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Foliar Application of Plant Growth Regulators (Pgrs) Auxin and Cytokinin for Improvement Flowering of Lilium Brindisi in Anklav Taluka, District Anand, India

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Abstract:
The experiment was conducted on Lilium brindisi to evaluate the response of foliar application of plant growth regulators (PGRs)Auxin and Cytokinin for improvement of flowering in semi-arid dry condition of central Gujarat during the year 2021-2022 under the green net(75% shade) condition at Anklav, Anand, Gujarat. The experiment was laid out in a Completely Randomized Block Design(CRD) with five treatments and each treatment was replicated thrice. Different PGRs concentration of IAA: BAP foliar spray was given, the first foliar spray on the 5th week and the second foliar spray on the 8th week of a bulb plantation. Total five treatments comprises T0(control), T1 (IAA:BAP=50:100), T2(IAA:BAP =100:100), T3(IAA:BAP =100:50),T4(IAA:BAP =25:100). The results indicated that foliar application of T2(IAA:BAP) concentration(100:100) significantly affect No. Of buds, Bud length, Flower Length, and Diameter of flower in Lilium brindisi. From these results Treatment 2 (IAA: BAP)= (100:100) concentration is Improving flower qualities of Lilium brindisi.

Keywords: IAA, BAP, Lilium brindisi, Foliar spray, Plant growth regulators, Flowering

INTRODUCTION:

Lilies(Genus Lilium) is a monocotyledon plant from the family Liliaceae. The plant height is ranging from 2-6 feet. It is a perennial herbaceous plant growing from bulbs. A Majority of species are native to the Northern hemisphere and its range extends to the northern subtropical region. The flowers are big and fragrant. A flower contains six tepals with different color ranges. Lilium spp. has a high value in the commercial floriculture market as a cut flower. In India, lilies grow in the temperate regions of north India, like Himachal Pradesh, Uttarakhand, Jammu, and Kashmir, the North-east region, is also grown under protected conditions in the plain region of Uttar Pradesh, Punjab. Due to its size, beauty, and longevity Lilium is one of the ten most superior cut flowers in the world (Thakur et al., 2005) [18]. Plants within the genus Lilium are highly prized by horticulturists because of their outstanding fragrance, range of colors, hardiness, and adaptability to diverse environmental conditions (Bahr and Compton,2004)[3]. It is currently one of the most important flowers farmed for the cut flower market due to its size, beauty, and longevity, lilium is among the top ten cut flowers in the world(Thakur et al., 2005)[18].Lilium is an important ornamental bulbous plant. They are produced both as potted plants and cut flowers and are used in land scaping(Dole and Wilkins 1999)[5].

The growth and yield of the plants are mainly influenced by two principles factors i.e. genetic and cultivation or management factors(Prakash et al.,2015)[14]. Foliar application of nutrients and plant growth regulators may improve flower quality parameters(Sajid et al.,2009)[16]. Bio-regulators are widely been used in horticultural and floricultural crops to enhance vegetative growth, flowering, yield, and post-harvest quality(Rademacher,2015)[15].

Auxin is not the predominant factor inducing senescence of cut Lilies but may increase anthocyanin content in flowers during the post-harvest display(Geng et al.,2012)[6]. BA is cytokinin which has been found essential for the growth and development of plant organs, retention of chlorophyll, and translocation of nutrients(Pandey and Sinha,1984)[13]. The exogenous application of cytokines increases the possibility of delaying senescence (Mantilla and Mascarini,2021)[11]. BAP (Benzylaminopurine) is a first-generation synthetic cytokinin that elicits plant growth and development responses by stimulating cell division. It is an inhibitor of respiratory kinase in plants and increases the post-harvest life of green vegetables and flowers (Siddiqui et al., 2011)[17].

Material and Method:

The experiment was conducted on Lilium brindisi to evaluate the response of foliar application of plant growth regulators (PGRs)Auxin and Cytokinin for improvement of flowering in semi-arid dry condition of central Gujarat during the year 2021-2022 under the Green net (75% shade) condition at Anklav, Anand, Gujarat. Flower Bulb plantation season was early October ,winter season which induce flowering.The experiment was laid out in a Completely Randomized Block Design(CRD) with five treatments and each treatment was replicated thrice. Different PGRs concentration of IAA: BAP foliar spray was given, a first foliar spray on the 5th week and a second foliar spray on the 8th week of a bulb plantation. Total five treatments comprises T0(control),T1 (IAA:BAP=50:100),T2(IAA:BAP =100:100),T3(IAA:BAP =100:50),T4(IAA:BAP =25:100

Data was recorded from five selected plants of each replication and the average value was calculated. Bud diameter, Bud length, pedicel length, and pedicel diameter were recorded using vernier calipers and Flower diameter flower length by scaling and flower initiation days counted from the first day of planting of the bulb and vase life of the flower count from the first day of flower bloom to the shedding of the flower tepals. Number of flower buds counted manually.

One way ANOVA test were generated by using PAST software.

Result and Discussion:

The data presented in Table 1 shows the effect of plant growth regulators on improving flowering in Lilium brindisi.

As shown in Table, a Significant difference was observed in a number of buds. The maximum buds recorded in T2 Treatment (IAA: BAP =100:100) (3.06), followed by T1 Treatment (IAA: BAP =100:100) that was (3.00) and T3 treatment (IAA: BAP =100:50) that is (2.86) in numbers. Results show a contrast to (Torres-Pio et al.,2021)[19] in which BA provoked bud abortion. In contrast to it, results show BA led to a decrease in the flower number in Brunello (Attiya et al.,2015)[2].

The Significant difference was found in a Diameter of the buds, maximum result recorded in To (control treatment) (2.842 cm) ,followed by T2 (IAA:BAP =100:100) treatment (2.636 cm) and T3 (IAA:BAP =100:50) treatment (2.585 cm). BAP caused a decrease in flower bud diameter (Attiya et al.,2015)[2] .

There was a significant difference recorded in Bud length, maximum result found in T2 (IAA:BAP =100:100) treatment (8.999 cm) followed by T1 (IAA: BAP=50:100) treatment (8.711 cm) and T4 (IAA: BAP =25:100) treatment (8.577 cm). According to this study by (Kumari et al.,2017)[8], the maximum length of the upper bud (73.33 mm) was found pre-harvest foliar spray of Benzyla adenine@100 µM/L.

Flower length was recorded as highest in the T2 (IAA: BAP =100:100)Treatment that is 8.9 cm, in the T0 treatment that is 8.763 cm and T1 (IAA: BAP=50:100) treatment that is 8.626 cm.

The significant difference was found in the Diameter of a flower, the maximum diameter was recorded in T2(IAA: BAP =100:100) Treatment 16.233 cm, followed by T3 (IAA: BAP =100:50) Treatment 14.866 cm. Maximum basal flower diameter was found BA@100 µM/L (192.80 mm) as compared to control (169.08 mm). The maximum upper flower diameter (134.36 mm) was found to be BA @100µM/L (T3) (Kumari et al. 2017)[8].

Flower initiation days are less in T3 (IAA: BAP =100:50) treatment (45.533 days), followed by T4 (IAA: BAP =25:100) Treatment that is (47 days) and T2 (IAA: BAP =100:100) treatment (47.533 days). This is in contrast to the application of BAP to induce earlier flowering (Nambiar et al.,2012)[12]. Appropriate doses of IAA were found very useful practices to enhance a number of earlier flowers (Kurtar et al., 2005)[10]. BA led to an increase in the time required for flowering and a decrease in the flower number in Brunello (Attiya et al.,2015)[2].

vase life of the flower(days) is maximum in T3 (IAA:BAP =100:50) treatment and T0 treatment that is 6.66 days ,followed by T2 (IAA:BAP =100:100) Treatment (6.633 days). The vase life of cut lilies was maximum with the application of a single dose of BA (100 ppm) (Kapri et al.,2018)[6]. BA, IAA, and GA3 at lower rates (50 mg l−1) significantly increased flower number per stem (‘Fangio’ 29 %-47 %; ‘Maytime’ 20 %-70 %), and vase life (Al-Ajlouni et al.,2023)[1].

IAA 100 ppm foliar application on Lilum (Lilium longiflorum L.) cv. Eremo shows adverse effects on Bud diameter(13.89 mm),flower diameter(13.96 mm),flower initiation days(58.02 days). And it promotes number of buds per plant(4.21), Bud length(9.11 mm) and vase life of flower (8.66 days) (Kumar et al.,) [8]. Kapri et al.,(2018)[7] investigated the effects of BA on flowering and post harvest characteristics of lily. The plants were exposed to various BA concentrations (100 ppm, 150 ppm and 200 ppm). The outcomes showed that a single dose of BA @ 100 ppm recorded maximum diameter of flower, minimum days to buds color appearance and maximum vase life.

These results were constant in all three replicates. During this experimental research, not any kind of side effect or any unintended consequence found due to foliar application of different ratio of IAA:BAP concentrations. These results following same pattern for second year also, during year 2023-24.This study explore not any kind of potential long-term effects of PGRs application on subsequent flowering cycles in flowering characters.

Table 1. Effect of growth regulators on flowering parameters:

Treatments	No. Of buds	Bud Diameter (cm)	Bud length (cm)	Flower length (cm)	Flower diameter (cm)	Flower initiation days	Vase life (Days)
T0 (Control)	2.700	2.842	8.520	8.763	14.692	49.510	6.660

T1 (IAA:BAP=50:100)	3.000	2.306	8.711	8.626	14.613	48.600	6.000
T2 (IAA:BAP =100:100)	3.060	2.636	8.999	8.900	16.233	47.533	6.633
T3 (IAA:BAP =100:50)	2.860	2.585	8.400	8.320	14.866	45.533	6.600
T4 (IAA:BAP =25:100)	2.730	2.414	8.577	8.320	14.613	47.000	5.866
S.Em.$^{+}$-	5.996	9.259E-02	0.120	9.431E-02	0.136	0.515	0.154
C.V.%	3.617	6.272	2.407	1.902	1.579	1.873	4.223
LSD ($p<0.05$)	0.188	0.291	0.378	0.297	0.431	1.623	0.488
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Conclusion:

Based on this experiment concluded that Treatment 2 (IAA: BAP=100:100) was found to be best in terms of no. of buds 3.06, bud length 8.999 cm, flower length 8.9 cm, and flower diameter 16.233 cm. For the diameter of the bud and vase life of the flower, Treatment T0 control was found to be best. For flower initiation days T3 (IAA: BAP =100:50) treatment was found to be the best.

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