

# EVALUATION AND PROPAGATION OF *LIQUIDAMBAR STYRACIFLUA* 'ROTUNDILOBA'

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The American sweetgum is recognized in many parts of the world, as well as areas of the United States into which it has been introduced, as a choice ornamental shade tree. Adaptable to a wide range of sites, this member of the Hamamelidaceae family is characterized by a pleasing pyramidal shape, attractive glossy foliage, and often spectacular fall color. Its landscape use, however, in its native range has been restricted as a result of a preoccupation with the negative aspect of its spiny fruit, which often obscures its many positive attributes. Suggestions are usually ignored that there are many non-pedestrian areas where the sweetgum would make an excellent choice (1).

## ORIGIN AND HISTORY OF *L. styraciflua* 'Rotundiloba'

With the only significant negative feature of the sweetgum being its fruit production, introduction of a fruitless form would greatly expand the range of suitable landscapes for use of this fine ornamental tree. Unknown to much of the gardening public, as well as the nursery trade, a true fruitless form has in fact been in existence for some 60 years.

The tree was first identified in 1930 by Mr. R. E. Wicker of Pinehurst, N.C. who found a sweetgum with round-lobed leaves. It was sent to the Arnold Arboretum in Boston, and a description was published in the *Journal of the Arnold Arboretum* in 1931 (2). The plant was described as a botanical form of *Liquidambar styraciflua rotundiloba* Rehder and was propagated and sent to a few botanical gardens. It remained relatively hidden for decades until it was noticed in 1968 that one of the original trees distributed to the Coker Arboretum at the University of North Carolina had never produced fruit. It has subsequently been determined that the fruitless characteristic and the round-lobed leaf are genetically linked and not simply a juvenility issue.

## EVALUATION

The fruitless sweetgum was initially evaluated with a number of other cultivars in trials by the Saratoga Horticultural Foundation in California beginning in 1968. It was not deemed worthy of

further propagation and distribution because it was felt that the tendency of this cultivar to form two or more leading shoots would result in narrow branch angles subject to storm damage (3). However, the original tree in Chapel Hill, which is now 90 ft. in height, as well as a 45-ft. tree on the North Carolina State University campus in Raleigh, both exhibit good form. In addition, neither tree has exhibited significant damage from several devastating ice storms in recent years. In our observations of younger, developing trees the formation of inordinately narrow branch angles has not been a significant problem.

Much of the more recent evaluation of the fruitless sweetgum has been conducted by the North Carolina State University Arboretum in Raleigh, North Carolina. One of the primary functions of the collection, under the direction of Dr. J. C. Raulston, is to evaluate promising new plants for use in the mid-Atlantic and southeastern United States. As part of this program, the fruitless sweet gum has been under evaluation for a number of years with plants distributed to different geographic areas for observation.

The form, 'Rotundiloba', in addition to its fruitless nature, differs from the species in the appearance of its leaf, which one would scarcely recognize as *Liquidambar*. The leaf is star-shaped with five lobes; however, as the name implies, the leaf margin is gently rounded. In addition, the fruitless form is late to color in the fall, displaying excellent coloration in shades of yellow, crimson, burgundy, and purple.

Growth rates have been rapid in the field where, with ample moisture and nutrition, four feet of growth may occur in established plants. Growth rates have been somewhat slower in containers, with early spring grafts or June-budded plants in No. 1 containers averaging 18 in. of growth the first year. Growth rates increased to 24 to 30 in. the second year following potting.

Perhaps the major question regarding *L. styraciflua* 'Rotundiloba' concerns its hardiness. The species itself is found naturally occurring from Connecticut to Florida and west to Illinois (USDA Zones 5-9). The trees in Chapel Hill and Raleigh (Zone 7) have been hardy to -15 °F. However clearly the tree is very late to go dormant. On the U.S. East Coast, the cultivar is probably not reliably hardy much farther north than the Raleigh, N.C. area. Plant distribution and observation is continuing in this area.

*Liquidambar styraciflua* trees generally are best-suited for neutral or acid soils. They do not grow well on alkaline soils.



## PROPAGATION

Because of the relatively small amount of 'Rotundiloba' stock available, we have utilized several techniques in an effort to determine the propagation method and timing that best suits our existing production schedule and also maximizes our success rate.

**Bench grafting.** Bench grafting of 'Rotundiloba' is best done in late February and early March on two-year, 1/4-in. caliper seedlings potted in deep, bottomless band pots. The understock is brought into an 60 °F greenhouse and drenched with Subdue 2E three to four weeks prior to grafting.

In our bench grafting we have predominantly utilized the familiar side-veneer graft. The carpentry is familiar (4) thus I will mention only specific modifications we have employed. Terminal scionwood containing three to four buds is used whenever possible. The use of non-terminal wood frequently results in a liner characterized by a "dog-leg" growth habit of the leader, versus the straighter central leader resulting from the use of terminal shoots.

The graft is made 1 to 2 in. above the soil level of the potted stock and wrapped with a 1/4- x 5-in. rubber budding strip, leaving gaps between each turn for subsequent callus formation. The entire graft union, as well as the scion, are then wrapped completely with Parafilm (American Can Co.). A high humidity seal for both graft union and scion is thus provided. Within two to three weeks the emerging new growth easily penetrates the film which, with time and warm temperatures, begins to break down. The rubber budding strip, however, is removed prior to any girdling of the stem.

We begin to head back the understock two to three weeks following emergence of the new growth. The process continues over a period of weeks until by late spring the understock is completely removed. Our success rate has been 95% in bench grafting the fruitless sweetgum.

**Chip budding.** We have also chip-budded (4) 'Rotundiloba' on 1-gal. seedling understock in mid-June as well as in late August to early September. Others have reported good success in budding other sweetgum cultivars with the more conventional T-bud. We utilize chip budding exclusively in our operation for several reasons. One important reason is the extended interval during which we can bud since the bark does not have to be slipping as is necessary in T-budding.

The bud union is wrapped with 1/2-in. polyethylene strips. We have found with high summer temperatures the Parafilm, if stretched too thin, may break down before adequate development of the bud union. The poly strip is cut or untied three to four weeks after June budding, and the understock is cut back to just above the upper edge of the callused union. At this time, a bud clip is

attached to the stem just below the bud union facilitating the development of a straight central leader on the young tree. For fall-budded trees the understock is headed back the following spring prior to bud break.

**Cuttings.** In limited trials we have propagated the fruitless sweetgum under mist from softwood cuttings taken in June. For us, however, percentage takes have been low and we have encountered difficulty in overwintering rooted cuttings. Plants from cuttings have also been inferior in growth form and vigor to budded or grafted plants.

**Tissue Culture.** Individual numbers of desirable sweetgum cultivars will probably be more rapidly increased in the future through tissue culture. Selected *Liquidambar* clones have been micropropagated from excised buds of mature specimens, with complete plants able to be acclimatized to the greenhouse without difficulty (5). 'Worplesdon' is a cultivar with attractive finger-like foliage and rich autumn color currently available on its own roots through micropropagation.

## SUMMARY

As the evaluation of *Liquidambar styraciflua* 'Rotundiloba' continues it appears that there is the potential for its widespread use, at least in the southeastern part of U.S. Its hardiness range and growth form will continue to be evaluated in future years. A number of nurseries are currently building up stock of the tree so that increasing numbers of plants should begin to appear in the trade in upcoming years.

## LITERATURE CITED

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- 2 Rehder, A 1931 New species, varieties, and combinations *Jour Arn Arb* 12 59-78
- 3 Santamour, F S and A J McArdle 1984 Cultivar checklist for *Liquidambar* and *Liriodendron* *Jour Arbor* 10(11) 309-312
- 4 Macdonald, B S 1986 Practical Woody Plant Propagation for Nursery Growers Vol 1 Timber Press Portland, Oregon
- 5 Sutter, E and P Barker 1983 Tissue culture of selected mature clones of *Liquidambar styraciflua* *Proc Inter Plant Prop Soc* 33 113-117

VOICE: We have propagated 'Rotundiloba' using softwood cuttings, but the percentage take was low, and overwintering was a problem. The plant seems less vigorous than the regular sweetgum.

MIKE BRACKEN: Could graft incompatibility be a problem?

STEPHEN BURNS: Dick Birr, North Carolina Extension Ornamental Crop Specialist, noticed graft incompatibility. He felt that the use of the cleft graft might be the problem. His technician felt it might be the graft carpentry, a poor match of stock and scion, but we have had no other reports of graft incompatibility.