

and insect problems, leyland cypress does have a place in the landscape and should be produced by nursery growers.

2. Since it does not transplant well balled and burlapped, and the roots easily come loose in bark mixtures, a different potting mixture should be found that can produce a more stable root ball.

3. Garden centers and landscapers will need to be educated as to the proper handling of these plants.

4. There are several cultivars of leyland cypress available. 'Leighton Green' is the most popular. I like 'Naylor Blue' with its blue tint and 'Gold Cup' with its golden tips. The variegated type is not very colorful as a large plant.

5. Selling the plants is why we are in business. Leyland cypress is a saleable plant, but we must do a better job of marketing so it will be profitable to grow. There has been some discussion that leyland cypress will replace red-tip photinia as the fastest growing hedge. First we must instruct landscape designers and garden center managers about leyland cypress, then they will have to sell it to the public.

Note It occurred to me while listening to Dr Michael Dirr, Dr. John Creech, Dr J.C. Raulston, and Don Shadow talk about possible new plant introductions that maybe we need an IPMS, International Plant Marketing Society arm of the IPPS to introduce new plants to the trade and, most importantly, to the public There are a lot of good plants available like Leyland cypress that are not being used because there is no demand. We must create a demand through better marketing

TEN OUTSTANDING FLOWERING TREES FOR POTENTIAL SOUTHEASTERN U.S. PRODUCTION

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Flowering trees are one of the most important visible parts of the landscape, adding color and drama against a green background. The southeastern U.S. is climatically suited for an enormous range of species and cultivars of flowering trees, yet relatively few taxa have become important in the nursery/landscape industries of this region. Probably 90% or more of the flowering trees now being used would be included in the following small list: *Cercis canadensis*; *Cornus florida* and cvs.; *Koelreuteria paniculata*; *Lagerstroemia indica* cvs.; *Magnolia stellata*, *M. × soulangiana*, and *M. grandiflora*; *Malus* cvs;

Prunus subhirtella; and *Pyrus calleryana* cvs. Selecting just 10 recommended trees for this paper is a difficult task from the wide number of potential candidates available. Final selection of the ones presented was based on observation of plants in The NCSU Arboretum as being well adapted for use in this area of hot, humid summers and yet surviving without damage the recent years of record cold temperatures (to -7°F in 1985); a third consideration was their almost total absence of any current commercial production or use in this region. They are presented in alphabetical order.

1). *Aralia elata* 'Aureo-variegata' and *A. elata* 'Variegata'. Very coarse-textured large shrubs or small trees reaching 10-15 ft. in height and providing a spectacular tropical appearance in the landscape. The leaves can reach 2-3 ft. in width and length. These two variegated forms are showy throughout the summer. Though the yellow and white variegations are distinctly different in cooler climates, in the heat of the southeast both fade to the same pure white variegation during summer. Large panicles of white flowers appear in the terminals of the plant in July, and the plant will remain in flower nearly a month. It is considered a connoisseur plant in Europe due to the rarity of stock plants and the difficulty in propagating it. Only a few speciality nurseries in Germany, Holland, and England offer it — and at very high cost. It is patch- or chip-budded on to *Aralia elata* understock, which can be produced from seed or by division of the rhizomatous root system that suckers readily (4). Last year, we successfully cleft-grafted the white variegated form on a plant of *Aralia spinosa*, the native Hercules' club or devil's walking stick, which was growing in the arboretum. The major limitations to commercial production would be finding scion wood to use in budding, and learning to do the budding successfully.

2. *Cercis*. The eastern redbud, *Cercis canadensis*, is an extremely popular native small deciduous tree easily grown from seed and widespread in the nursery trade. Several other redbuds superior to the species eastern redbud are rare or totally unavailable in commercial production due to propagation difficulties. *C. canadensis* 'Forest Pansy' is presently being produced in the southeast in small quantities but market popularity warrants greatly increased production volume. 'Forest Pansy' is noted for its dark purple foliage which emerges almost purple-black under cool spring conditions. In climates with cool night temperatures this dark color can be retained through the summer until autumn; however, in the warm night conditions in the southeastern U.S. the color will fade to species green by midsummer with the speed of change dependent on the midsummer degree of heat encountered.

C. reniformis 'Oklahoma' introduced by Warren and Son Nursery in Oklahoma is vastly superior to the common eastern redbud, with dark green, waxy leaves and the darkest red-purple flowers of any redbud. As a plant it would be worth growing for foliage alone even if no flowers were produced. Another cultivar, *C. reniformis* 'Texas White', has the same handsome foliage and pure white flowers — stunning in spring.

A very rare species, *C. mexicana* (or *C. canadensis* var. *mexicana*) has the same glossy, dark green leaves but the margin of the leaf is undulate giving it perhaps the most beautiful foliage of any redbud. The Mexican redbud has proven hardy in zone 7 in Dallas and should be adaptable throughout the southeastern U.S. Redbuds are best propagated vegetatively by T- or chip-budding on *C. canadensis* seedlings in late summer (1). Work is in progress with tissue culture and supposedly 'Forest Pansy' is now in successful culture.

3). *Chionanthus retusus*. The Chinese fringetree is a small deciduous tree which may reach 25 ft. in height with glossy, dark-green leaves, which are handsome throughout the season. The pure white flowers appear in early summer and transform the tree into a solid mass of white. Hardy to zone 5. It is native to China, Japan, and Korea and has long been in cultivation in the west (1845) but has never achieved widespread popularity due to propagation difficulties. The seed exhibits double dormancy and is difficult to germinate (3). The plant can be rooted in low to medium percentages (our trials usually run 20 to 50%) with semi-hardwood cuttings under mist in summer. Juvenile cuttings from young seedlings will root easiest; once a ready rooting population is established, a stock block could be established to shear annually to the ground to maintain juvenility (5). Once rooted, cuttings have difficulty in becoming properly-shaped plants with a tendency toward shrub rather than tree form. Stubbing a 2 to 4 year old plant to the ground and pruning the basal sprouts to a single stem as they emerge may speed the development of a tree-form plant.

4). *Cornus controversa*. The giant or pagoda dogwood from China, Japan, and Korea is the largest of dogwood species, reaching 70 ft. in the wild and 30 to 40 ft. in cultivation. Introduced in 1880, and later proclaimed by Wilson as one of the finest of ornamental plants, it has fast, vigorous growth, masses of creamy-white flowers in panicles in early summer, attractive purple-blue fruit, and young branches with reddish-purple coloration in winter. Young plants have grown 3 to 5 ft. per year in the NCSU Arboretum and are far more tolerant of our poor clay soil than *C. florida*. Considering its ease in propagation, it is strange this outstanding plant has never

achieved wide-spread commercial success in the U.S. Seeds require 5 months of warm followed by 3 months of cold stratification for germination (2). We have had good success (60 to 90%) with both softwood cuttings in summer under mist and hardwood cuttings in winter.

5). *Cornus* 'Eddie's White Wonder'. A hybrid dogwood produced by a cross of *C. florida* with *C. nuttallii*, the Pacific dogwood. The Pacific dogwood is a large plant reaching 50 ft. in height with large flowers of 5 white bracts. It often reblooms in the fall. Though among the most spectacular of dogwoods, it cannot be grown successfully in the eastern U.S. The hybrid with the eastern dogwood has produced a plant with larger leaves and flowers with more vigorous growth than the eastern parent, but with 4 bracts rather than the 5 of the western species (a few 5 bract flowers do seem to appear). At the NCSU Arboretum it has not rebloomed in the fall. Though Dirr (2) states it is not suitable for eastern culture, its performance in Raleigh has been spectacular with vigorous growth and heavy flowering for the last 6 years. It should be budded on *C. florida* seedling understock (rather than *C. nuttallii*, which is less tolerant of eastern soils and may be responsible for reported failure in the east).

6). *Koelreuteria bipinnata*. A much showier species of goldenrain tree than the commonly grown *K. paniculata* with larger leaves that are bipinnately compound, yellow flowers that appear several weeks later in summer, and showy fruits pink to purple-pink in color in autumn. It is sometimes reputed not to be hardy, but such reports come from a common problem of mislabeled seed in commercial trade. Growers receive *K. elegans* [syn. *K. formosana*] (zone 9) instead of the true *K. bipinnata* which is hardy in Washington, D.C. and has withstood -7°F with no injury in the NCSU Arboretum. It is easily propagated by seed, which must be scarified and then moist stratified for 3 months.

7). *Lagerstroemia fauriei* and hybrids. The NCSU Arboretum has several plants of *L. fauriei* from the original U.S. National Arboretum distribution now probably 25 to 30 years of age and 15 ft. wide by 20 ft. tall. The red flaking bark on these magnificent multiple-trunked specimens will compare to any other ornamental plant in existence, and the plants should be widely promoted as small ornamental trees. The recent U.S. National Arboretum *L. indica* \times *L. fauriei* hybrid introductions, and particularly 'Natchez', carry the beautiful bark and better flowers. Plants are easily propagated by softwood or hardwood cuttings. The two recent record cold winters have demonstrated the much greater hardiness of *L. fauriei* and its off-spring. These plants showed little or no injury at -7°F whereas all *L.*

indica cultivars (except 'Dallas Red') were killed to the ground. My observation of nursery comments of 'Natchez' injury and lack of hardiness seem to involve plants grown in containers and not properly overwintered to prevent root freezing, or of nursery plants being pushed into excess active growth in the fall by heavy nutrition and irrigation to get large-sized marketable plants quickly.

8). *Magnolia denudata* (or *M. heptpetala*). The Yulan magnolia from China has been in cultivation there for many centuries as one of the finest of classic garden plants and has been in western cultivation since 1789. It makes a small tree to 35 ft. with pure white fragrant flowers appearing very early in spring. It has been difficult to root from cuttings and is often grafted on *M. × soulangiana* (2). Recently west coast propagators have had better success with cuttings, and larger quantities of plants are becoming available. The NCSU Arboretum now has a block of 50 young seedlings grown from seed from the Beijing Botanical Garden. It is hoped that cuttings may be rooted more readily from these very juvenile plants and that by pruning they may be kept in a state of juvenility.

9). *Prunus mume*. The Japanese flowering apricot is considered one of the finest of small flowering trees in Japan where several hundred cultivars have been selected. It is a deciduous tree to 15 to 20 ft. with both single and double white, pink, and red, highly fragrant flowers appearing in January-February. It is the first tree to bloom in the landscape. There are also weeping, fastigate, and cork-screw branch forms. Concern has been expressed about potential hardiness with obvious growth activity in midwinter. In January, 1985, plants in the NCSU Arboretum were in full bloom the day temperatures dropped to -7°F and no limb dieback occurred. Plants grow rapidly with 3 to 5 ft. of growth per year under field conditions when young. We grew a block of about 200 seedlings last year in #1 containers, and some plants made 7 ft. of whip growth in one growing season. Propagation is by seed after 3 months' stratification, or cultivars are produced by semi-hardwood cuttings under mist in early summer (40 to 80% rooting) or by T- or chip-budding on to *P. cerasifera* understock (3).

10). *Rhus chinensis*. The Chinese sumac is a small tree reaching 15 to 20 ft. in height with masses of creamy white flowers in autumn, followed by yellow to red fall foliage color. The plant is quite variable from seed in plant qualities, flower panicle size, flower color, foliage coloration, plant form, and hardiness (dependent upon seed source as the species is native from subtropical Malaysia to subarctic Manchuria). 'September Glory' is a cultivar selected for excellent fall color. Plants may

be propagated by seed following stratification, or the cultivar propagated by pencil-sized root cuttings taken in January-February when the plant is dormant.

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TEN WOODY PLANTS THAT DESERVE A LONGER LOOK

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Describing ten new outstanding plants is impossible. Describing ten outstanding plants is easy. The following plants have crossed my path many times. I have observed them north and south — east and west. Many grow in my garden and others have been used in propagation studies. These plants offer the southeastern nurserymen an opportunity to compete in the burgeoning market for "new" and better plants.

1). *Magnolia grandiflora*, southern magnolia, is embarrassingly variable when grown from seed. Most nurserymen realize this and have either made selections from seed populations or grow known cultivars. At least 25 cultivars are reported in the literature. Propagation is difficult. Grafting/budding, as well as cuttings are used. For the past three years we have worked with 'Bracken's Brown Beauty'. These are handsome trees with lovely blooms and beautiful fruit. Initial results were disastrous but through trial and error the following propagation procedures have evolved that produce 90% and greater success.

Water management has been a real problem. Intermittent mist, using an interval of 2½ sec./5 min. from 8 a.m. to dark has seemed to solve the problem. Sand or peat:perlite stayed too wet, so coarse perlite was substituted as the rooting medium. No concentrations of IBA in 50% alcohol gave good root-