TAXUS PRODUCTION AT THE RHODE ISLAND NURSERIES

THOMAS JAMES VANICEK

The Rhode Island Nurseries, Inc.
Newport, Rhode Island 02840

Rhode Island Nurseries, Inc. has grown to become a 500-acre, field growing, wholesale nursery since its founding in 1896. Much has changed in this time but it remains in the control of the Vanicek family and still considers the genus *Taxus* to be their specialty. With such introductions as *T.* ×*media* 'Densiformis' and *T.* ×*media* 'Nigra' they stand ready to embark on the next 90 years with the same drive and dedication to the nursery industry.

From the time the Taxus cuttings are stuck until they are sold the nursery will lose roughly 20% of them. Much of this loss comes from grading out the weaker or less desirable plants, as opposed to cultural (disease, insects) and mechanical damage. Eleven cultivars of *Taxus* are stuck each season. The average yearly total for all 11 cultivars is 150,000 cuttings. Within 8 to 9 years, depending on the cultivar, 115,000 plants will be sold.

The taking of cuttings begins in mid-November and is usually finished by the 2nd week in December. The source for these cuttings are the nursery's 6 to 11 year old plants. These plants have been planted on 3 ft centers for 2 yr and will remain for 2 more yr before being sold. Estimates of the number of cuttings a plant will yield are made in summer. A specific number of rows are set aside to insure that an adequate supply of cuttings will be available. All other plants are trimmed at this time.

In mid-November the crew enters the field and works one cultivar at a time. The workers are careful in their selection, so as not to deform or impede the growth of the plants. Cuttings are taken with small hand shears and placed into wooden boxes. The boxed cuttings are then transported to the propagation facility. They are watered and then all, except those needed to keep the crew working, are placed in a walk-in cooler that is set at 37°F.

The initial cutting is 8 to 10 in. long. Each man draws one of these and strips off the lower 3 to 4 in. of needles and shoots. After doing this to a dozen or so, bunching them in one hand, a guide stick is used to gauge uniform height. All stems are given a fresh cut and the tops are pruned to gain uniformity. Finished cuttings are 7 in. long and are set to one side and the process continues.

The cuttings sit (about 30 min) until enough are made for sticking. Two people working together, generally do all the treatments and sticking. For *Taxus*, the treatment is a quick-dip into a solution that is 50% Chlormone and 50% water. [Note: *Taxus baccata* 'Repandens' is treated in a solution that is 75% Chlormone and 25% water.] The cuttings are then promptly stuck into the

benches filled with 8 in. washed concrete sand. [Note: The sand is carried in during the previous weeks and has been pounded down to provide support.] A heavy dibble stick is used to assist in the sticking, and to re-pack the sand around the cuttings. Rows are 1 in. apart with spacing within the row of approximately ½ in. Spacing is modified somewhat depending on the peculiarities of each bench (i.e. a hotter bench needs greater spacing).

Bottom heat, from hot water circulating in pipes beneath each bench, is provided immediately. The desired root zone temperature is 65°F. Once callus has formed, the root zone temperature is increased to 70°F for the duration. The tops of the cuttings are subject to heat only from residual bottom heat or solar build up.

All cuttings are watered as needed, generally once or twice a week. Measures are taken continually to ensure proper humidity. Through careful watering and, on occasion, use of electric fans, to provide air flow, humidity is not allowed to develop to a critical state. Excess humidity can lead to several problems—an outbreak of *Rhizoctonia* being one of the most damaging.

The *Taxus* cuttings remain in the rooting bench until late May or early June. They are then transplanted from the rooting bench inside to shaded growing beds outside.

This process starts with the assembly of the rooted cuttings. The rooted cuttings are pulled out of the sand and graded (roots vs. no roots). All cuttings have their tops and roots pruned. All roots are also rinsed in a solution of Rapid-Gro (rate = 1 tablespoon/gal). After the rooted cuttings are pulled, pruned and dipped, they are assembled in wooden boxes (approximately 10 × 10 × 18 in.). These boxes either go directly to the planting area or into the walk-in cooler.

Simultaneously the land is being prepared for planting. The preparation begins with the application of a layer of cow manure, roughly 2 in. thick, over the entire field. The manure is promptly disc-harrowed, and the field is then plowed. Plowing is done to a depth of 24 in. After the field is replowed and reharrowed, the field is then rototilled twice and is only now qualified to be planted.

All *Taxus* beds are planted with an Edgal 6 row bed planter. Beds are 4 ft wide and their length varies depending upon field size. The rows within each bed are 8 in. apart and plants are spaced 6 in. apart within each row. (Beds are approximately 2 ft apart.)

When it is time to plant, the boxed rooted cuttings are placed on the machine in front of each worker, so that the bed planter can be fed. As the tractor pulls the planter along, two workers follow making certain all are placed at a proper depth and that there are no misses.

The beds are then tramped. Each row is packed down by foot to bring the soil in firmly around the root zone. Afterwards, the beds are scratched to loosen up the soil surface and level off the entire bed surface.

Mulch is then applied. Mulching assists greatly in weed control, as well as in moisture retention for the young plants. Since shredded sugar cane is no longer available, several substitutes have been tested. To date, only two come close to matching the excellent qualities of sugar cane: rye straw, which is bought in, and sudan grass, which is harvested on site.

Both, however, have their drawbacks. The rye straw does not mat quickly and is easily blown away until it does so. Also, regardless of any claims to the contrary, there is always volunteer rye. The Sudan grass fares somewhat better. A major drawback here could be that it only lasts about 1 yr before it breaks down (we would like it to stand up for 2 yr). Also, the necessary room to grow Sudan grass and machinery to process it must be available.

After a mulch is applied, stakes are driven along either side of the beds. Shades are placed on these about 18 in. above the beds. The shades are nothing more than a 4 × 6 ft frame with lath. They provide 56% shade. The shades are removed during the second summer to facilitate further hardening off.

These *Taxus* plants will remain here for 2 yr. Maintenance during this period will include periodic weeding, pruning, and scheduled applications of pesticide.

From this 2-yr bed the *Taxus* are lined out for an additional 2 or 3 yr. [*T. cuspidata* and the *T.* × *media* cultivars 'Densiformis', 'Halloriana', and 'Hicksii' are lined out for 2 yr; *T. cuspidata* cultivars 'Brevifolia', 'Brownii', 'Hatfieldii', 'Tauntonii' and *T.* × *media* cultivars, 'Nigra', and 'Repandens' are lined out for 3 yr]. Land preparation is the same as that for bed preparation. Harvesting is also similar.

For lining out, the beds are undercut with a custom-made bed digger. The plants are pulled out and the roots pruned with a hand knife (the tops had been trimmed the previous summer). They are graded, assembled into boxes, and sent to cold storage or the planting area. All planting, at this stage, is still mechanical. A two-row planter is now utilized.

The planting machine is tractor-pulled with 4 workers feeding 2 rows. The *Taxus* are lined out in rows 3 ft wide with spacing of 12 in. within the row. As in the bedding procedure, two persons follow the machine, making certain there are no misses and the plants are at the proper depth. When planting is completed, all the lines are tramped. The entire field is then cultivated, either by a tractor-pulled, three-row cultivator or by a single-row, mule-pulled cultivator.

Just this year, 1986, we began experimenting with herbicides. [Note: only liners have and ever will be subject to herbicides.] Aside from this, maintenance includes yearly pruning, cultivating and weeding, as necessary, and scheduled pesticide applications.

When the 2 or 3 yr term has ended, the *Taxus* are transplanted

for the final time. This move will occur in the fall.

The lined out *Taxus* have their tops pruned in mid-to late summer in preparation for this move. As the land to be planted is being prepared, the liners are harvested. A two-row root pruner is used to help lift the plants to the surface. The liners are then pulled out of the ground, and all soil is shaken off of the roots. They are graded and then root pruned with a hand knife. After assembling into boxes, which measure 12 × 12 × 48 in., the liners are sent to be watered and stored in a shed, out of the wind and sun.

Once the field to be planted is properly marked, the boxed liners are re-watered and sent to the field. Here they are distributed throughout the field and all planting is done by hand. The plants are "check-planted" on 3 ft centers. (Rows are 3-ft wide with 3 ft spacing in each row. This planting system facilitates cross cultivation, which is the primary form of weed control.)

When the entire field is planted, the plants are tramped. Oats, as a cover crop, are applied and cultivated into the soil. In 2 yr, these plants will be the source of *Taxus* cuttings and the whole process will repeat.

In total, the *Taxus* remain at this final stage for 4 yr, after which in the spring they are harvested and sold. During those 4 yr, they require constant cultivation. Each field will be cultivated for weed control once every 3 to 4 weeks. Generally, a crew with hoes will follow to get any weeds, which may have been missed. Pruning is critical at this stage. Efforts are made to gain maximum uniformity without hindering maximum growth. Scheduled pesticide application becomes more important as well. Beginning June 15, Orthene is applied to all *Taxus* as a defense against black vine weevil. July 15 a program against scale is started using malathion.

A fertilization-assist program has recently been in effect for *Taxus*. In late May—early June all final stage *Taxus* are side dressed during the last growing season before harvest. This provides a more colorful, vigorous plant to be delivered to the customer.

From start to finish, every *Taxus* plant produced is under complete control. By having a ready supply of cutting stock, Rhode Island Nurseries can form, direct, and guide the plant for its entire life. Through pruning and trimming at the earliest stages of development, quality and uniformity are assured. The root systems, alone, are pruned four times within 8 to 9 yr. The tops receive attention at least once every year for the same period.

But it all begins with a good selection of cuttings and devoted attention during their development. This should be considered the most critical stage, where traits are developed and carried through for the duration of that plant's life. If a plant starts weak or diseased, it will never keep pace and, as such, becomes a liability.