

viable part of our industry and with maturity will become a standard. Though far from a "magic bullet" it offers solutions to many propagation problems. All serious propagators need to investigate this expanding field and experiment to determine if it will work for their operation. Our advice is to hedge your bets: We know of several who went totally with tissue culture and lost 100 percent of their plants.

Bracken Tree Growers has given information and assistance to researchers, governmental agencies, and numerous individuals regarding the actual implementation of tissue culture propagation in a working environment. We trust our experience can aid the industry in assimilating this valuable new technology.

PROPAGATING NEW MAGNOLIA CULTIVARS

DAVID G. ELLIS

*Magnolia Nursery and Display Gardens
Rt. 1 Box 87
Roberts Road
Chunchula, Alabama 36521*

Todd Gresham, the City Parks Director for Santa Cruz, California, hybridized Asian magnolia species and cultivars intensively during the 1960s. Some of the names Gresham gave earlier hybrids are 'Rouge Alabaster', 'Leatherleaf', 'Raspberry Ice', 'Royal Crown', 'Crimson Stipple' and 'Royal Flush'. Specific information about these hybrids may be cited in *Magnolias* by Neil Treseder. Before his death Gresham dispersed 1600 of his seedlings, which had not yet bloomed, to the Gloster Arboretum located in Gloster, Mississippi. In the late 1970s these seedlings began to reach blooming age. Several enthusiasts began to select and number magnolias that had particular beauty. Ken Durio, owner of Louisiana Nursery in Opelousas, Louisiana, named the following cultivars: 'Tina Durio', 'Darrell Dean' and 'Mary Nelle', named for the wife of the late Joe McDaniel. 'Sweet Sixteen' and 'Elisa' are two other early selections. Professor Joe McDaniel, Dr. John Giordano, and Dr. John Allen Smith made approximately 50 selections, which were propagated by cuttings and planted in their respective gardens. As these plants matured, their commercial value became apparent. Further observation and selection by Magnolia Nursery resulted in the following cultivars:

Magnolia 'Sangreal'. Cup-shaped, red-purple flowers, up to 8 in. across, open early and continue into the bloom season.

M 'Dark Shadow'. This compact tree makes an excellent presentation of very deep colored red-purple flowers. Buds just before opening are 2½ in. long.

M 'Full Eclipse'. Early blooming with erect pointed tepals, which reflex slightly to produce a carefree effect. Long slender tepals are red-purple outside, whitish inside. Tree has columnar growth habit.

M 'Winelight'. Large 8-in. flowers open somewhat later than most. Thick tepals, even distribution of blush covering ⅓ of the tepal fading to white at the tips.

M 'Candy Cane'. Somewhat early blooming the 6-in. flower is marked by thin stripes arising from the base. These stripes are deep rose. They are very stark and hence suggest the name.

M. 'Jon Jon'. Late flowering, almost in a season within itself. Flowers profuse, quite large 10 to 12 in. The flower is essentially white with a slight rose coloration at the base. Excellent branching habit forms a rounded crown.

M 'Pink Goblet'. Midseason bloomer with bloom lasting well into the season. Ten- to 11-in. flower holds a classic goblet shape. Flowers are evenly spaced and from a distance appear to be solid pink. A vigorous grower with a regal classic appearance.

M. 'Deep Purple Dream'. The darkest red-purple of all our magnolias. Tree is slow growing and small in habit. Blooms when small. Not a prolific bloomer yet continues sporadically throughout the growing season. Blooms are not affected by frost or late freezes.

Initially we intended to propagate by chip budding. However, we discovered that rooting these magnolias was relatively easy. We prefer plants on their own roots, of course. Initial efforts were with buttersoft cuttings transported by cooler from Gloster. They were wounded on one side and stuck under heavy mist. Root development took place on one side and often in the air above the rooting medium due perhaps to lack of oxygen in the rooting medium. However, rooting was excellent.

In 1985 Magnolia Nursery began building up stock of all 50 selections by cutting propagation. The rooting agent used initially was Woods Rooting Compound at the rate of 1:5. The rooting medium was pure pine bark amended on a per cubic yard basis with a 1.5 lbs. of Micromax; 9 lbs. of Osmocote 18-6-12 (8- to 9-month formulation); 6 lbs. of dolomitic limestone; and 1.3 lbs. of gypsum.

Containers used were 4-in. pots (Lerio SR 400). Softwood cuttings were taken in early spring and wounded on two sides through the third leaf node below the terminal. Cuttings were approximately 6 in. long with two nodes exposed. Leaves were trimmed to allow air flow. Mist frequency was initially set at 6 sec. every 6 min. and backed off as rooting developed.

Close attention to detail yielded near 100 percent rooting with the exception of JG 3, later named 'Jon Jon'. Unrooted cuttings of 'Jon Jon' along with *Magnolia denudata* were pulled aside during transplanting the following June, wounded once again through the callus, dipped in Wood's 1:5 and stuck once again. Rooting percent increased to acceptable levels.

Experimentation with hormonal mixes have continued, using moderate levels of IBA and NAA as well as changes in medium. Recent efforts involved a mix with approximately 90 percent

coarse-grade perlite with 10 percent peat. Nutritional levels of rooting media have remained the same. The hormonal combination was 5,000 ppm KIBA initially on cuttings taken late April to mid-May. After mid-May 5,000 ppm KIBA + 1,500 ppm KNAA was used.

Mist failure resulted in 90 percent leaf desiccation on cuttings taken in April. Although the cuttings had just begun to callus, new growth had started due to the youth of the cutting material. Primary leaves were allowed to remain in order that even small amounts of photosynthesis might occur to maintain some sort of metabolism. As new growth developed old leaves were removed. Even after the catastrophe nearly 100 percent rooting occurred. Growth was excellent. Cuttings stuck later in the growing season were much slower to root, yet percentages were still good. New growth occurred mostly from the base of the cuttings. This new growth was less vigorous than that of the earlier cuttings. This experience has shown that buttersoft or near buttersoft cuttings are desirable. Cuttings of 'Jon Jon' rooted considerably better, indicating that KNAA might be helpful. Otherwise no significant effects of KNAA on later cuttings were noted. I feel that some cultivars might benefit from KNAA on early cutting.

Winter exposure of first-year container production has proven risky. Containers are overwintered in minimum-heat houses to prevent root injury. This also gives us early growth for propagation.

Efforts to propagate *Magnolia grandiflora* have indicated one major trend; results will be cultivar specific. Cuttings have typically been taken in early to mid-August. Mid- to late July would probably be better. Five magnolia selections are listed and described below with a rooting rating of 1, good—to 5, poor.

M 'Fairhope I'. Dense branching, short nodal length, large round wavy leaves with little indumentum, rounded crown (2.5).

M. 'Fairhope II'. Narrow lanceolate slightly rippled leaves. Good brown indumentum. New growth appears with silver tint. (4).

M 'Springhill'. Columnar to pyramidal in habit. Leaves are very glossy deep green and elliptic with pointed tips. Apparently not subject to leaf blotch problems. Gold-colored indumentum. Pure white blooms. (3).

Unnamed magnolia from Lillian, Alabama. Very heavy indumentum approaching chocolate brown. Leaf is moderate sized and elliptic, deep green and glossy. Bloom is typical. (5).

M 'Lakeside'. Large curvy leaf. A very fast growing tree. (1).

All selections have been rooted but with varying degrees of success as indicated. Better rooting might be achieved by earlier timing as well as improved drainage of the rooting medium. In 1986 we tried Wood's 1:1 with pine bark. We had varying degrees of success with different selections. In 1987 we had similar responses with 10,000 ppm KNAA in pure perlite. We have at present a batch of cuttings stuck with 5,000 ppm KIBA + 5,000 ppm KNAA in 90

percent perlite and 10 percent peat. Response seems good with rooting apparent as well as good callus throughout. One comment: with *Magnolia grandiflora*, good callus does not necessarily mean that rooting will occur. In any event, cutting production of *Magnolia grandiflora* is far superior to seedling propagation. Overall growth will far exceed in both rate and habit if good selections are propagated.

In conclusion, I stress the importance of timing, heavy mist, moderate hormonal levels, wounding, and excellent medium drainage to compensate for increased mist and tender wood.

IDENTIFICATION AND PROPAGATION OF VARIOUS LIRIOPEs AND OPHIOPOGONS

GARY ADAMS

Evergreen Nursery
1220 Dowdy Road
Athens, Georgia 30606

IDENTIFICATION

The justification for this discussion is that liriopes and ophiopogons are used in huge numbers, that they are so easy to grow, that few people know the fine points of production, that there are cultivars of great merit which are virtually unknown. Evergreen Nursery has specialized in groundcover production, mainly ivy and liriopes, since the 1960s. At present we produce 24 cultivars of liriopes and ophiopogons.

What are the differences between liriopes and ophiopogons? The most useful point of identification is that the ophiopogon flowers hang down on their scape, while lirioppe flowers are held erect. Ophiopogons are slightly less hardy, are usually strongly rhizomatous, always bear the flowers down in the foliage and have a flower with a subinferior ovary. Lirioppe flowers bear a superior ovary. Cultural practices discussed apply equally to liriopes and ophiopogons unless otherwise indicated.

Differentiation between species and cultivars begins at the root system. There are caespitose, or clump-forming types, and rhizomatous types.

The rhizomatous species are the most common and include *Lirioppe muscari*, *Lirioppe spicata*, and *Ophiopogon japonicus*. Of these *Lirioppe muscari* is the slowest spreader and the prettiest in flower. Leaves are up to 1/2-in. wide and 12 to 15 in. long on established plants. The flowers are held about the same height as the foliage and are a lavender-blue.