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Propagation Techniques Of Pyracantha Crenulata (D. Don.) M. Roem

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Abstract: *Pyracantha crenulata* is very important species in the forest ecosystem of Uttarakhand Himalaya. Recently it has been seen that modernization and climate change drawing adverse effect on its habitat. The objective of the present investigation was to develop nursery techniques of Ghingharu (*Pyracantha crenulata*) through seed and vegetative method for mass propagation. Therefore an experiment carried out by seed sowing in different mediums (sand, sand + soil, vermiculite) and different places (mist chamber, shade net, open beds) with different pre sowing treatments. Seed were presoaked in normal water for 12 hours and hot water for 12 hours. The results indicate that maximum 60 % seed germination was observed after normal water soaking for 12 hours with sand + soil (1:1) in mist chamber. The vegetative propagation was conducted with leading shoot cuttings of 2 year old seedlings originated from seed. Pretreated cuttings with different IBA treatments were planted in sand in mist chamber. The cuttings treated with IBA 5000 ppm, performed maximum 74 % rooting in comparison to other treatments. The IBA treatment with 4000 ppm and 6000 ppm reduced rooting percentage as 29 % and 72 % respectively.

Keyword: Seed sowing, vegetative propagation, IBA, habitat.

1. INTRODUCTION

Pyracantha crenulata M.Roem, syn. *Crataegus crenulata* Roxb. of Rosaceae family (locally known as Ghingharu) is an evergreen shrub which attains height up to 5 m and found in Kumaun Himalayas between 2000 ft to 7000 ft in chir and banj forest (Osmastan. A.E., 1927). It has a fairly wide distribution from Sutlej to Nepal 1600–2500 m (Brandis. D., 1921). *Pyracantha crenulata* is native to temperate Himalaya (Weber 2003). Flowering takes place in May and fruit ripe in July- Aug. The fruits are edible, rich in sugar and leaves are used to make herbal tea (Kunkel.G., 1984). The fruits are good source of food for wild animals viz., birds & Langur (Presbytis species) in rainy season. The wood is used for making walking sticks and fuel. Fruits have cardiotonic, coronary vasodilator and hypotensive properties. It has been used for cardiac failure, myocardial weakness, paroxysmal tachycardia, hypertension, arteriosclerosis and Burgor's disease (N.S. Chauhan: 1999). The ripe fruit is eaten fresh and the powder of dried fruit with yoghurt is used in the treatment of bloody dysentery (Manandhar. N. P., 2002). The plant makes an excellent hedge and it can be used as a good soil binder for stabilizing the degraded areas and slopes which are prone to land slide. It prefers good well-drained, moisture retentive loamy soil. It is successful on sunny aspects and avoids shady locations where fruit production is affected (Gamble, 1972). Plants maintain and expand their populations over time by the process of regeneration (Barnes et al. 1998). It is used in Ayurvedic medicines and commercially harvested from forest areas for different medicinal preparations viz., infusion of dried fruits, liquid extracts and tinctures. So it appears to be important to develop its propagation techniques and create awareness among the people besides its conservation.

2. Material and methodology

2.1 Description of experimental area

The experiment was conducted in the forest nursery of Research wing of forest department at Nainital, Uttarakhand from 2010 to 2013. The area is situated at N 29^0 22.751´ latitude and E 79^0 25.955´ longitude at an altitude of 1775 m. The climate of the area is temperate. Temperature ranging from 1^0 C to 30^0 C and receive 1800 mm annual rainfall. Frost occurs from December to February and snowfall occasionally occurs in the month of winter.

2.2 Experimental material and design

The cutting of leading shoots of *Pyracantha crenulata* were collected from healthy and vigorous seedlings of 2 years old originated from seeds. IBA (Indole Butaric Acid) concentration of 4000 ppm, 5000 ppm, 6000 ppm & control were used in this experiment. The cuttings of 7-10 cm were prepared and immediately treated with IBA 4000 ppm (400mg/100g Talc) and IBA 5000 ppm (500mg/100g Talc) IBA 6000 ppm (600mg/100g Talc). IBA concentration was prepared in Talcum powder. Both treated and untreated cuttings were tagged and planted in mist chamber in sand beds at 5 cm spacing. Humidity was maintained above 60 %, temperature 25^0c to 35^0c and fogging for one minute at 30 minutes interval. Experiment was consisted of 4 treatments and each treatment was replicated thrice with 30 cuttings per treatment. Three year data were analyzed and best results shown in table 1. The knowledge of exact stage of seed collection is of immense importance to avoid the collection of immature and non-viable seeds (R.L.Willian 1985). Pre-harvested, immature and non-viable seeds can cause nursery and plantation failure. The seeds of *Pyracantha crenulata* were collected from sadiatal, Nainital region of Uttarakhand state during July-August. Normally 240 seed weight was found in 1gm. The germination studies were conducted in mist chamber, shade house and open beds. The different mediums viz., sand, sand + soil (1:1) and soil were used for seed germination. Pre sowing water treatments and control treatment were applied for seed germination. The seeds were presoaked in normal water for 12 hours and hot water for 12 hours. 50 seeds were taken for per treatment per medium per replication. The seed germination data were analyzed and best result shown in table 2.

Table 1 : *Rooting and sprouting percentage of Pyracantha crenulata in different IBA ppm.*

Treatment	*Rooting (%)*	*Sprouting (%)*
MT1P	*39*	*49*
MT2P	*74*	*81*
MT3P	*72*	*72*
MCP3	*27*	*39*

M = Sand, T1 = IBA 4000 ppm, T2 = IBA 5000 ppm, T3 = IBA 6000 ppm, C = Control, P = Mist chamber

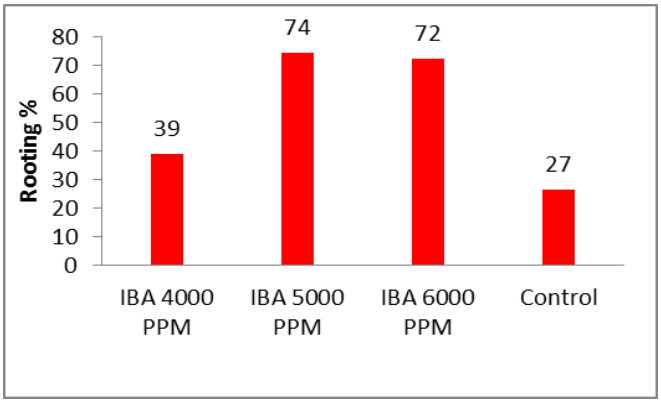

Fig. 1. *Effect of IBA concentration on rooting percentage.*

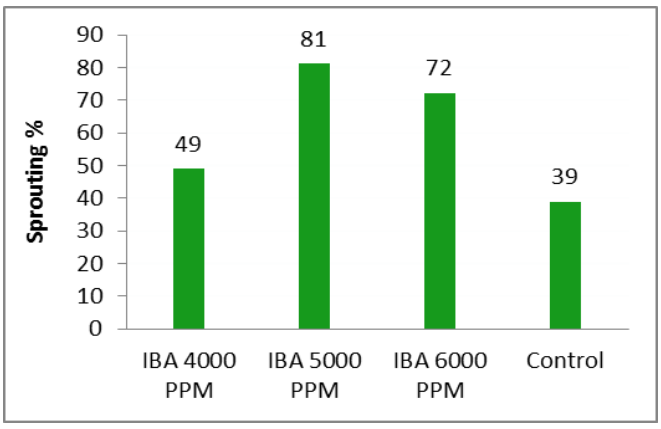

Fig. 2. *Effect of IBA concentration on sprouting percentage.*

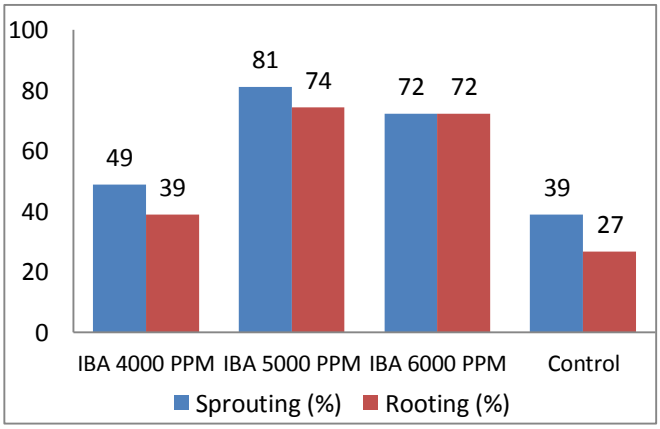

Fig. 3. *Comparison between rooting and sprouting % after IBA treatment*

Table 2 : *Germination percentage of Pyracantha crenulata in different pre sowing water treatments, different mediums and different places.*

Germination %			
Medium	**Mist chamber (P1)**	**Shade house (P2)**	**Open beds (P3)**
Treatment (T1) - Normal water soaking for 12 hours			
Sand (M1)	56.67	58	41.33
Sand+ Soil (M2)	60	35.33	43.33
Soil (M3)	46.67	40	33.33
Treatment (T2) Hot water soaking for 12 hours			
Sand (M1)	13.33	3.33	1.33
Sand + Soil (M2)	14	3.33	1.33
Soil (M3)	7.33	2	4
(C) Control			
Sand (M1)	40	34.67	15.33
Sand + Soil (M2)	38.67	33.33	13.33
Soil (M3)	24	30	21.33

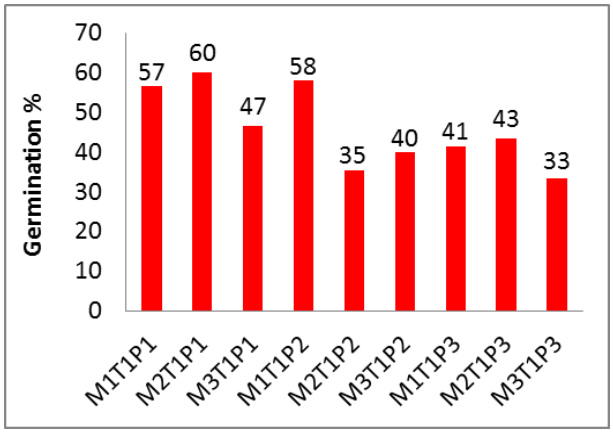

Fig. 4. *Effect of normal water soaking for 12 hours on seed germination in different mediums and different places.*

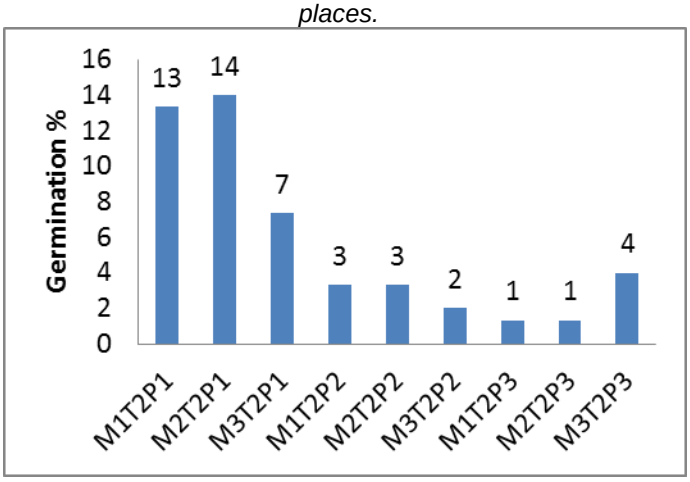

Fig. 5. *Effect of Hot water soaking for 12 hours on seed germination in different mediums and different places.*

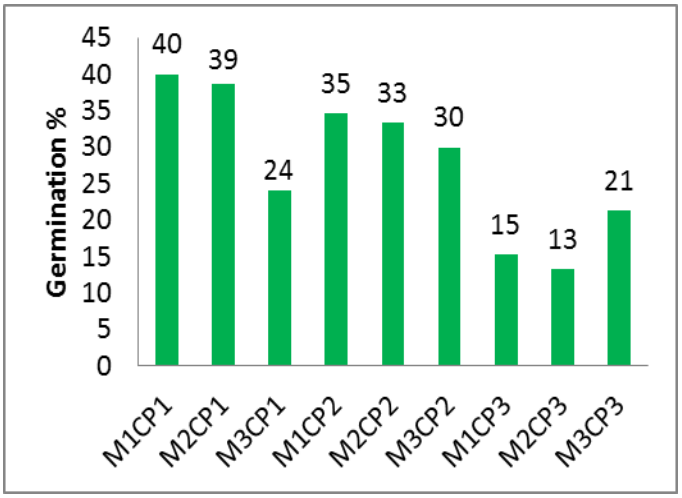

Fig. 6. *Control seed germination in different mediums & different places.*

3. Result and discussion

Development of nursery technique is a very important tool to raise desired genetic plants in a short period and fulfilling the aim of enhancing the desired population and species conservation. Cutting of 5 -10 cm mature wood with heal performed well in mid-August. (Sheat. W. G., 1948). Previous studies indicate that best seed germination was observed when seed sowing was done soon after ripening of seeds in cold atmosphere. Fruit flesh can inhibit seed germination (Huxley. A., 1992). Different IBA concentrations were studied to understand their effect in promoting sprouting and rooting percentage in *Pyracantha crenulata* in mist chamber in sand beds. The results in Table 1 clearly shows that cutting treated with IBA 5000 ppm produced maximum 74 % rooting followed by 72 % in IBA 6000 ppm and 27 % rooting in control treatment (Figure 1) while on the other hand maximum sprouting 81 % and minimum 39 % was observed in IBA 5000 ppm and control respectively (Figure 2). Present study showed that treatment enhancing IBA concentration above 5000 ppm causes reduction in rooting and sprouting percentage (Figure 3). The treatment of IBA 5000 ppm found to be the best for rooting in cuttings. Previous studies on seed germination indicate that seeds with hard seed coats requires pre-sowing treatments best seed germination are observed when seed sowing was done soon after seed ripening. Fruit pulp can inhibit the seed germination (A. Huxley, 1992). The germination of 68 % was reported in GA3 250 ppm concentration after 24 hrs of soaking under laboratory (S. C. Joshi et al., 2010). Seeds were collected soon after ripening; seeds pulp were removed immediately then dried in sunlight and sown in September. Pre sowing water treatments, mediums and places were studied to analyze the seed germination. The data in Table 2 indicate that maximum germination of 60 % was observed in mist chamber (P1) with sand + soil (M2) after normal water soaking for 12 hours (T1) followed by 58 % in shade house with sand (M1) after normal water soaking for 12 hours (T1) (Fig 4). Hot water soaking for 12 hours decreased the germination percentage (14 %) in sand + soil combination in mist chamber (Fig. 5). Control treatment was observed with 40 % germination in mist chamber (P1) with sand + soil (T2) (Figure 6). Seed results show that higher germination was observed in mist chamber after normal water soaking for 12 hours (T1) in sand + soil compare to other treatments. The overall results indicate that vegetative propagation though cutting has maximum artificial reproduction compare to seed germination. It needs more propagation through various techniques besides its conservation on the basis of above study. It can be recommenced that artificial regeneration through leading shoot cutting is the best for utmost result but it can take 3-6 months. As *Pyracantha crenulata* is commercially harvested from forest areas for different medicinal preparations.

References

[1] Osmaston, A.E., A Forest Flora for Kumaon, 1926.

[2] Brandis. D., Indian Trees: An account of trees, shrubs, woody climber, bamboos & palms, indigenous or commonly cultivated in the British Indian empire, constable & company, Ltd. London, pp-294, 1921.

[3] Weber, E., Invasive plant species of the world: a reference guide to environmental weeds. CABI Publishing, United Kingdom, pp. 352–3, 2003.

[4] Kunkel, G., Plants for Human Consumption. An excellent book with a brief list of edible parts, 1984.

[5] Chauhan, N.S., Medicinal and Aromatic plants of Himachal Pradesh M.L Gidwani, Indus publishing company FS-5, Tagore Garden, New Delhi, 1999.

[6] Manandhar, N. P., , Plants and People of Nepal, 2002.

[7] Gamble. J. S., A manual of Indian timbers: an account of the growth, distribution, and uses of the trees and shrubs of India and Ceylon, with descriptions of their wood-structure, Bishen Singh Mahendra Pal Singh publication, Dehra Dun, 1972.

[8] Barnes B.V., Zak D.R., Denton S.R. and Spurr S.H.. Forest Ecology, John Wiley and sons. Inc., New York, 1998.

[9] Willian.R..L., A guide to forest seed handling with special reference to the tropics. FAO Forestry Paper, 20/2. FAO, Rome, pp 379, 1985.

[10] Sheat. W. G., Propagation of Trees, Shrubs and Conifers. A good book on propagation techniques with specific details for a wide range of plants, 1948.

[11] Huxley. A., The New RHS Dictionary of Gardening, 1992.

Photoplate 1: *(A-B) Flowering and Fruiting in Pyracantha crenulata (C) Ripe fruits (D) Cleaned seed (E) Seed germination in mist chamber (F) Transplanted seedling in Root-trainers (G-H) Vegetative propagation.*