About Our Cover

Mayhaws: Trees of Pomological and Ornamental Interest

Since antebellum times, mayhaw *[Crataegus aestivalis* (Walter) Torrey & Gray, *C. opaca* Hook. & Arn., *C. rufula* Sarg.] fruit has been treasured for culinary uses in the U.S. deep South (Elliott, 1971). Mayhaws merit attention not only for their delightful aromatic fruit, but also because they are one of the few ornamental flowering trees adapted for use in lakeshore and wet-area landscaping. Mayhaws are members of the family Rosaceae, subfamily Maloideae, tribe Crataegeae. This round-topped, small tree (8 to 10 m high) has outstanding ornamental characteristics: attractive foliage, showy white to pale pink blossoms (15 to 28 mm in diameter), clusters of brilliantly colored fruits, and an upright or pendulous tree form. Mayhaws are locally abundant in low, wet areas in limesinks, bays, sloughs, river bottoms, and along streams and in swamps from North Carolina to Florida and west to Arkansas and Texas (Fig. 1) (Clewell, 1985; Coker and Totten, 1945; Correll and Correll, 1975; Correll and Johnston, 1970; Godfrey and Wooten, 1981; Kurz and Godfrey, 1962; Mohr, 1969; Phipps, 1988; Radford et al., 1974; Sargent, 1965; Small, 1913; West and Arnold, 1952). Hawthorns are easily recognized as a group (genus), but species are extremely difficult to distinguish due to polyploidy and apomixis (Cronquist, 1981; Phipps, 1983). More than 1100 species have been described from North America (Bailey, 1960; Rehder, 1960), but only those early ripening, palatable, *Crataegus* spp. (series *Aestivules)* from the southern United States are considered mayhaws.

Mayhaw trees flower profusely and early (late February to mid-March in southern Georgia, USDA zone 9A) on previous season's shoots and spurs. Fruit ripens mostly in early May; hence, the name mayhaw. Mayhaw fruit is a small pome (8 to 19 mm in diameter), yellow to bright red, fragrant, acid, and juicy, resembling cranberries in appearance with a crabapple-like taste. Studies conducted on mayhaw fruit from the 1989 season showed the fruit to be rich in K (152-245 mg/100 g), Ca (20-56 mg/100 g), ascorbic acid (23-40 mg/100 g) and high in β–carotene (226-1200 µg/100 g). These values compare favorably with those from the Mexican hawthorn *(C. mexican* Moc. & Sesse) and the Chinese hawthorn *(C. pinnatifida* Bunge) (Coetzee et al., 1950; Rogers and Rogers, 1988).

Until recently, the fruit has only been used locally in marmalades, butters, preserves, jellies, condiments, syrups, wines, desserts, and as food for wildlife (Elliot, 1971; Gibbons, 1974; Halls, 1977; Hedrick, 1919; Morton, 1963; Reynolds and Ybarra, 1984; Wood, 1864). However, during the past 5 to 10 years, mayhaws have received attention as a source of income for cottage industries. The fruit, netted from the water or hand-harvested from native trees, wholesales for $2.75 to $4.40/kg ($5 to $8/gallon) and jelly retails for up to $18.00/liter ($8.50/pint). There are, at present, at least eight commercial manufacturers of the jelly in the southeastern U.S. Because demand exceeds supply, many farmers and entrepreneurs, and some researchers, are showing interest in culture and use of this native plant.

HORTICULTURE

Propagation. Under natural conditions, hawthorn seeds do not germinate until overwintered (Hartmann and Kester, 1983). *Crataegus* species have embryo dormancy and require treatment in a moist medium at low temperature before germination will occur (Schopmeyer, 1974). Seeds are an easy way to produce plants, since nucellar seedlings, which produce fruit like the mother tree, are common in mayhaws (W.B. Sherman, personal communication).

Mayhaw cuttings can also be rooted under intermittent mist or in a humidity chamber during the summer (Payne and Krewer, 1990). Propagation from hardwood and root cuttings has also been reported by nursery workers; however, no details were revealed. Mayhaws are easily grafted during dormancy (late winter). A whip-and-tongue or simple whip graft can be used. Cleft grafting can be used on larger trees.

Rootstock. Mayhaw appears to be initially compatible with any hawthorn species. In Mississippi, the parsley haw *(C. marshallii* Egg].) is considered an excellent rootstock for *C. opaca* (McDaniel, 1980). Good results have been reported using cockspur (C. *crus-galli* L.) and Washington hawthorn [C. *phaenopyrum* (L.f.) Med.] rootstock in Texas for *C. opaca.* Trials with *C. opaca* in Louisiana, however, have produced variable results with Washington hawthorn. *C. aestivalis* can also be grafted onto commercially available Washington hawthorn seedlings, but it is not known how they will perform at maturity. In Georgia, the hoghaw *(C. flava* Aiton), which grows on sand ridges, can be used, but, due to its slow growth rate, the mayhaw scions may overgrow the hoghaw rootstock. Mayhaw seedlings are probably the best choice as a rootstock in damp soils.

Cultivars. About a dozen mayhaw selec-

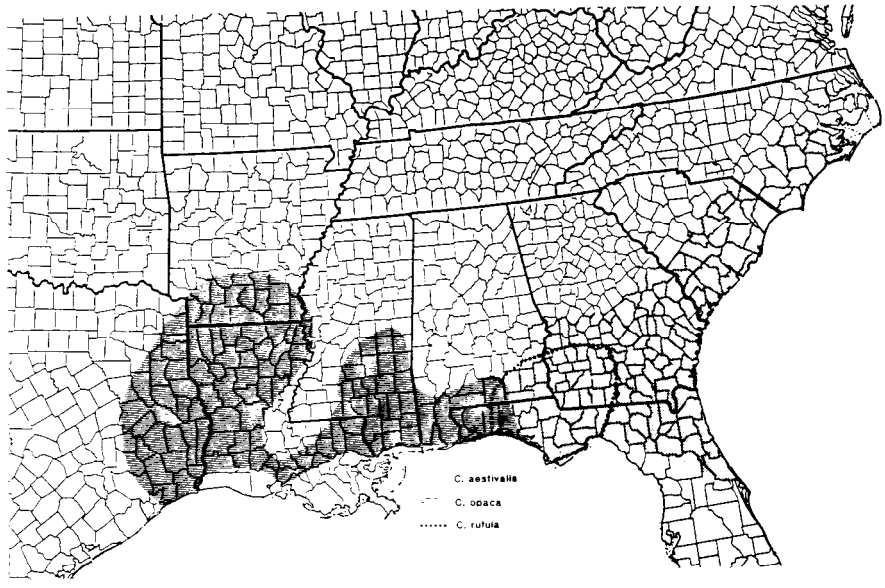

Fig. 1. Native range of mayhaw *(Crataegus aestivalis, C. opaca, C. rufula)* in North America.

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(continued from inside front cover)
tions have been collected from the wilds (river bottoms, lime-sink, swamps, sloughs) of Georgia, Mississippi, Louisiana, and Texas, with attention given to size of fruit, harvest or ripening period and yield (Payne and Krewer, 1990); however, information from field trials is very limited. Most ripen over a 30-day harvest period, but 'Lori' *(C. aestivalis)* may have 80% of the fruit ripe at one time. 'Super Spur' *(C. opaca)* appears to be one of the best from the standpoint of yield and tree form. Yields of 30 kg/tree have been reported for 30- to 40-year-old wild mayhaws in Georgia and 60 kg for a 15year-old 'Super Spur' in Louisiana. Preliminary reports indicate that current mayhaw cultivars are best-adapted to USDA zones 9A and 9B. Although most cultivars have a low chilling requirement (250 to 500 hr at ≤ 7C) and bloom early, some unnamed selections under test should be adapted to the piedmont of the southeastern U.S. Most *C. aestivalis* cultivars bloom a few days later than *C. opaca* cultivars, and may be better choices further north. Bloom occurs over an extended period of time and the fruit are reported to be fairly frost hardy once past the bloom period. Tree winter hardiness is good, but data on flower bud winter hardiness are limited. There have been reports of mayhaws fruiting after -25C and 2-year-old trees survived -32C without damage; however, fruit production has been poor under these conditions (Akin, 1985).

Orchards. Although tolerant of wet, very acid soils (pH < 5.0), better growth has been observed when mayhaws are planted on well-drained, slightly acid soils (pH 6-6.5). Mayhaw trees are long-lived and may have a 9-m canopy diameter after 20 years. A spacing of ≈6.1 × 6.1 m is suggested to provide sufficient space for mechanical or hand harvesting. Yearly pruning to remove low branches and to open up the tree canopy for greater light penetration may be necessary with most cultivars.

Pest problems. There is limited information on the pest management of mayhaws; however, it is known that they are susceptible to many of the insects and diseases that attack other pome fruits (Crops Res. Div., 1960; Forest Service, 1985). Several insects, including plum curculio *[Conotrachelus nenuphar* (Herbst)], apple maggot *[Rhagoletis pomonella* (Walsh)], hawthorn lace bug *[Colythuca cydoniae* (Fitch)], flower thrips *(Frankliniella* spp.), roundheaded appletree borer *(Saperda candida* F.), flatheaded appletree borer *[Chlysobothris femorata* (Olivier)], whitefringed beetle *(Graphognuthus* spp.), apple blotch leafminer *[Phyllonorycter crataegella* (Clemens)], terrapin scale *[Mesolecanium nigrofasciatum* (Pergande)], cottony maple scale *[Pulvinaria innumerabilis* (Rathvon)], apple mealybug *[Phenacoccus aceris* (Signoret)], and pear sawfly *[Caliroa cerasi* (L.)] feed on the foliage, flower, fruit, and wood of mayhaw. The plum curculio and apple maggot, in particular, have caused extensive damage to fruit in some locations and will probably require preventive treatment.

There are numerous diseases known to occur on various hawthorn species, but little information is available on diseases of mayhaws. Quince *rust (Gymnosporangium clavipes* Cke. & Pk.) and American hawthorn rust *(G. globosum* Farl.) have been severe on some mayhaws native to southern Georgia and northern Florida and several *C. aestivalis* and *C. opaca* cultivars since 1983. At present, no rust control recommendations are available except the planting of rust-free selections. At this time, only two pesticides, insecticidal soap and rotenone/pyrethrin, can be used for pest control on mayhaws destined for food use.

PROSPECTS

Although mayhaw appears to be initially compatible on most *Crataceg*us rootstocks, our knowledge of mayhaw rootstocks is rudimentary at best. There is little published information available on the productivity and long-term compatibility, because mayhaw orchard plantings have existed <5 years. Existing information on methods of propagation is also very limited. Cultivar evaluations have not been conducted in replicated orchard plantings, and low-chilling requirements of many cultivars may limit their commercial adaptability to zone 9A or 9B.

Research possibilities are unlimited. Preliminary research projects are underway by university personnel in Georgia, Mississippi, Louisiana, and Texas, especially with regard to cultivar evaluation and pest control. If the industry is to greatly expand, cultivars adapted to mechanical harvesting are desired. There are many potential products made from mayhaws, such as juices, jellies, preserves, candies, pastries, and wine. At this point, only the jelly manufacturing has been investigated by university or industry personnel. Thus, the potential exists for a greatly expanded market dependent upon a consistent supply of fruit. Unless problems associated with production are solved, the traditional harvest from native stands will be insufficient to allow for alternate product development.

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