since they are coming from a low-light environment. The available light should be gradually increased as the plantlets become established. Our greenhouse fog system has 90% shade. After about 2 to 4 weeks in this structure plantlets are moved to other greenhouses with 73% to 80% shade. Some plants, such as spathiphyllum, will remain at 73% shade until they are sold. Other plants, such as gerbera daisies, will be transferred to structures with 30% shade after several weeks at 73% shade. We discourage application of any pesticide during the first 2 weeks after transplanting. Strict adherence to correct sanitation procedures is much more desirable. However, plantlets should be monitored closely after transplanting from the sterile tissue-culture environment and pesticides may be used cautiously if any problems do arise. Be sure a pest is involved before you use chemicals.

As you can see, numerous factors are involved in establishing tissue-cultured plantlets in soil. By paying close attention to them, one should have few problems in establishing tissue-cultured plantlets and in producing an outstanding crop.

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ASEXUAL *MAGNOLIA GRANDIFLORA* PROPAGATION AT SHADY GROVE NURSERY

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Our nursery was established in 1939 by John F. Brailsford, Sr., with retail sales, container yard, and a garden shop in town. Shady Grove Nursery now has 350 acres under cultivation with 150 acres of new ground; 60 acres of this will come into production this year, 25 to 30 acres a year later. Hopefully, we will then be able to rotate fields in the old nursery and top out at 500 acres. We are wholesale growers, now serving landscape contractors, architects, and other nurseries.

Around 20 years ago we realized people deserved better than seedling-grown magnolias. We were also interested in

broadening the usefulness of *Magnolia grandiflora* by selecting clones with different architectural shapes and textures. Consequently, through the years we have developed six *Magnolia grandiflora* selections with distinctly different architectural characteristics. The names of the selections are 'Claudia Wannamaker', 'Margaret Davis', 'Hasse', 'Shade Grove #4', '#5', and '#6'. All of them have dark, glossy green foliage with brown pubescent backs.

We use the same propagation techniques for all six except for the timing of taking the cutting wood. For example, the Hasse #4, #5, and #6 wood was mature and cuttings were taken on June 29 and 30 this year. Claudia Wannamaker and Margaret Davis wood was ready July 5 and 6. In years past the cutting wood has matured much later.

In the actual process of taking the cutting wood, *timing* and *sanitation* are my main two concerns. We take our cutting wood early in the morning while it is still turgid. The wood is placed either in damp burlap or damp vermiculite bags to protect and keep it fresh. While most of the crew is taking the wood, two people are left behind to fill metal flats that have been sanitized with a solution of Clorox and water. They are filled with straight vermiculite. That is right. Straight vermiculite is our propagating medium. It is thoroughly wet down and each flat is tapped down tight to secure the cutting as they are stuck. We used wooden flats for a long time until we found that root rot fungi over-wintered in the cells or pores of the wood. We then changed to metal flats, which we sterilize with a solution of 2 gal. Clorox to 55 gal. water. We can get 4 flats to a wheelbarrow with a rack across the top. As soon as we have 4 flats ready, we soak the cuttings down and go to our open-frame intermittent mist houses. We have a 24 hr. clock to cut on and off, and 10 min. clocks that are set for 2 sec. every 3⅓ min. When we first put the magnolia cuttings in the mist frames, the clocks run from 8 a.m. until dark. As the cuttings begin to callus and root, the watering time is cut back gradually at each stage of the process.

We dip our cuttings in captan, 16 tbs/3 gal. water. We use this for 3 or 4 days until the solution becomes diluted. Other fungicides should work as well. My rooting hormone in the past has been Rootone F, which contains a fungicide. I cut a 45° angle through the bottom of a node, dip the cutting of the fungicide solution, shake dry, and dip it in the Rootone F. Cuttings are inserted in the vermiculite-filled flats 2 in. deep. The cutting's overall length is 4½ to 6 in. depending on the length of the first cycle of growth.

This past summer I did an experiment with different hormones. Rootone F as a powder, Hormodin #2 as a powder, Dip 'N Grow as a liquid at the rate of 1:10, Chloromone as a liquid at the rate of 1:2 with water. Cuttings dipped in Dip 'N Grow rooted fastest, but more rooted and at a more uniform rate using my old stand-by, Rootone F.

Once the cuttings are stuck, we spray on a 2-wk. interval across the top with a fungicide. Once the cuttings start to callus and root, we spray with Sol-U-Grow, a 12-48-8 soluble powdered fertilizer at 4 to 6-wk. interval. If everything goes well, cuttings start rooting in 6 to 8 wks. They are then potted off in 1-qt. and 3-qt. pots, depending on the quantity and density of the root ball. The one draw-back to straight vermiculite is that the roots are very tender and have to be handled with extreme care. In general, we have found these techniques to be quite successful in our particular production scheme.

Rootone F - A combination of NAA, IBA and thiram.
Hormodin #2 - 3000 ppm IBA
Dip 'N Grow - 10,000 ppm IBA + 5000 ppm NAA
Chloromone - Alfalfa extract plus NAA

PROPAGATION OF DWARF NANDINA CULTIVARS

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Flowerwood Nursery is currently producing two dwarf nandina cultivars. They are:

1. *Nandina domestica* 'Purpurea' (*N. domestica* 'Nana Purpurea')

2. *Nandina domestica* 'Harbour Dwarf'

We began producing 'Nana Purpurea' by cuttings in 1978 from our first batch of purchased plants. 'Harbour Dwarf' was started from purchased plants in 1980.

Dwarf nandina cultivars are high-value crops that are relatively easy to propagate if correct conditions can be met and if a large supply of stock plants are available. This latter factor accounts for the difficulty of getting large production numbers in a fairly short time. Generally, on a young plant only one or two cuttings are available at any one time, with the 'Harbour Dwarf' at this stage producing the fewest cuttings.