

Development and Standardization of Nursery Techniques of *Cotoneaster bacillaris* (Wall. Kurz ex Lindl) in Uttarakhand Himalaya

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ABSTRACT: *Cotoneaster bacillaris* is an important shrub of hill region which plays an important role in biodiversity conservation, providing food and shelter for wild animals, soil conservation & maintaining forest ecosystem. Study was carried out by seed sowing in different medium (humus + soil (1:1) & sand) in shade house. Seeds were treated viz., normal water soaking for 12 hours; normal water soaking for 12 hours and subsequently soaking in con. Sulphuric acid for 15 second and control. The result shows that seeds pre soaked in normal water for 12 hours and subsequently soaked in con. Sulphuric acid for 15 second had maximum 56% germination with humus + soil (1:1) in shade house. Vegetative propagation was conducted by leading shoot cuttings of 2 year old seedlings originated from seed which were treated with IBA 3000 ppm, Rootex and control. The data of cutting propagation indicate that cutting treated with Rootex powder produced maximum 69% rooting followed by 52% rooting in IBA 3000 ppm and control treatment reduced rooting percentage as 22 %.

KEYWORDS: Seed sowing, Vegetative propagation, IBA, Leading shoot, Conservation.

I. INTRODUCTION

Cotoneaster bacillaris of Rosaceae family is an erect deciduous shrub locally known as Ruins in Kumaun, Himalaya. It occurs between 900 to 2100m elevations, common in secondary growth forest near villages [1]. A very ornamental plant succeeds in full sun or semi-shade but does not fruit so freely in a shady position and tolerates atmospheric pollution. They are very attractive to bees whilst, the fruit is a good winter food source for many species of birds [2]. A rose tan dye is obtained from fruit [3]. The stolons are said to be astringent [4]. The branches are used for making walking sticks and agricultural implements [5]. The leaf paste with cow urine applied externally on scabies and rheumatic arthritis [6]. Leaf paste with cow's urine is applied externally in arthritis. Wood used for walking sticks, and made into articles viz 'Bangluda', 'Zangkta'. Leaves lopped for fodder and manure; bark yields fibre [7]. Shrub species play an important role in soil conservation as well as providing food and shelter for wild animal. The activity of modernization and anthropogenic pressure are drawing adverse effect on its population in nature. Thus there was a need to develop propagation techniques of *Cotoneaster bacillaris* for its nursery stock preparation, future plantation and conservation.

II. RELATED WORK

The cutting of half-ripe wood with a heel in July/August in a frame [8, 2]. Earlier studies of seed germination have showed that seed with hard seed coat requires pre-sowing treatments to germinate. The seed is best sown as soon as it is ripe in the autumn in a cold frame, when it will usually germinate in the spring. [8, 2]. Stored seed germinates faster if given 3 months warm stratification at 15^oc and then 3 months cold stratification at 4^oc. The seed usually germinates within 1-18 months at 15^oc but it can take 2 years [9].

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III. MATERIAL AND METHODOLOGY

Description of experimental area

The experiment was conducted in the forest nursery of Research wing of forest department at Nainital, Uttarakhand from 2011 to 2013. The area is situated at N 29° 22.751' latitude and E 79° 25.955' longitude at an altitude of 1775 m. The climate of the area is temperate. Temperature ranging from 1° C to 30° C and receive 1800 mm annual rainfall. Frost occurs from December to February and snowfall occasionally occurs in the month of winter.

Experimental material and design

The cutting of leading shoots of *Cotoneaster bacillaris* were collected from healthy and vigorous 2 years old seedlings originated from seeds in the months of July. IBA concentration of 3000 PPM, Rootex & control were used in this experiment. 7-10 cm long cuttings with 3 nodes were prepared and immediately treated with IBA 3000 PPM and Rootex, both treated and untreated cuttings were tagged and planted in mist-chamber in sand beds at 5 cm spacing. The humidity was maintained above 60 %, Temperature 25°C to 35 °C and fogging at 30 minutes interval. The experiment consists of 3 treatments and each treatment replicated thrice with 30 cuttings per treatment.

Seeds were collected from the Lohaghat region of Uttarakhand in the month of September, immediately seed pulp was removed from seeds and dried. 34 cleaned seeds were found in 1gm. cleaned and viable seed were sown in germination tray in different medium as sand, humus + soil (1:1) under shade house with pre-sowing treatments (normal water soaking for 12 hours, normal water soaking for 12 hours subsequently 15 second soaking in con. sulphuric acid) and control were applied to study the seed germination. Seed experiment consists of 6 treatments and each treatment replicated thrice with 100 seed per treatment.

IV. RESULT AND DISCUSSION

Propagation technique is required to raise nursery stock of threatened, rare, endangered and desired plants easily in a shorter time with the aim of plantation & conservation. The Indole 3-butyric acid (IBA) concentration, Rootex powder and control were studied in sand medium under mist chamber to analyse their effect in promoting sprouting and rooting percentage in *Cotoneaster bacillaris*. Result of vegetative propagation is given in Table 1.

Table 1. Effect of Rootex and IBA concentration on sprouting (%) and rooting (%) parameters in *Cotoneaster bacillaris* with sand under mist chamber.

Treatment	N0. of cuttings sprouted	Sprouting %	N0. of cuttings rooted	Rooting %
MT1P	72	80	62	69
MT2P	60	67	47	52
MCP	41	46	20	22

Acronym used: M= Sand, T1 = Rootex, T2 = IBA 3000 ppm, C= Control, P= Mist chamber

Results in Table 1 indicate that maximum 72 cuttings sprouted (80%) and 62 cuttings rooted (69%) in Rootex with sand in mist chamber (MT1P) followed by 60 cuttings sprouted (67%) and 47 cuttings Rooted (52%) in IBA 3000 ppm with sand in mist chamber (MT2P). Control was observed minimum 41 (46%) cuttings sprouted and 20 cuttings rooted (22%) with sand in mist chamber (MCP).

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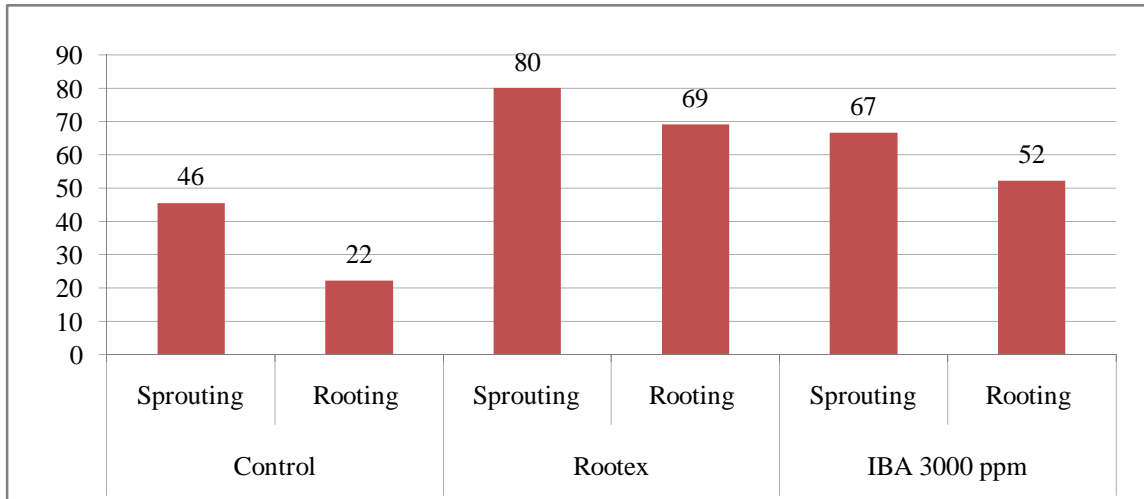


Figure 1: Effect of IBA ppm and Rootex on rooting and sprouting percentage.

Figure.1 clearly shows that cutting treated with Rootex powder was observed maximum 80% sprouting and 69% rooting followed by 67% sprouting and 52 % rooting in IBA 3000 ppm. On the other hand, control treatment was reduced sprouting and rooting percentage as 46% and 22% respectively.

The different pre-sowing treatment, medium and place were studied to analyse the seed germination. Result of seed germination is given in Table 2.

Table 2. Germination (%) of *Cotoneaster bacillaris* in different treatment and medium

Treatment	No. of seed germinated	Germination %
M1T1P	162	54
M1T2P	167	56
M1CP	98	33
M2T1P	156	52
M2T2P	162	54
M2CP	113	38

Acronym used: M1= Humus + Soil, M2= Sand, T1 = Normal water soaking for 12 hours, T2= 15 second soaking in con. Sulphuric acid after normal water soaking for 12 hours, C= Control. P= shade house

The seed sowing results indicate that Maximum 167 seed germinated (56%) in normal water soaking for 12 hours subsequently 15 second soaking in con. Sulphuric acid with humus +soil under shade house (M1T1P) followed by 162 seed germinated (54%) both in Normal water soaking for 12 hours with humus + soil under shade house (M1T1P) and in normal water soaking for 12 hours subsequently 15 second soaking in con. sulphuric acid with sand in mist chamber (M2T2P). Control treatment with humus + soil and control with sand were observed minimum no. of germinated seed as 98 (33%) & 113(38%) respectively.

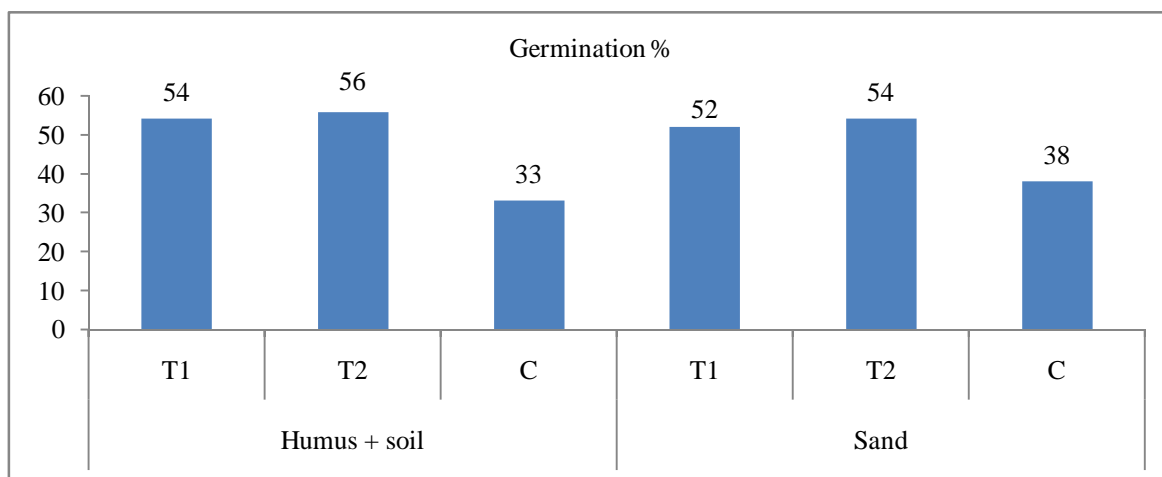


Figure 2: seed germination in shade house after pre sowing treatments and control.

Figure 2 indicate that seed pre treated in normal water for 12 hours subsequently 15 second soaking in con. sulphuric acid (T2) showed maximum 56 % germination with humus + soil (M1, Figure.2) followed by 54 % germination in normal water soaking for 12 hours (T1) with Humus + soil (M1, Table 2, Figure. 2). Seed pre treated in normal water for 12 hours subsequently 15 second soaking in concentrated sulphuric acid (T2) with sand (M2) also showed 54 % germination. On the other hand control treatment reduced seed germination as 38 % and 33 % in sand (M2) and Humus + soil (M1) respectively. (Figure.2)

V. CONCLUSION

In our study it was observed that leading shoot cutting of 2 year old seedlings originated from seed treated with Rootex showed maximum 69% rooting within 3-4 months while seed sowing experiment showed maximum 56 % germination within 2-3 months in shade house. On the basis of this study, it is established that *Cotoneaster bacillaris* shows better results when propagated through shoot cuttings taken from 2 year old seedlings originated from seed. This species needs more propagation through various techniques besides its conservation.



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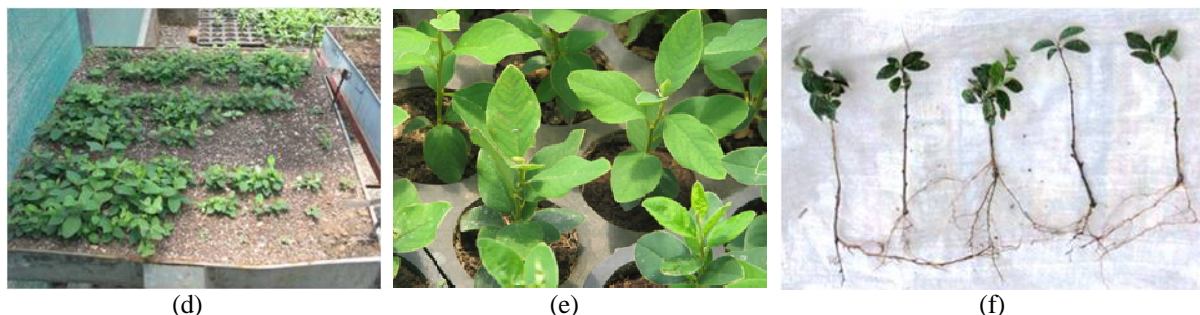


Fig. 3: (a)- Ripen seed, (b)- Cleaned seed, (c)- Germination in sand, (d)- Seed germination in sand + humus, (e)-Transplanting in root-trainers, (f) - Rooting in cuttings

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