

## **Effect of Container Type and Potting Media on Biochemical and Nutrient Composition of *Cedrus deodara* Seedlings**

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### **Abstract**

The present study was carried out during 2002-2004 with three container types viz. root trainer 150 cc, root trainer 275 cc and polybags 160 cc and eight potting mixtures in different combinations to assess their effect on the bio-chemical and nutrient composition of *Cedrus deodara* seedlings. The study revealed that root trainer 275 cc raised seedlings exhibited maximum bio-chemical and nutrient contents as compared to the seedlings raised in the other containers. Among different potting media, Soil : Moss : FYM in the ratio 2 : 1 : 1 and Soil : Sand : FYM in the ratio 1 : 1 : 3, showed better bio-chemical and nutrient composition which resulted in the better growth of seedlings in the nursery.

**Key words :** *Cedrus deodara*, Root trainers, Potting media, Biochemical and nutrient composition.

The Himalaya is a home of conifers and constitutes one of the most divergent and economically important group of species, the most prominent being deodar (*Cedrus deodara*). Deodar is found throughout the Western Himalaya from Afghanistan to Garhwal at elevation ranging from 1,200 to 3,050 m, being most common from 1,800 to 2,600 m. Deodar is found gregariously in areas receiving 1,000 to 1,800 mm annual rainfall mainly from July to September with snow from December to March. It is a tree of temperate climate and mountainous country with ample snowfall. The species is widely distributed in the Western Himalayan states of Jammu & Kashmir, Himachal Pradesh and Uttranchal. At present the deodar forests are being harvested to meet the sharply increasing demands for their wood for timber, packing cases besides being a source of raw material for a number of wood based industries, these forests play a very important role in soil and water conservation in the Himalayas. The regeneration of these forests, however, is not keeping pace with the removals and this problem has resulted in the depletion of the growing stock over large areas. Presently, the seedlings are raised in perforated polybags. The main disadvantage of polybags has been root coiling and water logging at times, leading to poor field survival and growth. Modern plastic containers or root trainers are now used to raise nursery stock to overcome the

demerits inherent with traditional containers including polybags. Root trainers offer many advantages i.e. develop fibrous root system, quicker seedling production, avoid root coiling, low seedling mortality on field planting, require less space and potting media (Tinus 1992).

The primary requirement of growing seedlings in root trainers is potting media or growing media. Potting media which has high water and nutrient holding capacity, easily available, good porosity should be used for raising seedlings in root trainers (Landis 1990). Production of healthy and vigorous nursery forms an important pre-requisite for raising of successful plantations. The biochemical and nutrient composition of seedlings are mainly responsible for vigorous vegetative growth. Therefore, the present study was under taken to see the effect of container type and potting media on biochemical and nutrient composition of *Cedrus deodara* seedlings in nursery.

### **Methods**

The present study was carried out at Department of Silviculture and Agroforestry, Dr Y. S. Parmar University of Horticulture and Forestry, Solan (Himachal Pradesh) during 2002-2004. The area is situated at an altitude of about 1,500 m amsl (33°55' latitude, 77°09' longitude). The study area falls in the moist

sub-temperate zone which experiences 1,000 to 1,300 mm precipitation annually. Three container types and eight potting mixture in different combinations were tried. The seeds were sown in the containers with different potting mixtures in December 2002. The outline of treatments are given as follows. Container Types— $C_1$ : Root trainer (150cc),  $C_2$ : Root trainer (275cc),  $C_3$ : Perforated polybags (160cc). Potting Mixture— $M_1$ : Forest soil,  $M_2$ : Soil : Sand : FYM (1 : 1 : 1),  $M_3$ : Soil : Sand : FYM (1 : 2 : 2),  $M_4$ : Soil : Sand : FYM (1 : 1 : 3),  $M_5$ : Soil : Sand : Moss (1 : 1 : 1),  $M_6$ : Soil : Moss : FYM (2 : 1 : 1),  $M_7$ : Soil : Sand : Compost (1 : 2 : 3),  $M_8$ : Soil : Sand : Compost : FYM (1 : 1 : 1 : 1).

Forest soil was collected from deodar forest. The compost consists of decomposed farm yard manure (FYM), sand and forest soil were sieved with ordinary nursery meshes to remove un decomposed twigs, leaves and other foreign matter. Moss were ground in the grinder. All the materials were collected locally. After completion of one growing season, the seedlings were extracted and tested for biochemical and nutrient composition. Total sugars and starch content were estimated by Phenol-sulfuric acid method given by Dubios et al. (1951). Soluble proteins were estimated by the method prescribed by Lowry et al. (1951). Nitrogen was estimated by K Jeltec Auto Analyzer. Phosphorus content was determined colorimetrically by Vandate-molybdate yellow color method (Jackson 1973). Potassium, calcium and magnesium were estimated by atomic absorption spectrophotometer. The data generated were statistically analyzed in accordance with the procedure outlined by Gomez and Gomez (1984).

### Results and Discussion

The effect of container type and potting mixture

on the biochemical and nutrient composition of *Cedrus deodara* seedlings is presented in Tables 1 and 2.

Container type significantly affected the biochemical and nutrient content of the seedlings. Table 1 shows that seedlings raised in root trainer of size 275cc recorded maximum (4.17%) starch content and the minimum (3.45%) was observed in seedlings raised in polybags of size 160cc. Similar trend was observed in other biochemical constituents viz. total sugars and soluble proteins. The maximum total sugars (2.40%) and soluble proteins (4.22%) were recorded in seedlings raised in root 275cc. Nutrient content also showed significant difference raised in different container types. The maximum nitrogen (1.70%), phosphorus (0.47%) and potassium (2.45%) content were found in seedlings raised in root trainer 275cc and minimum values were recorded in seedlings raised in polybags of 160cc. Similarly maximum calcium (0.70%) and magnesium (0.58%) were observed in seedlings raised in root trainer 275cc.

The potting media also significantly affected the biochemical and nutrient contents of the seedlings (Table 2). Table 2 reveals that maximum starch (4.16%) was recorded in seedlings raised in the potting mixture of soil : moss : FYM ( $M_6$ ) in the ratio 2 : 1 : 1 which was statistically at par with (4.14%) in seedling raised in potting mixture of soil : sand : FYM ( $M_4$ ) in the ratio 1 : 1 : 3. Maximum total sugar (2.36%) was exhibited in seedlings raised in potting mixture of soil : moss : FYM ( $M_6$ ) in the ratio 2 : 1 : 1 which was statistically at par with potting mixture of  $M_4$  and  $M_8$  respectively. Soluble proteins also showed the similar trend with maximum of 4.55% in potting mixture of soil : moss : FYM ( $M_6$ ) in the ratio 2 : 1 : 1. The nutrient contents also exhibited the similar trend. The maximum nitrogen (1.60%) was recorded in  $M_4$  and  $M_6$  potting media. Maximum phosphorus (0.43%) was recorded in

**Table 1.** Effect of container type on biochemical and nutrient composition of seedlings.

Container type	Starch (%)	Total sugars (%)	Soluble proteins (%)	N (%)	P (%)	K (%)	Ca (%)	Mg (%)
$C_1$	3.76	2.20	3.96	1.47	0.34	2.12	0.53	0.50
$C_2$	4.17	2.40	4.22	1.70	0.47	2.45	0.70	0.58
$C_3$	3.45	2.04	3.54	1.41	0.28	1.62	0.44	0.40
CD 0.05	0.04	0.05	0.05	0.04	0.01	0.04	0.04	0.03

**Table 2.** Effect of potting media on biochemical and nutrient composition of seedlings.

Potting media	Starch (%)	Total sugars (%)	Soluble proteins (%)	N (%)	P (%)	K (%)	Ca (%)	Mg (%)
M <sub>1</sub>	3.43	2.11	3.64	1.40	0.25	1.75	0.35	0.43
M <sub>2</sub>	3.51	2.17	3.72	1.42	0.32	1.75	0.56	0.50
M <sub>3</sub>	3.66	2.13	4.13	1.49	0.34	1.90	0.59	0.53
M <sub>4</sub>	4.14	2.29	4.45	1.60	0.41	2.30	0.64	0.53
M <sub>5</sub>	3.95	2.11	3.65	1.41	0.32	2.04	0.54	0.48
M <sub>6</sub>	4.16	2.36	4.55	1.60	0.38	2.38	0.65	0.58
M <sub>7</sub>	3.35	2.21	3.84	1.44	0.38	2.12	0.53	0.14
M <sub>8</sub>	4.0	2.30	3.92	1.53	0.43	2.31	0.58	0.50
CD 0.05	0.06	0.07	0.08	0.06	0.04	0.06	0.03	0.03

M<sub>8</sub> potting mixture which was statistically at par with M<sub>4</sub> potting mixture respectively. Maximum potassium (2.38%), calcium (0.65%) and magnesium (0.58%) were also recorded in seedlings raised in potting mixture of soil : moss : FYM (M<sub>6</sub>) in the 2 : 1 : 1. The minimum nutrient contents were observed in forest soil (M<sub>1</sub>) only.

The biochemical and nutrient contents of root trainer 275cc raised seedling were more as compared to the seedlings raised in other containers. This may be due to their fibrous root system which enabled the seedlings to absorb water and nutrients from the soil more efficiently, ultimately leading to better growth (Benson and Shepherd 1977). The better nutrient and biochemical contents of seedlings in potting mixtures of soil : moss : FYM (M<sub>6</sub>) and soil : sand : FYM (M<sub>4</sub>) may be due to availability of more nutrients to the plant which resulted in better growth of seedlings in the nursery. The results are in harmony with the findings of Bhardwaj et al. (1986) for *Pinus roxburghii*, Pyarelal and Karnataka (1993) for *Quercus leucotrichophora* and Singh et al. (1997) for *Dalbergia sissoo*, *Acacia nilotica*, *Albezia lebbek* and *Prosopis cineraria*.

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