

# PROPAGATION OF SOME WOODY ENDEMIC PLANTS OF EASTERN NORTH AMERICA

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The native flora of eastern North America has a number of rare woody plants that are under-represented in botanical gardens and may also have commercial potential for the nursery trade. I would like to share some of what I have learned about ten of these, and where possible, supply propagation material to anyone interested.

This work reflects research done by the Arnold Arboretum and sponsored by the Center for Plant Conservation. I would like to thank intern Laurie Sullivan for her assistance in these trials.

The rarest conifer in North America is probably the stinking cedar, *Torreya taxifolia*. A member of the yew family, it is found in only four counties of the Florida panhandle and possibly southwestern Georgia. Trees of 40 ft were reported previously but now, due to a blight, adult trees are dying in native stands and extinction is a real possibility. Determining the effective propagation of this species might be a matter of some importance if the species is to survive at all.

From cuttings taken in mid-autumn, I was able to get decent rooting. Cuttings were placed in a poly tent in a mix of coarse sand and perlite (1:1, v/v), bottom heated to 75°F, and examined after 2 months.

A small quantity of cuttings were taken from five, different small plants. IBA-talc powder (8000 ppm) was used on 40 cuttings with 5000 ppm IBA alcohol dip used for another 40 cuttings. IBA powder showed an overall rooting percentage of 54% with the IBA dip showing 65%. No real qualitative difference between the roots in each lot was apparent. Rooted cuttings showed a strong tendency to grow laterally if the cuttings were initially from lateral branches. Unless the original cutting was from a leader, reestablishment of a new leader took a year or two.

Propagation from seed is more problematic as they are hard to obtain. The Biltmore Estate in Asheville, North Carolina has a stand of mature trees and may be the only source of seed in the country as trees in the world no longer seem to be setting seed.

Our records at the Arnold Arboretum show poor seed germination with *Torreya* in general and what literature exists cites long periods of time between sowing and eventual germination. I am presently in the middle of a seed trial with 11 different treatments and hope to report on my results at a future time.

Another rare member of the yew family that is found only in

two counties of the Florida panhandle is the Florida yew, *Taxus floridana*. I have only seen one plant, a multi-stemmed shrub of 10 feet situated alongside a stream, but trees of 25 ft have been reported. Foliage is thin, dark green, and about an inch long. Wild fall-collected cuttings from a mature wild plant in deep shade showed 57% rooting when treated with 8000 ppm IBA powder, under poly, in sand and perlite (1:1, v/v). Cuttings subsequently taken from these rooted cuttings rooted in much higher percentages the following year.

Cuttings were taken in late December, placed in sand and perlite (1:1, v/v) under poly with bottom heat. All cuttings were rated in mid-April: 10,000 ppm IBA alcohol dip rooted 100%, 8000 ppm IBA powder rooted 90%, and control rooted 80%. The Florida yew has survived one winter outside in Boston, surviving a low of  $-1^{\circ}\text{F}$ .

The foliage, however, shows a tendency to change color when exposed to cold temperatures, changing to a purple-brown as early as October. The heat tolerance of this yew may make it a potential ornamental for southern states.

Of the eight American magnolias, *Magnolia ashei* is the rarest, being found only in the Florida panhandle. Despite this southerly distribution, it has proven hardy in Boston, like a number of other plants from this region. It is found in deep shade usually as an understory plant but can reach a height of 25 ft. It is often multi-stemmed and has a short, broad, gangly, open habit.

Leaves of this magnolia are huge, measuring over 2 ft long and almost one foot wide. Its flowers are equally outsized with a diameter of 12 in.

This species is reported to grow and bloom well in shade. The plant, therefore, may be an interesting choice for courtyard planting or as an understory plant. Cuttings taken in late July produced no roots. Treatments included: 6000 ppm K-IBA dip, sand and perlite (1:1; v/v); 6000 ppm K-IBA dip, pumice mix (#10 grade pumice, perlite, peat [6:3:1, v/v/v]); and control in sand/perlite. A final treatment was tried, one with which I have had great success with other species of magnolia. A flat wooden toothpick, soaked in 6000 ppm K-IBA, was inserted longitudinally up into the soft pith of the cutting. About  $\frac{1}{3}$  to  $\frac{1}{2}$  in. of toothpick was inserted, then the remainder trimmed off.

Budding would best be done by chip budding onto hardy magnolias of the *Rytidospermum* section, i.e. *M. macrophylla*, *M. fraseri*, *M. tripetala*, or *M. hypoleuca*.

Seed germinates if given a cold stratification period of 6 to 12 weeks' duration. Germination occurred 6 weeks after sowing.

*Ilex collina*, the long-stalked holly, is a deciduous shrub of great ornamental potential that is found in West Virginia, Virginia, and North Carolina. I have seen populations in West Virginia and



Virginia and judging from the trees seen with it (spruce, fir, and hemlock) it should demonstrate good hardiness. The plant itself is a multi-stemmed species growing to 10 ft. The main ornamental attribute of this holly is its large fruit, about 8 mm in diameter and held on a long peduncle  $\frac{3}{8}$  to  $\frac{5}{8}$  in. long. Fruit ranges in color from dark scarlet-red to orange to a yellow-fruited form, *Ilex collina* f. *van trompii*.

A cutting trial was set up using three different media: sand and perlite (1:1, v/v); peat and perlite (1:1, v/v); and pumice mix. Cuttings were taken in mid-July, given a treatment of 8000 ppm IBA powder, and placed under an intermittent mist system. Cuttings were rated in mid-October and little difference was evident among media. Controls and all hormone treatments rooted 100% with little qualitative difference. Leafless fall cuttings stuck in pumice mix, after treatment with 8000 ppm IBA powder also rooted 100%.

A seed germination trial was conducted with fresh, wild-collected, seed from a West Virginia population. Lots from 18 plants were given treatments including direct sowing; a three-month cold stratification; five months warm stratification, followed by three months cold; and three months warm, followed by two months cold. Results after one year are mixed. Fresh sown seed has produced both seedlings and seed with just radicle emerged. Similar results were obtained from the 3 month cold treatment. Treatments that started with a warm stratification, often had seeds producing radicles in the bag prior to the cold treatment; therefore, in many cases, the cold treatment was skipped. In general, it appeared that the seed lots that received any length of warm stratification, whether followed by cold stratification or not, had produced more seedlings after one year.

*Ilex amelanchier*, the sarvis or satinberry holly, is another rare deciduous holly of the southeast coastal plain. It inhabits woody stream banks and sand hills in sporadic stands from North Carolina to Louisiana. A shrub, or rarely a small tree, it features a soft-green foliage and a fruit that, at maturity, is a striking rose-purple color with a satiny rather than glossy finish. This species has withstood below zero temperatures in Boston. The specimens we have are not heavy fruiting, so there is room for some selection with this species. A cutting trial was started in mid-July using cuttings from a ten-year old plant. The treatments were the same as those with *Ilex collina*. The following results were obtained: for the peat mix, both control and treated cuttings rooted 100%; for the sand mix, the treated cuttings rooted 100%, control 0%; and for the pumice mix, treated cuttings rooted 86%, control 100%. Qualitatively, the peat mix produced better roots and seems to be the best for this species.

A seed trial was also conducted with the following results: Direct sowing yielded 36% germination as compared to 68% germination after a three-month cold stratification treatment. Seed lots

were also given warm stratification, followed by cold stratification treatments. A 5 month warm plus 3 month cold (5W, 3C) treatment germinated 64% and with a 3W, 2C treatment seed germinated 72%. In short, it seems to be a very easy holly to get good seed germination as long as it receives a cold treatment.

*Conradina verticillata*, the Cumberland rosemary, is a low growing shrub native to Big South Fork and Obed River drainages of the Cumberland Plateau in Tennessee and Kentucky. It is found on sandy gravel bars in full sun, although during flood stage the plant is totally underwater.

The Cumberland rosemary, although highly ornamental, has received only limited testing and its tolerance to cold is still unclear. One botanist, Howard Pfeiffer, grows the plant successfully in Zone 5 in Mansfield Center, Connecticut. It features small, purple-pink to whitish flowers, and shows both upright and more prostrate forms. These prostrate forms deserve trial as a ground cover.

This is the easiest plant to root I have ever handled. Two hundred and forty fall-cuttings were collected from 20 different plants. The cuttings were treated with 4000 ppm IBA powder, stuck in a poly tent with bottom heat and a medium of sand and perlite (1:1, v/v). Two hundred thirty-six cuttings, or 98%, rooted with a good to excellent rating.

I have never seen seed pods on any plants, either cultivated or wild, and no data exists for germination of *C. verticillata* seed, to my knowledge.

White wicky, *Kalmia cuneata*, is one of the rarest shrubs of the U.S. East Coast. It is found only in eight counties in the Carolinas where it inhabits sand plains and pocosins. A rhizomatous shrub, it grows to 5 ft and features a creamy-white flower with an inner red band. It blooms later than *K. latifolia*, in July rather than June, and is unique among kalmias in that it is deciduous and shows a maroon fall color. We now have an 8-year old plant that has survived sub-zero temperatures.

Cuttings were taken in July from this specimen and stuck under an intermittent mist system. Treatments were 8000 ppm IBA powder and control; and media of peat and perlite (1:1, v/v), and sand and perlite (1:1, v/v). In the peat mix, IBA-treated cuttings rooted 60% with control rooting 80%; while in the sand mix the IBA-treated rooted 90% and controls rooted 0%.

Seeds germinated without pretreatment, with seedlings appearing after one month. However, Richard Jaynes states in his definitive book, "The Laurel Book" that seed receiving a cold stratification of one to four months germinates much better than those receiving no cold treatment.

This plant is probably useful for planting in sandy soils, rock gardens, and small scale landscapes.

*Cladrastis kentuckea*, or *C. lutea* as it was formerly known, is a



large tree with the common name, yellow wood. It ranges from central Indiana to southern Alabama and from eastern Kentucky out to Oklahoma, but is rare and scattered throughout. In cultivation, yellow wood can reach heights of 60 ft, with a spread generally wider than its height. I have seen specimens with a trunk circumference of 14 ft.

It is an all-seasons ornamental. Long hanging panicles of sweetly fragrant white flowers appear in mid-June. In general, the tree has a good floral display every other, or even every third year. Foliage is compound, usually seven large leaflets per leaf. Fall color ranges from clear yellow to a soft orange. Winter interest is created by its grey beech-like bark and striking habit.

Propagation by seed is quite simple. Like many woody legumes, once the seed is removed from the pod, the hard, impermeable seed coat must be scarified. The easiest method is simply to put the seeds in a container, add boiling water, and allow to cool. Seed must then receive a cold stratification period of three months prior to sowing.

The existence of a pink-flowered form makes vegetative propagation desirable. Unfortunately, *C. kentuckea* is difficult to propagate by cuttings. This summer I attempted to root cuttings from a 60-year-old tree of the species under mist. An experiment was set up with two media, sand and perlite (1:1, v/v) and pumice mix. Treatments were 8000 ppm IBA powder, a 6000 ppm K-IBA saturated toothpick inserted longitudinally at base as described for the magnolia, and control in the sand mix. Only the toothpick treatment produced any rooting, at 10%. However, in the pumice mix, the control and IBA powder treatment rooted 10%, while the toothpick treatment rooted 70%.

Grafting is also possible and our records show success in grafting the pink-flowered cultivar, 'Rosea' onto the species. *Cladrastis kentuckea* 'Rosea' was first described in 1961, registered in 1963, and has been sporadically propagated at the Arnold Arboretum. It is a plant we hope to have for distribution in the near future.

The plumleaf azalea, *Rhododendron prunifolium*, was first introduced to horticulture in 1918 by the Arnold Arboretum. It is found only in wooded ravines in a limited area along the southern Georgia-Alabama border. I have seen it growing as an understory plant on a steep slope whose soil was quite heavy.

Its value to horticulture is primarily its lateness of bloom. In Boston, the reddish-orange blooms usually start in late July and continue well into August. This late flowering makes it a valuable partner for hybridizing and this has been proven by the late Ed Mezitt, whose fine hybrids were shown last year by Wayne Mezitt. The plumleaf azalea, despite its southerly distribution, shows surprising hardiness, having been hardy in Boston for decades, and

having been rated as hardy to  $-25^{\circ}\text{F}$  by the State Arboretum of Minnesota.

From cuttings taken from an old plant in early July, I was able to get good rooting percentages. Both the pumice mix and sand mix (see *I. collina*) were used with a hormone treatment of 8000 ppm IBA powder. The pumice mix showed 80% rooting for control, and 87% for hormone treatment. The sand mix showed 80% rooting for control, and 93% for hormone treatment. Rooting quality was a bit better in the pumice mix with 70% of the rooted cuttings rated excellent, versus 55% for the sand mix.

Seed germination is quite simple provided sound seed is obtained. I have had good seed germination from direct sowing onto sphagnum moss, although germination would probably be more uniform with a short, cold stratification. Because of its late bloom, *R. prunifolium* often does not have enough time to set good seed in Boston. One way around this might be to containerize some plants which could be brought into a greenhouse to develop further.

*Franklinia alatamaha*, a member of the camellia family, is this country's most famous rare woody species. Once native to the Alatamaha River drainage area Georgia, it has been extinct in the wild for almost two centuries.

At the Arnold Arboretum we have a number of mature specimens measuring about 18 ft high and equally broad. Habit is loose and upwardly arching. *Franklinia*'s outstanding ornamental attributes are its gorgeous white blossoms and its burgundy fall color. As the species flowers in autumn, usually in September and October, it is possible to have blooms and fall color coinciding.

Under mist, cuttings taken in early August rooted quite easily at 100% when treated with 8000 ppm IBA powder and placed in pumice mix. Similar results were obtained with a 6000 ppm K-IBA dip in the same medium. In a sand and perlite medium, 8000 ppm IBA powder rooted 100 percent although quality was a bit less than the pumice lots as only 80% showed excellent roots vs. 100% excellent for pumice. A control in this medium rooted 80%.

*Franklinia* seed differs from *Stewartia pseudocamellia*, another member of the Theaceae, in that it does not have a double dormancy and seed germinates well after a 3 month cold stratification period.