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Influence of Planting Time on the Flower and Bulb Production of Asiatic Lilium under Protective Condition

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Abstract

An experiment was conducted at Floriculture Research Field, Horticultural Research Centre, Bangladesh Agricultural Research Institute, Gazipur, Bangladesh during October, 2021 to June, 2022 and October, 2022 to June, 2023, two consequtive lilium growing season to find out the optimum planting time for better flower and bulb production and also to extend the flowering duration of lilium. Lilium bulbs planted at 01 December produced the longest plant (64.0cm). The longest spike and rachis (72.70cm and 33.27, respectively), maximum number of florets/spike (10.50) and the largest floret (18.0cm) were produced by the bulbs planted at November 15. When considering the bulb and bulblet production, bulb planted at 15 November produced the heaviest and largest bulbs (25.27g and 5.13cm, respectively) and the maximum number and weight of bulblets/plant (4.63 and 5.53g, respectively). Similarly, the maximum number of bulbs/150m2 (3.82 thousands) were produced by the bulbs planted at November 15.

Keywords: Planting Time; Lilium Flower; Bulb Production

Introduction

Lilium is one of the most important bulbous flowers, belongs to Liliaceae family which have a very good demand in the flower market as cut flower and pot plants [1]. This flower is considered as high value flower with eye-catching colours, magnificent appearance, longer vase life and in some cases with exhilarating fragrance which ranks fourth among top ten cut flowers of the world trade [2]. Recently, this flower has become popular in Bangladesh with the increase in living standard of people and being started to cultivate commercially. Among the different types of lilies, the Asiatic and Oriental hybrid lilies are very popular. Asiatic lily are relatively easier to grow and can be grown in the tropical region during the cooler months. Normally, in Bangladesh condition the weather of November is the optimum to plant Asiatic lilium by which flowers may be available in the market during January to February. But there is a great demand of lilium flower round the year which is very difficult to produce in Bangladesh climatic condition. To meet up the local demand this flower is being imported from other countries and is selling in the local market with high price (BDT. 150-200/- per stick) [3]. As commercial orientation has been started in Bangladesh and farmers are also very much interested to cultivate this flower so, it is the appropriate time to give focus on various aspect of research like extending the flowering period. By using interval planting, the flowering period may be extended for fetching a good price during different occasions. In this way, lilium growers may get higher price as well as users may be benefited. Therefore, this program was undertaken with following objectives.

- To find out the optimum planting time for better flower and bulb production.
- To extend the flowering duration of lilium.

Materials and Methods

The experiment was carried out at Floriculture Research Field, Horticultural Research Centre, Bangladesh Agricultural Research Institute, Gazipur, Bangladesh during October, 2021 to June, 2022 and October, 2022 to June, 2023, two consequtive lilium growing season. Ten different planting dates were considered as treatments starting from 01 October/2021 and 2022 with 15 days interval and ended on 15 February, 2022 and 2023. Bulbs of BARI Lilium-1 were taken as planting materials. The experiment was laid out in RCB design with 3 replications. The unit plot size was 1.2 m x 1.50 m and spacing was maintained at 15cmx 15cm.

The experimental land was well prepared by adding cocodust (50:50 soil and cocodust) and 10ton cowdung/ hactare. No chemical fertilizers were applied up to 3 weeks of bulb planting. After 3 weeks of bulb planting, NPK@30:20:20g/m2 was applied. Urea and MoP @ 100kg/ ha were top dressed before spike initiation stage and bulb lifting, respectively. The cultural operations like weeding and watering were done as per the requirement. Mulching with straw was done when temperature got high. Netting (GI wire and nylon thread) was given to support the plants. The plants were protected from birds and other harmful animals using net made of nylon threads. 'Carbendazim' (Autostin) was sprayed @ 1g/L of water at 15 days interval starting from 20 days after planting to protect the plants from botrytis blight disease. Simultaneously, neem oil and Biomax (1 ml/L) were used to protect from aphids and beetles. The flower spikes were harvested when the lower most buds showed colour. During flower harvesting, the plants were kept leaving 25-30cm stem in the field for bulb development. When the leaves were brown and more or less damaged the bulbs were lifted carefully and stored at 2.1-2.50c temperature for next planting. The data on growth, flowering and bulb characters were recorded from ten randomly selected plants from each unit plot during the study period. The data were analyzed statistically by using R software to find out the variation among different treatments. Treatment means were compared by LSD [4].

Results and Discussion

All the parameters of growth and flowering of lilium were statistically influenced by various planting time except rachis length (Table 1). Lilium bulbs planted at 01 December produced the longest plant (64.0cm) followed by those planted at November 15 (63.90cm), November 01 (62.03cm), December 15 (59.53) and October 15 (58.77). Apparently similar results were observed in the study of Asiatic Lilium variety Pavia by Chandrashekar, et al. [5], where planting in November recorded maximum plant height (55.73cm) and it was followed by December (54.09cm) compared to other months of planting. Diksha, et al. [6] reported that the varieties planted during 1st fortnight of October performed better resulting in terms of maximum plant height. This might be due to the favourable environmental conditions prevailing during these months in that particular area.

Treatments	Plant Height (cm)	Spike Length (cm)	Rachis Length (cm)	Floret Number/ Spike	Floret Diameter (cm)
Planting at 01 October (T_1)	56.53^{bcd}	62.53^{cd}	27.03	9.03^{abc}	15.30^{ab}
Planting at 15 October (T_2)	58.77^{abc}	63.03^{bcd}	27.7	9.50^{ab}	15.77^{ab}
Planting at 01 November (T_3)	62.03^{abc}	68.03^{abc}	28.27	9.4^{ab}	16.50^{ab}
Planting at 15 November (T_4)	63.90^{ab}	72.70^{a}	33.27	10.50^{a}	18.0^{a}
Planting at 01 December (T_5)	64.0^{a}	70.10^{ab}	28.33	9.93^{ab}	17.50^{ab}
Planting at 15 December (T_6)	59.53^{abc}	69.77^{ab}	29.03	10.0^{ab}	17.03^{ab}
Planting at 01 January (T_7)	54.53^{cd}	65.03^{bc}	28.03	9.77^{ab}	16.33^{ab}
Planting at 15 January (T_8)	49.80^{de}	62.50^{cd}	26.53	8.50^{abc}	14.77^{ab}
Planting at 01 February (T_9)	44.57^{e}	57.03^{de}	26.53	8.03b^{c}	14.03^{ab}
Planting at 15 February (T_{10})	46.0^{e}	55.03^{e}	24.7	7.03^{c}	13.0^{b}
Level of Significance	**	**	NS	**	*
CV (%)	4.65	3.79	10.98	8.58	10.08

Source: Means with the same letter(s) are not significantly different.
** Significant at 1% level of probability *Significant at 5% level of probability NS, non-significant.
Table 1: Growth and flowering of Lilium influenced by various planting time.

Similar variations with respect growth parameters were reported by Lee, et al. [7] and Bhardwaj, et al. [8] in Asiatic lilies. Considering spike length, the bulbs planted at November 15 produced the longest spike (72.70cm) and it continued up to 15 December planting. The maximum number of florets/ spike (10.50) produced by the bulbs planted at November 15

followed by all the planting dates except 1st and 15 February planting which produced only 8.03 and 7.03 florets/spike, respectively. Similarly, lilium bulbs planted at November 15 produced the largest floret (18.0cm) followed by all the planting dates except 15 February planting which produced the smallest flower (13.0cm). The reasons for the difference in various plant characters at different plantings may be due to the variations in temperature, day length and sunshine over the period.

All the parameters of bulb and bulblet production of lilium were significantly influenced by various planting time Table 2.

Treatments	Bulb Weight (g)	Bulb Diameter (cm)	Bulblet Number/Plant	Bulblet Weight/Plant (g)
Planting at 01 October (T_1)	15.03^{de}	3.43^{ef}	2.73^{cde}	3.77^{bcd}
Planting at 15 October (T_2)	16.80^{cd}	3.77^{de}	2.77^{cde}	3.93^{bcd}
Planting at 01 November (T_3)	19.27^{bc}	4.53^{bc}	3.03^{bcd}	4.70^{abc}
Planting at 15 November (T_4)	25.27^{a}	5.13^{a}	4.63^{a}	5.53^{a}
Planting at 01 December (T_5)	22.27^{ab}	5.03^{ab}	3.90^{ab}	4.97^{ab}
Planting at 15 December (T_6)	20.03^{bc}	4.77^{ab}	3.50^{bc}	4.87^{abc}
Planting at 01 January (T_7)	18.80^{c}	4.17^{cd}	3.03^{bcd}	4.70^{abc}
Planting at 15 January (T_8)	13.0^{ef}	3.03^{fg}	2.70^{cde}	3.70^{cd}
Planting at 01 February (T_9)	11.53^{f}	2.53^{gh}	2.53^{de}	3.23^{d}
Planting at 15 February (T_{10})	10.0^{f}	2.43^{h}	2.03^{e}	2.93^{d}
Level of Significance	**	**	**	**
CV (%)	6.68	4.65	10.42	9.98

Source: Means with the same letter(s) are not significantly different.
** Significant at 1% level of probability.
Table 2: Bulb and bulblet production of Lilium influenced by various planting time.

Bulbs planted at 15 November produced the heaviest and largest bulbs (25.27g and 5.13cm, respectively) and the maximum number and weight of bulblets/plant (4.63 and 5.53g, respectively). Planting at 01 December also showed better performances regarding all parameters. Though delay and early planting did not show good performances compare to normal planting but moderate performances were showed which may help to extend the flowering period. Hong, et al. [9] also reported that the weight of new corm production in gladiolus decreased with delay in planting.

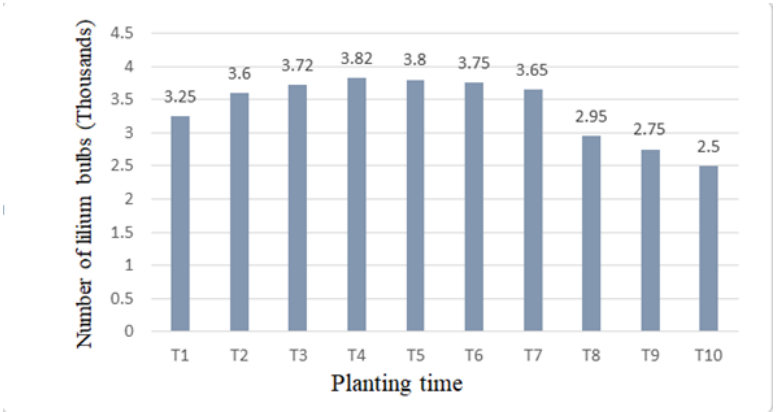

Figure 1: Yield of lilium bulbs/150m^2 influenced by planting time.
T1=Planted at 01 October T6=Planted at 15 December.
T2=Planted at 15 October T7=Planted at 01 January.
T3=Planted at 01 November T8=Planted at 15 January.
T4=Planted at 15 November T9=Planted at 01 February.
T5=Planted at 01 December T10=Planted at 15 February.

Similarly, bulbs planted at 15 November produced the maximum number of bulbs/150m2 (3.82 thousands) followed by planting at 01 December (3.80) while the minimum number of bulbs (2.50 thousands) were produce by the bulbs planted at February 15 (Figure 1).

The flowers obtained from the bulbs planted at 15 November showed the maximum vase life (10.0 days) followed by the flowers obtained from the bulbs planted at 01 December and 01 November (9.5 and 9.0 days, respectively) Figure 2. On the other hand, the minimum was observed in the flowers obtained from the bulbs planted at 15 February and 01 February (6.0 and 6.5 days, respectively). The minimum life in vase may be the results of the rising temperature as higher temperature shortened the vase life of flowers [10,11]. Jiao, et al. [12] also reported that the rate of respiration increases with rising temperature which enhances the deterioration of flowers as well as reduced the vase life.

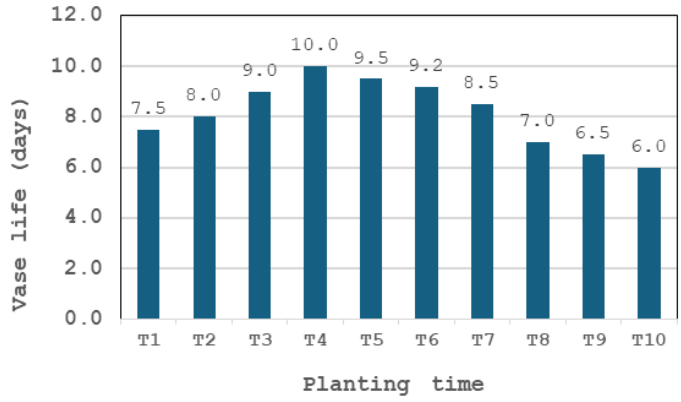

Figure 2: Influence of planting time on the Vase life of BARI Lilium-1.
T1=Planted at 01 October T6=Planted at 15 December.
T2=Planted at 15 October T7=Planted at 01 January.
T3=Planted at 01 November T8=Planted at 15 January.
T4=Planted at 15 November T9=Planted at 01 February.
T5=Planted at 01 December T10=Planted at 15 February.

Conclusion

Lilium bulbs planted at November 15 and December 01 showed better performances and produced quality flowers, bulb and bulblets production. But considering the market demand, the planting time can be extended up to 15 February which may help producers and traders to make profit and also users to enjoy the beauty of lilium flowers for longer time.

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