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Study on response of *Rhododendron arboreum* Smith layered shoots to auxins' application

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ABSTRACT

Rhododendron possessing various aesthetic, sacred, economic and medicinal values faces wide scale human interferences due to its overexploitation and unsustainable extraction making this genus as rare/endangered. In addition to its difficulty in multiplication, scanty information is available regarding vegetative propagation methods of this species. Therefore the present study was an attempt to know the response of *Rhododendron arboreum* Smith layered shoots to different concentrations of auxin formulations with constant amount of 5 per cent captan + 5 per cent sucrose. Among all the treatments T_5 (0.4% IBA + 5% captan + 5% sucrose) resulted in better callusing (23.33%) and live cutting (16.67%) whereas least live cutting rate of 3.33 per cent was observed in T_6 (0.05% NAA + 5% captan + 5% sucrose) and T_7 (0.10% NAA + 5% captan + 5% sucrose). However different IBA and NAA formulations failed to induce rooting in this species. Thus a comprehensive study involving anatomical, physiological and chemical aspects that interfere with the rooting of this species is needed to decide the further course of action and at the same time an intensive study is also needed to understand its rooting behaviour and conservation.

Keywords: *Rhododendron arboretum*; formulations; air layering; live cutting

INTRODUCTION

Rhododendron arboreum Smith (Ericaceae), a small evergreen tree commonly known as Burans is considered the most widely distributed species in Himalayas from an altitude of 1200 to 3800 m amsl possessing various aesthetic, sacred and economic values and has been exploited for various medicinal purposes such as bark juice for treatment of cough and diarrhea and flower juice for menstrual disorder. In Himachal Pradesh it is found in Chamba, Kangra, Kullu, Shimla, Mandi, Kinnaur and Sirmour districts. It is also common in Shimla catchment, Gullu forest in Jogindernagar and Kalaghat in Solan (Chauhan 1999). The flower petals are dried and preserved by Gorkhas/ Nepalis for use in treatment of blood dysentery and also fermented to make local liquor (Gurans Ko Rakshi) and its wood is used for making ploughs and Khukri handles and as fuelwood. So due to regular changes in environmental conditions and biotic and abiotic disturbances such as human interference, overexploitation, deforestation and unsustainable extraction the natural populations of rhododendrons are gradually diminishing and these are classified as rare/ endangered (Singh et al 2009). Availability of different multiplication methods is therefore important for conservation of the species. However very limited literature is available regarding the vegetative propagation methods of this species. In addition it is one of the hard to root species and all efforts made on various means of vegetative propagation of the species have failed so far. It has been reported that phenolic substances which leach out from the cut surfaces of the rhododendrons inhibit root initiation particularly when the explants are taken from mature tree (Tiwari and Chauhan 2006). Therefore the present study was an attempt to find out the effect of auxins' application on *R arboreum* layered shoots.

MATERIAL and METHODS

The air layering was done in the monsoon season in Shilli area of district Solan. Air layers (Plate 1) were prepared by removing 1-2 cm wide bark ring nearly 8-10 cm above the origin taking care that wood portion was not injured and rooting hormone was applied throughout the circumference of the debarked ring portion. Layered portion was covered with sphagnum moss, wrapped with a transparent poly-sheet and tied with thread at both the ends to avoid any loss of moisture. The chemical formulations were prepared in talcum powder using the methodology of Blazich (1988). Different powdered formulations of auxins (different concentrations of IBA and NAA) were prepared and transferred to small plastic containers and stored in cool dry place kept away from sunlight to avoid auxin degradation. The data obtained were subjected to statistical analysis as per the methods detailed by Steel and Torrie (1960) and Gomez and Gomez (1984). The data were appropriately transformed wherever required before subjecting to ANOVA to know the response of air-layered shoots to auxins' formulations with constant amount of 5 per cent captan + 5 per cent sucrose.

RESULTS and DISCUSSION

Data given in Table 1 show that in air-layered shoot, the IBA formulation of T_5 (0.4% IBA + 5% captan + 5% sucrose) resulted in the highest callusing of 23.33 and 16.67 per cent of live cutting that was followed by T_4 (0.3% IBA + 5% captan + 5% sucrose) having 16.67 per cent of callusing with 10.00 per cent live cutting followed by T_6 (0.05% NAA + 5% captan + 5% sucrose) with 13.33 per cent callusing and 3.33 per cent live cutting. Similar observations were made by Thakur (2005). The least callusing (3.33%) was observed in T_7 (0.10% NAA + 5% captan + 5% sucrose and T_1 (Control, 5% captan + 5% sucrose). However no callusing was found in T_0 (Control). Despite of callusing (Plate 2) and use of auxin formulations shoots were failed to root. These results are in accordance with the observations of Nautiyal et al (1992) who recorded complete failure of rooting under all seasons and hormonal treatments inspite of profused sprouting in July for *Anogeissus latifolia*. Failure of cuttings to differentiate into roots irrespective of IBA applied, season of planting and cutting and donor type may be supported by the findings of Ferriani (2006) who failed to root stem cuttings of *Rhododendron thomsii*.

Thus it is suggested that a comprehensive study involving anatomical, physiological and chemical aspects that interfere with the rooting of the cuttings in *R arboreum* is needed to decide the further course of action. An intensive study is much needed to understand its rooting behaviour. Moreover awareness and participation of the people is warranted for its successful conservation.

REFERENCES

Blazich FA 1988. Chemicals and formulations used to promote adventitious rooting. In: Adventitious root formation in cuttings (T Davis, BE Haissig and N Sankhla eds), Dioscorides Press, Portland, OR, pp 132-149.

Chauhan NS 1999. Medicinal and aromatic plants of Himachal Pradesh. Indus Publishing, New Delhi, India, 632p.

Table 1. Effect of auxins on callusing and live cutting of *Rhododendron arboreum* layered shoots

Treatment (T)	Callusing[+] (%)	Live cutting[++] (%)
T_0 (Control, no treatment)	0.00 (1.00)	0.00 (1.00)
T_1 (Control, 5% captan + 5% sucrose)	3.33 (1.77)	0.00 (1.00)
T_2 (0.1% IBA + 5% captan + 5% sucrose)	6.67 (2.54)	0.00 (1.00)
T_3 (0.2% IBA + 5% captan + 5% sucrose)	10.00 (2.97)	6.67 (2.54)
T_4 (0.3% IBA + 5% captan + 5%sucrose)	16.67 (4.16)	10.00 (3.32)
T_5 (0.4% IBA + 5% captan + 5% sucrose)	23.33 (4.91)	16.67 (4.16)
T_6 (0.05% NAA + 5% captan + 5% sucrose)	13.33 (3.74)	3.33 (1.77)
T_7 (0.10% NAA + 5% captan + 5% sucrose)	3.33 (1.77)	3.33 (1.77)
$CD_{0.05}$	7.27 (1.46)	7.28 (1.55)

[+]Figures in parentheses are arc-sine transformed values

[++]Figures in parentheses are square root transformed values

Plate 1. Air layered shoots of *Rhododendron arboreum*

Plate 2. Callus formation in *Rhododendron arboreum*

Ferriani AP, Bortolini MF, Zuffellato-Ribas KC and Koehler HS 2006. Vegetative propagation by cuttings of azaléia tree (*Rhododendron thomsonii* HOOK f). Semina Ciências Agrárias **27(1):** 35-42.

Gomez KA and Gomez AA 1984. Statistical procedures for agricultural research. 2nd edn, John Wiley and Sons, Inc, New York, USA, 680p.

Nautiyal S, Singh U and Gurumurti K 1992. Lack of rooting response of *Anogeissus latifolia* (Bakli) to auxin treatments. Indian Journal of Forestry **15(4):** 298-301.

Singh KK, Rai LK and Gurung B 2009. Conservation of rhododendrons in Sikkim Himalaya: an overview. World Journal of Agricultural Sciences **5(3):** 284-296.

Steel and Torrie JH 1960. Principles and procedures of statistics with special reference to the biological sciences. McGraw-Hill, New York, pp 187-287.

Thakur KS 2005. Vegetative propagation studies in chilgoza pine (*Pinus gerardiana*) through cutting and air layering. MSc thesis, Dr YS Parmar University of Horticulture and Forestry, Nauni, Solan, Himachal Pradesh, India.

Tiwari ON and Chauhan UK 2006. *Rhododendron* conservation in Sikkim Himalaya. Current Science **90(4):** 532-541.