

Vegetative Propagation of *Rauvolfia serpentina* Benth.

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Abstract

The influence of planting method on rooting of root cuttings, and basal half and terminal stem cuttings with apical shoots of *Rauvolfia serpentina* was studied at Reang (foot hill, alt 210 m), Darjeeling W. Bengal. Method of planting and cutting type significantly influenced the rooting parameters. The highest rooting percentage was recorded from the root cuttings planted horizontally and stem cuttings prepared from the terminal half of the stem with apical shoot. This may offer an alternative means of rapid multiplication to produce quality planting materials, selected from genetically superior plants with high extractable reserpine content for large scale cultivation.

Key words : *Rauvolfia serpentina*, Vegetative propagation, Planting method, Root cuttings, Stem cuttings.

Rauvolfia serpentina Benth. (Apocynaceae) is a small indigenous under shrub of moist deciduous forest of South East Asia including, India, Bangladesh, Burma, Sri Lanka, Malaya, Andaman Island and Indonesia. Its altitudinal zone in foot hills of Sikkim Himalaya is 610 m (amsl) and ascends up to 1,220 m in the Khasia mountains (Hooker 1875). *Rauvolfia serpentina* Benth. is one of the important medicinal plant (Biswas 1956). In *Ayurvedic* medicine it was used for treatment of snake bite, insect sting (Eccher 1988), and mental disorder (madmen's medicine), later on its root was used in the treatment of epilepsy, diarrhoea, dysentery, and uterine stimulants to facilitate child birth, ingredient for yeast culture for local brew popularly known as "Harira" in tribal area of North West Bengal (Basnet 2003) and with the discovery of reserpine by Muller et al. (1952) it gained important in the treatment of hypertension, uses as sedative and tranquilizing agent in modern medicine (Husain 1992). On account of the excellent herbal medicinal value large scale propagation and cultivation of this plant is essential just to protect the plant from human exploitation and to maintain their sustainable natural population. Multiplication from seed offers one possibility for cultivation of this plant. Seed germination in *Rauvolfia serpentina* Benth. is poor and variable, ranged from 10 to 74% (Husain 1992, Sarin 1982). The seedlings propagated from the seeds are genetically heterogous, may cause variation of

quantity of extractable reserpine. On the other hand, vegetative propagation from the genetically superior selected plant with high reserpine content may offer the possibility to maintain constant active principle. Besides this growing the crop from vegetative means not only eliminates difficulties associated with seed germination, seedling survival and rapid multiplication but also reduce the time of crop cycle. Therefore, this study was made to explore the alternative means of propagation for ensuring the rapid and regular supply of quality planting materials for large scale cultivation.

Methods

A field experiment was conducted during 2005–2006 at Reang forest location (alt 210 m lat 26°59'N; long 88°26'), Darjeeling Forest Division, WB. The soil is true representative of lower hill zone, with 3.9% organic matter and pH 4.9. Plants collected from the Reang forest nursery were washed in the running tap water and stem cuttings of basal half portion of mean size 132.8 ± 31.9 cm length and 3.0 ± 0.81 mm diameter and remaining terminal portion of mean 152.0 ± 22.8 length, 2.8 ± 0.44 mm diameter were prepared. Similarly root cuttings of average size 39.0 ± 10.8.5 to 41.0 ± 12.4 mm length and 11.0 ± 4.3 mm diameter were also prepared and dipped in 0.05% bavistin + 0.1% dithan for five minutes. The experimental plots were

Table 1. Effect of planting methods and cutting type on rooting of *Rauvolfia serpentina*. T₁= Root cutting planted vertically maintaining polarity; T₂=Root cutting planted horizontally; T₃ = Stem cuttings (basal half); T₄ = Stem cuttings (terminal portion with apical shoot).

Treat-ment	Rooting (%)	No. of roots	Max root length (cm)
T ₁	60.00	4.00	2.50
T ₂	96.00	4.20	4.30
T ₃	40.00	4.40	6.50
T ₄	80.00	4.00	2.30
SE ±	1.05	0.43	0.19
CD (0.05)	2.70	1.10	0.50
CD (0.01)	4.20	1.70	0.76

prepared by digging hoeing and levelling in the field.

The experiment was conducted to observe the effect of planting method of root cuttings and type of stem cuttings on rooting in following manner : T₁ = Inserted vertically flush to ground maintaining polarity, T₂= Planted horizontally in 2.5 cm deep furrow and covered with soil, T₃ = Basal half portion of the stem cuttings, T₄ = Terminal portion of the stem with apical shoot.

For each treatment 100 cuttings into five replications were planted in randomized block design in the prepared field without any treatment. Thereafter the sprouting and rooting responses were recorded after 45 days of planting of cuttings.

Results and Discussion

Effect of Planting Method of Root Cuttings

The type of cuttings and method of planting of root cutting had a significant effect on rooting and root parameter. Table 1 reveals that the root cutting planted vertically and normally maintaining polarity registered 60% rooting with average root length 2.5 ± 0.5 mm. The rooting response of cuttings planted horizontally was 96% with an average of 4.3 ± 0.19 mm root length. The rooting surface in both the type was wound callus. The maximum root length, rooting percentages were significantly different between T₁ and T₂. Present findings of highest (96%) rooting response in root cuttings placed horizontally gets support from earlier work who reported auxin synthesis in lower surface of stem placed in horizontal position

(Vanover et al. 1945) and root regeneration is often related to endogenous auxin (Gurumurti et al. 1974, Nautiyal et al.1991).

Effect of Stem Cutting Type on Rooting

The stem cutting of basal half (T₃) responded with 40% of rooting with 4.4 ± 0.43 number and 6.5 ± 0.19 cm length of primary roots. This result is the lowest rooting response and highest average number and length of primary roots over other treatments. Similarly stem cuttings of terminal half with apical shoot (T₄) responded with 80% rooting. The mean values of primary roots were 4.0 ± 0.43 numbers and 2.30 ± 0.19 cm respectively. In this case the rooting response was highest. The number of primary root was at par with the treatment T₁ but less over other treatments. The present findings of superiority of upper portion's cutting over basal half has also been reported in cherry (Hartmann and Hansen 1958), (Eccher 1988), in *Taxus baccata* and peach (Marini 1983).

It may be inferred that the whole plant part (stem and root) of *Rauvolfia serpentina* have the rooting capability and can be used successfully for large scale propagation.

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