

## Use of Auxins in Vegetative Propagation of *Andrographis lineata* Nees - An Endemic Medicinal Plant from Southern India

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**Abstract:** The present investigation deals with the cultivation prospects of an endemic medicinal plant *Andrographis lineata* Nees, which is commonly used for various medicinal purposes. Due to over exploitation this herb is vanishing from natural habitat hence its propagation on commercial scale is recommended. Stem cuttings of *Andrographis lineata* are easy to root. Treatment with IBA (Indole-3-Butyric Acid) and IAA (Indole Acetic Acid) promoted rooting and increased shoot growth in greenhouse under intermittent misting. The percentage of rooting was high in the cuttings treated with 150 ppm IAA (53.60%) and was better with 200 ppm IBA (27.40%) concentration compared to control. The length of roots was maximum in the cutting treated with 150 ppm of IBA (7.01 cm) and 150 ppm of IAA (9.42 cm). The roots were profuse and branched in nature. The percentage of rooting and root length improved by using IBA and IAA, either alone or together.

**Key words:** Medicinal plant • *Andrographis lineata* • Indole -3-butyric acid • Indol acetic acid • Stem cutting • Sprouting

### INTRODUCTION

Species of *Andrographis* Wallich ex Nees (Acanthaceae) are used in the Indian systems of medicine namely Siddha, Ayurveda and Unani [1]. The genus exhibits antipyretic properties [2]. This genus consists of 40 species distributed in Tropical Asia [3]. About 21 species are distributed in India [4] and all of them available in Tamilnadu [5]. Among the 21 species 18 species are reported to be endemic to India [6]. *Andrographis lineata* Nees (Fig. 1) is an endemic medicinal herb [6] found in wild in Shevaroy Hills (Eastern Ghats) of Salem District, Tamil Nadu. (11°45' and 11°55' N and 78°11' to 78°20'E) upto 1600 m. Various medicinal properties like antipyretic, anti-inflammatory, antivenom, anti-diabetic, diabetes, jaundice, worms, snake bite, skin diseases and also as veterinary medicine have been attributed to this plant in the traditional system of Indian medicine [7-15]. It is used as hepatoprotective, antibacterial and diuretic activity [16-20]. Three flavonoids were isolated from the leaf extract [21].

The tribals (Malayalis) the herbal medical practitioners and other traditional healers use this plant for snake bite, dog bite, fever, constipation, astringent, bronchitis and skin diseases. The seedlings of these

plants are periodically browsed by cattle. Due to this the species now exist only in small patches between thorny bushes. The natural multiplication through seed is difficult [9] due to biotic factors [9]. There is no earlier report on use of auxins in vegetative propagation of this useful plant. The work was undertaken to determine rooting response of *A. lineata* under greenhouse using auxins and results reported. Rooting of stem cuttings through application of growth regulators has been undertaken as a protocol for large scale propagation of this herb following the method of Jayasankar *et al.* [22] and Rao *et al.* [23].

### MATERIALS AND METHODS

In the present study healthy stem cuttings from six months old mature branches of *Andrographis lineata*. Investigations were carried out in the College Campus of Government Arts College (Autonomous), Salem. Stem cuttings were obtained from plants growing in Shevaroy Hills in November 2010. Ten cuttings were taken for each treatment. These cuttings were treated with IBA (50, 100, 150, 200 and 250 ppm) and IAA (50, 100, 150, 200 and 250 ppm). The basal portion of cuttings were soaked in IBA and IAA solution for 4 hrs. For the control stem cuttings were soaked in distilled water only.



Fig. 1: *Andrographis lineata* in natural habitat

Treated cuttings were then planted in earthenware pots filled with soil, sand and FYM (1:1:1) and the pots were kept in the greenhouse, frequently watered. Observations were recorded after two months of planting the cuttings. The data on root number, root length (cm), percentage of rooting, percentage of sprouting and shoot length (cm) were recorded.

### RESULTS AND DISCUSSION

The auxinic compounds IAA and IBA had profound root inducing capability. The results on response of plant growth regulators for rooting and root length were recorded 60 days after planting (Table 1). All the treatment of IBA and IAA significantly enhanced the

percentage of rooting in comparison to the control (Table 1). Among the IAA treatments highest rooting percentage was recorded with 150 ppm of IAA (53.60) which was followed by 200 ppm (39.45), 250 ppm (38.84), 100 ppm (37.21) and 50 ppm (34.51) (Fig. 2). The IBA treatments highest rooting percentage was recorded with 100 ppm (46.34). Which was followed by 250 ppm (35.76), 150 ppm (32.65), 50 ppm (29.76) and 200 ppm (27.40). These treatments showed better results than the control.

The differential effects of various auxins on rooting of stem cutting of various plant species have been ascribed to the chemical nature of auxin, the mode of treatment and the morpho-physiological status of the cutting [24-27]. All the treatment of IAA and IBA significantly increased the number of roots / cutting as

Table 1: Effect of IAA and IBA on rooting stem cuttings in *Andrographis lineata*

T	ppm	Cutting sprouted %	Percent of rooting %	Root number	Root length (cm)
Control		6.00	10.23	1.64	2.10
IAA	50	26.00	34.51	4.73	6.84
	100	32.00	37.21	5.26	6.96
	150	67.00	53.60	8.56	9.42
	200	44.00	39.45	6.17	6.70
	250	50.00	38.84	5.89	6.12
IBA	50	24.00	29.76	4.65	6.04
	100	27.00	46.34	4.64	6.82
	150	41.00	32.65	4.92	7.01
	200	30.00	27.40	5.14	6.13
	250	34.00	35.76	4.83	6.08
Mean		34.63	35.06	5.13	6.38

T= treatments, ppm = concentration in parts per million

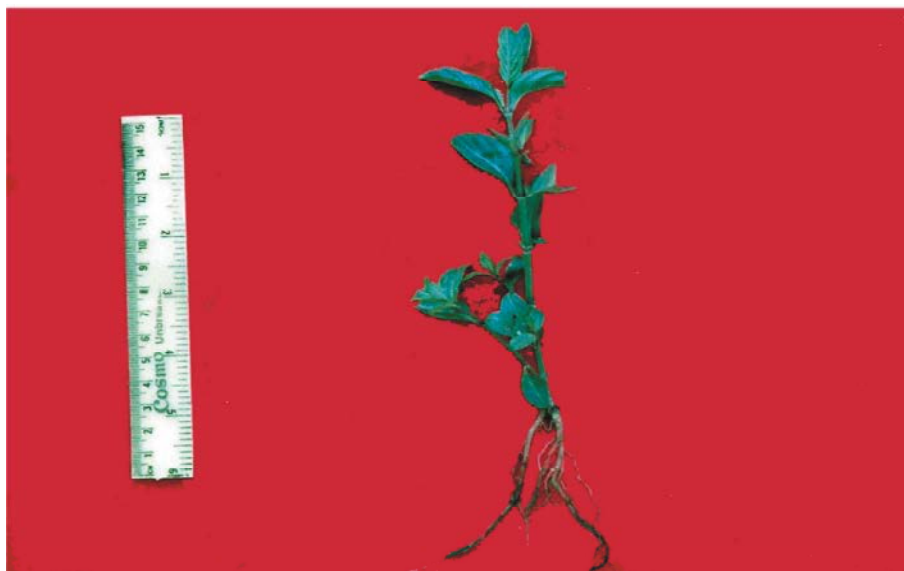


Fig. 2: Rooting of *Andrographis lineate* with IAA treatment

compared to control. The highest number of roots per cutting was observed when cutting were treated with 150 ppm IAA (8.56) followed by 200 ppm IBA (5.14). IAA treatment significantly increased the number of roots/cutting as compared to 50 ppm IBA (4.65), 100 ppm IBA (4.64), 150 ppm IBA (4.92) and 250 ppm IBA (4.83) respectively. Root and shoot length revealed maximum (9.42 cm) with 150 ppm IAA followed by 100 ppm IAA (6.96 cm) and 150 ppm IBA (7.01 cm) treatments respectively. The IAA and IBA treatments produced significantly longer shoots than the control. The maximum shoot lengths in 150 ppm IAA and 200 ppm IBA treatments could be due to the better influences of the treatments. The reports by Venkaiah *et al.* [28]; Gbadamosi and Oni [29] and Richard, [30] confirm the potential of IAA and IBA to root stem cuttings of tropical trees and American species of *Cordia* [31]. Sun and Chen [32] reported the higher effects of plant growth regulators (IAA, IBA, NAA) on sprouting of rose buds. Growth hormones causes enlargement of plant cells, cell division, laterals branching of shoots and roots, vascular differentiation and early embryonic development [33]. IBA were in conformity with the reports of its effectiveness as compared to numerous naturally occurring auxins in promotion of adventitious roots [34]. Moreover, Butola and Badola [35] have recommended IBA and IAA as promising treatments to improve rooting, growth and biomass in *Angelica glauca* and *Heracleum candicans*. The existing reports on seed germination are not reliable in view of their low

germinability and slow growth [36, 37]. Thus proliferation by means of stem cuttings is the most economical, easiest and fruitful method of vegetative propagation. Moreover, to improve sprouting, rooting and survival of stem cuttings, plant growth regulators can be wisely and widely used. It is evident that *A. lineata* has got many uses. Due to over exploitation this herb is vanishing from natural habitat hence its propagation on commercial scale is recommended.

## CONCLUSION

The present study provides a further research scope on *in vitro* and *ex vitro* propagation of the species. The investigation laid a strong foundation for the conservation of this important medicinal plant.

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