free of canker for several years (as determined by close visual examination of the main trunk) have recently developed cankers in the upper branches. This late cankering has occurred on trees growing in close proximity to trees that are cankered but have survived for 5 years.

Fungicides ordinarily applied for leaf spot disease protection have been ineffectual against dogwood canker. This would suggest a systemic pathogen that is untouched by fungicides applied to outer plant surfaces, if the pathogen is indeed a fungus Dogwood trees are usually pruned to develop a single trunk and pruning wounds may serve as entry points for pathogens. However, unpruned trees in our plots had more cankers than pruned ones. No common fungal pathogen has been isolated from cankers. All attempts at causing cankers with fungi isolated from cankers has been unfruitful. Other pathogenic organisms should be considered as possible causal agents.

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RHODODENDRON PRODUCTION

JOHN ED. KINSEY

Kinsey Gardens, Inc.
Knoxville, Tennessee 37914

Rhododendron production in the U.S. was for many years centered in the Pacific Northwest, particularly in the Oregon and Washington area. It has gradually moved east and is progressing further south. We feel that the significant differences in our production are that we are growing finished plants in full sun at lower elevation and further south than has previously been reported on a commercial scale Otherwise our techniques are traditional.

Rhododendron production at Kinsey Gardens accounts for about one-third of our nursery sales. Our other major crops are azaleas and conifers. We are presently growing about 25 large-leaved rhododendron cultivars and several dwarf or small-leaved ones. Most of these are of H-1 or H-2 hardiness. The majority of

the plants are marketed in 2- and 3-gallon containers; and some are sold in half-bushel baskets. We strive for a one to two year turnover Knoxville, Tennessee, is in hardiness zone 7 and is about 800 feet in elevation. We feel that we are in a good rhododendron production climate We get three full flushes of growth per season, a good percentage of flower buds on many cultivars the second season, and have relatively few disease problems.

Our production begins with propagation of cuttings taken from vigorous one-year-old plants in 1 and 2 gallon containers. Cuttings of the last flush of growth are taken in November after fall sales slow down and after the poly houses are covered. In fact, we could successfully root cuttings year round if it would fit our production schedule. Cuttings are put in plastic bags and taken to the greenhouse where they are prepared. We first wash the cuttings in a Benlate (benomyl, duPont) and Captan solution for about 5 minutes. Then they are drained and rinsed with clean water so they can be handled and prepared All leaves are removed from the base leaving 3 to 4 leaves near the apex. The apical bud is pinched out and the stem is wounded on both sides through the cambium with a sharp knife. A fresh cut is made at the base of the cutting to trim to uniform length and to remove the water-soaked base of the cutting. Care is taken to keep the cuttings clean after the fungicide soak. We do not trim the leaves to a shortened length except on a few cultivars with excessively long foliage. Cuttings are then treated with 0.8% IBA (indole-3-butyric acid) in talc and stuck into a 6-inch-deep raised bench containing a 2:3 mixture of sphagnum peat and coarse perlite. The houses and benches are thoroughly cleaned, painted with cuprinol, and the mix changed after each crop. Bottom heat is supplied by a propane-fired unit heater attached to a convection tube, which is routed under the bench Heat is forced up through the medium by sealing the sides of the bench to the ground with a poly skirt. We try to maintain 72° to 75°F soil temperature as we feel this is important for winter propagation. Mist is controlled by a time clock with manual corrections for weather changes. When the bench is completely filled, cuttings are usually then drenched with Truban (ethazol, Mallinckrodt) and Benlate.

After 2 to 3 months the cuttings are tight and are lifted in February and potted into quart containers. These are put into a heated house and forced into immediate growth Photoperiodic lighting is begun on these potted plants in early spring to simulate long days. We often get 1 to 2 flushes of growth before May when we can take them outside and shift into 2-gallon containers While in the small pot we liquid-feed and pinch very conscientiously to develop a well-branched body.

The plants are moved outside and shifted into 2-gallon containers. The potting mix is 4:1 pine bark and expanded shale containing 8 pounds of Sta-Green Pro-Start, a potting soil fertilizer containing gypsum, superphosphate, urea formaldehyde, potassium nitrate, and micronutrients; 10 lbs. of dolomitic lime; and 10 lbs. of Osmocote 18-5-11 12-month fertilizer per cubic yard. Little additional fertilizer is necessary the first year. The rhododendrons are grown in full sun the year round except possibly for a short acclimation period after moving the quart pots from the poly houses. We feel that the full sun makes the plants stockier, cleaner, deeper-rooted, better budded, and generally tougher for use in the landscape. During the summer the plants are irrigated only in the morning every other day. Water is supplied overhead by Nelson Whiz Heads. Even if the plants flag during the heat of the day, we do not water as long as the medium is still wet. We feel that overwatering is one of the biggest hazards in rhododendron production. The plants in the 2-gallon cans remain can-to-can in the uncovered poly houses the first summer. Weed control in the cans is accomplished with Ronstar (oxadiazon, Rhone-Poulenc). The rhododendron growing area is on a slight slope and is graveled with ¾ inch crushed stone to insure proper drainage and to help prevent root disease problems. Irrigation water comes from ponds fed by surface and spring water. During the first year the plants are pushed hard and carefully pinched at each flush. During the hot, humid periods the leaves and stems are protected by bimonthly sprays with such materials as Dithane M-45 (mancozeb, Rohm & Haas), Daconil (chlorothalonil, Diamond-Shamrock), Benlate (benomyl, duPont), Orthene (acaphate, Chevron), diazinon, Sevin (carbaryl), and Kelthane (dicofol). We use a John Bean hydraulic sprayer as we are too close to a residential area to allow use of a mist blower-type sprayer. We do little or no drenching of the medium after the plants leave the quart pots. We depend on proper potting medium and watering practices to control root diseases.

All plants are overwintered under clear poly in 15-feet-wide polyhouses. Some cultivars of the vigorous 1-year plants often have to be protected from early frosts by irrigation or by covering early. We must protect this last flush of growth for it is the source of our winter cuttings. Generally, we like to have all houses covered by Thanksgiving The doors of the rhododendron houses are left open except during very severe cold periods. We had first hoped to grow outside during the winter, but 1977 convinced us this was too risky. Cuttings are taken from these 1-year plants, which again prunes and induces branching in the following spring flush. Some of these plants are sold at this stage as unbudded 2-gallon plants with picture tags.

Then the following spring, the more vigorous cultivars are

shifted to 3-gallon containers for finishing. The less vigorous cultivars, or smaller graded plants, are spread out and left in the 2-gallon can to produce a heavy, 2-gallon, often budded, plant by the second fall. We are able to produce an 18- to 24-inch plant in 2 years by following this schedule.

Cultivars that we like to grow and which do particularly well under our conditions include 'Roseum Elegans', 'Roseum Superbum', 'English Roseum', 'Catawbianse Boursault', 'America', 'Nova Zembla', 'Anah Kruschke', 'P.J.M.', 'Blue Ensign', 'Chinoides', 'Gomer Waterer', 'Catawbiense Album', and 'Anna Rose Whitney'. Some cultivars such as 'Scintillation' tend to leaf scorch when grown in full sun and should possibly be shaded for best results in our area.

RHODODENDRON PROPAGATION

TED GOREAU

Imperial Nurseries
Quincy, Florida 32351

Imperial Nurseries' southern division is located in Quincy, Florida, approximately 20 miles northwest of Tallahassee. The climate in this part of north Florida is mild compared to the endless summers farther south or the long winters of the northern states. The long growing season, abundance of good water, and moderate winter temperatures of this area combine to make it virtually ideal for growing many species of ornamental shrubs and trees in containers.

Although most of the woody ornamentals grown here require little or no cold protection, some species do require special handling because of the prolonged periods of high humidity and warm temperatures that are common in the summer months. There are several cultivars of rhododendron among this group.

At the southern division of Imperial Nurseries the cultivars of rhododendron receiving special handling are *Rhododendron* 'Nova Zembla', *R.* 'Roseum Elegans', *R.* 'English Roseum', *R.* 'Pink Treasurer' and three catawbiense cultivars — 'Catawbiense Grandiflora', 'Catawbiense Boursalt', and 'Catawbiense Album'. These plants are more susceptible to water mold and other fungus-related diseases and are more sensitive to heat stress than most species we grow, making proper irrigation, drainage, and frequent fungicide applications critical. They require slightly lower fertilizer levels, hand pinching and, because they are more prone to mechanical damage, shipping in cartons, as opposed to the solid stacking method we normally use. One, two, and three