

## REDWOODS - HOW TO GROW THEM IN CONTAINERS

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Redwoods characteristically produce some seed each year with some areas being good producers most every year while others with apparently the same conditions very rarely produce any seed, possibly for either genetic, climatic, or nutritional reasons.

Seed is gathered by climbing the trees *when* cones are ripe, or with luck, finding an area where squirrels are doing the hard labor.

Seed size varies from 59 to 300 M/pound with an average of about 120 M.

Viability of seed we have used has varied from a high of 65% to a low of 8%, normal seems to be about 15-20%. Stratification of seed seems to do little good and in general is not practiced.

*The* planting mix used in containerized planting most often seems to be vermiculite-peat of about 50% each, but other mixes have been tried with little if any change in results.

Seeding can begin about February 15 with germination starting in 2 weeks, without heat, with completion of germination in 6 weeks after seeding. Earlier planting, without heat, results in *too* long a germination period while later seeding requires too much nutrient to get a plantable tree by hardening off time in fall. Later seeding is possible if heat is available to speed up the germination. The early seeding is advantageous because then it is not necessary to crowd the trees to get the required growth prior to hardening off time.

Thinning starts, depending on weather, from six weeks to two months after seeding, when the new seedlings are about 1 1/2" high and lateral roots are small and scarce. Transplanting to restock plugs that did not have a germinant can easily be done at this time with a success of about 80%+. These transplants seem to be smaller than the average but at the end of the season a five to eight inch seedling with good caliper should result.

Clipping of seedlings may be necessary if they grow much taller than 1 1/2 inches and *the* root system becomes correspondingly more massive.

Growth control of seedlings is possible, as with other conifers, by changing or altering the fertilizers applied to the plants.

All fertilizers are soluble and are introduced into the irrigation water by *some* sort of a metering device. Redwood seems to do best if, after the seed coat drops off, the following nutrient solutions are added:

1. High nitrogen plus low phosphorus and potassium for about six weeks.
2. Low nitrogen, high phosphorus and low potassium alternated with the high nitrogen low phosphorus and potassium for about two months.

3. Low nitrogen, high phosphorus and potassium fertilizer with occasional fertilizing of the previously mentioned nutrient solutions comprise the third or hardening off stage.

Feeding with calcium nitrate and chelated iron, plus micro nutrients, about monthly, seem to be necessary for vigorous growth. Ammonium sulphate or ammonium nitrate may be beneficial during the growing months but only if the plants seem to be lagging.

Too much high phosphoric acid fertilizer during the middle of the growing season will cause the roots to grow too much and removing the seedlings from the container can be a problem at planting time.

#### Disease Control:

During the first two months, while the star of the newly emerged germinate is still succulent, diseases such as the root rots and damping off have been effectively controlled by applications of Dexon and Truban.

During the latter part of the growing season when the crowns of the seedlings have closed and the weather is still warm with cool evenings, Botrytis or grey mould generally attacks - especially right after a rain. This mould is present in the decaying material in the surrounding forest areas and attacks the growing, succulent, moist growing areas of the seedlings.

We have successfully resisted heavy losses since the first year of operation by controlling those factors that we can:

- I. If the seedlings are dormant and fully hardened off the disease doesn't have much effect.

If the seedlings are dry at the end of the day there is less chance that any infection will occur.

If the plants are actively growing and succulent, weekly applications of the following four different fungicides have prevented losses. Manufacturer recommended doses were applied.

1. Botran 75W
2. Daconil 2787
3. Dithane M45
4. Benlate (Benomyl fungicide)

These were recommended by pathologists Art McCain of U.C. Extension and Dick Smith, U.S.F.S. Of the above, Benlate seems to be the least effective because some strains of Botrytis have developed which effectively resist this fungicide.

Research into control of Botrytis has been carried out by Drs. Art McCain, Paul Smith of U.C. Extension and Mike Srago of U.S.F.S. at Simpson Timber Company nursery. This research was under laboratory conditions and will be repeated under regular greenhouse conditions to test the effectiveness of several apparently effective candidate fungicides.

To summarize: Redwoods have been and are now being grown successfully with the help of soluble fertilizers to control growth, so a plantable seedling will be produced in about 8 months.

Because the plants are in an unnaturally dense environment, various fungicides are necessary as well as constant examination and observation during the eight month period from seed to outplanting. This generally results in a vigorous, healthy seedling of good size.

Field plantings throughout the redwood region have resulted in survival from a low of 73% during 1977 to a high of 98%, while the plantings near the coast and on north and east exposures have been the most successful.