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EFFECT OF NITROGEN, PLANTING DISTANCE AND BULB SIZE ON VASE LIFE OF TUBEROSE (*POLIANTHES TUBEROSA* L.) CV. HYDERABAD DOUBLE

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Abstract

A field experiment was carried out to study the effect of nitrogen, planting distance and bulb size on vase life of tuberose (*Polyanthes tuberosa* L.) cv. Hyderabad Double. Results revealed that higher levels of nitrogen enhanced percent increase in spike length (1.69 & 1.71) and (1.80 & 1.82), percent opening of florets per spike (24.82 & 25.20) and (41.90 & 42.52), drooping of florets observed minimum (1.79 &1.82) and (5.36 & 5.44) at 4rth and 8th days of spike kept in vase solution in consecutive year of experiments 2012-13 and 2013-14. Maximum spike life (8.33 & 8.45 days) was reported with nitrogen applied 300 kg/ha. In two year of experiments. Wider spacing (30 × 30 cm) promoted the percentage increases in spike length (1.32 & 1.34) and percentage of opening of florets per spike (29.52 & 29.96) at 4rth day while 8th day could not responses significantly in both the year of experiments. Drooping of florets minimum was observed at 4rth and 8th day (1.64 & 1.66) and (4.64 &4.70) however spike life was noticed (8.77 & 8.90 days) respectively in two successive years of experiments. Bigger bulb size also left significant responses on various study of vase life of tuberose. Percent increases in spike length (1.35 & 1.37) and (1.53 & 1.56), percent opening of florets per spike (28.16 & 28.58) and (41.43 & 42.05), drooping of florets (1.90 &1.93) and (4.81 & 4.88) observed minimum at 4rth and 8th days in both the year of experiments. Maximum spike life (8.77 & 8.90) days were recorded in spike obtained from bigger size bulb kept in vase solution in consecutive year of experiments.

Key words: Nitrogen, planting distance, bulb, tuberose, spike, vase life

Introduction

Flowers are an integral part of human life, due to their diversity in beauty, form, texture, colour and fragrance. Tuberose (*Polianthes tuberosa* Linn.) is commercial ornamental bulbous plant popularly known as Rajnigandha. It is native to Mexico (Trueblood, 1973), from where it spread to different part of world during the 16th century. It belongs to the family Amaryllidaceae. Tuberose is semi hardy, dwarf, perennial (Edwards, 2006), bulbous, day neutral plant, bulbs are made of scales and simple leaf base the stem remains concealed in scales, roots are adventitious and shallow. It is commercially propagated by bulb. Tuberose is grown for garden decoration in pots, beds, borders for cut flower, loose flower and extraction of essential oil. Tuberose is popular among flower loving people because of its sweet and pleasant fragrance and also long keeping quality. Nutrients such as nitrogen play a major role in the growth and development of plants (Scott, 2008). Silberbush *et al.* (2003) and Kim *et al.* (1998) have emphasized to supply nutrients to the soil during the growth of plants to increase their productivity and vase life. Besides being the chief constituent of the chlorophyll molecule require for photosynthesis, its deficiency leads to a decrease of photosynthesis (Thomas *et al.* 1975), nitrogen is also required for synthesis of amino acids, amines, protein, nucleic acids, nucleotides, urines, pyrimidines, coenzymes, hexose amine etc. Plant density is another, important yield contributing factor, can be manipulated to maximize production from per unit area. Quantity as well as quality of bulbs depends upon various factors, out of which size of bulbs play important role. Size of planting material is important for obtaining good quality spike. Present study was under with objectives to assess the individual effect of nitrogen does, planting distance and bulb size on vase

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life of tuberose.

Materials and Methods

The present study was conducted at Main Experiment Station, Department of Horticulture, N.D.U.A. & T., Faizabad in two successive years 2012-13 and 2013-14. The experiment was conducted in Randomized Block Design (factorial) with 16 treatment combinations, comprising of 4 levels of nitrogen (0, 100, 200 and 300 kg/ha), two levels of planting distance S_1 (30 × 20 cm) and S_2 (30 × 30 cm) and two levels of bulb size B_1 (less than 2.00 cm) and B_2 (greater than 2.00 cm). Nitrogen was applied through urea in two split doses (half as basal dressing and half in top dressing 40 days after sowing), The soil of the experimental site was loam having medium available nitrogen; phosphorus and potassium with p^H level 7.86. Vase life of spikes was studied as influenced through nitrogen levels, planting distance and bulb size. Five plants were tagged for recording the data in each treatment leaving the border plants pertaining to vase life of tuberose in two consecutive years. The data were analysed by procedure suggested by Gomez and Gomez (1984).

Results Discussion

The investigation revealed significant improvement in all the parameters of vase life in tuberose. Percent increase in spike length, percent opening of florets per spike and drooping of florets on 4^{rth} and 8^{th} days and spike life of tuberose. Varu *et al*. (2007) and Jitender and Daljee (2004) reported that flower age with time, they lose moisture and colour fade. While flowers like jasmine tuberose turn brown and dry. In some plant mass shedding petals occurs. For instance, the petals of linseed droop within a few hours of self pollination. Those of the gulmohar (*Delonix regia*) and amaltas (*Cassia fistula*) are shed more leisurely. In many tubular flower the entire abseies, as in *Nyctenthes arbotristis*.

Study the keeping quality of flower scape was improved over control significantly by 100 and 200 kg N ha $^{-1}$ but the highest dose proved ineffective and were noted to be at par with control. Thus, the beneficial effect accruing with lower levels of nitrogen (100 and 200 kg may be considered a plus point while evaluating the results due to nitrogen fertilization. Dalal *et al*. (1999), Sashikala *et al*. (2001) and also reported that higher dose of nitrogen

Table 1: Effect of Nitrogen, Planting distance and Bulb size on vase life of Tuberose (*Polianthes tubersa* L.) cv. Hydrabad double.

Treatments	% increase in spike length (4^{rth} days)		% increase in spike length (8^{th} days)		% opening of florets per spike (4^{rth} days)		% opening of florets per spike (8^{th} days)		Drooping of florets (4^{th} days)		Drooping of florets (8^{th} days)		Spike life (days)	
	2012-13	2013-14	2012-13	2013-14	2012-13	2013-14	2012-13	2013-14	2012-13	2013-14	2012-13	2013-14	2012-13	2013-14
N_0	0.63	0.64	0.75	0.76	30.79	31.25	41.24	41.86	2.60	2.64	5.66	5.75	7.16	7.27
N_1	1.11	1.13	1.20	1.22	27.58	27.99	37.79	38.35	2.00	2.03	4.93	5.00	8.47	8.59
N_2	1.62	1.64	1.68	1.70	24.18	24.54	38.87	39.46	1.63	1.65	4.38	4.44	8.77	8.90
N_3	1.69	1.71	1.80	1.82	24.82	25.20	41.90	42.52	1.79	1.82	5.36	5.44	8.33	8.45
S.Em±	0.05	0.05	0.5	0.05	0.37	0.40	1.12	1.11	0.05	0.06	0.06	0.06	0.08	0.09
CD at 5%	0.15	0.15	0.16	0.16	1.08	1.15	3.23	3.22	0.15	0.17	0.17	0.18	0.24	0.25
S_1	1.20	1.22	NS	NS	24.16	24.52	NS	NS	2.37	2.40	5.53	5.61	7.59	7.17
S_2	1.32	1.34			29.52	29.96			1.64	1.66	4.64	4.70	8.77	8.90
S.Em±	0.04	0.03			0.26	0.28			0.04	0.04	0.04	0.04	0.06	0.06
CD at 5%	0.11	0.10			0.76	0.81			0.11	0.17	0.12	0.13	0.17	0.18
B_1	1.17	1.19	1.18	1.20	25.52	25.90	38.47	39.04	2.10	2.13	5.36	5.44	7.59	7.17
B_2	1.35	1.37	1.53	1.56	28.16	28.58	41.43	42.05	1.90	1.93	4.81	4.88	8.77	8.90
S.Em±	0.04	0.03	0.04	0.04	0.26	0.28	0.79	0.79	0.04	0.04	0.04	0.04	0.06	0.06
CD at 5%	0.11	0.10	0.11	0.11	0.76	0.81	2.29	2.27	0.11	0.17	0.12	0.13	0.17	0.18

N_0=0 kg/ha, N_1=100 kg/ha, N_2= 200 kg/ha, N_3= 300 kg/ha, S_1= 30 cm × 20 cm, S_2= 30 cm × 30 cm, B_1= 1.00-2.00 cm, B_2= 2.00-3.00 cm, NS= Not significant.

adversely affected the keeping quality of cut flower of gladiolus, similar findings are reported by Varu and Barad (2009), Sudagar *et al.* (2010) and Sehgal and Kumar (2009) in tuberose. Hatibarua *et al*. (2002), Hunmili and Paswan (2003) and Nagaraju *et al*. (2002) however, observed that keeping quality of cut flower remained unaffected by nitrogen treatments. High dose of nitrogen produce soft and tender stalk which causes deleterious effect on vase life of cut flowers. Planting density and bulb size also increase vase life of spike by increasing the length of spike and quality of florets.

Thus, once the specific physiological process triggering flower senescence is identified effects could be made to delay them, which may prove beneficial to floriculture industry. The aging petals show break down of protein and nucleic acids. At the onset of wilting, the activity of various hydrolyses increased dramatically findings are similar as Hutchinson *et al*. (2002), Singh, K.P. and Kumar, J. (2009) and Varu and Barad (2007). The endogenous production of ethylene shoots up in flower and petals as they deteriorate. As in fruits, ethylene production also seems to be associated with changes in other hormones. The inter relationship between auxin and ethylene has been established in orchid flowers but that of ethylene and abscisic acid has started receiving attention only recently.

At the cellular level, the aging petals show that the lysosomal section acts by the autophagic activity of the vacuole. During the last phase of senescence, the tonoplast ruptures and completes digestion of the cytoplasmic constituents occurs in the autolysin cells. The factors which play a key role in governing the life of cut flowers including carbohydrates supply and water balance. Addition of sugar and an antimicrobial agent to the holding solution prolongs vase life substantially similar findings reported by Zhang *et al*. (2004), Tyagi and Singh (2006), Tawar *et al.* (2003) and Devadanam *et al*. (2007).

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