

# Effect of auxins on clonal propagation of *Syzygium travancoricum* Gamble. A critically endangered species of the southern Western Ghats

A. Hussain and C. Anilkumar

Jawaharlal Nehru Tropical Botanic Garden and Research Institute, Palode,  
Thiruvananthapuram 695 562 Kerala

(Received : 5 February, 2014; accepted 15 March, 2014)

## ABSTRACT

Vegetative propagation through stem cuttings and air layering in *syzygium travancoricum* was tested. The highest rooting of 90% was achieved with the use of IBA 1000 ppm from tender stem cuttings of 15-20 years old plants while air layering was found to be 100% by the use of IBA 1000 ppm. Thus the standardized clonal propagation method is recommended as potential methods for multiplication, conservation and management of these endangered and red listed tree resources from untimely endangerment for the posterity.

**Key words :** Vegetative propagation, Indole Butyric Acid (IBA), Critically endangered, Conservation.

## Introduction

*Syzygium travancoricum* is a medium sized tree species of family Myrtaceae, scarcely distributed in swampy Travancore region of Southern Western Ghats. Its bark is used in local medicine. (Nair and Sastry, 1987). As a threatened species (Joseph, 1977; *et. al*; Jain and Sastry, 1984; Ahmadullah & Nair, 1987; Nair & Sastry, 1987, 1988, 1990), population relics were located in a sacred groove of Quilon District (Nair & Mohanan, I.C). Recent collection from Thrissur apart from Palode hints species distribution up to Northern Kerala. Leaves are chartaceous ovate, obtusely acuminate, narrowed at base and decurrent on intra marginal veins, 1.2-2.0 cm long petiole. Mast year occurs once in three to four years when most of the whitish small flowers of April-May in axillary corymbose cymes become berries of June-July. Only few of the lavishly set reddish brown ripe fruits bear viable seeds. The survival percentage of saplings is also very low. Age ratio revealed the presents of only mature trees as an indication of de-

graded demography. All these factors prompted this study to standardize the vegetative propagation methods on this species for augmenting conservancy.

## Materials and Methods

Differently aged branches *viz*: tender, semi hard and hard were collected during June-July from 10-15 year old trees from an altitude of 120 msl. Nodal cuttings of 10-15 cm with 4-5 nodes and two or three pairs of leaves at the tip were prepared. The basal portion of each cuttings was dipped in three different root regulating hormones *viz*. Indole Acetic Acid (IAA), Indole Butyric Acid (IBA) and Naphthalene Acetic Acid in four concentrations. (250, 500, 1000, 2000 ppm) as tested in the case of *Coscinium fenestratum* (Jose *et al.*, 2009) with dipping time 3 minute. The control set of cutting were dipped in distilled water before planting. Sets of cuttings were immediately planted inside the sand bed of a mist house where warm humid climatic conditions pre-

ailed (25-30°C / 75 – 85% RH). Number of roots per cutting, length of roots *etc.* were taken in to account after 40 days of planting and were statistically tabulated as the mean values of 50 replicates  $\pm$  SD.

The same age identified for stem rooting experiment was followed in air layering. It was conducted during the month of September- October where favourable climatic conditions were experienced (22-30°C / 65- 85% RH). Approximately 15 -25 cm below the shoot tip of the lateral and main branches, a small strip of bark (1.5 – 2 cm) was girdled out using a budding knife, just below the nodal region. Auxins such as NAA, IBA and IAA in four concentrations (250, 500, 1000 and 2000 ppm) were brushed in the girdled region. (The auxins of different concentrations were already standardized for optimum range). Thus the brushed girdles were immediately covered with white thin transparent polythene sleeves containing moist rooting compost coccopeat, river sand and dried and sieved cow dung (2:1:1) and tied firmly at both ends to avoid drying of the medium. The experiment was done simultaneously on 10 branches on each concentrations to arrive reliable conclusion on the efficiency of the rooting performance. The air layers were observed regularly for the initiation of roots without opening polythene sleeves. A set of layers without auxins treatments was also maintained as control to compare the rooting effect of different auxins.

## Results and Discussion

Since the root initiation was least with hard cuttings,

semi hard and tender cuttings were tried for rooting with different auxins. The tender stem cuttings rooted more with comparative success rate than semihard cuttings with different auxins in different concentrations. A maximum rooting of 90% with mean root no  $3.62 \pm 1.68$  was observed with IBA – 1000 ppm. (Fig.1 and Table 1). The other concentrations (as shown in the table 1) except IAA- 250 and

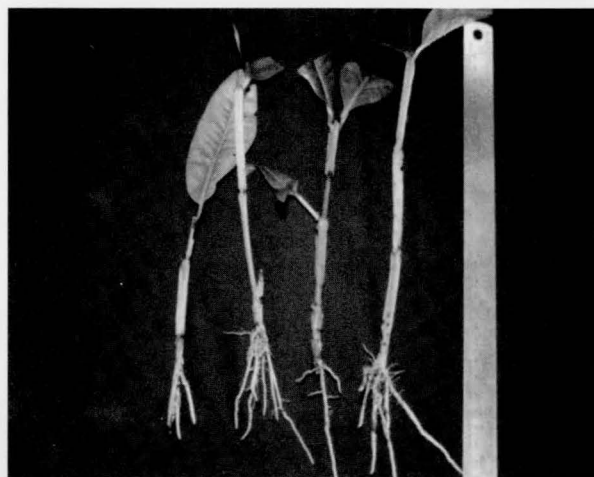


Fig. 1. Rooted stem cuttings of *Syzygium travancoricum*

NAA- 250 ppm had shown comparatively better rooting response. Only 20% of rooting was observed in control set of cuttings.

Rooting success through air layering with effect of all concentrations of auxins (as shown in Table 2) was comparatively better rooting response. And among the auxins the effect of IBA was very signifi-

Table 1. Effect of Auxins on rooting of stem cuttings of *Syzygium travancoricum* Gamble

Treatments (ppm)	Rooting%	Mean number of roots Mean $\pm$ SD	Mean length roots Mean $\pm$ SD (cm)	Survival of ramets %
IAA- 250	-	-	-	-
IAA- 500	40	3.05 $\pm$ 1.53	7.80 $\pm$ 1.92	70
IAA - 1000	30	3.34 $\pm$ 1.52	8.67 $\pm$ 2.51	80
IAA - 2000	40	3.5 $\pm$ 0.70	7.0 $\pm$ 1.41	70
IBA-250	50	3.62 $\pm$ 1.68	7.60 $\pm$ 2.07	60
IBA-500	70	2.67 $\pm$ 1.52	7.34 $\pm$ 1.52	60
IBA-1000	90	3.62 $\pm$ 1.68	7.60 $\pm$ 2.07	80
IBA-2000	30	2.6 $\pm$ 1.52	8.67 $\pm$ 3.21	60
NAA-250	-	-	-	-
NAA-500	20	3.0 $\pm$ 2.82	8.34 $\pm$ 3.05	50
NAA-1000	40	3.05 $\pm$ 1.53	7.80 $\pm$ 1.92	70
NAA-2000	30	2.0 $\pm$ 1.41	6.33 $\pm$ 2.08	60
Control	20	3.52 $\pm$ 1.42	6.34 $\pm$ 2.5	50

cant for the species. The highest rooting percent, shortest duration for root initiation, better survival performance of rooted layers etc. were merit on the application of IBA (Fig. 2 and Table 2) The auxins IBA 1000 ppm had shown 100% of rooting with minimum period of 15 days for root initiation and maximum survival percentage of ramets. The control set had shown only 20% of rooting and low sur-

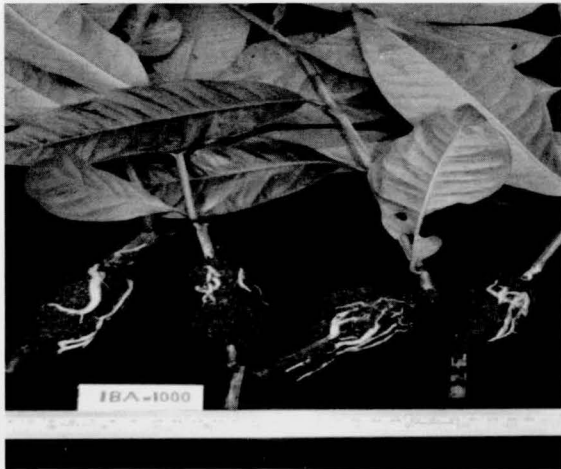


Fig. 2. Rooted layers of *Syzygium travancoricum*

Table 2. Comparative effect of auxins and survival of air layers in *syzygium travancoricum*

Treatments (ppm)	Formation of Roots		Survival percentage of layers (days)
	Percentage of roots	No. of Roots	
IAA- 250	30	4.0 ± 1.0	60
IAA- 500	40	4.75 ± 0.95	70
IAA - 1000	40	5.25 ± 0.9	50
IAA - 2000	30	3.67 ± 1.52	60
IBA - 250	50	4.5 ± 1.9	60
IBA - 500	70	4 ± 1.47	70
IBA - 1000	100	3.66 ± 2.16	80
IBA - 2000	40	4 ± 0.8	60
NAA - 250	30	2.66 ± 1.52	50
NAA - 500	50	4.5 ± 1.60	60
NAA -1000	40	5.2 ± 0.95	60
NAA -2000	30	3.67 ± 1.52	60
Control	20	3.5 ± 2.12	40

vival percentage.

**Conclusion**

Since the clonal propagation through stem cuttings and air layering is a quick and economically useful techniques for producing true to type progenies and uniform planting materials of superior quality of this critically endangered species (IUCN, 1997; Ravikumar and Ved, 2000). The method therefore helpful to supplement the deficit in seed production (Jose *et al.*, 2000; Mohd Aslam *et al.*, 2007). The method also reduces the juvenile period and subsequently facilitates early flowering and fruiting among the individuals.

**Acknowledgmets**

Authors would be to thanks the Director, JNTBGRI for the facilities.

**References**

Anilkumar, N., Sivadasan, M. and Ravi, N. 2005. *Flora of Pathanamthitta, Western Ghats, Kerala*, pp: 219.  
 IUCN, 1997. IUCN Red list categories. *IUCN, Gland, Switzerland*.  
 Jose, P.A., Hussain, A. and Mohanan, N. 2009. *Proceedings of the 21<sup>st</sup> Kerala Science Congress – Kollam KSCSTE, Govt. of Kerala*, pp. 641-644.  
 Jose, P.A., Pandurangan, A.G. and Hussain, A. 2009. Clonal propagation of *Coscinium fenestratum* (GAERTN.) COLEBR- a critically endangered medicinal plants of Western Ghats. *Journal of Non-Timber Forest Products*. 16(4) : 295-298.  
 Jose, P.A; N, Mohanan and Hussain, A. 2010. Clonal propagation of *Humboldtia vahiliana* Wt.- an endemic tree of southern Western Ghats. *Eco. Env. & Conservation*. 16(3) : 365-368.  
 Mohd Aslam, Syed Arshad, Mohd Sidiq Rather, Salathis ,H.S and Seth, C.M. 2007. Auxins induced rooting in *Taxus buccata* Linn. Stem cuttings. *Indian Journal of Forester*. 30 (2): 221-226.  
 Nair, M.P. and Sastry, A.R.K. 1987. *Red Data Book of Indian Plants*. Vol. 1, pp. 217.