

PERFORMANCE OF ASIATIC *LILIUM* HYBRID FOR VEGETATIVE GROWTH AND BULBLET FORMATION DURING SCALE PROPAGATION

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ABSTRACT

An experiment was carried out during 2013-2014 to investigate the performance of Asiatic *Lilium* hybrid for vegetative growth and bulblets formation during scale propagation of *Lilium*. The result of the study revealed that among different scale position middle scale recorded maximum value for sprouting of scale (61.10%), number of leaves clump⁻¹ (4.17), number of roots scale⁻¹ (7.53) and length of the longest root (9.50cm). Besides it also produced more circumference of bulblets (6.07cm), weight of individual (23.49g) and total (131.94g) number of bulblets scale⁻¹. Whereas outer scale performed better in respect to number of bulblets scale⁻¹ (6.80). On this aspect irrespective to varieties, performance of middle scale of mother bulb was excellent with respect to all the parameters except number of bulblets scale⁻¹ which was maximum under outer scale. For production purposes, middle scale and outer scale should be used to achieve the highest bulblet number scale⁻¹.

(Key words: *Lilium* scale position, vegetative character, bulblet)

INTRODUCTION

Among various flowers grown commercially, *Lilium* occupies a prominent place in cut flower trade in addition to its use as an important garden plant. These flowers are emerging as the largest income contributor when compared with any other cut flower or plantation crop in India. Due to its size, beauty and longevity *Lilium* is one of the ten most superior cut flowers in the world (Thakur *et al.*, 2005).

Generally liliams are propagated sexually by seeds or asexually by natural formation of daughter bulbs, by axillary bulblets developed in the axils of leaves, stem bulblets formed underground or above ground and through scales. (Hartmann *et al.*, 1997). Among various conventional methods of propagation, scale propagation is widely used method for *Lilium* multiplication. However, the commercial size bulbs are obtained in 3-4 years (Park, 1996). Propagation through scales is a rapid means of multiplication, particularly in cultivars that do not produce stem bulblis (Bose and Yadav, 1998).

The purpose of our work was to provide to study the performance of scale position on vegetative growth and bulblet formation during scale propagation of *lilium*.

MATERIALS AND METHODS

The present experiment was carried out in form of a pot culture trial in the terrace garden of the Department of

Floriculture and Landscaping located in the premises of the College of Agriculture, OUAT, Bhubaneswar during 2013-2014. Bulbs of Asiatic *Lilium* hybrids cv. New Wave, Orange Matrix, Alaska, Nov Cento and Monte Negro harvested in the second week of February 2013 were kept in moist media in perforated poly bags in refrigerator at 4°C temperature for vernalization. The weight and diameter of bulbs ranged from 49.0 to 64.5 g and 14.84 to 16.04 cm respectively. The outer most layers of scales that were withered or injured were removed. Scales were detached manually from each bulb of Asiatic hybrid lilies were grouped into three groups viz., Outer Scale (S1), Middle Scale (S2), and Inner Scale (S3), according to their anatomical position on the basal plate. At the time of detaching the scale from mother bulb care was taken to see that a small portion of basal plate also remained attached with each scale. Six healthy and uniform sized scales under each group (viz., outer, middle and inner) of five Asiatic hybrid lily varieties were planted in each pot containing media composition of soil: FYM: sand in 2:1:1 ratio (V/V) at a depth of 5 cm on 19 November 2013 during afternoon hours. The bulblets were harvested after seven months and data recorded on different attributes were subjected to statistical analysis using factorial complete randomized design with scale position (Outer scale, Middle scale, Inner scale) having three replications and fifteen treatment combinations. Observations on sprouting of scale, number of leaves clump⁻¹, number of roots scale⁻¹, number of bulblets scale⁻¹, circumference of the bulblets and weight of individual and total number of bulblets scale⁻¹ were undertaken.

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RESULTS AND DISCUSSION

Effect of scale position on vegetative growth character of Asiatic *Lilium* hybrids

Study of data presented in table 1 revealed that maximum sprouting (61.10%) was recorded in S2 (Middle scale) which differed significantly from other scale positions. It was followed by S1 i.e. outer scale (54.44%). On the other hand the minimum was recorded with S3 i.e. inner scale (50.00%). Therefore, presence of more food reserve i.e. carbohydrate with greater meristematic activity of middle scale might have contributed for higher percentage of sprouting of scales and greater survival of newly formed plantlets. On the other hand presence of less reserve food material in the inner scale resulted in the lowest percentage of sprouting of scales.

It was evident from table 1 that maximum number of leaves scale⁻¹ (8.03) was recorded in S1 (Outer scale) which differed significantly from other scale positions. It was followed by S2 i.e. middle scale (6.72). On the other hand the minimum was also recorded with S3 i.e. inner scale (5.20). So far as position of scales was concerned presence of higher amount of reserve carbohydrate in outer and middle scale as compared to inner scale might have become the deciding factor for production of more leaves. The result of this study is conformity with Matsuo (1972), who also reported more scale leaves from middle and outer scales of Easter lily (*Lilium longiflorum*). Uesato (1973) also found that number of leaves formed were double from outer scales than from the inner most scales.

Perusal of data presented in table 1 showed that maximum number of roots bulblet⁻¹ (7.53) was recorded in S2 (Middle scale) which differed significantly from others. It was followed by S1 i.e. outer scale (6.86). While the minimum (6.60) was recorded with S3 i.e. inner scale. The result of the present study contradict the findings of Dhiman (2007), who observed maximum number of roots from inner scale followed by middle scale and outer scales. On the other hand Uesato (1973) found that four times the number of roots was formed from the outer scales than from the inner most scales. It was also evident from table 1 that maximum length of root (9.50 cm) was recorded in S2 (Middle Scale) which differed significantly from others. It was followed by S1 i.e. outer Scale (7.94 cm) which was at par with S3 i.e. inner scale (7.83 cm). Similar results have also been reported by Dhiman (2007), who recorded maximum root length in middle scale followed by outer and inner scale in sand + vermiculite medium.

Effect of scale position on bulblets character of Asiatic *Lilium* hybrids

It is revealed from table 2 that maximum number of bulblets scale⁻¹ (6.80) was recorded in S1 (Outer Scale) which differed significantly from others. It was followed by S2 i.e. middle scale (6.00). While the minimum (3.33) was recorded with S3 i.e. inner scale. The result of the study is in conformity with Iapichino *et al.* (1994), who reported that

inner scale had smaller size and weight than middle scale and outer scale and consequently limited wound surfaces where adventitious bulblet formation occurred and offered less food reserve to sustain generative processes and bulblet growth. Similar results have also been reported by Park (1996), who concluded that increase in the bulblet formation in outer scale was probably due to more carbohydrate content. Study of data presented in table 2 revealed that maximum circumference (6.07cm) was found in S2 (Middle scale) which differed significantly from other scales. It was followed by S1 i.e. outer Scale (5.42cm). While the minimum (5.31cm) was recorded with S3 i.e. inner scale. The result of the present study contradict the findings of Akcal and Kahraman (2016), who observed highest bulblet diameter from outer scale. But the result of the study is in agreement with that of Marinangeli *et al.* (2003), who observed that inner scales produced bulblets with significantly smaller diameter than those measured in bulblets from middle and external scales.

As per data indicated in table 2 maximum weight of individual bulblet scale⁻¹ (23.49g) was recorded in S2 (Middle Scale) which differed significantly from other scales. It was followed by S1 i.e. outer Scale (18.42g), while the minimum (17.12) was recorded with S3 i.e. inner scale. However, weight of bulblets under S3 and S1 were statistically comparable. These results are in contrary with the results of Sawwan *et al.* (2000), who also obtained maximum weight of bulblets in outer scales in *Lilium longiflorum* Cv. White American. As per the data recorded in table 2 maximum weight of total bulblet (131.94g) was recorded in S2 (Middle Scale) which differed significantly from others. It was followed by S1 i.e. outer Scale (108.93g) while, the minimum (67.26g) was recorded with S3 i.e. inner scale. It was observed that although number of bulblets was significantly higher (6.80) with S1 (outer scale) as compared to S2 i.e. middle scale (6.00), the weight of individual bulblets was much higher (23.49g) with middle scale (S2) as compared to outer scale i.e. S1 (18.42g) as result total weight of bulblets scale⁻¹ was significantly higher under S2 (middle scale) as compared to outer scale (S1). Although individual weight of bulblets (17.12g) under S3 (inner scale) was statistically comparable with that order S1 (outer scale), the number of bulblets under S3 i.e. inner scale was significantly lower (3.33) as compared to S1 (outer scale) or S2 (middle scale) which might be the contributing factor for lowest weight of total number of bulblets scale⁻¹ recorded with S3 (inner scale). These results are in contrary with the finding of Dhiman (2007), who obtained maximum weight of bulblet in inner scale.

Based on the results of the study it was demonstrate that performance of middle scale of mother bulb was excellent with respect to all the parameters except number of bulblets scale⁻¹ which was maximum under outer scale. On the other hand most unsatisfactory performance was exhibited by inner scale for all the parameters studied. However, middle scale and outer scale should be used for horticultural production purposes.

Table 1. Impact of scale position on different perception of vegetative growth character of Asiatic *Lilium* hybrids

Scale position	Sprouting percentage of scales	Number of leaves scale ⁻¹	Number of roots bulblet ⁻¹	Length of the longest root (cm)
Outer Scale (S1)	54.44 (47.63)	8.03	6.86	7.94
Middle scale (S2)	61.10 (51.65)	6.72	7.53	9.50
Inner scale (S3)	50.00 (45.00)	5.20	6.60	7.83
SE (M) ±	0.30 (0.18)	0.07	0.14	0.42
CD at 5%	0.88 (0.52)	0.22	0.40	1.23

Table 2. Impact of scale position on different perception of bulblets character of Asiatic *Lilium* hybrids

Scale position	Number of bulblets scale ⁻¹	circumference of the bulblets (cm)	Weight of individual bulblet scale ⁻¹ (gm)	Weight of total number of bulblet scale ⁻¹ (gm)
Outer Scale (S1)	6.80	5.42	18.42	108.93
Middle scale (S2)	6.07	6.07	23.49	131.94
Inner scale (S3)	5.31	5.31	17.12	67.26
SE (M) ±	0.03	0.03	0.41	0.12
CD at 5%	0.08	0.08	1.18	0.34

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