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Influence of IBA on propagating hardwood cuttings of *Lagerstroemia indica* (L.) PERS

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Abstract
The current study was aimed to find the effect of IBA on rooting of cuttings in *Lagerstroemia indica* (L.) Pers. The experiment was laid out in Completely Randomized Block Design (CRD) with 4 replications, including four treatments of various concentration of Indole-3-butyric acid (IBA) solutions *viz*., 1000 ppm, 2000 ppm, 4000 ppm and control (without any treatment). Minimum days for sprouting (10.52 days), rooting percentage (95.43%), number of roots per cutting (8.15) and root length (10.56 cm) are recorded maximum IBA 4000 ppm. IBA concentrations 2000 and 4000 ppm are on par with each other and significantly higher than control in survival percentage. From this experiment we conclude that, the rooting and survival capacity of hardwood stem cuttings of *Lagerstroemia indica* under mist chamber conditions, can be improved by quick dipping of basal portion of cuttings on IBA with 4000 ppm concentration.

Keywords: IBA, lagerstroemia, crepe myrtle, hardwood cuttings, propagation

Introduction

Lagerstroemia indica (L.) Pers. is known as Crape myrtle, a well-known ornamental tree species of Lythraceae family. It is naturally grown in East Asia and Indian Subcontinent. *Lagerstroemia indica* grows in full sun or under canopy. Leaves are small and oval in shape. Flowers with crimped petals are pink, white or purple in colour. *Lagerstroemia* have flowers for 1-2 months during summer and are best suited for border plantings around buildings or as mass ground cover plantings in gardens and parks. They can also be planted along the side of the pathways and lawns increasing their beauty and elegance. Several cultivars of Crape-Myrtles are now available in horticultural trade. *Lagerstroemia* are suitable for urban landscaping as they successfully grow in urban areas where air pollution, poor drainage, poor soil and drought are common (Roy *et al*., 2015) [1].

Lagerstroemias are propagated by seed, cuttings or division of rook suckers. Among the propagation methods, stem cutting is the easiest and cost effective method of multiplication to get true-to-type plants mainly for ornamental shrubs. Propagation by hardwood cuttings of Crepe myrtle are usually done in October-November (Roy *et al.*, 2015) [1]. The rooting ability and success percentage of cuttings depends on many factors. Among them, plant growth regulators play an important role in formation of roots and shoot growth in cuttings. Root commencement with the exogenous application of plant growth regulators occupies a significant role in the field of plant propagation (Mukherjee *et al.*, 1976) [2]. With this, current study was aimed to find the effect of IBA on rooting of *Lagerstroemia indica.*

Materials and Methods

The experiment was conducted at Institute of Agriculture, Tamil Nadu Agricultural University, Kumulur, Tiruchirappalli district of Tamil Nadu, India. The experiment was laid out in Completely Randomized Block Design (CRD) with 4 replications, including four treatments of various concentrations of Indole-3-Butyric Acid (IBA) solutions *viz*., 1000 ppm, 2000 ppm, 4000 ppm and control (without any treatment). Hardwood cuttings of 20 cm length with minimum 3-4 nodes were collected from healthy plants, available in the institute. A slant cut was given at the basal end and a transverse cut at the top of each cutting. The basal end (2.5-3.0 cm) of the cuttings was dipped for 30 seconds with IBA solutions of fixed treatment. Then, the treated cuttings were planted vertically in sterilized inert sand media under mist chamber condition to promote rooting. All cuttings were maintained under mist chamber and watered regularly. Relative humidity in the mist chamber was maintained at ≥ 85% and temperature at 30±2^{0}C. Further observations were recorded at 45 days after planting (DAP) on various root parameters such as days taken for sprouting, rooting percentage (%), number of rooted per cutting and root length (cm). Survival percentage (%) of the rooted cutting was recorded at 90 DAP. The inference was drawn after comparing the calculated F values with the tabulated F values at 5% (P= 0.05) level of significance. The estimates of mean, variance and standard error were done as per Panse and Sukhatme (1978) [3].

Table 1: Effect of IBA concentrations on propagation of *Lagerstroemia indica* (L.) Pers.

Concentrations	Days for sprouting	Rooting percentage (%)	Number of roots per cutting	Root length (cm)	Survival percentage (%)
T1 - IBA 1000 ppm	15.46	82.63	5.33	5.50	89.20
T2 - IBA 2000 ppm	13.56	93.42	6.15	9.87	92.50
T3 - IBA 4000 ppm	10.52	95.43	8.15	10.56	97.50
T4 - Control	19.36	60.46	3.13	4.10	82.60
Mean	14.73	67.39	5.69	7.51	73.13
SE.D	0.87	2.96	0.34	0.46	3.51
CD	1.85	6.30	0.73	0.98	7.48

Result and Discussion

All the parameters taken for observation, in this experiment, showed significant among the treatments, which are shown in table 1. Minimum days for sprouting was recorded in the 4000 ppm (10.52 days), followed by 2000 ppm (13.56 days). On comparing with control, all the treatments have significant effect in early sprouting. It assures that the treatment of cuttings with IBA induce rooting of cutting much faster than untreated one. On examining after 45 DAP, higher rooting percentage was recorded in 4000 ppm (95.43%), followed by 2000 ppm (93.42%) which are on par which each other. Number of roots per cutting (8.15) recorded maximum in 4000 ppm of IBA. Root length recorded maximum (10.56 cm) in 4000 ppm followed by 2000 ppm (9.87 cm) which are on par with each other. Our findings are in line with experimental reports of Hossain and Urbi (2016) [4] on adventitious rooting of shoot cuttings in *Andrographis paniculata*. They stated that higher concentration of NAA resulted in an increased number of adventitious rooting per cutting. Similar reports were given by Raji and Osman (2012) [5] and Dash *et al*., (2011) [6] as that the higher dosages of auxins induced increased number of roots within a short time.

Shiri (2019) [7] reported on Duranta that IBA with increased concentration significantly increased root number in Duranta tip cuttings. The highest average number of roots was recorded at 5000 ppm, followed by 2500 ppm which was not different from 7500 ppm and the control. Cuttings grown with an IBA of 7500 ppm had the lowest average number of roots. With 5000 ppm giving higher root length than the control and 7500 ppm, however 5000 pm was not statistically different from 2500 ppm. With this report, we can come through a thought that, the increase in concentration of auxin more than 4000 will give increase in root length, though not significantly in effect. Also, it may induce more root length and root number in cuttings of Lagerstroemia. It may be experimented to find out the toxic level of IBA to hardwood cuttings of Lagerstroemia in further studies by increasing concentration of IBA.

Shenoy (1992) [8] in *Rosa damascena* reported that the increase in root length over control may be due to the enhanced hydrolysis of carbohydrates, metabolites accumulation and cell division induced by Auxin. These results were in line with the findings of Patil *et al*., 1998 [9] in *Jasminum sambac* (Jasmine), Singh *et al*., 2010 [10] in *Bougainvillea glabra* (bougainvillea), Grewal *et al*., 2005 [11] in *Dendranthema grandiflora* cv. Snowball, Singh *et al*., 2013 [12] in *Cestrum nocturnum* (night jasmine) and Sharma, 2014 [13] in *Tagetes erecta* (marigold) and Chowdhuri and Sadhukhan (2017) [14] on *Eranthemum bicolour* though the type of stem cutting utilized were varied.

On observing survival percentage after 90 DAP, all the IBA concentrations shows higher survival, significantly higher than control. 4000 ppm and 2000 ppm concentration shows on par results (97.50% and 92.50%) respectively. The survival capability of the rooted cutting in an inert sand media might be due to the action of plant growth hormones on the stem cuttings and the growth of sprouted roots. This was supported by the statement Abidin and Baker (1984) [15] that plant growth hormones also have effects on cell elongation and cell division thereby boosting root length, thus enhancing overall growth of cuttings; which improves the survival capacity of the rooted cutting. Our findings are in line with Shiri (2019) [7] who reported the same experiment in Duranta using IBA, that cuttings grown with an IBA concentration of 5000 ppm recorded the highest percentage survival with an average of 81.85%. The survival of cuttings grown using an IBA maximum concentration (7500 ppm) was not significantly different from the number of cuttings grown in the control treatment and the least concentration (2500 ppm). This ensures that, the increase in concentration upto 5000 ppm will not have deteriorate effect in rooting of cuttings. In all parameters control recorded the minimum value among the treatments. The production of roots in the control group may be caused by endogenous auxin, which might influence and play important role for root primordia formation in the cuttings (Hossain and Urbi, 2016) [4].

Similar experiment was done by Razvi *et al.*, (2018) [16] in *Lagerstroemia speciosa*, in which they reported that maximum number of roots and root length were recorded in IBA 4000 ppm treated cuttings. Ryalsa *et al.*, (2018) [17] reported in *Lagerstroemia indica* that root quality, root number and cutting quality of Shumaka™ Crape Myrtle© were increased when Hortus IBA concentrations increased. Bandana and Shamet (2011) [18] reported that application of 0.4% IBA+1% captan+2% sucrose-talc registered the best sprouting (68.89%), rooting (75.56%) and root characteristics of *Lagerstroemia indica.*

Conclusion

From this experiment it is concluded that the rooting and survival capacity of hardwood stem cuttings of *Lagerstroemia indica* under mist chamber conditions, can be improved by quick dip method (30 seconds) of basal cut portion in IBA 4000 ppm concentration. Further study may be conducted to standardize and find out the maximum IBA concentration (within the toxic level) to be used to get maximum effect of rooting and root promotion in *Lagerstroemia indica*.

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