

Conservation of Critically Endangered species *Poeciloneuron pauciflorum* Bedd., through air layering methods

S.Ghanthi Kumar

Research Associate,

PG & Research Department of Botany,

St.Xavier's College (Autonomous),Palayamkottai,
Tirunelveli, Tamilnadu -627002

Abstract

Air layering methods of propagation was done in red listed species *Poeciloneuron pauciflorum* Bedd., under field condition at Inchikuzhi in Agasthiyamalai Biosphere Reserve area in Tirunelveli and Kanyakumari. The treatment with IBA at 1000ppm of semi-hard branches. As a result of this treatment, 60% was rooted and 30% were callus formation and 10% was not responding. This treatment was made in monsoon season. The success of air layering in this species being readily be used for producing enough saplings for removal of the species from Red –list.

Key words: *Poeciloneuron pauciflorum*, red-list, air layering.

Introduction

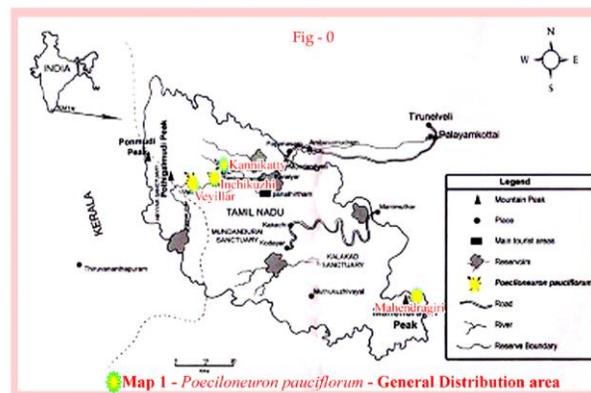
The *P. pauciflorum* tree is present in Tirunelveli and Kanyakumari at The Agasthiyamalai Biosphere Reserve. The Biosphere between 83.0 - 84.4°N latitude and 77.5°-77.18°E longitude, belonging to Cluciaceae, is an every green medium sized tree with 7-15m height and 0.45-0.70m grith. *P. pauciflorum* trees were observed in four distinct localities viz., Inchikuzhi, Kannikatty, Veyillar and Mahendragiri area (Map 1) in southern Western Ghats. The density of the trees in a particular locality is low with the range of 5-11 per 900m. The species has already included under endangered and threatened list (Ganeshaiyah, 2005 and Nayer & Sastry,1987). The World Conservation Monitoring Centre assessment information was Critically Endangered B1+2c (www.iucnredlist.org, 1998).The kani tribals use it for the treatment of Mendel disorder, infectious diseases and for exorcism activities(GhanthiKumar & Manickam, 2008). In this background, necessary for removal of this species from Red list. The air layering methods of plant propagation is most useful and in germplasm development such as multiplication of species in large number of saplings true to parent genotype, in short span of time to overcome seedling stage etc., and also useful for propagating rare and vulnerable species which are difficult to raise from cuttings(Wright, 1974).

Materials and Methods

Air layering method was applied to *P.pauciflorum* in field condition of Inchikuzhi at Agasthiyamalai Biosphere Reserve in Titunelveli district, during monsoon seasons (Table 1&2; Fig-0) and chose young and hard mother plants.

Table 1: Ecology of *P. pauciflorum* in different forest ranges of Agasthiyamalai

Locality	Altitude (in meter)	Mean temperature at 1 la.m to 1 pm (°C)	Habitat
Inchikuzhi	750	23 ± 2°C	Interior forest
Kannikatty	600	22 ± 2°C	Stream bank
Veyillar	870	21 ± 2°C	Stream bank
Mahendragiri	950	21 ± 2°C	Stream bank



A constriction was made 25-30 cm below from the tip for young mother plant cuttings and 30-35 cm for hard cutting of plant with help of a sharp knife, make two parallel cuts about 1 1/2 inches apart around the stem and through the bark and cambium layer. Connect the two parallel cuts with one long cut and remove the ring of bark leaving the inner woody tissue exposed and the auxin called Indole Butyric acid (IBA) at different concentrations was applied with a handful of moistened layering mixture considering of Coconut husk and Vermicompost in the ratio 3:1 was used to envelope the wounded portion of the stem and wrapped with Black polythene sheet, firmly tied at both the ends with a thread to ensure moisture content retained inside. One set in each case was kept as control. Observations were made at regular intervals to record the root initiation (Hartmann & Kester,1983). Of the three types of cuttings used, only semi hard responded with root initiation. Therefore the study was repeated on semihard branches with different concentrations of auxin (500,750,1000,1250,1500 ppm etc.) to standardize air layering.

Results and Discussion

Initiation of roots was observed through polythene sheet after 40 days of air layering during monsoon season in field conditions. Application of auxin stimulates cambial activity resulting in mobilization of reserve food materials to the site of root initiation (Gurumurthi et al, 1984). In *P. pauciflorum*, air layering method was suitable for monsoon season because newly leaves arise from august and September (Table-2).

Table-2: Phenological character of *P. pauciflorum*

Location	Flushing	Flowering & Fruiting	Seed shedding	Seedling
Inchikuzhi	August & Sept.	Jan. & Feb.	March & April	July
Kannikatti	October	Nov. & Dec.	Jan. & Feb.	March
Veyillar	August	Oct. & Nov.	Nov. & Dec.	February
Mahendragiri.	Feb. & March.	March & April	May & June	July

According to Nagapal et al (1982) investigated in the seasonal changes in rooting is regulated by several internal basipetally translocated substances acting synergistically with auxin. The treatment of IBA concentration from 500 to 1500 ppm had resulted such as 500 ppm to 750 ppm callus formation and 1000ppm was roots formed and 1250 to 1500 ppm senescence callus formed. The result was put into a table 3 & Fig-1.

Table 3: Percentage of response in *Poeciloneuron pauciflorum* at Inchikuli.

S.No	Hormone (IBA) Concentration (ppm)	Treatment of Sapling	Callus induction	Root induction	Percentage of success (%)
1	500	10	3	0	30
2	750	10	4	3	70
3	1000	10	3	6	90
4	1250	10	6	1	70
5	1500	10	6	0	60

Airlayering on *Goniothalamus rhynchantherus* Dunn., was propagated in the same concentration of auxin (Rajkumar & Pandurangan, 2008). The air layers were healthy and roots were robust in appearance. The rooted plants were severed from the mother plant and carefully transported to CBB by wrapping with wet gunny bags. Soon they were transplanted to earthen pots filled with sand, soil and vermicompost manure in the ration 2:1:1, kept under shade nets and nursed for 15 days for *in-vivo* acclimatization. All the air layers were successful in establishment and perform well after 2 months of transplantation.

Successful rooting during monsoon may be due to higher water potential in the stem (Rajkumar & Pandurangan, 2008) and the availability of reserve food materials along with high activity of meristematic tissue (Solanki et al, 1986). The presence of carbohydrates and auxin at the girdled area make the dormant adventitious root primordial give rise to roots. Again it is also known that the leafy branches synthesize certain auxillary substances helping in the induction of adventitious roots (Misra et al, 2008).

Another fact is that a good number of rare and endemic, plants are growing in deep jungles and valleys, hillocks of difficult and inaccessible terrains. This being the reason, they still remain understudied for their biology and very little is known about their potentials. The production of plants through air layers, which are capable of flowering earlier than seedlings have generated a 'ready to study' ex-situ condition regarding the endemic and RET germplasm (Arya & Hahue, 1982).

Based on the results of the present study, it is inferred that air layering can be adopted as an easy, effective and successful mechanism for the Clonal multiplication of *Poeciloneuron pauciflorum*. It is a promising tool for both *in-situ* and *ex-situ* conservation focusing on reintroduction and restocking programmes. The success of air layering is of immense importance in the present day scenario as habitat destruction poses manifold adverse effects on ecosystem dynamics which may even lead to the extinction of the species.

Acknowledgement

We thank the Department of Biotechnology, Government of India, New Delhi for provided the financial support. We also thank Dr. V.S.Manickam former Director and founder in CBB for providing the opportunities to do the work. I sincerely acknowledge, the Principal Chief Conservator of Forest, Chennai for providing the permission to do the work.

Reference

- [1] Ganeshaiyah, K.N.2005. Recovery of endangered and threatened species: Developing a national priority list of plants and insects, *Current sci*, 89 : 25.
- [2]Nayer, M P and Sastry, A.R.K. 1987. Red Data book of Indian plants, Vol.1.*Botanical survey of India,calcata*, 1987.
- [3]GhanthiKumar, S and Manickam. V.S. 2008. Ethnobotanical Utilization of *Poeciloneron pauciflorum* Bedd. by the Kani Tribes of Agasthiyamalai, Western Ghats, Tamil Nadu, India, *Ethnobotanical Leaflets*, 12: 719-22.
- [4]Wright, R C M.1974. Simple plant propagation. *Ward lock Ltd*, London.
- [5]Arya, R S and Hahue M S.1982. Airlayering in *Pinus patula* schl&cham., and *P.carbaea* morelet var.*hondurensis*, *Indian Forestry*, 108:66-68.
- [6]Misra, V K, Chaukiyal S P and Mohinder pal. 2008. Air layering trials in *Azadirachta indica* A.juss, *Indian forestry*, 128: 70-74.
- [7]Rajkumar, G and Pandurangan A G.2008. Airlayering in *Goniothalamus rhynchatherus* Dunn, A rare and endemic plant of agasthiyamalai in southern westrn ghsts, *Ind J Bot Res*, 4:155-159.
- [8]Palanisamy, K.1999. Propagation of Neem by Airlayering, *Indian forestry*, 125:331-332.
- [9]Solanki, K.R., Kackar,N.L and Jindal,S.K.1986.Airlayering in *Prosopis cineraria*(L.)Mac Bride. *Indian forester* 112(3):202-227.
- [10]Nagapal, R, Puri S and Khosla, P K 1982. Propagation of *Olea europaea* Linn.By Airlayering.In Khosla, P.K *et al.*, *Improment of forest Biomass. Pragati Press,Delhi*, 193-199.
- [11]Gurumurti, K, Gupta, B B and Adrshkuar.1984. Hormonal regulation of root foration In:Purohit,S.S. *et.al*, *Hormonal regulation of plant growth development, Agrobotanical publishers*, India, 387-400.
- [12]Hartmann, H T and Kester, DE.1983. *Plant propagation principles and practices* prentice Hall,Newjersey.



Fig - 1



a) Mother plant ; b-c) Treatment of sapling ; d-h) Morphological changes of treated sapling;
i-j) Root induction