



EFFECT OF IAA AND IBA ON THE ROOTING OF *ANDROGRAPHIS MACROBOTRYNS* NEES STEM CUTTINGS – AN ENDANGERED MEDICINAL PLANT OF INDIA

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ABSTRACT

The present paper highlights the propagation prospects of an endangered medicinal plant *Andrographis macrobotrys* Nees, which is popularly used for several medicinal applications. Such as snake bite, diarrhoea and skin diseases, etc. Due to over exploitation this plant is vanishing from original habitat hence its cultivation on commercial scale is approved. Stem cuttings of *Andrographis macrobotrys* are comfortable to root. Treatment with IAA (Indole-3-Acetic Acid) and IBA (Indole – 3 – Butyric Acid) advanced rooting and raised shoot growth in greenhouse under intermittent misting. The percentage of rooting was elevated in the cuttings treated with 300 ppm IAA (55.14%) and was the roots length was maximum in the cutting treated with 400 ppm of IAA (9.54 cm) and 300 ppm of IBA (7.48 cm). The roots were luxuriant and branched in quality. The percentage of rooting and root reach reformed by using IAA and IBA, either single or together.

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INTRODUCTION

Andrographis macrobotrys Nees is a member of the Acanthaceae family (Fig.1). Species of *Andrographis* Wallich ex Nees are used in the Indian systems of medicine such as Ayurveda, Homeopathy, Naturopathy, Siddha, Unani, Amachi and Modern (Alagesaboopathi and Balu, 1999). The genus *Andrographis* as a whole is of potential importance to India. The genus exhibits antipyretic properties (Kirtikar and Basu, 1975). This genus consists of 40 species distributed in Tropical Asia (Anonymous, 1948). About 21 species are distributed in India (Gamble, 1982) and all of them available in Tamilnadu (Henry *et al.*, 1987). Among the 21 species 18 species are reported to be endemic to India (Ahmedullah and Nayar, 1986). *Andrographis macrobotrys* Nees is an endangered medicinal plant found in wild in Shevaroy Hills of Eastern Ghats, Salem district of Tamilnadu. (11°45' and 11°55' latitude; 78°11' to 78°20' E longitude) upto 1400 m. For the fulfillment of the present and future need this plant requirement to be propagated scientifically at a commercial scale. But its propagation through seeds is difficult due to lesser germination percentage (Alagesaboopathi, 2002).

It is used of diarrhoea, muscular pain, fever, snake bite, antipyretic and skin diseases (Alagesaboopathi and Senthikumar, 2006; Dash and Padhy, 2006; Alagesaboopathi and Balu, 1999; Chinnappan Alagesaboopathi; 2010). Two new flavonoids were isolated from the whole plant extract. (Anilkumar Reddy *et al.*, 2005). There is no previous report on use of auxins in vegetative cultivation of this useful plant. The work

was undertaken to effect rooting response of *A. macrobotrys* under greenhouse using growth regulators and results reported. Rooting of stem cutting through function of growth regulators has been undertaken as a protocol for enormous scale cultivation of this plant following the technique of Jayasankar *et al.*, 1990; Rao *et al.*, 1999; Chinnappan Alagesaboopathi, 2010 and Alagesaboopathi, 2011.

MATERIALS AND METHODS

Andrographis macrobotrys Nees was used as test plant in the present study. Samples of *A. macrobotrys* were collected from plants growing in Shevaroy Hills in September 2011. Age of the collected samples was 4 -6 months. Experiments were carried out at Department of Botany, Government Arts College (Autonomous), Salem. For propagules growth 10 – 15 cm long and 0.5 – 0.7 cm diameter cuttings of stem cuttings were taken. 10 cuttings were taken for each treatment. These cuttings and treated with IAA (100, 200, 300, 400 and 500 ppm and IBA 100, 200, 300, 400 and 500 ppm). The basal portions of cuttings were soaked in IAA and IBA solution for 5 hrs. For the control stem cuttings were soaked in distilled water only. After 5 hours the cuttings were planted in polythene bags filled with soil, sand and farm yard manure (1:1:1) and the polythene bags were kept in the greenhouse, frequently watered. Observation were recorded after 65 days of planting the cuttings. The information on root number, root length (cm), percentage of rooting, percentage of sprouting and shoot length (cm) were recorded.

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RESULTS AND DISCUSSION

Importance of *A. macrobotrys* as medicinal plant, especially as a principle for andrographolide and flavonoids is known to plant researchers for a long time. As cultivation through seeds is rather complicated, cuttings have been performed for the application. The growth regulators IAA and IBA had deep root inducing ability. The results on reply of plant growth regulators for rooting and root length were recorded 65 days after planting (Table 1). All the treatment of IAA and IBA significantly enhanced the percentage of rooting in comparison to the distilled water (control) (Table 1). Among the IAA treatments highest rooting percentage was recorded with 300 ppm (55.14) which was followed by 400 ppm (39.20), 200 ppm (38.11), 500 ppm (35.13) and 100 ppm (28.24) (Fig. 2). The IBA treatments maximum rooting percentage was recorded with 300 ppm (49.146), which was followed by 400 ppm (40.13), 500 ppm (37.40), 200 ppm (36.47) and 100 ppm (26.17) (Fig.3). These treatments proved better results than the distilled water (control).

Table 1 Effect of growth regulators on root formation in stem cuttings of *Andrographis macrobotrys* Nees on 65 days after treating.

Growth regulators	Concentration of growth regulators (ppm)	Cutting sprouted %	Percent of rooting	Root number	Root length (cm)
-	-	5.20	10.02	1.72	2.26
Control (Distilled water)	100	28.01	28.24	5.12	7.94
	200	36.07	38.11	6.74	6.82
	300	58.10	55.14	8.11	8.13
	400	63.15	39.20	8.76	9.54
	500	48.00	35.13	6.14	6.90
IBA	100	26.16	26.17	3.14	6.70
	200	35.10	36.47	4.62	6.04
	300	49.17	49.16	6.18	7.48
	400	46.20	40.13	5.61	6.96
	500	52.00	37.40	4.17	6.42
Mean		40.65	35.92	5.48	6.83

ppm = Concentration in parts per million.

The differential causes of different auxins on rooting of stem cutting of several plant species have been ascribed to the chemical nature of auxin, the technique of treatment and the morpho-physiological status of the cutting. (Nanda, 1970; Hartmann and Kester, 1983; Pal, 1998; Nilanjana Das, 2006). All the treatment of IBA and IAA significantly raised the number of roots / cuttings as compared to distilled water (control). The highest number of roots per cutting was noted when cutting were treated with 400 ppm IAA (8.76) followed by 300 ppm IBA (6.18). IAA treatment significantly enhanced the number of roots/cutting as compared to 100 ppm IBA (3.14), 200 ppm IBA (4.62), 400 ppm IBA (5.61) and 500 ppm IBA (4.17) respectively. Root length determined highest (9.54 cm) with 400 ppm IAA followed by 300 ppm IAA (8.13 cm) and 300 ppm IBA (7.48 cm) treatments respectively. The IBA and IAA treatments produced significantly elongated shoots than the control (12.40 cm). The highest shoot lengths in 400 ppm IAA and 300 ppm IBA treatments could be due to the improve effects of the treatments.



Fig 1 *Andrographis macrobotrys* Nees in natural habitat



Fig 2 Rooting of *Andrographis macrobotrys* Nees with IAA treatment



Fig 3 Rooting of *Andrographis macrobotrys* Nees with IBA treatment

The earlier reports by Alagesaboopathi, (2010; 2011) confirm the potential of IAA and IBA to root stem cuttings of endemic medicinal species of *Andrographis ovata* and *Andragraphis lineata*. Sun and Chen (1998) reported the higher influences of plant growth regulators (IAA, IBA and NAA) on sprouting of rose buds, Growth hormones effects enlargement of plant cells, cell division,

laterals branching of shoots and roots, vascular differentiation and early embryonic growth (Hobbie *et al.*, 2000). The existing reports on seed germination are not secure in view of their lesser germinability and dull development (Butola and Badola, 2004). The previous reports propose that, the rooting response using stem cuttings of the medicinal essential endangered tree plant *Sterculia urens* (Kesava Reddy, 1994; Purohit and Dave, 1996). Medicinal plants commonly grow in uncultivated in natural habitat, but scientific manner would be helpful to extend their biomass yield as well as andrographolide contents. Thus proliferation by means of stem cuttings is the most economical, easiest and luxuriant way of vegetative cultivation. Moreover, to upgrade sprouting, rooting and survival of stem cuttings, plant growth regulators can be wisely and largely used. It is conspicuous that *A.macrobotrys* has got numerous uses. Due to over exploitation this plant is vanishing from natural habitat hence its cultivation on commercial scale is recommended.

CONCLUSION

The present study gives a further investigation expanse on *in vitro* and *ex vitro* cultivation of the plant. The exploration laid a potent support for the conservation of this endangered medicinal plant.

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