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GROWTH AND FLOWERING OF SPIDER LILY AS INFLUENCED BY PLANTING TIME AND NITROGEN

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Abstract

A field investigation was carried out at Satpuda Botanic Garden, College of Agriculture, Nagpur in 2013 in factorial randomized block design to study the growth and flowering of spider lily as influenced by planting time and nitrogen. The treatments comprised of three levels of planting time *i.e.* 15th January, 15th February and 15th March and four levels of nitrogen *i.e.* 0 kg N ha^{-1}, 200 kg N ha^{-1}, 300 kg N ha^{-1} and 400 kg N ha^{-1} with three replications. It was revealed that the vegetative growth *viz.* leaves plant^{-1} and length and width of leaf, yield parameters *viz.* flowers stalk^{-1}, flower stalks plant^{-1} and flowers ha^{-1} and quality parameters *viz.*, longevity of flowers and weight of bulbs plant^{-1} in spider lily were influenced non-significantly due to different treatments of planting time. However, in respect of nitrogen levels significantly maximum leaves plant^{-1}, length and width of leaf, flowers stalk^{-1}, flower stalks plant^{-1}, flowers ha^{-1}, longevity of flowers and weight of bulbs plant^{-1} were noted with the application of 400 kg N ha^{-1}, whereas, all these parameters were recorded minimum under the control treatment *i.e.* 0 kg N ha^{-1}. Interaction effect of planting time and nitrogen was found non-significant in respect of all these parameters except days for 50 per cent flowering and it was noted earliest under 15th March planting with 0 kg N ha^{-1}, whereas, 15th January planting with 400 kg nitrogen ha^{-1} required maximum days for days for 50 per cent flowering in spider lily.

Key words : Planting time, nitrogen, spider lily, flower yield, bulbs.

Introduction

Spider lily (*Hymenocallis littoralis* L.) is native to South America and belongs to the family *Amaryllidaceae*. It is a bulbous ornamental plant, which is 45-60 cm tall and has long, broad and strap shaped green leaves. Now a days, it is emerging as an important commercial flower crop in Maharashtra. The flowers of spider lily are largely used in garlands, decoration of *mandap*, marriages and social ceremonies and various religious functions.

Nitrogen is a constituent of proteins, enzymes, vitamins and plant hormones. It imparts vigorous vegetative growth and dark green colour to the plants, produces early growth, delays maturity of plants and governs the utilization of potassium, phosphorus and other nutrients. It is reported that nitrogen helps to increase yield and quality of flowers. It is also found that production of flowers can be regulated by adopting proper time of planting of flower crops, so that the produce can be made available in the market whenever, there is a good demand for these flowers. Considering the important role of planting time and nitrogen for increasing the profit and productivity of flower crops, the present investigation was proposed on growth and flowering of spider lily as influenced by planting time and nitrogen.

Materials and Methods

The investigation was carried out at Satpuda Botanic Garden, College of Agriculture, Nagpur during January, 2013 to September, 2013 in factorial randomized block design. The treatments comprised of three treatments of planting time *i.e.* 15th January, 15th February and 15th March and four levels of nitrogen *i.e.* 0 kg N ha^{-1}, 200 kg N ha^{-1}, 300 kg N ha^{-1} and 400 kg N ha^{-1} with three replications. The bigger and uniform sized bulbs of spider lily were selected and then planted at a spacing of 60 × 45 cm in the flat beds on different dates as per the treatment. At the time of land preparation, well-rotted FYM @ 20 t ha^{-1} was mixed uniformly in the soil before last harrowing. A recommended dose of phosphorus and potassium *i.e.* 100 and 50 kg ha^{-1}, respectively was applied to all the treatment plots as a full dose at the time of bed preparation before planting, while, the dose of nitrogen was applied as per the treatments. The dose of nitrogen was splitted in three equal splits and each was applied at the time of planting, 1 month after planting and 2 months after planting. Growth observations were recorded at 120 days after planting, whereas, flowering and yield observations were taken after flowering; weight of bulbs plant^{-1} was recorded after harvesting of bulbs at 240 days after planting.

Results and Discussion

Growth

The data presented in table 1 exhibited that vegetative growth in terms of leaves plant^{-1} and length (cm) and width of leaf (cm) was influenced non-significantly by planting time and significantly by levels of nitrogen.

Significantly the maximum leaves plant^{-1} (19.85), length of leaf (101.11 cm) and width of leaf (3.47 cm) were noted with the nitrogen dose of 400 kg ha^{-1}, which was followed by 300 kg nitrogen ha^{-1}, however, the control treatment *i.e.* 0 kg N ha^{-1} recorded minimum leaves plant^{-1} (15.51), length of leaf (95.33 cm) and width of leaf (3.26 cm). The highest values were recorded at 400 kg N ha^{-1}, which might be due to vigorous vegetative growth of spider lily plant, as proper nitrogen level encourages plant growth and helps a plant to thrive well. Also cell elongation is caused due to sufficient level of nitrogen, which is helpful for photosynthesis. The results are in conformity with the results reported by Ghule *et al*. (2006) in spider lily, who reported that maximum number of leaves plant^{-1} were recorded with application of higher dose of nitrogen *i.e.*, 300 kg N ha^{-1}. Similar results were also obtained by Patel *et al*. (2010) in gladiolus, who concluded that the gladiolus crop fertilized with 250 kg N ha^{-1} significantly improved the length and width of leaf as compared to 200 and 300 kg N ha^{-1}. The interaction effect of planting time and nitrogen in respect of leaves plant^{-1}, length of leaf and width of leaf in spider lily was found to be non-significant.

Flowering

A significant differences in respect of days for 50 per cent flowering in spider lily was observed due to different planting time (table 1). The treatments of 15th March planting required significantly less number of days for 50 per cent flowering (137.41 days) whereas, maximum days for 50 per cent flowering (177.91 days) were required under 15th January planting. This might be due to the more number of days were required for first flower bud emergence under 15th January (**T_1**) planting which might have been due to non-availability of required temperature and day length for flower bud initiation of spider lily and this might have extended the juvenile phase of the plant. Similarly, the type of spider lily taken for study flowers only in rainy season, hence, 15th March planting might have required less period for flower bud initiation and extended juvenile phase under 15th January planting which might have resulted into delayed 50 per cent flowering in spider lily. Similar results were obtained by Gurav *et al.* (2005) in tuberose who reported earliest flowering with April planting as compared to other treatments of time of planting *viz.* 1st June, 1st August, 1st October, 1st December and 1st February.

The data from table 1 indicated significant differences amongst the different levels of nitrogen. It was observed that the control treatment (0 kg N ha^{-1}) noted significantly earliest (149.00 days) 50 per cent flowering, which was followed by the treatment N_2 *i.e.* 200 kg N ha^{-1} (156.77 days), whereas, it was found latest (160.55) with the treatment N_4 *i.e.* 400 kg N ha^{-1}. Higher dose of nitrogen might have enhanced the biological activities like cell division, cell elongation, protein synthesis and food formation and ultimately this might have enhanced the vegetative growth of spider lily plant and delayed flowering. These results are in close conformity with the findings of Ghule *et al*. (2003) in spider lily who reported that, days to flowering increased significantly with an increase in nitrogen level.

Interaction effect of planting time and nitrogen in respect of days for 50 per cent flowering was found to be significant (table 2). The treatment combination of T_3N_1 (15th March planting with 0 kg N ha^{-1}) required minimum days (134.33 days) for 50 per cent flowering, which was found at par with the treatment combinations of T_3N_2 (126.66 days), T_3N_3 (128.00 days) and T_3N_4 (130.33 days), however, the treatment combination of T_1N_4 (15th January planting with 400 kg N ha^{-1}) took maximum days (184.00 days) for 50 per cent flowering. This might have been due to the combined effect of planting time and nitrogen level.

Flower yield

The data presented in table 1 revealed that the yield of spider lily in respect of flowers stalk^{-1}, flower stalks plant^{-1} and flowers ha^{-1} was non-significantly influenced by different planting time. However, different levels of nitrogen influenced all these yield parameters significantly. It was observed that, significantly, the maximum flowers stalk^{-1} (15.41), flower stalks plant^{-1} (1.46) and flowers ha^{-1} (4.33 lakh) were noticed with the application of highest dose of nitrogen (400 kg N ha^{-1}), which was superior over all other treatments, whereas, significantly minimum flowers stalk^{-1} (11.20), flower stalks plant^{-1} (1.06) and flowers ha^{-1} (3.02 lakh) were noted with the control treatment *i.e.* 0 kg N ha^{-1}.

Table 1 : Effect of planting time and nitrogen on growth and flowering of spider lily.

Treatments	Leaves plant^{-1}	Length of leaf (cm)	Width of leaf (cm)	Days for 50 per cent flowering (days)	Flowers stalk^{-1}	Flowers stalk plant^{-1}	Flowers ha^{-1} (lakh)	Longevity of flowers (days)	Weight of bulb plant^{-1}
Planting time									
T_1 - 15th Jan.	18.00	98.83	3.40	177.91	14.05	1.35	4.10	2.81	141.86
T_2 - 15th Feb.	17.28	97.83	3.31	153.33	13.61	1.22	4.03	2.61	140.84
T_3 - 15th March.	16.59	98.00	3.30	137.41	12.97	1.15	3.11	2.43	139.61
SEm±	0.39	0.29	0.03	1.19	0.33	0.05	0.10	0.11	0.63
CD at 5%	N.S.	N.S.	N.S.	3.49	N.S.	N.S.	N.S.	N.S.	N.S.
Nitrogen									
N_1 – 0 kg ha^{-1}	15.51	95.33	3.26	149.00	11.20	1.06	3.62	2.17	124.15
N_2 – 200 kg ha^{-1}	16.01	97.33	3.30	156.77	13.42	1.13	4.00	2.41	141.33
N_3 – 300 kg ha^{-1}	17.08	99.11	3.32	158.55	14.15	1.31	4.11	2.70	145.68
N_4 – 400 kg ha^{-1}	19.85	101.11	3.47	160.55	15.41	1.46	4.33	3.20	150.92
SE (m) ±	0.45	0.33	0.04	1.37	0.39	0.06	0.06	0.13	0.73
CD at 5%	1.34	0.98	0.12	4.03	1.14	0.17	0.17	0.38	2.15
Interaction									
SEm±	0.79	0.58	0.07	2.38	0.67	0.10	0.05	0.22	1.26
CD at 5%	N.S.	N.S.	N.S.	6.99	N.S.	N.S.	N.S.	N.S.	N.S.

Table 2 : Interaction effect of planting time and nitrogen on growth, yield and quality of spider lily.

Treatments combination	Days for 50 per cent flowering (days)
T_1N_1	164.33
T_1N_2	180.66
T_1N_3	182.66
T_1N_4	184.00
T_2N_1	148.33
T_2N_2	153.00
T_2N_3	155.00
T_2N_4	157.00
T_3N_1	134.33
T_3N_2	136.66
T_3N_3	138.00
T_3N_4	140.66
SE (m) ±	2.38
CD at 5%	6.99

This increase in flower yield with increase in nitrogen level might be due to the fact that increase in nitrogen level enhanced the chlorophyll formation thereby increased photosynthesis and synthesis of reserve food material, which promoted vegetative growth and increased flower yield. These results are in conformity with Devi and Singh (2010) in tuberose, who reported that, increasing nitrogen levels resulted in an increased flower yield in tuberose. The interaction effect of planting time and nitrogen on all these flowers yield parameters in spider lily was found to be non-significant.

Quality

The data (table 1) indicated that longevity of flowers and weight of bulbs plant^{-1} in spider lily had influenced non-significantly by different treatments of planting time and significantly due to nitrogen levels.

The treatment N_4 *i.e.* 400 kg N ha^{-1} noted significantly maximum longevity of flowers (3.20 days) and weight of bulbs plant^{-1} (150.92 g) and it was followed by 300 kg N ha^{-1}, whereas, the control treatment *i.e.* 0 kg N ha^{-1} recorded minimum longevity of flowers (2.17 days) and weight of bulbs plant^{-1} (124.15 g). An increase in longevity of spider lily flowers with increasing dose of nitrogen from 0 to 400 kg N ha^{-1} might be due to the increased vegetative growth of plant, which might have resulted in an increased turgidity of flowers. Similarly, higher rate of nitrogen *i.e.* 400 kg ha^{-1} recorded the highest weight of bulbs plant^{-1} in spider lily. These results are in harmony with those obtained by Rathore and Singh (2009) in tuberose, who suggested that maximum longevity of spikes and weight of bulbs plant^{-1} were obtained with the treatment receiving nitrogen at 320 kg N ha^{-1} as compared to other treatments *viz*. 120 and 220 kg nitrogen ha^{-1}.

The interaction effect of planting time and nitrogen on longevity of flowers and weight of bulbs plant^{-1} in spider lily was found to be non-significant.

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