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Optimization of Rooting Behaviour by the Application of IBA on the Cuttings of Queens Flower (*Lagerstroemia speciosa*)

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ABSTRACT

Background: Queen's flower (*Lagerstroemia speciosa*) is an important ornamental plant that is utilised in residential landscape and avenue plantation for both public and private purposes around the world. Seed dormancy problem in *Lagerstroemia* which negatively affects germination. To overcome the challenges associated with seed propagation, researchers have explored rooted *Lagerstroemia speciosa* cuttings as an alternative method.

Methods: Three concentrations of IBA (Indole-3- butyric acid) @ 1000 ppm, 2000 ppm and 3000 ppm were used to root initiation of *Lagerstroemia speciosa* stem cuttings. There were four treatments: 1000 ppm, 2000 ppm, 3000 ppm and control.

Result: The 2000 ppm IBA treatment performed the better response in comparision to other treatments and recorded, 79 per cent rooting, followed by the treatment 3000 ppm IBA, (76 per cent rooting) and in the control, (68 per cent). In 2000 ppm IBA, the percentage of rooting, the number of roots per cutting and the length of the longest roots all are at their peak as well as showed the superior growth performance. The growth parameters of IBA-@ 2000 ppm treated cuttings revealed that this is the optimum IBA concentration for *Lagerstroemia speciosa* propagation trough cuttings in a semi-arid climate.

Key words: IBA hardwood cuttings, Rooting.

INTRODUCTION

In many civilizations and societies, ornamental plants play a significant role (Heywood, 1999). Queen's flower (*Lagerstroemia speciosa*) is an important ornamental plant that is utilised in residential landscape and avenue plantation for both public and private purposes around the world. It is a deciduous, multipurpose ornamental tree belonging to the Lythraceae family that grows in tropical and subtropical climates successfully. Its deep and wide-spreading root system also helps to prevent erosion. It can also be grown in rivers sides and swampy areas as a windbreak. The tree's leaves are 12-inches long, dark green, rectangular, leathery and turn a lovely crimson colour before shedding. It prefers well-drained clayey, loamy, or sandy soils that are acidic or alkaline (Lichtenhan *et al.,* 1993). The intriguing architecture of the tree and the flowers make it perfect for shading and adding colour to the landscape as an ornamental plant. Its woods also employed in the manufacturing of boats and carts. In *Lagerstroemia speciosa* seed dormancy is major problem ultimately poor germination. Azad *et al.* (2010) have also confirmed this problem. In their article, Khurana and Singh (2001) also mentioned that seed dormancy has an impact on germination and seedling growth rate in *Lagerstroemia parviflora*. This delays the establishment of a plant nursery, limiting Lagerstroemia speciosa planting in horticultural nurseries, forestry plantations and private gardens (Hossain *et al.,* 2007). Unfortunately, rooted *Lagerstroemia speciosa* cuttings is equally challenging, necessitating research into the best auxin treatments for propagation (Yakandawala and Adhikari, 2014). The goal of this study was to improve the rooting behaviour of Queens Flower production (*Lagerstroemia speciosa*) by the treatment of commercially utilized rooting hormones *i.e*. IBA.

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MATERIALS AND METHODS

For this investigation, the cutting samples of *Lagerstroemia speciosa* were collected from mother plant grown at Narayan Bagh, Botanical Garden, Jhansi, Uttar Pradesh. The experiment was conducted in the forest nursery of Rani Lakshmi Bai Central Agricultural University, Jhansi, 25.43°N 78.58°E on an average elevation of 284 meters above sea level Uttar Pradesh India. Cuttings were collected from *Lagerstroemia speciosa* parent plants that were young, vigorous and actively growing. Cuttings are made by clipping leaves, small branches and the branch tip with secateurs and preserved in moist conditions by covering them with in a wet cloth. The branch is typically clipped to two nodes with healthy buds and is 15-20 cm long. Indole 3-butyric

Table 1: Effect of IBA concentrations on leaf sprouting parameters.

Treatments	Days to sprouting	No. of sprouts at one MAP	No. of sprouts five MAP	Length of sprout five MAP (cm)
T_1 (IBA @ 1000 ppm)	6.9	1.9	3.7	11.4
T_2 (IBA @ 2000 ppm)	5..3	2.3	3.6	12.8
T_3 (IBA @ 3000 ppm)	6.3	2.7	3.9	11.7
T_4 (Control)	9	2	3.1	10.2
S.Em.±	0.4	0.16	0.23	0.81
CD at 5%	1.3	0.53	NS	NS

acetic acid (IBA) stock solutions was made by dissolving a weighed amount of the IBA in 2 ml ethyl alcohol (95 per cent) and prepared the IBA solution as per treatmens *i.e*. @ 1000, 2000 and 3000 ppm. The growing media consisting soil, sand and FYM were filled in poly bags. The basal portion of *Lagerstroemia speciosa* cuttings were cut and approximated 2-3 cm (2015) length of cutting were dipped for 10 seconds in the in the IBA solution as per treatments and allowed to five to ten minutes in shade for dry up the cutting. The treated cuttings were placed in poly bags as per treatments. The data were randomly recorded as per parameters The obtained data were subjected to one factor statistical analysis and ANOVA employed.

RESULTS AND DISCUSSION

Data on days for sprouting, No. of sprouts 1 month after planting (MAP), no. of sprouts 5 MAP, length of sprout (cm) 5 MAP are presented in Table 1. Study on sprouting and rooting parameters were conducted in three different IBA concentration level for 6 months of period and data obtained. Leaf sprouting were observed five (5) days after planting in *Lagerstroemia speciosa* cuttings and it was earlier in cuttings treated with 2000 ppm IBA which was at par with T_3 (IBA 3000 ppm). Maximum days required for sprouting in the untreated cuttings (control). Number of sprouts after 1 month of planting was observed higher (2.7.) in the cutting treated with 3000 ppm IBA which was at par with T_2 2000 ppm. Number of sprouts after 5 month of planting was non-significant. Mean root length after 5 MAP were recorded higher in the cuttings treated with 2000 ppm IBA, but overall non significant results were observed in mean sprout length.

IBA had a considerable effect on rooting in semi-hardwood cuttings, according to the results of this experiment. Cuttings treated with IBA had the highest percentage of rooting as compared non treated cuttings. Table 2 shows that the mean data for the number of roots per cutting. According to the statistics, the number of roots observed in cuttings under treatment T_2 is the highest, followed by treatments T_3 and T_4 (Control). Significantly, the IBA @ 2000 ppm achieved the maximum–number of roots, indicating that it is the most ideal concentration for obtaining the maximum number of roots in *Lagerstromia* cuttings. The rooting percentage of treatment T_2 (79%) has the maximum value, whereas, the rooting percentage

Table 2: Effect of IBA concentrations on rooting parameters.

Treatments	Number of roots per cutting	Rooting percentage	Root length (cm) five MAP
T_1 (IBA @ 1000 ppm)	2.6	73.8	9.2
T_2 (IBA @ 2000 ppm)	4.5	79	8.9
T_3 (IBA @ 3000 ppm)	3.5	76.3	9.6
T_4 (Control)	1.10	38.3	1.24
S.Em.±	0.14	2.80	0.37
CD at 5%	0.48	6.57	1.24

of untreated cuttings under control T_4 has the lowest value of 68%, according to the mean data illustrated in Table 2. As a result, applying 2000 ppm IBA for maximum rooting is statistically significant as compared to 3000 ppm and 1000 ppm IBA. The data in table 2 clearly depict that there is not much significant variation in different concentration and control for mean root length at 5 MAP. However, the maximum root length (9.6 cm) was recorded in T_3 (IBA 3000 ppm) cutting followed by T_1 *i.e*. IBA 1000 ppm (9.2 cm) and minimum root length (8.9 cm) observed under T_2 (IBA 2000 ppm).

The IBA treatments had significant influence on percentage rooting in semi-hardwood cuttings of *Lagerstromia speciosa.* However, IBA concentrations of 2000 ppm had a substantial impact on percentage of rooting. The control resulted minimum no of roots, indicating that rooting hormone was was shows a positive influence on root formation in *Lagerstroemia speciosa* semi hardwood cuttings. These findings are close conformity with the findings of Yakandawala and Adhikari (2014), discovered that *Lagerstroemia speciosa* cuttings do not root readily unless they are treated with rooting hormone. Treatment T_2 (IBA @2000 ppm) had a substantial effect on the number of roots. Similar findings were also reported by the (Rao *et al.,* 1999) in *Wrightia tinctoria*. Similar findings were also obtained in a number of additional investigations. Mishra *et al.* (2010) were also reported that when IBA was applied to hard wood cuttings of *Tinospora cordifolia*, it increased spouting, rooting and root length in comparison to IAA and NAA. Nautiyal *et al.* (1992) investigated that IBA at 100 and 200 ppm was more successful in comparison to NAA or IAA. From the present nursery experiment it is clear that IBA is responsible for improving rooting in *Lagerstromia speciosa* cuttings.

CONCLUSION

In the current study, researchers focused on optimizing the rooting behavior of *Lagerstroemia speciosa* cuttings by applying different concentrations of IBA (Indole-3-butyric acid). The gathered data were subjected to statistical analysis to determine the most effective IBA concentration levels for promoting rooting.The results of the statistical analysis showed significant variations in sprouting vigor among the different treatments. Among these treatments, it was observed that the application of IBA at a concentration of 2000 ppm had a substantial impact on the rooting efficiency of semi-hardwood cuttings of Lagerstroemia speciosa. Compared to the other treatments, this particular concentration of IBA demonstrated the highest effectiveness in promoting successful root development in the cuttings.

Conflict of interest

All authors declared that there is no conflict of interest.

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