quality flowers per unit area. This endeavour calls for better management practices to standardize its cultivation so that the crop is grown in the farmers fields like other bulbous crops. One of the important practices is the maintenance of plant density for obtaining maximum production of bulbs per unit area. No doubt, nitrogen is the most important limiting nutrient element for growth and development of the crop but the time of application of the nutrient to the crop needs to be standardized for getting highest Nitrogen use efficiency. Besides, it is a known fact that the photosynthates are stored or utilized in sinks were severe competition exists. Bulbs and flowers are two major sinks in Daffodil and the removal of one sink may influence the other sink. In view of above, the study was undertaken to determine the effect of planted bulb weight, nitrogen application time and deheading in bulb production and growth in daffodils.

RESOURCES AND METHODS

A field experiment on the effect of planted bulb weight, nitrogen application time and deheading on the bulb production in daffodil cv. Tunis was conducted during winter seasons of 2009-10 and 2010-11 at Research Farm, Division of Floriculture, Medicinal and Aromatic plants, SKUAST-K, Shalimar on silty clay loam soil low in available nitrogen medium in available phosphorus and potassium with neutral pH. The treatments consisting of 3 factors *viz.*, 3 planted bulb weights (10.00, 12.50 and 15.00 t/ha) 3 nitrogen application time (two splits, one each in 2nd week of November and 1st week of March, two splits, one each in 1st week of March and April and single split in 1st Week of March) and 2 deheading (No deheading and deheading at tight bud stage) were laid in a randomized block design replicated thrice. The fertilizers *viz.*, phosphorus and potassium at the rate of 150 and 75 kg/ha through SSP and MOP, respectively were applied uniformly to each plot as basal dose and other cultural and management operations were conducted as per package of practices. Uniform sized bulbs at the rates as per treatment were planted in 2nd Week of November, 2009. Nitrogen was applied through urea at the rate of 150 kg/ha as per treatment. Various observations *viz.*, days to sprouting, number of leaves,leaf dry weight, leaf area/plant, days to flower bud appearance, bulb weight/ plant, number of bulbs/ha and total bulb yield/ha were recorded. The data obtained was analysed by the method given by Panse and Sukhatame (1985).

OBSERVATIONS AND ANALYSIS

The results obtained from the present study as well as discussions have been summarized under following heads :

Planted bulb weight :

The data (Table 1) shows that during 2010-11 the planting of bulbs produced significant effect on various growth parameters. Significantly the highest number of leaves/plant (4.59) at 90 days after March 1st (DAM) were recorded with planted bulb weight of 15.00 t/ha followed by planted bulb weight of 12.50 t/ha (4.34) and

Table 1 : Effect of planted bulb weight on growth characters in daffodil cv. Tunis

Treatments	Number of days to sprouting	Number of leaves/palnt		Leaf dry weight/plant (g) after 90 days		Leaf area/plant (m^2) March 1st	
	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11
Planted bulb weight (t/ha)							
W_1 = 10.00	82.89	3.88	4.17	0.99	1.14	33.36	31.36
W_2 = 12.50	83.80	3.96	4.34	1.00	1.18	28.55	33.05
W_3 = 15.00	83.00	4.01	4.59	1.04	1.25	29.16	33.66
C.D. (P= 0.05)	NS	NS	0.37	NS	0.08	NS	1.74
Nitrogen application time (150 kg/ha)							
N_1 = Two splits (2nd week of Nov. and 1st week of March)	81.83	3.98	4.22	1.00	1.16	28.50	31.80
N_2 = Two splits (1st week of March and 1st week of April)	84.00	4.02	4.68	1.05	1.28	29.31	31.61
N_3 = Single split (1st week of March)	83.87	3.85	4.20	0.98	1.13	28.36	31.66
C.D. (P= 0.05)	1.12	NS	0.37	NS	0.08	NS	1.74
Deheading							
D_0 = No deheading	84.36	3.98	4.39	1.03	1.21	29.05	32.94
D_1 = Deheading at tight bud stage	82.10	3.92	4.34	0.99	1.17	28.33	32.44
C.D. (P= 0.05)	0.91	NS	NS	NS	NS	NS	NS

NS=Non-significant

the lowest 4.17 leaves/plant in planted bulb weight 10.00 t/ha. However, during 2009-10 growth characters did not significantly influence these parameters. Days to sprouting was not affected by different bulb weights because of similar metabolic activity in bulbs at active phase, however, planted bulb weight of 10.0 t/ha recorded the lowest days (82.89) to sprouting. Planted bulb weight of 15.00 t/ha recorded significantly higher leaf dry weight/ plant (1.25 gat 90 DAM) during 2010-11 over planted bulb weight at 10.00 t/ha (1.14 g 90 DAM) but was at par with bulb weight of 12.50 t/ha, whereas during 2009-10, different planted bulb weights recorded statistically insignificant dry weights/plant 90 DAM. Similarly, maximum leaf area (33.66 cm^2 at 90 DAM) during 2010-2011 was recorded in planted bulb weight at 15.00 t/ha and the minimum leaf area (31.36 cm^2) in planted bulb weight at 10.00 t/ha. However, during 2009-10 the differences in the leaf area/plant at different planted bulb weight remained statistically non-significant. Infact good material present in the uniform sized bulbs forced their sprouting at about similar timing because of similar rate of metabolic activity in the bulbs at the active phase. Leopold and Kriedemann (1980) indicated that within limits, plants inherent capacity for growth and overall performance is a direct consequence of how successfully it exploits the local environment. Such factors as light, temperature, water supply and mineral nutrition assume major importance. The higher density affords more leaves and greater leaf area per unit leaf area and therefore, greater potential for overall yield. When the higher density does not produce competition for the above factors, the photosynthetic rate of individual leaves would tend to increase. The results of the present investigation also get support from the findings of Nazki *et al.* (2005) who reported increased number of leaves/clump in Narcissus at higher planted bulb density of 50/m^2. Kumar *et al.* (2003) also recorded more number of leaves/clump in tuberose at lower spacing.

Bulb weight plant^{-1} was significantly higher in planted bulb weight at 10.00 and 12.50 t/ha than 15.00 t/ha (Table 2). 15.00 t/ha planted bulb weight registered yield superiority of 30.30 and 50.47 per cent over 12.50 and 10.00 t/ha, respectively. The results clearly indicates that spacing of plants has a marked effect on the yield of crop. Comparatively availability of more nutrients, moisture, light etc under wider spacing might have resulted in higher bulb weight/plant. Kumar and Singh (1998) and Kumar *et al.* (2003) working on tuberose have also reported higher bulb weight/plant at wider spacing. In case of number and weight of different bulb sizes and total bulb yield/ha the values remained significantly higher at planted bulb weight of 15.00 t/ha. This again indicates that proper spacing of plants has a marked effect on the yield of crop. No doubt, an increase in distance between plants increased the yield per plant; the increment gradually lessers as the spacing is widened

Table 2 : Effect of planted bulb weight on days to floral bud appearance, bulb weight/plant, number and yield of bulbs/ha

Treatments	Days to flower bud appearance (Days after March 1st)	Bulb weight /plant (g)	Number of bulbs/ha (Lakhs)	Total bulb yield (t/ha)
Planted bulb weight (t/ha)				
W_1 = 10.00	106.38	39.02	6.101	14.86
W_2 = 12.50	107.13	38.85	7.141	17.16
W_3 = 15.00	111.35	37.29	9.864	22.36
C.D. (P=0.05)	3.10	0.97	0.72	0.39
Nitrogen application time (150 kg/ha)				
N_1 = Two splits (2nd week of Nov. and 1st week of March)	105.39	37.02	7.262	16.37
N_2 = Two splits (1st week of March and 1st week of April)	109.13	39.77	8.130	19.90
N_3 = Single split (1st week of March)	110.33	38.37	7.711	18.11
C.D. (P=0.05)	3.10	0.97	0.72	0.39
Deheading				
D_0 = No deheading	108.13	37.74	7.655	17.67
D_1 = Deheading at tight bud stage	108.43	39.02	7.747	18.58
C.D. (P=0.05)	NS	8.79	NS	0.32

NS=Non-significant

per unit area. Wider spacing results in lesser plants per unit area and the increase in yield per plant is insufficient to compensate for this reduction in plant population.

Nitrogen application time :

Nitrogen application in two splits one each at 2nd week of November and 1st week of April significantly reduced the days to sprouting (81.83) compared to single split of nitrogen in 1st week of March (83.87) and two splits of nitrogen in 1st week of March and April (84.00). Nitrogen being an essential constituent of plant tissue is involved in cell division and cell elongation and hence higher availability of nitrogen to bulbs may have induced early sprouting compared to late sprouting in the treatments where nitrogen was not applied. These results commensurate the findings of Sehrawat *et al*. (2003).

Two splits of nitrogen in 1st week of March and April during 2010-11 resulted in significant increase in number of leaves (4.68 leaves/plant) which was followed by two splits in 2nd week of November and 1st week of March (4.22 leaves/plant) and the lowest number of leaves/plant (4.20) were recorded with single split of nitrogen in 1st week of March. However, difference in number of leaves/plant during 2009-10 remained non-significant. Leaf dry weight and leaf area plant^{-1} showed the similar trend *i.e.*, both the characters showed significant increase with two splits of nitrogen in 1st week of March and April as compared to other application timings. Significantly minimum number of days (105.39) to flower bud appearance was recorded in two splits of nitrogen (2nd week of November and 1st week of March) than other treatments of nitrogen application. The treatment (two splits of nitrogen in 1st week of March and April) ensured regular supply of nitrogen in small quantities at critical growth stages. Thus proper utilization of nitrogen applied might be responsible for better growth. Since nitrogen is lost from the soils by leaching and volatilization especially during winter; hence applications of nitrogen need to be made largely on crop needs. It appears that utilization of nitrogen by plant occurs readily whenever, the available nitrogen is in the soil. So keeping the plant supplied with nitrogen is a matter of keeping usable nitrogen in the soil (Goss, 1973). Thus a regular supply of nitrogen in splits is important for better growth. Similar findings have also been reported by Wani *et al.*, 2015 in case of lilium.

Data (Table 2) also revealed that two split applications of nitrogen in 1st week of March and 1st week of April recorded significantly higher bulb weight (39.77 g/plant) than single split application of nitrogen in 1st week of March (38.37 g/plant). Bulb weight/plant recorded with one time nitrogen application split in 1st week of March and two nitrogen splits in 2nd week of November and 1st week of March were statistically at par. Nitrogen is an important constituent of proteins, chlorophyll and amino acids. Regular and timely supply of nitrogen to the bulbs might have increased the amount of proteins and amino acids thereby increasing the bulb weight/plant. Kumar *et al.* (2003) reported that the nitrogen increased total leaf area of plants causing high dry matter accumulation and its mobilization in the corms which resulted in increase of the corm weight. Nitrogen application time also resulted in significant improvement in the number of bulbs/ha and total bulb weight (t/ha). Application of two splits of nitrogen (1st week of March and April) resulted in a total bulb yield of 19.90 t/ha followed by 18.11 and 16.37 t/ha with application of single nitrogen split (1st week of March) and two nitrogen splits (2nd week of November and 1st week of March), respectively.

Deheading :

Deheading at tight bud stage significantly reduced the number of days to bulb sprouting (82.10) than no deheading treatment (84.36) (Table 1), whereas the growth characters *viz.*, number of leaves, dry weight of leaves and leaf area/plant at 90 DAM during two years of experimentation remained statistically non-significant by deheading treatment. In bulb crops, the development of flower and stem growth is more dependent on current photosynthesis than on bulb reserves thereby meaning that there are two competing sinks for photosynthesis *i.e.* the reproductive structures and the growing bulbs. Elimination of floral sink increases translocation of photosynthates to growing bulbs. (Jhon and Khan, 2003). More photosynthates present in the bulb encourage growth of more leaves thereby more leaf dry weight and leaf area.

Bulb weight/plant recorded with deheading at tight bud stage was significantly higher than no deheading. Similarly, total bulb yield at deheading at tight bud stage was significantly higher (18.58 t/ha) than no deheading treatment (17.67 t/ha) (Table 2). The increase in size and weight of bulbs under deheading is obviously a result of more resource allocation to the underground sinks which could have otherwise been used by the developing flowers (Wang and Breen, 1984). Any relocation of photosynthates as a consequence of elimination of floral sink mostly takes place to the main bulb. The results agree with those of John and Khan (2003).

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REFERENCES

Goss, G.A. (1973). Physiology of plants and their cells. Pergamon Press, INC, New York (United States of America).

Jhon, A.Q. and Khan, F.U. (2003). Effect of flower and leaf removal on bulb production in tulip cv. Cassini. *SKUAST J. Res.,* **5** : 190-193.

Kumar, R., Chaturvedi, O.P. and Misra, R.L. (2003). Effect of N and P on growth and flowering of gladiolus. *J. Ornamental Hort.,* **6** (2): 100-103.

Kumar, S. and Singh, R.P. (1998). Effect of nitrogen, bulb size and spacing on bulb and bulblet production of tuberose (*Polyanthus tuberosa* L.) *South Indian Horti.,* **46**(3/6): 294-298.

Leopold, A.C. and Kriedemann, P.E. (1980). Plant Growth and Development. 2nd Edition. Tata Mc Graw-Hill Publications, NEW DELHI, INDIA

Nazki, I.T., Khan, F.U., Qadri, Z.A., Paul, T.M. and Sheikh, M.Q. (2005). Effect of crop duration, planting density and bulb grade on foliar, floral and bulb growth in *Naciassus tazetta* Linn. cv. Paper White Grandiflorus. *J. Ornamental Horti.,* **8** (3): 222-224.

Panse, V.G. and Sukhatme, P.V. (1985). *Statistical Method for Agricultural Workers*. (2nd Eds.). Indian council of Agricultural Research, NEW DELHI, INDIA.

Sehrawat, S.K., Dahiya, D.S., Singh, S. and Rana, G.S. (2003). Growth, flowering and corm production in gladiolus as influenced by NPK application. *Haryana J. Horti. Sci.,* **32**(3-4): 222-224.

Wang, Y.T. and Breen, P.J. (1984). Respiration and weight changes of Easter lily during development. *Horti. Sci.,* **19**: 702-703.

Wani, M.A., Nazki, I.T. and Din, A. (2015). Effect of split application of ammoniacal and nitrate sources of nitrogen on lilium growth and yield. *J. Plant Stress Physiol.,***1**(1) : 7-12.