IARJSET

ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Vol. 8, Issue 8, August 2021

DOI: 10.17148/IARJSET.2021.88108

Role of rooting hormone on root induction of Tecoma stans semi-hardwoodcuttings

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ABSTRACT: The experiment was conducted at Institute of Agriculture, Tamil Nadu Agricultural University, Kumulur, Tiruchirappalli district of Tamilnadu, India. The experiment was laid out in Completely Randomized Block Design (FCRD) with 2 replications, including seven treatments of various concentration of NAA solutions viz., 500 ppm, 1000 ppm, 1500 ppm, 2000 ppm, 2500 ppm, 3000 ppm and control (without any treatment). Semi-hardwood cuttings of *Tecoma stans* were treated in quick dip method for 30 seconds and planted under mist chamber for rooting. Minimum days of sprouting (9.90 days), higher rooting percentage (80.90 %) and maximum root length (16.75 cm) were recorded in 3000 ppm concentration of NAA. We conclude from this experiment that quick dipping for 30 seconds with 3000 ppm of NAA will promote earlier rooting, maximum rooting percentage and improved root growth in propagation through rooting of *Tecoma stans* semi hardwood cuttings under mist chamber conditions of semi-arid tropical region.

Keywords - *Tecoma stans*, NAA, rooting hormone, quick dip method, semi-hardwood

1. INTRODUCTION

Tecoma stans (L.) Juss. ex Kunthis a large shrub or small tree of Bignoniaceae family. It is an ornamental shrub growing for its lemon yellow, fragrant, funnel-flowers with pinnate leaves. It is native America (Bailey and Bailey, 1976)[1]. The flowers are in a raceme arrangement. The demand for the planting material for this yellow trumpet bush is very high and the difficulty existed in sexual reproduction due to Heterozygosity. Vegetative propagation is the only way for true-to-type multiplication when Heterozygosity acts as barrier for production of uniform planting materials. Simple and cost effective vegetative propagation method is stem cutting. The rooting ability and success percentage of stem cuttings depends on many factors such as variety, season, location, age of the mother plant, part of the plants used, nutrient status of the cutting, climatic conditions, aftercare etc. As well, rooting hormones used for stimulating quick and more roots on propagules plays an important role in multiplication through stem cuttings. Root induction through additional application of rooting hormone, though it present in plants, occupies a significant role in the field of plant propagation (Mukherjee *et al.*, 1976) [6].

Base of the stem cuttings treated with rooting hormone will induce more rooting compared to untreated one. Sometimes, rooting hormones are used in the propagation of species which will not root easily under normal conditions. Auxin is well known to improve rooting of different types of cuttings. The development of root primordium cells depends on the endogenous Auxins in the cutting and synergic composite such as a diphenol. These substances lead to the synthesis of ribonucleic acid (RNA), which act upon root primordium initiation (Hartmann *et al.*, 2002) [4]. Synthetic Auxins are commonly used to improve rooting efficiency and quality of stem-cuttings. Treatment of cuttings with rooting hormones has been reported to improve rooting in many woody and semi woody species. Hence, the present study has been taken up to understand the method of propagation through semi-hardwood stem cutting of *Tecoma stans* along with the treatment of rooting hormone.

2. EXPERIMENTAL METHODS OR METHODOLOGY

The study was carried over at Institute of Agriculture, Tamil Nadu Agricultural University, Kumulur, Tiruchirappalli, Tamilnadu, India. The experiment design was laid out in Completely Randomized Block (CRBD) with 2 replications and seven treatments viz., Naphthalene Acetic Acid (NAA) - 500 ppm, 1000 ppm, 1500 ppm, 2000 ppm, 2500 ppm, 3000 ppm and control (without any treatment) respectively. Semi-hardwood stem cuttings of 20 cm length, with minimum 3-4 nodes without leaves having pencil thickness were collected from healthy T*ecoma stans* mother plants. 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 NAA solutions. Then, the treated cuttings were planted vertically in sterilized

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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 shoot and root parameters such as days taken for sprouting, rooting percentage (%), number of buds sprouted, root length (cm), shoot length (cm) and number of leaves formed on cuttings. 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 (1967) [7].

3. RESULTS AND DISCUSSION

The result wereanalysed in this experiment, shows (as in table 1) significance on the parameters such as days for sprouting, rooting percentage and root length. But on accounting the effect on number of buds per cutting, shoot length, number of leaves per cutting; the results were not considerably significant. Cuttings of yellow trumpet bush had undergone minimum days of sprouting (9.90 days) when treated with NAA 3000 ppm. All the treatment were highly significant from control in days for sprouting but on par within each other. Rooting percentage of the cuttings also shows higher value in 3000 ppm concentration (80.90 %). But it is on par with other concentrations such as 2500 ppm (78.60 %), 2000 ppm (71.60%), 1500 (68.50%) and 1000 (65.30%). This observation clearly denotes that, NAA treatment encourages quick sprouting and maximum rooting percentage of cuttings irrespective of concentrations. It is clear from the results that effect of root promotion through quick dipping of rooting hormone is directly proportionate to the concentration of rooting hormone treated. Our findings are in line with experimental reports of Hussain and Urbi (2016) [5] on adventitious rooting in shoot cuttings of *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) [9] and Dash *et al*., (2011) [2] as that the higher dosages of auxins induced increased number of roots within a short time.

Maximum root length (16.75 cm) was recorded in 3000 ppm concentration, followed by 2500 ppm (15.90 cm) and 2000 ppm (13.57 cm) which are on par with each other. Shenoy, 1992[11] 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[8] in *Jasminum sambac* (Jasmine), Singh *et al*., 2010[13] in *Bougainvillea glabra* (bougainvillea), Grewal *et al*., 2005[3] in *Dendranthema grandiflora* cv. Snowball, Singh *et al*., 2013[12] in *Cestrum nocturnum* (night jasmine) and Sharma, 2014[10] in *Tagetes erecta* (marigold).

Table 1: Effect of different concentrations of NAA on rooting of *Tecoma stans*

Concentrations	Days for sprouting	Rooting percentage (%)	Number of buds per cutting	Root length (cm)	Shoot length (cm)	No. of leaves per cutting
500 ppm	12.40	60.70	2.30	10.10	8.97	6.90
1000 ppm	12.30	65.30	2.40	11.70	9.50	7.20
1500 ppm	11.57	68.50	2.60	12.67	10.10	7.80
2000 ppm	11.55	71.60	2.90	13.57	10.05	7.80
2500 ppm	10.10	78.60	3.10	15.90	10.25	8.49
3000 ppm	9.90	80.90	3.45	16.75	10.71	8.70
Control	15.50	35.60	2.10	6.60	7.50	6.30
Mean	11.90	65.89	2.69	12.47	9.58	7.60
SE.d	1.70	9.53	0.39	1.82	1.36	1.08
CD	3.65	20.43	0.83 (NS)	3.91	2.92 (NS)	2.32 (NS)

CONCLUSION

On observing effect of NAA on rooting of T*ecoma stans* semi-hardwood stem cuttings, it is clear that rooting hormone NAA have the capacity to promote more rooting which results in quick sprouting and maximum rooting percentage. It is confined that quick dipping for 30 seconds with 3000 ppm of NAA will promote earlier rooting, maximum rooting percentage and improved root growth in *Tecoma stans*.

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