Original Research Article

"Growth and Flowering of Asiatic Lily (*Lilium*× *asiatica*) cv. Litouwenas Affected by $GA_3$and NAA Under Naturally Ventilated Polyhouse Conditions of Prayagraj"

Comment [U1]: Effect of GA_3 and NAA on Growth and Flowering of Asiatic Lily (*Liliumasiatica*) cv. Litouwen Under Naturally Ventilated Polyhouse Conditions of Prayagraj

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ABSTRACT

The present investigation was carried out under a naturally ventilated polyhouse, in the Department of Horticulture, SHUATS, Prayagraj, Uttar Pradesh. iIn the month of December 2020 with records taken from the month of February to the month of March 2021.and the observations recorded up to February and March 2021.There were nine treatments comprising of two growth regulators*viz.*,GA_3(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, the foliar application of 250 ppm GA_3 significantly increasedthe numberno. of leaves per plant (66), with as recorded dataGA_3@ 250 ppm has enhanced days(25.7 days) to bud initiation.,The number no. of bud per plantwas(2.8) and stem lengthwas(43.4cm) respectively.,GA_3at@a concentration of350 ppm enhanced vase life (7.9 days).andWhereas application of NAA@at a concentration of 100 ppm enhancedthe number no. of bulblets (3.3).

Keyword: Asiatic Lily, Polyhouse, GA_3,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

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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 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.

EXPERIMENTALDESIGNANDT REATMENTS

An experiment was performed by using randomized block design (RBD) with three replications.Also, in this experiment plant sprayedwith GA_3 (200, 250, 300, 350 ppm), NAA (50, 100, 150, 200 ppm) with control after planting of lilium bulbs. The observations were recorded with respect at 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_2 GA_3 250 ppm. In the year 1990, **Pal and Das** also reported that GA_3 promoted no. of leaves per plant in Asiatic lily.

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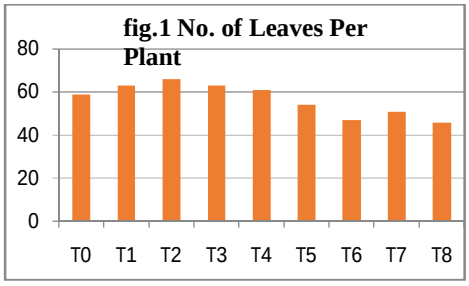
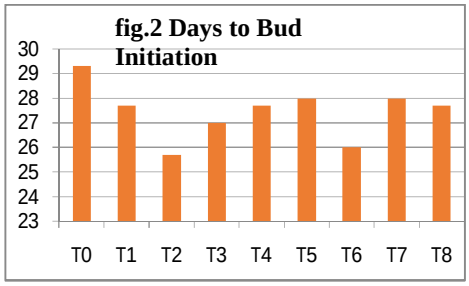


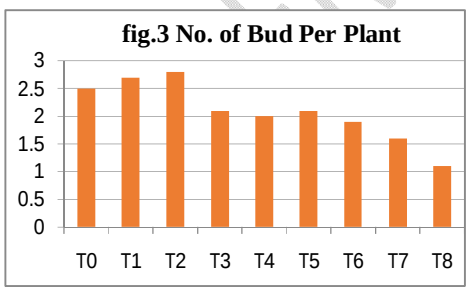
fig.1 No. of Leaves Per Plant

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_2GA_3$250 ppm took lesser days (25.7 days), which were found maximum days (29.3 days) for bud initiation in T_0Control. The result revealed that foliar application of 250

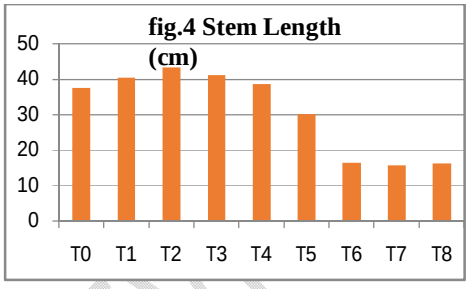
ppm GA_3 significantly advanced days to bud initiation in Asiatic lily cultivar Litouwen. The reason behind this effect may be due to the stimulation and enhancement of vegetative growth. The present findings are in consonance with **Singh *et al.*(2018).**



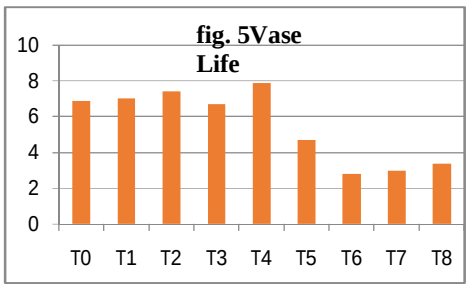
No. of bud per plant :-The effect of different growth regulators showed significant influence on no. of bud per plant. It was spotted that no. of bud per plant was more (2.8) in T_2 GA_3 250 ppm. Which had fewer bud per plant with NAA 200 ppm T_8. In this study, number of flower buds per plant significantly increased with levels of GA_3 at 250 ppm. However these parameters were recorded maximum in GA_3 250 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. Longeststem length was observed in T_2GA_3 250 ppm (43.4 cm) and Shortest stem length were seen in T_7 NAA 150 ppm (15.7 cm).The results is in agreement with the report of**Padmalatha*et al.* (2013)** recorded effect of GA_3 on growth and flowering of two gladiolus cultivars Darshan and Dhiraj and noted maximum spike length with GA_3.



Vase life of flower :-As mentioned in Table 1 plants treated with GA_3 @ 350 ppm T_4 had longer vase life (7.9 days)whereas, the shorter vase life (2.8 days) was recorded in T_6 (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_3 on gladiolus cv. Jessica. And **Jadhav*et al.* (2015)** reported that pre-harvest foliar spray of GA_3 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_6 (NAA @ 100 ppm, 3.2) whereas, fewer bulblets were reported in T_0 (Control, 0.9).The findings are in agreement

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with those of NAA accelerates the growth of the plant, stem cell and manufacturing root cells. Similarly, when NAA was used by **Simmonds and Cumming (1976),**in *Liliumlongiflorum*cultivars.

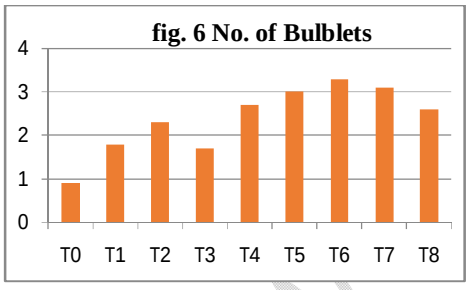

fig. 6 No. of Bulblets

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_0	**Control**	59	29.3	2.5	37.7	6.9	0.9
T_1	**GA_3@200 ppm**	63	27.7	2.7	40.5	7	1.8
T_2	**GA_3@250 ppm**	66	25.7	2.8	43.4	7.4	2.3
T_3	**GA_3@300 ppm**	63	27	2.1	41.2	6.7	1.7
T_4	**GA_3@350 ppm**	61	27.7	2.0	38.6	7.9	2.7
T_5	**NAA@50 ppm**	54	28	2.1	30.2	4.7	3.0
T_6	**NAA@100ppm**	47	26	1.9	16.5	2.8	3.3
T_7	**NAA@150ppm**	51	28	1.6	15.7	3	3.1
T_8	**NAA@200ppm**	46	27.7	1.1	16.3	3.4	2.6
S.Ed. (±)		**2.74**	**0.75**	**0.45**	**3.06**	**0.67**	**0.66**
C.D. at 5%		**5.86**	**1.62**	**0.96**	**6.50**	**1.42**	**1.41**

Table.1 The influence of GA_3 and NAA onNo. 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_3 @ 250 ppm gave significant results forNo. of leaves per plant, days to bud initiation, no. of bud per plant, stem length, while GA_3@350ppm gave better vase life of flowerin Asiatic lily cultivar Litouwen. And NAA @ 100 ppm gives significant result in no. of bulblets. Hence, GA_3 @ 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

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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, London1949;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 *Liliumlongiflorum*. *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. *ScientiaHorticulturae*, **5**: 77-83

Singh J., Nigam R., Singh R., Kumar A. and Kumar A. (2018).Effect of ibberellic acid and cycocel on growth, flowering and yield of chrysanthemum (*Dendranthemagrandifloraramat*) cv. birbalsahni. *Journal of PharmacognosyAndPhytochemistry*, **1**: 2753-2758.