

## Original Research Article

### “Growth and Flowering of Asiatic Lily (*Lilium* × *asiatica*) cv. Litouwenas Affected by GA<sub>3</sub> and NAA Under Naturally Ventilated Polyhouse Conditions of Prayagraj”

#### ABSTRACT

The present investigation was carried out under a naturally ventilated polyhouse, Department of Horticulture, SHUATS, Prayagraj, Uttar Pradesh. In the month of December 2020 and the observations recorded up to February and March 2021. There were nine treatments comprising of two growth regulators viz., GA<sub>3</sub> (200, 250, 300, and 350 ppm), and NAA (50, 100, 150, and 200 ppm) along with control. The whole experiment was laid out following in a Randomized Block Design (RBD) with three replications. The results revealed that among the *Lilium* cv. LITOUWEN foliar application of 250 ppm GA<sub>3</sub> significantly increased no. of leaves per plant (66), as recorded data GA<sub>3</sub> @ 250 ppm has enhanced days to bud initiation (25.7 days), no. of bud per plant (2.8) and stem length (43.4 cm), GA<sub>3</sub> @ 350 ppm enhanced vase life (7.9 days). Whereas application of NAA @ 100 ppm enhanced no. of bulblets (3.3).

**Keyword:** Asiatic Lily, Polyhouse, GA<sub>3</sub>, NAA

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#### INTRODUCTION

*Lilium* sp. is cultivated worldwide and is one of the most important generator cut flower, pot plant and garden plant. The genus *Lilium* belongs to the family Liliaceae comprising of around 100 species and more than 9,400 cultivars, which are divided into seven sections (Comber, 1949). Lily is the common English name for flowering plants of the *Lilium* genus and they are extensively being grown in polyhouse as cut flower in global flower trade due to wider choice of growing periods, array of colours and everlasting quality. The cultivars of genus *Lilium* are highly appreciated by the horticulturists for their outstanding range of

colour, fragrance and adaptability to several environmental conditions. *Lilium* can be used for informal planting in grassland or among orchard trees, along crocuses, bluebells and tulip to create flower meadows.

Large and attractive flowers with the capacity to rehydrate after a long distance transportation, have made *Lilium* gain popularity fast in our country. The cultivars are highly appreciated for their outstanding range of colours, fragrance and adaptability to several environmental conditions (Bahr and Compton, 2004). However, nearly all the cut flowers of *Lilium* available in the florists' shop are being acquired from

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Bengaluru, Pune and hilly areas of the country like Himachal Pradesh, Uttarakhand and North Eastern regions. However, Asiatic lily varieties / hybrids grown by amateurs in the state of Uttar Pradesh are coming up well and blooming in wide range of colour, size and shape. Although agro-climatic conditions of the State are suitable for this flower crop, yet its commercial cultivation has not attracted the flower growers due to lack of awareness about the crop, quality planting material and knowledge about its production technology.

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### MATERIALS AND METHODS

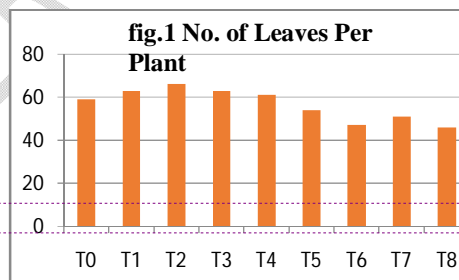
The present investigation was conducted at Horticulture Research Field, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj during December 2020 to March 2021.

### EXPERIMENTAL DESIGN AND TREATMENTS

An experiment was performed by using randomized block design (RBD) with three replications. Also, in this experiment plants sprayed with GA<sub>3</sub> (200, 250, 300, 350 ppm), NAA (50, 100, 150, 200 ppm) with control after planting of lily bulbs. The observations were recorded with respect to 15 days after planting to know the response of Asiatic lily to different regulators at different concentration.

### RESULT AND DISCUSSION

**No. of leaves per plant :-** In no. of leaves per plant treatment differed significantly with respect. It was found that maximum no. of leaves per plant (66) was reached in the T<sub>2</sub> GA<sub>3</sub> 250 ppm. In the year 1990, Pal and Das also reported that GA<sub>3</sub> promoted no. of leaves per plant in Asiatic lily.



**Days to bud initiation (days):-** The results presented in Table 1 revealed that growth regulators treatments had significantly with respect to days to bud initiation. It was studied among the different treatment in T<sub>2</sub>GA<sub>3</sub>250 ppm took lesser days (25.7 days), which were found maximum days (29.3 days) for bud initiation in T<sub>0</sub>Control. The result revealed that foliar application of 250 ppm GA<sub>3</sub> significantly advanced days to bud initiation in Asiatic lily cultivar Litouwen. The reason behind this effect may be due to the stimulation and enhancement of

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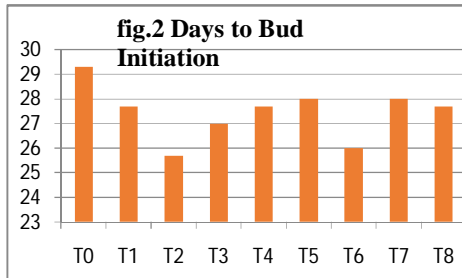
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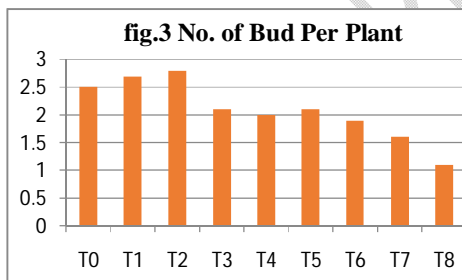
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vegetative growth. The present findings are in consonance with Singh *et al.* (2018).

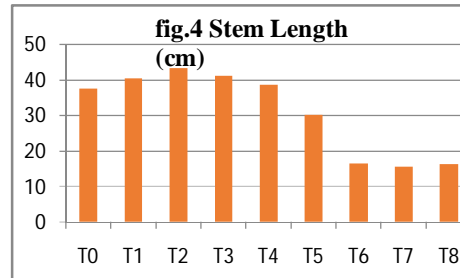


**No. of bud per plant :-** The effect of different growth regulators showed significant influence on no. of bud per plant. It was spotted that no. of bud per plant was more (2.8) in T<sub>2</sub> GA<sub>3</sub> 250 ppm. Which had fewer bud per plant with NAA 200 ppm T<sub>8</sub>. In this study, number of flower buds per plant significantly increased with levels of GA<sub>3</sub> at 250 ppm. However these parameters were recorded maximum in GA<sub>3</sub> 250 ppm treatment, in accordance with the findings of Khan and Tiwari (2003) in dahlia.

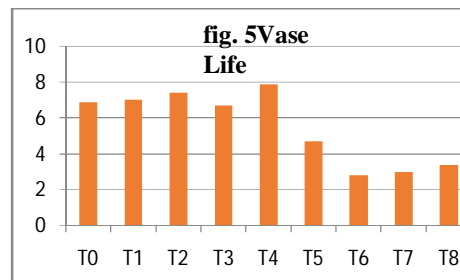


**Stem length (cm) :-** The data pertaining to stem length exhibited significant difference among the treatments. Longest stem length was observed in T<sub>2</sub> GA<sub>3</sub> 250 ppm (43.4 cm) and Shortest stem length were seen in T<sub>7</sub> NAA 150 ppm (15.7 cm). The results is in agreement with the report of Padmalatha *et al.* (2013) recorded effect of GA<sub>3</sub> on growth and flowering of two gladiolus cultivars

Darshan and Dhiraj and noted maximum spike length with GA<sub>3</sub>.



**Vase life of flower :-** As mentioned in Table 1 plants treated with GA<sub>3</sub> @ 350 ppm T<sub>4</sub> had longer vase life (7.9 days) whereas, the shorter vase life (2.8 days) was recorded in T<sub>6</sub> (NAA @ 100 ppm) among all the treatments. The findings are in agreement with similarly, Kumar and Gupta (2014) recorded significantly higher vase life with pre-soaking and foliar spray of GA<sub>3</sub> on gladiolus cv. Jessica. And Jadhav *et al.* (2015) reported that pre-harvest foliar spray of GA<sub>3</sub> on gladiolus cv. American Beauty was significant in enhancing the vase life.



**No. of bulblets :-** As mentioned in Table 1 among the different growth regulator treatments, number of bulblets increased significantly with T<sub>6</sub> (NAA @ 100 ppm, 3.2) whereas, fewer bulblets were reported in T<sub>0</sub> (Control, 0.9). The findings are in agreement with those of NAA accelerates the growth of the plant, stem cell and manufacturing root cells. Similarly, when NAA was used by

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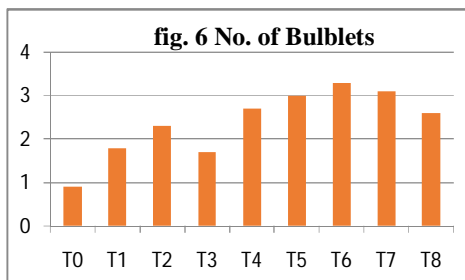
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Simmonds and Cumming (1976), in *Lilium longiflorum* cultivars.



UNDER PEER REVIEW

Treatment No.	Treatment	No. leaves per plant	Days to bud initiation (days)	No. of bud per Plant	Stem length (cm)	Vase Life	No. of bulblets
T <sub>0</sub>	Control	59	29.3	2.5	37.7	6.9	0.9
T <sub>1</sub>	GA <sub>3</sub> @200 ppm	63	27.7	2.7	40.5	7	1.8
T <sub>2</sub>	GA <sub>3</sub> @250 ppm	66	25.7	2.8	43.4	7.4	2.3
T <sub>3</sub>	GA <sub>3</sub> @300 ppm	63	27	2.1	41.2	6.7	1.7
T <sub>4</sub>	GA <sub>3</sub> @350 ppm	61	27.7	2.0	38.6	7.9	2.7
T <sub>5</sub>	NAA@50 ppm	54	28	2.1	30.2	4.7	3.0
T <sub>6</sub>	NAA@100ppm	47	26	1.9	16.5	2.8	3.3
T <sub>7</sub>	NAA@150ppm	51	28	1.6	15.7	3	3.1
T <sub>8</sub>	NAA@200ppm	46	27.7	1.1	16.3	3.4	2.6
<b>S.Ed. (±)</b>		<b>2.74</b>	<b>0.75</b>	<b>0.45</b>	<b>3.06</b>	<b>0.67</b>	<b>0.66</b>
<b>C.D. at 5%</b>		<b>5.86</b>	<b>1.62</b>	<b>0.96</b>	<b>6.50</b>	<b>1.42</b>	<b>1.41</b>

Table.1 The influence of GA<sub>3</sub> and NAA on No. of leaves per plant, Days to bud initiation(days), No. of bud per plant, Stem length (cm), Vase life, No. of Bulblets.

## CONCLUSION

From the present investigation It is concluded that among the different growth regulators treatments GA<sub>3</sub> @ 250 ppm gave significant results for No. of leaves per plant, days to bud initiation, no. of bud per plant, stem length, while

GA<sub>3</sub>@350ppm gave better vase life of flower in Asiatic lily cultivar Litouwen. And NAA @ 100 ppm gives significant result in no. of bulblets. Hence, GA<sub>3</sub> @ 250 ppm can be recommended for plant growth and flowering of Asiatic lily cv. Litouwen. And NAA @ 100ppm for bulblets formation.

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## REFERENCES

- Bahr, L.R. and Compton, M.E. (2004). Competence for in vitro bulb regeneration among eight *Lilium* genotypes. *Hort Science*, 39(1): 127-129.
- Comber H. A new classification of the genus *Lilium*. Lily Year Book, Royal Horticultural Society, London 1949;13:86-105.
- Jadhav, P.B., Mangave, B.D., Singh, A., Dekhane, S.S. and Patel, D.J. (2015). Effect of plant growth regulators and natural growth substances on growth and flowering of gladiolus cv. American Beauty. *International Journal of Current Research*, 7: 17674-17676.
- Khan, F.U. and Tiwari, G.N., (2003). Effect of growth regulators on growth and flowering of dahlia (*Dahlia variabilis* L.). *Indian Journal of Horticulture*, 60 (2): 192-194.
- Padmalatha, T., Reddy, G.S., Chandrasekhar, R., Shankar, A.S. and Chaturvedi, A. (2013). Effect of foliar sprays of bio regulators on growth and flowering in gladiolus. *Indian Journal of Agricultural Research*, 47(3): 192-199.
- Pal, A.K. and Das, S.N. (1990). Effect of growth regulators on growth and flowering of *Lilium longiflorum*. *Orissa Journal of Horticulture*, 18 (1-2): 18-21.
- Kumar, S. and Gupta, A. K. 2014. Postharvest life of *Gladiolus grandiflorus* L. cv. Jessica as influenced by pre-harvest application of gibberellic acid and kinetin. *Journal of Postharvest Technology*, 2(3): 169-176.
- Simmonds, J.W. and Cumming, B.G. (1976). Propagation of *Lilium* hybrids dependence of bulblet production on time of scale removal and growth substances. *Scientia Horticulturae*, 5: 77-83
- Singh J., Nigam R., Singh R., Kumar A. and Kumar A. (2018). Effect of gibberellic acid and cycocel on growth, flowering and yield of chrysanthemum (*Dendranthemagrandifloraramat*) cv. birbalsahni. *Journal of Pharmacognosy And Phytochemistry*, 1: 2753-2758.

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