## BIBLIOGRAPHY

1 McMillan-Browse, P D A 1979 Hardy Woody Plants from Seeds Grower Books London

2 Garner, R J 1979 The Grafter's Handbook Oxford University Press, New York

3 Hartmann, H T and Kester, D E 1975 Plant Propagation Principles and Practices, 3rd ed , Prentice-Hall Inc , Englewood Cliffs, New Jersey

4 Nelson, Paul V 1978 Greenhouse Operation and Management Reston Publishing Co , Inc Reston

5 Wells, James S 1955 Plant Propagation Practices Macmillan Publishing Co , Inc , New York

6 Wright, R C M 1975 The Complete Handbook of Plant Propagation Macmillan Publishing Co Inc , New York


## PRODUCTION OF CONIFER SEEDLINGS


HANS HESS

*Hess' Nurseries, Inc*
*Cedarville, New Jersey 08311*


There are many different things to consider in the production of evergreens from seed. I believe one of the more important is the source of the seed you buy For example, Douglas fir seed from the Rocky Mountain area of Colorado is hardy and has a medium growth rate. Seed of the same species coming from Oregon and Washington at elevations of 500 to 600 feet is much less hardy and has a far more rapid growth rate

*Juniperus virginiana* from mid western sources will be crossed with *Juniper scopulorum* and will not resemble the true eastern red cedar. White pine is available from New York the lake states and the south, for planting in northern areas New York and lake states seed is the most desirable.

A seedling business that is going to be successful should provide a continuing supply of seed selections each year. This can be a problem if you buy seed on a year to year basis and there is a no crop situation on one or more plants. To prevent this problem a grower should provide himself with some sort of refrigerated storage, then he can keep a year's supply of seed on hand to prevent shortages. Conifer seed in dry refrigerated storage of 34°F will retain its viability for several years.

Soil type is a very important consideration in conifer production. A well drained, light sandy loam soil is best for most conifers. This soil type provides for rapid drainage during wet periods and encourages the development of a more fibrous root system, an essential for survival when transplanting.

Preparation of the seed bed area must receive careful attention Sufficient land should be available to allow for a two year cover crop, three years is even better. A good permanent grass can be used or, a rotation of Sudan grass in summer and a rye grass for winter These should be fertilized and limed if necessary for a pH of 5 5 to 6, since most conifers prefer a somewhat acid soil. The area to be seeded should be plowed in August to permit the cover crop to break down somewhat. Disc as needed and then fumigate with methyl bromide or other soil fumigants to eliminate nematodes and as many weed seeds as possible When methyl bromide is used the material is injected at about 8 to 10 inches and covered with plastic. This remains in place for 72 hours before being removed When the plastic cover has been removed the ground should be cultivated to allow the remaining gas to escape. After 10 to 14 days the area is safe for planting.

We use a raised bed for planting and to get this a bed maker is used. This has two disks which throw soil to the middle which is leveled by two angled planks and a mica harrow. The resulting bed is 42 inches wide with a three foot path between the beds

The seeding at our nursery is a hand operation. The seed is broadcast by hand, one person on each side of the bed. We have purchased a seeder and, are experimenting with this and hope to have it working satisfactorily in the near future. After a bed has been seeded it is rolled to press the seeds into the soil. After this is completed a sanding machine spreads an even layer of sand on top of the bed about ½ inch deep for most cultivars. We put a marsh grass known as salt hay on top of the sand and hold this in place with erosion cloth pinned down with 6-inch staples. This prevents the erosion of the beds from heavy rains. Seeding is done in late October and early November. Although you can also get good results planting early March on most cultivars.

Birds, especially the wrens and sparrows, are very fond of pine and spruce seed and will destroy the entire crop as it germinates and the seed is still on the cotyledons. They pull the seed and the cotyledons off leaving just the stem. To prevent this problem we coat the seed with a very thin layer of linseed oil and then apply powdered red lead prior to planting and not one seedling is touched.

Seed germination takes place in our areas (which is zone 7) during March and April. Seeds of *Cedrus deodara* and other *Cedrus* species and cultivars are first to germinate, usually about March 10th to March 15th. Pine and spruce seed germinates in late March and April, and *Taxus* germinates usually in late April and early May.

As soon as germination begins the erosion cloth and salt hay are removed. Evergreen seedlings need shade to prevent damage from the sun and we immediately punch 2×2 pointed stakes on the outside of the bed on top of which we stretch wire held on the stake by a staple, and the wire is drawn tight on each end and the lath shading rolled out on top.

Our soil being a light sandy loam requires plenty of water and fertilizer for good growth. Irrigation mains are put in place soon after germination and remain for the entire season. We apply, if there is no rain, 1½ inches of water per week and 200 lbs of 20-10-10 fertilizer per acre every two weeks. The fertilizer is applied by plane since a tractor can not go over the lath shading. Fertilizing is shut down by mid August so that the plants can harden for winter. In mid-September we remove the shading from the seedlings except for a few cultivars which need the shade for winter proteciton. These would include *Cedrus* and fir species.

The growth response is quite good. *Taxus* and hemlocks are 2-4 inches in height, most pines 3-6 inches, *Platycladus orientalis* (Syn.: *Thuja orientalis*), 6-8 inches and, *Cedrus deodara*, 8-12 inches. We sell the *Cedrus deodara* as one year plants. Many of them are of sufficient caliper to be used as grafting understock A few pines are also sold as one year plants for potting to prepare for spring field planting.

The majority of the evergreen cultivars are not ready for sale until the end of their second year. During the second year we use a combination of 20-10-10 and Osmocote 14-14-14, a slow release fertilizer. This combination is applied every 3 weeks during the growing season. The first application is applied in March and the last in mid-August. Water is applied at the same rate of 1½ inches per week during the growing season. Our two year seedlings are of good caliper and height. *Abies concolor* 6-10 in, Douglas fir 10-15 in, *Pinus strobus* 6-8 in, Japanese black pine 10-15 in, *Taxus cuspidata* (Syn.: *T capitata*), 6-8 in and, *Tsuga canadensis* 8-12 in.

## WOODY TREE AND SHRUB SEEDLING PRODUCTION

WAYNE LOVELACE
*Forrest Keeling Nursery*
*Elsberry, Missouri 63343*

Production of tree and shrub seedlings in open field beds presents many management factors not present in more controlled seedling production programs such as greenhouses, coldframes, and other protected structures. It represents one of