Magnificent *Maclura*—Past and Present

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New cultivars of the Osage orange have stimulated interest in this distinctive native tree.

The Osage orange, *Maclura pomifera*, has a long and interesting history of use by both Native Americans and early pioneers (Sand, 1991). Its wood was once in demand for making hubs and wheel rims for horse-drawn vehicles, mine timbers, posts, and other uses where resistance to rotting was important. Its decay resistance is due to the chemical 2, 3, 4, 5-tetrahydroxystilbene, located in the wood and toxic to many fungi (Smith and Perino, 1981).

Perhaps the species is best known as a "living fence" because of its stout thorns on zigzagging branches, ease of propagation, rapid growth, and tolerance to heat, drought, and wind. Osage orange was first cultivated in the South in the early 1800s. The plant reached Jacksonville, Illinois, by 1830, brought north by Professor Jonathan Turner, a biology teacher from Illinois College, and promoted through the efforts of John A. Wright, editor of *The Prairie Farmer*. By 1847 Turner was convinced that Osage orange was the best fencing material available, describing it as "horse high, bull strong, and pig tight"; it functioned as a fence long before the invention of barbed wire, which did not come into wide use until 1875 (Dick, 1975).

Maclura pomifera, a member of the mulberry family (Moraceae), grows best in the rich bottomlands along the Red River between Texas and Oklahoma. It also occurs naturally across southern Missouri, Arkansas, and parts of Louisiana (Smith and Perino, 1981). The species is often referred to as hedge apple, or just "hedge," from its common use as hedges and windbreaks in the plains states. Dunbar and Hunter suggested the idea of cultivating Osage orange as a hedge to President Thomas Jefferson upon return from their expedition to the Red River in 1806 (Morton, 1967).

The common name of the plant comes from its globular, characteristic fruit, about the size of a large orange, borne on female trees of this dioecious species (Figure 1). The French found the Osage Indians making their bows from its wood and called it *bois d'arc* (meaning wood-of-the-bow). Such bows were so highly regarded by Indian tribes to the north that they were considered worth a pony and a blanket in trade. Recently the tree has been advocated as an urban tree for difficult planting sites (Powell, 1979).

The Champion Tree

The champion Osage orange tree in the United States was reported in 1939 to be located in Charlotte County, Virginia; it measured 15.5 meters (50.9 feet) high, with a circumference of 7.5 meters (24.5 feet) and a spread of 28.2 meters (92.5 feet) (Collingwood, 1939). Recent correspondence has indicated that this same tree, although somewhat in decline, is still on

Figure 1 Typical fruit and thorns of Maclura pomifera, *both undesirable when the tree is planted for landscape use.*

the front lawn of the restored home of Patrick Henry, near Red Hill, Virginia, and is now nearly 18 meters (59 feet) high with a crown spread of 30.5 meters (100 feet) and a trunk diameter of 2.7 meters (9 feet) (Figure 2). The Henry family reports that the family physician present when Patrick Henry died on June 6, 1799, became so upset at not being able to save the legendary patriot that he went outdoors and "threw himself underneath a large tree, weeping bitterly" (Daily, 1983). The Osage orange is thought to be the "large tree" mentioned, a living landmark of another era.

The largest Osage orange in Kansas grows in Labette County and measures 18 meters (59 feet) tall with a 21.3-meter (70 feet) crown spread and a 4.8-meter (15.8 feet) circumference. Although doubts have been expressed about the hardiness of this southern species, it has survived as far north as the Platte River in central Nebraska (Dick, 1975). Large specimens occur across southeastern Iowa and central Illinois and Ohio, and it has also been planted along the West Coast. Internationally, it has been reported growing in the British Isles, France, Germany, Italy, the Netherlands, Portugal, Romania, Russia, Switzerland, and Australia (Spaulding, 1956).

After the Osage orange became widely planted as fencing around small farms, it quickly invaded the prairies, occurring as small, pure stands or with mixed hardwoods;

Figure 2. The champion Osage orange tree at the home of Patrick Henry in Charlotte County, Virginia. The tree is nearly sixty feet tall, with a nine-foot trunk diameter.

it moved into the eastern states, becoming naturalized in abandoned fields. The species has no natural pests.

Thornless and Fruitless Selections

Although Rehder (1967) reported a thornless variety of the Osage orange, *Maclura pomifera* var. *inermis*, such specimens are uncommon, and some horticulturists suggest that they are merely mature specimens of trees that were typically thorny when they were more juvenile. However, isolated thornless trees have been identified, and a few are creeping into the commercial trade. Kansas State University has been identifying and evaluating thornless selections for over twenty-five years (Pair and Keen, 1980). The first introduction made in the mid-1970s was 'Pawhuska', named after an Osage Indian chief. The most recent release is 'Wichita' (Figure 3), a thornless male selection found growing near Wichita, Kansas (Pair, 1991).

Other selections propagated from large specimens located in Oklahoma, Kansas, and Iowa continue to be evaluated. Quite promising is one called 'Whiteshield', found growing along Whiteshield Creek, and

named after a Cheyenne Indian chief. The tree has glossy, cordate-shaped leaves (Figure 4) and was discovered by John Flick near Hammond, Oklahoma. Another large male specimen without thorns, found by Al Ferguson growing in an old nursery near Denmark, Iowa, is being propagated for comparison with nine other clones at the Horticulture Research Center in Wichita, Kansas.

Propagation

Osage orange is easily propagated in a variety of ways. Seedlings, traditionally used for windbreaks or as understock for improved selections, are grown from stratified seed removed from the large, leathery fruit collected in the fall. Seed slip easily from the pulp if allowed to ferment in water for several days. Stratification for 30 to 45 days at 4 degrees Centigrade (40° F) is usually sufficient to break dormancy so seed can be planted in the greenhouse in January or February. If sown outdoors in the fall, germination will occur in April or May the following spring. Seedlings large enough for T-budding can be produced by mid-August.

Budding can be done in August using vigorous, current season's growth directly from any superior plant. Such buds will remain dormant until forced out the following April or May. Alternatively, dormant scionwood can be collected during winter and stored for June budding once bark slips on the understock.

Bench grafting is also easily accomplished using either a whip and tongue or cleft graft in midwinter. Grafts should be allowed to callus six weeks at near 12 degrees Centigrade (55° F) before potting up or lining out in the spring. The rootstock should be the same size as the scions used, or larger. Wrapping with grafting tape or masking tape secures the union until callusing occurs.

Cuttings, both softwood and hardwood, are commonly used to propagate thornless and fruitless selections vegetatively. Tender

Figure 3 A ten-year-old specimen of Maclura pomifera *'Wichita', a thornless, male cultivar.*

shoots, fifteen centimeters (6 inches) long, taken in May or early June and placed under intermittent mist, will root in five to six weeks. Rooting hormones greatly increase the percentage and the numbers of roots produced. Concentrations of indolebutyric acid (IBA) ranging from 2,500 to 5,000 parts per million are usually adequate. The commercial talc formulation Hormodin® No. 2 (3,000 ppm) works well. Softwood cuttings ready for potting in August need winter protection before lining out the following spring.

Hardwood cuttings can also be propagated easily with wood collected from January to March. With this method, plants of sufficient size can be produced for lining out the same season. Pair and Khatamian (1984)

Figure 4. A fruitless and thornless selection of Maclura *with glossy, cordate-shaped leaves.*

found basal stem portions rooted better than terminal sections when taken off mature trees. Wood collected in winter should be cut into six- to eight-inch cuttings, dipped in 5,000 to 10,000 ppm IBA, and placed over bottom heat near 21 degrees Centigrade (70°F) in a cool greenhouse (13 to 18 degrees Centigrade [55-65° F]). The rooting medium can be either perlite or a mixture of perlite and peat in a two-thirds to one-third ratio, and should be kept moist, but not too wet. Bottom heat allows callusing and rooting to occur before leaves emerge from the cuttings (Figure 5).

Cuttings taken as late as March 1 often root in three weeks and can be potted up in eight weeks—until of sufficient size for lining out in early summer. Since there is a strong tendency for multiple stems to occur in this species, cuttings can be grown for one season without pruning or training. If the plant is cut back to a single bud near the base the following spring (as in propagation by budding), a strong central leader can be produced to form a better, single-stemmed tree.

Osage orange has seldom been used as a common residential tree. Its wide-spreading root system requires ample space, but its rustic beauty—particularly when the glossy green leaves turn yellow in autumn—can provide shade and ornamental value to parks and landscapes and at the same time symbolize the American frontier.

As improved selections become available and the demand for stress-tolerant, pest-resistant trees increases, greater use may be

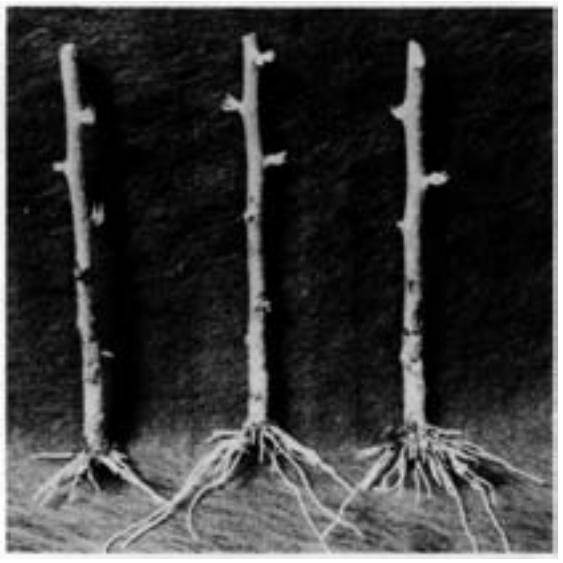

Figure 5. Rooted hardwood cuttings of Maclura *after four weeks of bottom heat and a treatment of 5,000 ppm IBA*

made of male *Maclura* cultivars. From the windswept prairie to the inner city, this tree may fill the need for those difficult planting sites where few other species can survive.

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