Proc. Fla. State Hort. Soc. 110:169-171. 1997.

PERFORMANCE OF MAYHAWS IN SOUTH GEORGIA AND NORTH FLORIDA

G. W. KREWER
University of Georgia
Tifton Campus
Tifton, GA 31973

T. E. CROCKER
Horticultural Sciences Department
University of Florida, IFAS
Gainesville, FL 32611

Additional index words. Crataegus aestivalis, Crataegus opaca, and *Crataegus rufula.*

Abstract. **Mayhaws [*Crataegus aestivalis* (Walter) Torrey & Gray, *C. opaca* Hook. & Arn., and *C. rufula* Sarg.] are swamp trees native to the Southeast U.S. Their fruit is used to manufacture excellent quality jelly which is highly esteemed. Traditionally, mayhaws have only been collected from wild stands, but demand for the fruit by home and commercial jelly manufacturers warrants their cultivation. A total of 35 mayhaw cultivars were evaluated at Tifton and Attapulgus, Ga. and seedlings in Florida from 1993-1997. An additional 100 selections collected from diverse sites in South Georgia by Burl Turnage were evaluated at Attapulgus. Best performing cultivars in Georgia in years of no late spring freezes were: Big V, Crimson, Mason's Superberry, Saline, Superspur, T.O. Superberry, Turnage #57 and Turnage #88. In years of late spring freezes (1993 and/ or 1996) the best performing cultivars in Georgia were: Big V, Crimson, Saline, Turnage #57 and Turnage #88. Mayhaws have performed well on upland sites in South Georgia and North Florida with drip irrigation. Trees grafted on mayhaw rootstock have performed well, while trees grafted on Washington hawthorn have lacked vigor. A new disease threat to mayhaws (as yet to be positively identified) is a shoot and flower blight which reduced yields in several orchards in 1997.**

Since antebellum times, mayhaw [*Crataegus aestivalis* (Walter) Torrey & Gray, *C. opaca* Hook. & Arn., and *C. rufula* Sarg.] fruit has been treasured for culinary uses in the U.S. deep South. 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 attractive foliage, showy white to pale pink blossoms (15-28 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 (Payne and Krewer, 1990, Payne, Krewer and Eitenmiller, 1990).

In earlier times there was sufficient wild fruit available to satisfy most local needs. However, recently many of the native stands of mayhaws have been destroyed by land clearing for forestry and agriculture. Many of the remaining groves of mayhaws have been posted, limiting public access for fruit collection. In addition, there are now many small commercial manufacturers of mayhaw jelly and syrup. Demand for pick-your-own and direct sales to consumers has also increased. Mayhaw fruit currently wholesales for about $5 to $8 per gallon ($2.75 to $4.40/kg) and retails for about $8 to $12 per gallon ($4.40 to $6.60/kg).

Demand for mayhaw fruit and their ability to grow on land too wet for most crops has created significant interest in commercial mayhaw production. The objective of this research was to determine if: 1.) mayhaws are adapted to commercial orchard production 2.) identify cultivars with excellent cropping ability and quality 3.) identify potential problems in their commercial production such as insects and diseases. Only limited information is available on the commercial production of mayhaws (Craft, Melcher and Langston, 1996; Puls, 1991).

Materials and Methods

In 1985 a small planting of four named mayhaw cultivars selected from wild groves in Mississippi, Louisiana and Texas were planted at the test orchard near Tifton, Ga. Native seedlings from Georgia were also included in the planting. From 1988-1996 this was expanded to include an additional 20 named cultivars and many seedlings. From one to four trees of each cultivar were planted. Most trees in the grove were grafted on *Crataegus aestivalis* or *C. opaca* rootstock and a few were on their own roots. Some trees were grafted on Washington hawthorn (*C. phaenopyrum*) rootstock. The trees were planted on a moderately wet Alapaha loamy sand without irrigation or a moderately dry Tifton loamy sand with and without drip irrigation. Soil pH was adjusted to 6.0-6.5. Trees were fertilized twice a year with a balanced fertilizer at about the same rate as the adjacent peach orchard. Several applications of insecticides and fungicides were applied post bloom each year on bearing trees.

In 1987, an orchard was established at the Attapulgus Research Farm near Bainbridge, Ga. One hundred trees of mostly *Crataegus aestivalis* collected from 33 diverse sites in North Florida and South Georgia by Mr. Burl Turnage were planted on a moderately dry Norfolk loamy sand with drip irrigation. In 1992 this planting was expanded to include 21 cultivars of *Crataegus opaca* from Mississippi, Louisiana and Texas grafted on *Crataegus opaca* rootstock. Soil pH was adjusted to 6.0-6.5. Trees were fertilized twice a year with a balanced fertilizer at about the same rate as the adjacent peach orchard. Several applications of peach insecticides and fungicides were applied post bloom each year on the bearing trees.

Cultivars and seedlings were evaluated on the basis of bloom date, crop load, fruit size, fruit shape, fruit firmness, fruit appearance, fruit color, fruit retention on the tree, and tree form. Typical full bloom dates varied from mid February to mid March depending on the cultivar. Crop loads varied from no production to heavy production depending on cropping ability and date of the last spring freeze. Severe freezes occurred at Tifton and Attapulgus on March 13-15, 1993 [low temperature about 22 degrees F (-5.6 degrees C)] and March 9, 1996 [low temperature about 20 degrees F (-6.7 degrees C)]. Fruit size measured in width varied from 11 to 19 mm. Fruit shape varied from oblong to oblate. Fruit appearance

was rated on a 1-10 scale with 10 considered the best possible. Cherry red fruit with a glossy red finish and a pink flesh are considered by many buyers as most desirable. Fruit appearance ranged from four to eight. Fruit firmness was rated on a 1-10 scale with 10 considered the best possible. Fruit firmness ranged for four to eight. Fruit retention on the tree was rated on a 1-10 scale with five dropping (shattering) more easily than desired, seven considered commercially ideal, eight slightly too well retained and 10 very excessive. Fruit retention varied from three to eight depending on the cultivar. Trees which retain their fruit well under normal weather conditions, but can be shaken off by vigorous hand shaking of the scaffold limbs are considered desirable. Tree form was characterized.

Several insect and diseases were noted during the study and identified by university entomologists and plant pathologists.

Results

Orchard Adaptability. Mayhaws appear to be well adapted to commercial orchard production. A spacing of 15 to 20 feet (4.6 to 6.1 m) in the row and 20 feet (6.1 m) between rows has been adequate to prevent orchard crowding during the first ten years on upright spreading cultivars. Only minimal detailed pruning has been conducted on the trees after the initial training phase to a modified central leader form. Annual removal of basal suckers and root sprouts is required. Undoubtably mayhaws would benefit from more detailed pruning to increase light penetration into the interior of the tree, but this is very time consuming, because prunings must be carried out of the orchard. The presence of numerous thorns does not allow mowing of prunings with rubber tire tractors. Some trees have required staking after severe wind storms and hurricanes. Trees grafted on mayhaw rootstock (*Crataegus aestivalis* and *Crataegus opaca*) or growing on their own roots have performed well. Tree grafted on Washington hawthorn have grown very slowly, with trunk diameters of only 5-6 cm after four years.

Mayhaws have grown well on upland sites with irrigation. During extreme droughts, trees on upland sites without irrigation can show marginal leaf burn. Mayhaws appear to be an excellent crop for low areas too wet for most crops. On these sites they can be grown without irrigation.

Cultivars. Thirty-five different named mayhaw cultivars and 100 selections (designated Turnage 1-100) were evaluated during the course of the study. The most promising mayhaw cultivars and selections in this study are listed below and in Table 1 in approximate order of ripening.

'T.O. Superberry' is an upright spreading tree that blooms in mid to late February and ripens fruit in late April. The fruit is large and dark red with pink flesh. Fruit firmness is excellent and retention on the tree nearly ideal. Its early bloom time resulted in very light crops in 1993 and 1996.

'Mason's Superberry' is an upright spreading tree that blooms in mid to late February and ripens fruit in late April. The fruit is large, very dark red with pink flesh. Fruit firmness is excellent and retention on the tree can be excessive. Its early bloom time resulted in very light crops in 1993 and 1996.

'Superspur' is an upright tree that blooms in late February and early March and ripens fruit in late April and early May. The fruit is large with a light red/yellow skin and yellow flesh. Fruit firmness and fruit retention are poor. Its early bloom time resulted in light crops in 1993 and 1996. Superspur is very productive in years without late spring freezes.

'Saline' is an upright, spreading tree that blooms in early to mid March and ripens fruit in late April and early May. The fruit is large with mostly red skin and light pink/orange flesh. Fruit firmness and retention are excellent. It produced a 60% crop following the 1996 freeze.

'Big Red' is an upright, spreading tree that blooms in early March and ripens fruit in late April and early May. The fruit is large with red skin and pink flesh. Fruit has good firmness and retention is very good. It produced a very light crop following the 1996 freeze.

'Crimson' is an upright, spreading tree that blooms in mid March and ripens fruit in late April and early May. The fruit is large with mostly red skin and light pink? flesh. Fruit firmness and fruit retention are only fair. It produced a 30% crop following the 1996 freeze.

'Big V' is an upright tree that blooms in early to mid March and ripens fruit in late April and early May. The fruit is large with light red skin and pinkish flesh. Fruit firmness and fruit retention are poor to fair. It produced a 40% crop following the 1993 freeze and a 50% crop following the 1996 freeze.

Turnage 57 selection is an upright tree that blooms in early to mid March and ripens fruit in early to mid May. The fruit

Table 1. Some promising mayhaw cultivars tested in south Georgia in approximate order of ripening.

Cultivar	Typ. date ripe	Typ. bloom date	Fruit size (mm)	Fruit color (skin/flesh)	Firm	Retention	Comments
T.O. Superberry	late Apr.	mid Feb.	15-18	dr. red/pink	8	7	early bloom a problem
Mason's Superberry	late Apr.	mid Feb.	17-18	dr. red/pink	8	8	early bloom a problem, holds on tree tightly
Superspur	late Apr./early May	late Feb./early March	17-18	lt. red-yellow/ yellow	5	5	productive, poor color, soft, shatters
Saline	late Apr./early May	early/mid March	15-19	mostly red/lt. pink	8	8	late blooming, productive, good firmness and retention
Big Red	late Apr./early May	early March	18-19	red/pink	7	7	good size and color
Crimson	late Apr./early May	mid March	16-18	mostly red/ lt. pink?	6	5.5	late blooming
Big V	late Apr/early May	lt. Feb/early Mar	16-18	lt. red/ pinkish-yellow	5	5	most of crop ripens in early May, soft, shatters
Turnage 57	early/mid May	early/mid March	13-16	red/yellow	5	5	late ripening, late blooming, soft, shatters
Turnage 88	mid May	early/mid March	15-17	red/yellow	5.5	6	late ripening, late blooming, somewhat soft

Ratings are on a 1-10 scale where 7 is very good and 8 excellent, except in the case of fruit retention where 8 is slightly excessive.

is medium in size with light red skin and yellow flesh. Fruit firmness and fruit retention are poor to fair. It produced an 80% crop following the 1993 freeze and an 85% following the 1996 freeze. Flowers appear to be pollen sterile, but it is very precocious and set heavy crops in both test orchards.

Turnage 88 selection is an upright, vigorous tree that blooms in early to mid March and ripens its fruit in mid May. The fruit is medium in size with light red skin and yellow flesh. Fruit firmness and retention are poor to fair. Turnage 88 was slow to come into heavy bearing, but since 1994 it has shown outstanding cropping ability. It was the highest yielding selection in the orchard at Attapulgus following the 1996 freeze, producing 41.2 lbs. (18.7 kg).

Pest Problems. A number of insect and disease problems were noted during the study. Since the orchards received pesticide applications during the post bloom period, plum curculio [*Conotrachelus nenuphar* (Herbst)] and apple maggot [*Rhagoletis pomonella* (Walsh)] were not a significant problem. Several scale insects have required treatment with dormant oil. Quince rust (*Gymnosporangium clavipes* Cke. & Pk.) has been a major problem in some commercial orchards, especially where cedar trees are located nearby. However, it has only been a minor problem in the two test orchards in this study. The fungicide myclobutanil (Nova) is pending registered for use on mayhaws to control rust. In 1997 a foliage and flower blight(s) were noted on several orchards in the state including Attapulgus. Samples from Attapulgus have been tentatively identified as *Monilina johnsonii* (Dr. Warren Copes, personal communication). This disease is potentially very serious and reduced the crop at Attapulgus by approximately one-half in 1997. This blight or a similar disease caused a near 100% crop loss in a Thomas Co., Ga. orchard in 1997. Leaf spots can partially defoliate mayhaw trees prematurely in September, but have not required treatment to date. A few herbicides such as glyphosate (Roundup) are labeled for use on mayhaws and can be used for weed control after the root suckers have been removed.

Literature Cited

Craft, B. A., G. Melcher and E. Langston. 1996. Mayhaws, a guide to orchard production and propagation. Morris Publishing. Kearney, NE.

Payne, J. A. and G. W. Krewer. 1990. Mayhaw: a new crop for the South, pp. 317-321. *In:* J. Janick and J. E. Simon (eds.) Advances in New Crops. Proc. First Nat'l. Symp., New Crops: Research, Development, Economics. Timber Press, Portland, OR.

Payne, J. A., G. W. Krewer and R. R. Eitenmiller. 1990. Mayhaws: trees of pomological and ornamental interest. HortScience, Vol. 25(3):cover, 246, 375.

Puls, E. 1991. Commercial mayhaw culture. La. Coop. Ext. Ser. Pub. 2429.

Proc. Fla. State Hort. Soc. 110:171-174. 1997.

HIGHBUSH BLUEBERRY VARIETIES FOR FLORIDA

P. M. LYRENE AND J. G. WILLIAMSON
Horticultural Sciences Department
University of Florida, IFAS
Gainesville, FL 32611-0609

Abstract. **Many southern highbush blueberry varieties (*Vaccinium corymbosum* L.) have been tested in Florida. The best of these allow blueberries to be harvested from early April through May. Early blueberries are not an easy crop to grow in Florida. Good site selection and intensive management are necessary for good results. Breeding cultivars that not only grow and survive well but also produce high yields of high-quality fruit suitable for early shipments requires many years of hybridization and evaluation. The varieties now available to growers in Florida all have strengths and weaknesses that must be considered by growers interested in producing this crop.**

Two classes of blueberries are grown in Florida, rabbiteye and highbush (Williamson and Lyrene, 1995). Rabbiteye varieties are domesticated forms of *Vaccinium ashei* Reade, a vigorous, late-ripening species native in north Florida, southeast Georgia, and south Alabama. Southern highbush varieties are hybrids of *V. corymbosum* L., from New Jersey, with *V. darrowi* Camp, an evergreen, short-statured, stoloniferous blueberry native in the Florida peninsula as far south as Lake Placid.

The breeding of low-chill highbush blueberries that could be grown in Florida was begun in 1950 by Ralph Sharpe (Sharpe, 1954; Sharpe and Darrow, 1959; Sharpe and Sherman, 1971). Programs to develop highbush varieties for other areas of the southeastern U.S. were later begun in Mississippi and in Georgia in conjunction with the U.S. Department of Agriculture (Draper, 1997). The long-term breeding program at North Carolina State University has also produced a few highbush varieties that can be grown in the colder areas of North Florida.

The first highbush blueberry varieties that could be grown in Florida were 'Sharpblue' and 'Flordablue', released from the University of Florida breeding program in 1977. These and subsequent varieties presented two marketing opportunities: pick-your-own marketing in the Florida peninsula and worldwide fresh-fruit marketing a month earlier in the year than had been possible with highbush blueberries in North Carolina or with rabbiteye varieties from north Florida (Lyrene, 1989; Lyrene and Sherman, 1984 and 1988).

Since 1983, when the first highbush blueberries were shipped from Florida, interest in the crop has remained high, but expansion of the acreage has been slow due to produc-

Florida Agricultural Experiment Station Journal Series No. R-06075.