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Community Trial on the Propagation and Conservation of *Taxus baccata* L.

Kamal Maden
Department of Botany, P. G. Campus, Biratnagar
Email:Kamalmaden@yahoo.com

Abstract

This article deals with the propagation of endangered but economically valuable gymnospermic plant species, *Taxus baccata* L. Taxol; an antitumor agent is prepared from the extracted material, both leaves and stem resin of it. Vegetative propagation was done by cuttings. The twigs were taken in Madimulkhark of Sankhuwasabha district and put in the bed for rooting without any chemical treatments. Independent experiments were conducted in two seasons i.e, February-March and May-June. The latter season was found suitable for emergence of young twigs.

Keywords: Taxol, Gymnosperms, Propagation, Conservation

Introduction

Any contribution to restore the population of threatened species is a milestone to conserve valuable species for human benefits. Proper propagation technique for threatened species could be a contribution in this regard. Consequently, such techniques help conserving a particular genotype, either through gametic and somatic means. Community people may propagate these plants by using any of these techniques in the natural habitat of threatened species without chemical treatment like phyto-hormones. Cutting is a very common and popular method of propagation. But external and internal factors like season, light, presence of leaves and internal tissue organization determine the formation of roots in stem cuttings. Such cuttings continue to produce flowers and fruits within 1-2 year's of plantation in the field (Carter and Paudayal 1987).

The present study has been undertaken to propagate one of commercially valuable gymnosperm *Taxus baccata* L., commonly called as Himalayan Yew and locally *'Lauth Sallo'*. Ethanol extract of its leaves is heavily exported for manufacturing cancer curing chemical called *taxol*. Taxol is thought to be a potential chemotherapeutic anticancer drug. Annually, in eastern region of Nepal middlemen buy huge quantity of fleshy leaves and small twigs at the rate of Rs 10 per kg from the community and national forests, and semi dried leaves and twigs normally at higher price as Rs. 30 per kg (Maden 2002a). A medium size tree normally gives a harvest of two quintals of fleshy leaves worth providing Rs. 2,000 net without tree felling. The leaves are pruned from September to April. Earlier, villagers used to cut down the trees for leaves but these days they cut only the small branches. It is estimated, from a single district Sankhuwasabha, trader's exported semi dried leaves around hundred tonnes this year (Maden 2002b). In harsh and chill weather *Taxus* normally has lower rate seed germination. Excessive collection of *Taxus* leaves through tree felling is an undesirable practice, which if continued would impact on the loss of *Taxus* from its habitat. To address this situation alternative means is the plantation to restore the habitat of *Taxus*. Taxus cultivation through

seed dispersal or seed sowing is not easy because seed collection is often difficult and germination normally takes time due to longer dormancy period, nonviable seeds and eating of seeds by birds (Chang and Yang 1996, Bista 1997, Pant and Joshi 1999).

Taxus baccata is included in the Appendix II of the CITES (IUCN 1995). CITES is designated to establish a system, which monitors the trade of the species that are at the verge of extinction. Though Nepal is a member of CITES, government has allowed exporting its leaves, and recently a few industries have started to export ethanol extract in huge quantity for taxol. It is a novel natural anticancer agent (Mitchell 1997) and is said that one gram of taxol costs US$ 600 in USA, and 2 gm is needed to cure breast cancer (Pant and Joshi 1999). It has been approved by FDA clinical treatment of ovarian and breast cancer in 1983 and also has significant activity in the treatment of patients with melanoma and other solid tumors (Wickremsinhe and Arteca 1993). The tree is scarce that hardly makes a normal supply to meet demands for taxol. Scientists are studying the feasibility of cultivating the trees to harvest the drug from the bark as well as the possibility of extracting the drug from the branches and needles. A partially synthetic form of the drug is also under development.

Materials and Methods

The twigs of *Taxus* were taken from the forest of Madimulkhark VDC (2,550 m) of Sankhuwasabha district. The diameters as well as length of the cuttings were taken 1.5 to 2.0 and 6.0 to 8.0 inches from old trees with and without leaves during February- March and May- June of 2001. These cutting were planted in the locally prepared beds (30 × 40 square inch) in a slanting (45degrees) position, without using any chemical treatments in Chauki (2680m) of Madimulkhark. Each cutting was provided roughly 16 square inch space. The bed was loosely covered by twigs of other plants above 6 feet and made moistening by spraying water when became dried. The roots were observed each two months. Weeds were removed time to time.

Results and Discussion

The two third of the cuttings planted during February and March died without giving any sign of shooting and rooting. Ninety percent of twigs gave the roots that were placed in the bed during May- June. The cutting of young twigs with a few leaves could provide good results. The roots normally appeared in six to eight months. A few cuttings could give roots after one year. A cutting without leaves hardly survived and rooted poorly. Shaded side slanting cuttings seem good to give expected results (Tables 1, 2, 3 and 4).

Auxin is necessary for the formation of roots in stem cuttings (Philips 1971). But the young twigs of *Taxus baccata*, like other vegetative propagating plants, can produce roots without any chemical treatments in the suitable environment where it grows naturally. The leaves and buds present in cuttings supply necessary root promoting substances (Hartmann *et al.* 1981, Nada and Kochhar 1995, Pant and Joshi 1999) probably by performing photosynthesis during propagation (Mesen *et al.* 1997, Pant and Joshi 1999). But too many leaves give negative effect because of higher transpiration rate and water deficiency that cause leaf shedding (Aminah *et al.* 1997). The community people easily can propagate *Taxus baccata* in its habitat without any high-tech but simple propagation through stem cuttings. This process, in upper temperate region, would contribute to conserve this threatened plant though it is slow growing species.

Table 1. Cuttings without leaves planted in Feb-Mar

No of Cuttings	Duration	Survived	Died
70	Ist 3 months	31	39
31	2nd 3 months	25	6
25	3rd 3 months	24	1
24	4th 3 months	24	0

Table 2. Cuttings with leaves planted in Feb-Mar

No of Cuttings	Duration	Survived	Died
70	Ist 3 months	29	41
29	2nd 3 months	26	3
26	3rd 3 months	23	3
23	4th 3 months	22	1

Table 3. Cuttings without leaves planted in May-June

No of Cuttings	Duration	Survived	Died
70	Ist 3 months	67	3
67	2nd 3 months	65	2
65	3rd 3 months	63	2
63	4th 3 months	63	0

Table 4. Cuttings without leaves planted in May-June

No of Cuttings	Duration	Survived	Died
70	Ist 3 months	68	2
68	2nd 3 months	66	2
66	3rd 3 months	65	1
65	4th 3 months	65	0

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