## LITERATURE CITED

1. Bryan, W.C. and P.D. Kormanik. 1977. Mycorrhizae benefit survival and growth of sweet gum seedlings in the nursery. *South J. Appl. For.* 1:21:23.
2. Dangerfield, J.A. 1975. Mycorrhizae plant relationships. *Proc. Inter. Plant Prop. Soc.* 25:104-111.
3. Hoagland, D.R. and D.I. Arnon. 1950. The water-culture method for growing plants without soil. *Calif. Agr. Exp. Sta. Circ.* 347. 32pp.
4. Maronek, D.M. 1977. Mycorrhizae and plant growth. *Proc. Int. Plant Prop. Soc.* 27:382-389.
5. Marx, D. and W.C. Bryan. 1975. Growth and ectomycorrhizal development of loblolly pine seedlings in fumigated soil infested *Pisolithus tinctorius*. *For. Sci.* 21:245-254.


BRUCE BRIGGS: We know that with high fertility it is hard to get a mycorrhizal infection. You appear not to have had this problem. Do you think it is related to your use of encapsulated fertilizer?

DALE MARONEK: You are right about high fertilizer levels inhibiting mycorrhizal establishment. We are presently examining the influence of encapsulated fertilizers on mycorrhizal infection. You may be right that the slow release types are not inhibiting.

MIKE DIRR: Can you compensate for the lack of growth in your pines, which looks like phosphorus deficiency, by adding additional phosphorus?

DALE MARONEK: In some cases, yes and in other cases, no.

MIKE DIRR: How host specific are the mycorrhizal fungi?

DALE MARONEK: Some are very broad and others are quite species specific.

## ROOTING *TAXUS* CUTTINGS WITH NO HEAT


EVERETT VAN HOF

*Van Hof Nurseries, Inc.*
*Portsmouth, Rhode Island 02871*


We first started propagating *Taxus* with no heat in the 1950's, but like all nurserymen, we had to build a greenhouse to root our *Taxus* cuttings. This gave us something to worry about in the winter — the snow, cold, wind, and filling the oil tank. Three years ago we returned to our original method for two reasons: the rising cost of fuel, and expanding our production would mean another greenhouse.

## PREPARATION AND PROCEDURES

The propagation frame is constructed so that it is 12 in. high on one side and 8 in. on the other. Three inches of sand is spread on the ground and tilled in to provide good drainage and aeration.

Cuttings are taken in mid-September because this allows them to callus before the weather becomes too cold. Thin cuttings from 2 yr bedded plants are best. A hormone treatment was not used until the fall of 1977 when some of the poorer rooting *Taxus* cultivars, such as *T.* × *media* 'Brownii' and *T. cuspidata* 'Nigra', were shown to produce better rooting percentages with the hormone. This fall we have, therefore, switched over to using Hormex 45 on cuttings of all *Taxus* cultivars except *T. cuspidata* 'Densiformis' which roots with 98% success. The cuttings are spaced using 1×2 in. furring strips between the lines and 1½ in. on the line.

After sticking, the cuttings are well watered and covered with sash and 50% lath shade. A shading compound is applied in May. The frame is aired about the first week of August for 10 to 14 days, after which the sash is removed and cuttings are covered with lath shade.

The cuttings are lifted about the first week of September, bedded out, mulched and covered with lath shade. New root growth is evident in 2 to 3 weeks.

We are also now using a deep, double frame. Twelve inches of sand was used in this frame. Cuttings root equally well in sand or soil. Sand, however, needs closer attention than the soil frame, as it dries out faster. The sand frame needs watering twice during the winter.

## SUMMARY

There are several reasons why we like taking cuttings in the fall of the year:

1. No fuel means low cost.
2. Aids in getting our spring planting done on time.
3. Cuttings planted in the fall put on good growth the first year.
4. September is much warmer for taking the cuttings than is December.

RAY MALEIKE: The cuttings were essentially 1 year old and then they were put out in a lath frame?

EVERETT VAN HOF: No, the cuttings were taken about

mid-September and they stayed in the frame for 1 year, after which they go directly to the field.

TOM McCLOUD: Was it just straight top soil that you used?

EVERETT VAN HOF: Yes, but we mix 3 inches of sand into the top soil.

TOM McCLOUD: Do you fumigate the medium or use any fungicides before you close the frames?

EVERETT VAN HOF: No.

VOICE: This method also works for junipers and spruce.

HANS HESS: Do you have sash bars for support or do you just butt them?

EVERETT VAN HOF: Just butt them against each other.

## OIL SAVINGS IN PITHOUSE ROOTING OF RHODODENDRON AND LAUREL CUTTINGS

ADRIAN J. KNUTTEL

*Knuttel Nurseries*
*Warehouse Point, Connecticut 06088*

Five years ago, when the price of heating oil was only 17.9 cents per gal., fuel costs were not a major consideration in designing propagation facilities. Now that the cost of oil is almost 50 cents per gal., and is expected to go much higher, it seems appropriate to optimize designs for fuel economy. At our nursery, we have had good results with a pithouse. Ours is an H-shaped building constructed of cement blocks at a cost of approximately $9000. The legs of the H are 96 × 11 ft. and 16 ft. apart. The connector between the legs is 12×16 ft. The walls of the connector and the inner walls of the legs are 7½ ft. high, and the outer walls are 6 ft. high. Soil is backfilled to about 10 in. from the top of the walls. The rafters are 2×6 spruce 3 ft. on center. There are 3 layers of plastic on the roof. We have 0.004 clear plastić on the underside of the rafters, 0.006 "602" on top cleated with 2×3's, and another layer of 0.006 "602" over the 2×3's. The connector contains a propagation work table, two oil heaters, and a wood stove for emergency heating. The oil heaters are 140,000 BTU hot air counter-flow furnaces with a one gallon per hour nozzle, and distribute heat by air ducts under the benches. The benches are 4 ft. wide with wire mesh bottoms and they are placed against the walls with a 30 in. wide concrete path between them. The floors under the benches are sand.