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Effect of Different Media on *In vitro* Rooting in Different Cultivar of *Lilium longiflorum* Cv. Elite, Brunello, Cordelia

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ABSTRACT

Background: Lilium (*Lilium longiflorum* Thunb.) belongs to the family Liliaceae and is a native of Northern Hemisphere (up to South Canada and Siberia). Conventionally Lilium can easily be propagated by sexual and asexual methods of propagation but these prevalent methods are not capable of meeting the increasing demand in domestic and global market. Generally, Lilium is propagated through bulbs but, limited number of bulbs per plant, long dormancy period of bulbs which again results into non-availability of planting material throughout the year. Keeping in view the above facts, the present study was undertaken with the following objective: "To standardize the cost effective protocol for micro propagation of lilium to produce disease free and true to type plants at a faster rate".

Methods: The present investigation was carried out in the Tissue Culture Laboratory of the Centre for Research and Application in Plant Tissue Culture. The experiment was laid out in a C.R.D. (Factorial) with three replications. *In vitro* raised bulblets were separated out and were transferred on to the root regeneration media. Different levels of NAA were used in MS media for the rooting of *in vitro* raised bulblets and percent rooting of plantlet is recorded.

Result: It was interesting to note that the media LR-3 (MS + NAA 1.0 mg/l) is most efficient for rooting in all type of cultivars. All the three cultivars used responded very poor on media LR-1 (MS basal).

Key words: *Lilium longiflorum,* Murashige and skoog (MS) media, Naphthalene acetic acid (NAA).

INTRODUCTION

Lilium (*Lilium longiflorum* Thunb.) belongs to the family Liliaceae and is a native of Northern Hemisphere (up to South Canada and Siberia). It also has the southern limits in Florida and the Nilgiri mountains of India. The diploid chromosome number of *L. longiflorum* is 24. Lilium is one of the top ten ornamental bulbous crops in the world (Anonymous, 1996). Due to large flowers, diverse array of colours, wide range of variability, long vase life and capacity to rehydrate after long transportation it has become an economically important floricultural crop. Hybrid lilies are exceptionally useful for use as cut-flowers and pot-plants. Lily plants (*Lilium* Spp.) are plants known as cut flowers and used in room decorations and flower arrangements (Miller, 1992). Conventionally Lilium can easily be propagated by sexual and asexual methods of propagation but these prevalent methods are not capable of meeting the increasing demand in domestic and global market. Generally, lilium is propagated through bulbs which has bottlenecks like high cost of planting material, infected from seed borne and other diseases like mosaic, grey mould, *etc*. Limited number of bulbs per plant, long dormancy period of bulbs which again results into non-availability of planting material throughout the year. Dormancy of bulbs also increases the cost of production because due to it the bulbs are required to be stored at low temperature for a longer period. During storage, a considerable number of bulbs are spoiled due to fluctuating temperature and humidity. Moreover, the transportation of bulbs from field to cold stores and vice-versa also significantly increases the cost of production. Keeping in view the above facts, the present study entitled, "Effects of different media on *in vitro* rooting in three cultivars of *Lilium longiflorum i.e.* Elite, Brunello and Cordelia" was undertaken with the following objective: "To standardize the cost effective protocol for micro propagation of lilium to produce disease free and true to type plants at a faster rate". Robb (1957) and Takayama and Misawa (1982) produced bulblets in the culture of lily bulb scales. Several previous studies also reported factors influencing *in vitro* lily culture namely explant sections (Robb, 1957 and Liu and Burger, 1986), the composition of growth regulators (Takayama and Misawa, 1982; Liu and Burger 1986; Niimi, 1984b; Miller, 1992 and Robb, 1957) and explant positions (Luong and Ket, 1993).

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MATERIALS AND METHODS

The present investigation was carried out in the Tissue Culture Laboratory of the Centre for Research and Application in Plant Tissue Culture, Department of Science

and Technology, Government of Haryana, located at CCS Haryana Agricultural University, New Campus, Hisar, in 2020. The experiment was laid out in a C.R.D. (Factorial) with three replications. *In vitro* raised bulblets were separated out and were transferred on to the root regeneration media. Different levels of NAA were used in MS media (Table 1). for the rooting of *in vitro* raised bulblets and percent rooting of plantlet is recorded.

RESULTS AND DISCUSSION

Five different media combinations were used to find out their effects on *in vitro* per cent rooting in three cultivars of *Lilium longiflorum i.e.* Elite, Brunello and Cordelia (Table 2). Cultivar Brunello showed highest survival (84.1%) in pots in green house followed by Cordelia (80.1%) and Elite (63.9%). The percentage rooting in cultivar Elite varied from 31.3 to 83.0, 25.6 to 99.4 in Brunello and 17.0 to 81.1 in Cordelia. So, the maximum (99.4) rooting percentage was recorded in cultivar Brunello on media LR-3 (MS + NAA 1.0 mg/l). It is also clear from the table that the media LR-3 (MS + NAA 1.0 mg/l) is most efficient for rooting in all type of cultivars. All the three cultivars used responded very poor on media LR-1 (MS basal). Among the cultivars the minimum rooting percentage was shown by cultivar Cordelia on media LR-1 (MS basal).

When surgically separated individual shoots were cultured for root induction on MS medium without any supplementation of auxin NAA shoots failed to develop healthy roots in all the three cultivars studied, while NAA supplemented modified MS media resulted in rooting due to the promontory role of auxins in root formation. All the cultivars when cultured over MS medium supplemented with 1.0 mg/l NAA showed best results in terms of per cent rooting along with healthy average number of roots initiated although this varied non-significantly within different cultivars studied. This might be due to the genetic constitution of the cultivars. These results are in conformity with the results obtained by Maesato *et al.* (1991); Priyadarshi and Sen (1992) and Dilta *et al.* (2000). Similarly, Mizuguchi *et al.* (1994) obtained early rooting in MS medium supplemented with 1.0 mg/l NAA in *L. japonicum*. Niimi (1984b) also reported same results in *L. subellum* and Maesato *et al.* (1991) in *L. japonicum*.

Aartrijk and Blom-Barnhoorn (1979) obtained stimulated rooting in *L. speciosum* upon culturing in 0.1 mg/1 NAA. *In vitro* rooting of bulblets was obtained on MS media containing NAA (0.01-1.0 mg/1) (Takayama and Misawa, 1979). Sindhu *et al.* (1998) reported that rooting of *in vitro* multiplied bulblets occurred in MS media containing NAA or IBA (0.1-1 mg/1) in Lilium x Connecticut King. Tomita *et al.* (1988) reported increased root formation with increase in sucrose concentration up to 120 g/1. The presence of BA and NAA in the media stimulated root formation in bulb scale explant of the Mid Century Hybrid Kitanohoshi, *L. longiflorum* cv. Georgia, *L. speciosum* cv. Uchida, *L. regale* and *L. concolor var*. Pulchellum.

Table 1: List of different media use.

Media code	NAA (mg/1)	Media strength
LR-1	0.0	Full
LR-2	0.5	Full
LR-3	1.0	Full
LR-4	1.5	Full
LR-5	2.0	Full

Table 2: Effect of different media *in vitro* on per cent rooting in different cultivar of *Lilium longifloru.*

Media	Cultivars			Mean
	Elite	Brunello	Cordelia	
LR-1	31.4±1.4	25.6±1.5	17.0±1.2	24.7
LR-2	45.2±0.7	62.4±6.6	45.3±1.3	51.0
LR-3	83.0±1.7	99.4±0.7	81.1±1.6	87.8
LR-4	65.3±0.6	67.5±1.3	72.7±1.9	68.5
LR-5	60.6±1.4	60.6±1.4	53.7±1.4	58.3
Mean	57.1	66.4	54.0	

C.D, at 5% level
Media = 1.73
Cultivar = 1.34
Media x cultivar = 2.99.

CONCLUSION

The rooting percentage was observed maximum in medium having composition MS + NAA (1.0 mg/l). All the three cultivars used responded well on media LR-3 with, 99.0% in Brunello, 83.0% in Elite and 81.1% in cultivar Cordelia.

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