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# Malus

International Ornamental  
Crabapple Society

Summer, 2001

Volume 15, No. 1



*Malus transitoria* Golden Raindrops™ with its interesting cutleaf and petite, lemon yellow fruits has shown some problems with fireblight. Pictured here at the UW -Madison Arboretum. (Photo by David Guthery)



The National Crabapple Evaluation Program plot at the Secret Arboretum in full bloom. (Photo by Erik Draper)

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## International Ornamental Crabapple Society Bulletin

Summer, 2001  
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Malus is the official publication of the International Ornamental Crabapple Society and is published twice annually. The Society is a non-profit organization.

You are invited to join our Society. Please address all membership and other inquiries to the IOCS office:

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Crabapple Society**  
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Kirtland, OH 44094

[www.malus.net](http://www.malus.net)

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J.R. Akridge*

**Front Cover Photo:** *Malus baccata* 'Jackii' has proven to have the best foliage in the NCEP Plot at the Secrest Arboretum. (Photo by David Guthery)

### **Rear Cover Photos:**

(Top left) Oxyporous root rot and collar rot is characterized by an overall decline in tree vigor, yellowing, stunting of the leaves, slowed shoot elongation and finally by the tree death.

(Photo by Austin Hagan)

(Top right) Scaffold limb dieback and severe spur and blossom blight on *M. ioensis* 'Klehm's Improved Bechtel'.

(Photo by Austin Hagan)

(Bottom) Fireblight cankers on *M. 'Mary Potter* in Alabama study.

(Photo by Austin Hagan)

## President's Corner

Prithee, take me to where the crabs grow. Thus saith the Bard of Avon. Come October, IOCS will heed Shakespeare's words, taking you to Ohio for a series of programs at their annual seminar. Here is the Who, What, When, Where, Why and How of it all. Let's start with...

### **WHO: IOCS Members and other Committed Crabophiles**

### **WHAT: 2001, A Crab Odyssey.**

There will be three days of demonstrations and discussions on the finery of fruit, form, flower and form features of the ornamental crabapple.

Day 1: Board meeting of the International Ornamental Crabapple Society and Field and Slide Demonstrations of How to Evaluate Crabapples for Aesthetics and Diseases.

Day 2: Educational Seminar for professionals on the Ornamental Crabapple: including recent National Crabapple Evaluation Plot results including disease and insect updates, rootstock trials, the history of crabapples, designing with crabapples, electron microscopy, surveys of crabapple preferences, and more.

Day 3: Public program on the Edible Landscape, featuring the Magic of Malus and more. Includes: Designing the edible landscape, crabapples for all seasons, taste tests of everything from apple cider to pickled crabapples, from corneliancherry dogwood pie to aronia juice milkshakes, from Dolgo butter to blueberry buckle. Also includes the world premeires of the Ode to Crabapples, Crab Aerobics and the Crabapple Song.

### **WHEN: Three Days in October.**

Day 1: October 18, 2001.

Day 2: October 19, 2001.

Day 3: October 20, 2001.

### **WHERE: Secrest Arboretum, Wooster, Ohio**

Secrest Arboretum is the research arboretum of Ohio State University, located at the Ohio Agricultural Research and Development Center in Wooster, Ohio. Wooster is 100 miles northeast of Columbus, Ohio and about 60 miles south of Cleveland. Secrest Arboretum includes one of the original National Crabapple Evaluation Program plots, a newly expanded plot with additional cultivars and replications and extensive arboretum roadside plantings of crabapples that attract thousands of visitors each spring.

### **WHY: Because...**

...Because, as the 1st Earl of Pomeroy said: No genus of ornamentals so gracefully combines fruit, flower, foliage and form to such wonderous aesthetic appeal as the magical Malus, the crown jewel of the rose family royal... Because, a fruitless crabapple is an oxymoron. Fall is the perfect time to view not only the fabulous fruits of "Prairifire" and "Strawberry Parfait", but also the pairing of fruits with fall foliage on "Golden Raindrops" and the cascading fire of "Molten Lava". Because Secrest Arboretum has one of the finest crabapple collections in the world as well as a cornucopia of other horticultural treats.

Jim Chatfield  
President, IOCS

# **Crabapples At Secrest Arboretum- Aesthetics and More: A 2000 Update**

by Erik A. Draper, James A. Chatfield and Kenneth D. Cochran

## **Introduction**

Crabapples are highly prized as a way to add shade, foliage, colorful flowers and fruit to the landscape. Rather than choosing a tree just for bloom color, selection should be based on total aesthetic qualities. Total aesthetics include the overall impact of diseases, insects, fruit, flowers, foliage, tree form and growth rate of each crabapple selection. Twenty eight crabapple taxa growing at the Secrest Arboretum , in Wooster, Ohio, were evaluated monthly from August 1993 -August 2000, with an additional fourteen crabapple taxa evaluated from August 1997 to August 2000 only. The results of these evaluations are presented in this report, which is intended for use by nurseries, garden centers, landscape architects, landscapers and homeowners. This information can assist in providing an accurate depiction of each tree's response to the specific growing conditions of Ohio.

## **Materials and Methods**

The crabapple research plot is located at Secrest Arboretum, in Wooster, Ohio, consisting of a completely randomized design with three single plant replicates of each taxa. Twenty-eight crabapple selections were planted in 1984, and were rated from August 1993- August 2000. An additional fourteen selections, indicated by “ \* “, were planted in 1994 and rated from August 1997- August 2000 only. Fruit color and size, bloom color, tree form, incidence of scab, and overall aesthetic average are reported in Table 1. Fruit color and size, bloom color and tree form were from observations made during 1995-1997 and cross referenced with observations made by Father John Fiala. Apple scab susceptibility ratings and observations were conducted yearly, during the months of June through August, 1994-2000, and those findings were compiled for this report. The aesthetic average was derived by rating all crabapples individually each month for overall aesthetic impact and each ratings for each taxon were compiled and averaged.

Table 2 provides the aesthetic average again, as well as the time of effective fruit display, and an expanded description of each crabapple taxon. These profiles offer the positive and negative aspects of aesthetics, and disease observations, according to the evaluations of the authors. The time of effective fruit display was compiled from biweekly observations conducted October 1995 through May 1998. Disease observations and ratings were compiled from findings noted and presented by the authors in other articles written for previous publications of this ornamental research circular.

## Results and Discussion

The 2000 growing season should have been called “an ordeal of diseases!” Due to prolonged and plentiful periods of wet weather, the trees were constantly challenged by ideal conditions for disease development. In fact, two trees, *M. Red Jewel*<sup>®</sup> and *M. Prairifire*, which until this year had been consistently scab free, developed scattered scab lesions on a few leaves. Apple scab was so prolific this year that highly susceptible trees exhibited previously unobserved symptoms. These symptoms were a sudden collapse and death of all foliage on a spur. Entire branches of the tree would appear to collapse and die, but stem tissue was not actually dead. Due to the heavy scab pressure, as soon as new leaves began to emerge, they were immediately overwhelmed by disease and these leaves died. This constantly blighted appearance caused many to believe that these branches really had died. Many trees that were highly susceptible to apple scab appeared almost leafless and an eyesore for most of this disease happy growing season.

It was also a challenging year for fireblight. However, due to the heavy fruit load last year, many trees were minimally affected because of the relative lack of flowers this season. Unfortunately, one crabapple cultivar, *M. tr. Golden Raindrops*<sup>™</sup>, that was showing great promise as a truly outstanding crabapple for use in Ohio, was significantly affected by fireblight. This variety will continue to be monitored closely to evaluate its performance under Ohio's conditions .

**Table 1: Characteristics For Selecting Crabapples in Ohio**

<b>Crabapple</b>	<b>Fruit Color<sup>1</sup></b>	<b>Fruit Size<sup>2</sup></b>	<b>Bloom Color<sup>3</sup></b>	<b>Tree Form<sup>4</sup></b>	<b>Scab<sup>5</sup></b>	<b>Aesthetic Avg.<sup>6</sup></b>
* <i>M.</i> 'Adirondack'	O/R	.25-.5	W	NU	None	2.5
<i>M. baccata</i> 'Jackii'	M/R	.4-.5	W	RO	None	2.8
<i>M.</i> 'Beverly'	P/R	.5-.75	W	US	None	3.6
<i>M.</i> 'Bob White'	G/Y	.4-.5	W	RO	None	2.8
* <i>M.</i> Camelot <sup>®</sup>	RO/P	.25-.4	W	DWS	Trace	3.0
* <i>M.</i> 'Canary'	Y	.25	W	OS	Minor	3.0
<i>M.</i> 'David'	CR	.5-.6	W	RO	None	3.0
<i>M.</i> 'Dolgo'	R/PU	1.5-2	W	BR	None	3.9
<i>M.</i> 'Donald Wyman'	R	.4-.5	W	BR	Minor	2.5
<i>M. floribunda</i>	Y	.3-.4	W	BS	Trace	3.0
<i>M.</i> Harvest Gold <sup>®</sup>	Y	.3-.4	W	BR	Major	3.1
<i>M.</i> 'Indian Magic'	RO	.3-.45	P	RS	Major	2.6
<i>M.</i> 'Indian Summer'	R	.5-.6	RO/R	RO	Major	3.0
* <i>M.</i> Lancelot <sup>®</sup>	Y	.25-.3	W	DWR	None	2.8
<i>M.</i> 'Liset'	MR	.5	RO/R	OR	Trace	3.2
* <i>M.</i> 'Louisa'	LG	.3-.4	P	TW	None	1.7
<i>M.</i> 'Mary Potter'	R	.25-.4	W	SW	Trace	2.2
<i>M.</i> Molten Lava <sup>®</sup>	R	.25-.3	W	BS	Minor	2.0
* <i>M.</i> 'Narrangansett'	CR	.4-.5	W	US	Major	2.9
<i>M.</i> 'Orimston Roy'	O	.3-.4	W	BR	Trace	2.5
* <i>M.</i> 'Pink Satin'	DR	.3-.4	P	US	Major	3.3
* <i>M.</i> 'Prairie Maid'	RO/R	.25-.4	DP	RO	None	2.6
<i>M.</i> 'Prairifire'	PU/R	.4-.5	CO/R	RO	Trace	2.4
<i>M.</i> 'Professor Sprenger'	OR	.5-.6	W	US	Trace	3.5
* <i>M.</i> 'Purple Prince'	B/PU	.4-.5	RO/R	BR	None	2.6
<i>M.</i> 'Red Jade'	R	.4-.5	W	SW	Minor	2.3
<i>M.</i> Red Jewel <sup>®</sup>	CR	.3-.4	W	UP	Trace	2.9
<i>M.</i> 'Red Splendor'	R	.5-.6	RO/P	US	Major	3.1
<i>M. sargentii</i>	R	.25-.3	W	BS	None	2.7
<i>M. sargentii</i> 'Candy mint'	R/PU	.25-.4	R/PU	LS	Trace	2.0
<i>M.</i> 'Sentinel'	R	.3-.4	W	NU	Minor	2.8
* <i>M.</i> Silver Drift'	CR	.3-.4	W	RO	Trace	2.6

Crabapple	Fruit Color <sup>1</sup>	Fruit Size <sup>2</sup>	Bloom Color <sup>3</sup>	Tree Form <sup>4</sup>	Scab <sup>5</sup>	Aesthetic Avg. <sup>6</sup>
<i>M.</i> 'Silver Moon'	M/R	.3-.4	W	OV	None	2.8
* <i>M.</i> 'Sinai Fire'	RO	.4-.5	W	HS	None	2.4
<i>M.</i> 'Snowdrift'	SR	.3-.4	W	BR	Major	2.9
<i>M.</i> 'Strawberry Parfait'	R	.4-.5	P	OS	Trace	2.5
<i>M.</i> Sugar Tyme <sup>®</sup>	CR	.4-.5	W	BR	Trace	2.6
* <i>M. tr.</i> Golden Raindrops <sup>™</sup>	Y	.25-.3	W	OS	None	2.4
<i>M.</i> White Angel <sup>®</sup>	R	.5-.6	W	BR	None	3.1
<i>M.</i> White Cascade <sup>®</sup>	LG	.3-.4	W	TW	Major	2.7
<i>M. x zumi</i> var. <i>calocarpa</i>	CR	.25-.3	W	BR	Trace	2.8
<i>M. x zumi</i> Winter Gem <sup>™</sup>	R	.25-.3	W	RO	Major	2.4

<sup>1</sup> Fruit Color Key: R-red, P-pink, Y-yellow, O-orange, OR-orange red, G-gold, M-maroon, M/R-maroon red, PU-purple, PU/R-purple red, RO-rose, RO/R-rose red, LG-lemon gold, CR-cherry red, DR-dark red, DP-deep pink, CO/R-coral red, SR-salmon red, B/PU-blue purple.

<sup>2</sup> Fruit size is given in inches.

<sup>3</sup> Bloom Color Key: W- white; RO/P-rose pink; RO/R-rose red; R- red; P- pink; DP-deep pink; CO/R-coral red.

<sup>4</sup> Tree Form: RO-rounded, OS-open spreader, US-upright spreader, NU-narrow upright, LS-low spreader, DWR- dwarf rounded, TW-true weeper, SW-spreading weeper, BS-broadly spreading, OV-oval, HS-horizontal spreader, BR-broad round

<sup>5</sup> Scab ratings are from 1993-2000 unless a \* is present by the crabapple name which denotes there is only data from four years (1997-2000) of observations.

none = no scab noted.

trace = a few leaves affected; no negative effect on aesthetics.

minor = 20%-50% of leaves affected; significant defoliation and/or leaf yellowing; negative effect on aesthetics.

major = 50%-90% of leaves affected; severe defoliation and discoloration of leaves; almost complete negation of any aesthetic effect.

<sup>6</sup> Aesthetic ratings are from 1993-2000 unless a \* is present by the crabapple name which denotes there is only data from four years (1997-2000) of observations. Ratings include flower, foliage, form, and fruit characteristics, and effects of disease and pest problems. The rating system is as follows:

1 = Exceptionally ornamental crabapple. Based on outstanding flower, foliage, fruit or form at time of rating.

2 = Highly ornamental crabapple. Good flower, foliage, fruit, or form at time of rating.

3 = Adequate as a landscape crabapple. Not highly ornamental at time of rating.

4 = Sub-standard as an ornamental crabapple at time of rating.

5 = Ornamentally unacceptable as a landscape crabapple at time of rating. Not recommended for use in the landscape.



**Table 2: Crabapple Descriptions**

<b>Crabapple</b>	<b>Aesthetic Rating Average<sup>6</sup></b>	<b>Time of Effective Fruit Display<sup>7</sup></b>
* <i>M. 'Adirondack'</i> {Orange-red fruits, white flowers, narrow upright form}. <u>Positives</u> : tight columnar form; great autumn fruit/foliage combination; fruit ripens to a deep orange-red; fruit appears singular rather than clustered; consistent flowers are red-tinged. <u>Negatives</u> : somewhat slow to establish and leafhoppers appear to relish the foliage. <u>Diseases</u> : No scab.	<b>2.5</b>	<b>late Aug. to mid-Dec.</b>
<i>M. baccata 'Jackii'</i> {Maroon-red fruits, white flowers, large broad round form}. <u>Positives</u> : reliable flowers; large, glossy green leaves (by far the best foliage of any crabapple in the plot); fall contrast of yellow and rust colored leaves against attractive maroon-red fruit is outstanding; frosty temperatures causes bark to take on an orange cast. <u>Negatives</u> : relative sparseness of fruit clusters and mediocre overall winter appearance. <u>Diseases</u> : No scab.	<b>2.8</b>	<b>late July to mid-Dec.</b>
<i>M. 'Beverly'</i> {Bright pinkish-red fruits, white flowers, large broad spreading form}. <u>Positives</u> : consistent flowers; impressive fruit display from late summer through early fall; profuse pink buds opening to snowy white flowers in spring. <u>Negatives</u> : muddied, rotted fruits turn black beginning mid-fall through winter; fruits partially eaten by birds creating an unsightly mess on the tree; sprawling growth habit is awkward. <u>Diseases</u> : No scab; however, moderate fireblight noted in 1994.	<b>3.6</b>	<b>late July to late Sept.</b>
<i>M. 'Bob White'</i> {Gold-yellow fruits, white flowers, rounded form}. <u>Positives</u> : persistent, small, firm fruits maturing mid-winter into striking orange gold color, an excellent color for winter landscape; exceptional floral display of delicate white blossoms opening from pinkish-red buds; overall one of the better yellow-fruited selections of the plot. <u>Negatives</u> : fruit/floral display alternates yearly from profuse to sparse; lacks summer appeal. <u>Diseases</u> : No scab.	<b>2.8</b>	<b>mid-Oct. to late Jan.</b>

- \* *M. Camelot*<sup>®</sup> 3.0 mid-June to late Oct.  
 {Rose-pink fruits, white flowers, low open spreading form}.  
Positives: oblong unique colored fruit; petite, lovely fuschia-tinged flower; diminutive size is great for space limited areas; foliage dark green with burgundy overtones. Negatives: very slow growing; dull leaf appearance.  
Diseases: Trace of scab.
- \* *M. 'Canary'* 3.0 mid-Aug. to early Nov.  
 {Yellow fruits, white flowers, open spreading form}. Positives: bright yellow tiny fruits hang in clusters along branches to accentuate form; nice autumnal fruit/foilage effect. Negatives: early defoliation from scab; fruit deteriorates rapidly to cider brown and falls off quickly.  
Diseases: Minor scab.
- M. 'David'* 3.0 mid-Sept. to mid-Nov.  
 {Scarlet fruits, white flowers, rounded form}. Positives: abundant snowy-white flower display; impressive cherry like fruits; nice tree form. Negatives: yearly floral/fruit displays alternate from profuse to sparse; large mummies hang from late fall to mid-winter; mediocre summer appeal.  
Diseases: Trace of scab.
- M. 'Dolgo'* 3.9 early Aug. to mid-Sept.  
 {Red purple plum-like fruits, snowy-white flowers, large rounded form}. Positives: consistent, early annual bloomer; almost neon red purple fruits are edible; fruit impressive for a brief period during mid summer. Negatives: major fruit mess due to fruit drop; overripe fruit smell is intoxicating; lacks ornamental effect for much of the year. Diseases: No scab.
- M. 'Donald Wyman'* 2.5 mid-Sept. to late March  
 {Bright red fruits, white flowers, large broad round form}.  
Positives: excellent floral display; persistent glossy fruits remain effective turning mud-red after a freeze; attractive exfoliating bark on mature trees. Negatives: tenacious fruit mummies hang into early summer; heavy fruit scab repeatedly reduces overall appeal. Diseases: Minor scab on leaves but major scab on fruit.
- M. floribunda* 3.0 mid-Oct. to early Nov.  
 {Fruit yellow, white flowers, broad spreading form}. Positives: airy floral display of pink-red buds opening to white flowers; great commingling of yellow and cider-brown fruit colors for autumnal effect;

feathery effect of pedicels in winter. Negatives: yellow flecking of foliage in summer; very short fruit impact; relatively ordinary appearance for much of the year. Diseases: Trace of scab.

**M. Harvest Gold®**                      3.1                      late Oct. to mid-Dec.

{Yellow fruits, white flowers, upright open form}. Positives: attractive butter yellow fruits mature to golden yellow; nice contrast of red pedicels against fruit clusters. Negatives: long period of bland green fruit well into mid-fall, leaves hang on for a long time hiding the fruit; awkward, gangly form; extensive fruit scab. Diseases: Major scab on leaves and fruit; some fireblight problems.

**M. Harvest Gold®**                      3.1                      late Oct. to mid-Dec.

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**M. 'Indian Magic'**                      2.6                      mid-June to early April

{Orange-red fruits, pink flowers, broad round form}. Positives: outstanding fruit display; unbelievable autumnal orange-red fruits with golden yellow underside; emerging foliage a pleasing burgundy; fall foliage an apricot-orange color; unfailing pink floral show. Negatives: tenacious fruit mummies; defoliation in mid-to-late summer from scab although fruit scab is minimal. Diseases: Major scab.

**M. 'Indian Summer'**                      3.0                      early June to mid-Feb.

{Red fruits, rose-red flowers, broad round form}. Positives: consistent annual, large blooms; prolific mid-summer to fall display of large red fruits; contrasting fruits complement yellow-orange fall foliage. Negatives: persistent fruit mummies; early defoliation from scab. Diseases: Major scab.

\* **M. Lancelot®**                      2.8                      early Oct. to early Dec.

{Yellow fruits, white flowers, dense round form}. Positives: diminutive size is great for space limited areas; consistent tree form; fruit is a pleasing mix of cider and yellow. Negatives: extremely tight, dense tree form; fruit/flower mostly hidden on the interior of the tree. Diseases: Trace of scab.

- M. 'Liset'** 3.2 **early July to mid-Dec.**  
 {Maroon red fruits, rose-red flowers, open round form}.  
Positives: consistent fruit display; nice fall contrast of fruits with peach colored foliage; new foliage is deep burgundy and matures to a bronze green. Negatives: awkward splayed growth habit; minimal fruit-foliage contrast; fruit mummies hang on until late fall. Diseases: Trace of scab.  
 Note: Unusual but apparently normal splitting of bark along branches and trunk is characteristic.
- \* **M. 'Louisa'** 1.7 **late July to mid-Nov.**  
 {Cream-gold fruits, pink flowers, true weeper form}. Positives: arching, graceful branches are upswept at ends; tree form is greatest asset; fruit darkens to a gold-orange with a tan blush. Negatives: fruit is scattered and sparse. Diseases: No scab.
- M. 'Mary Potter'** 2.2 **mid-Aug to late Nov.**  
 {Red fruits, white flowers, weeping-spreading form}. Positives: petite, abundant masses of reddish fruit; profuse pink buds open to an exquisite blossom display; elegant spreading growth habit; salmon colored underbark revealed as older bark peels away. Negatives: fruit mummies a distraction during winter months. Diseases: Trace of scab.
- M. Molten Lava<sup>®</sup>** 2.0 **early Aug. to mid-Dec.**  
 {Red-orange fruits, white flowers, spreading-weeping form}.  
Positives: consistent, profuse flower/fruit shows; fiery red fruits and yellowing fall foliage on cascading branch structure create a "molten lava" effect; excellent winter ratings due to layered horizontal branching; feathery effect created by red pedicels after fruit drops. Negatives: somewhat cluttered as tree matures; lacks summer appeal.  
Diseases: Minor scab.
- \* **M. 'Narangansett'** 2.9 **early Sept. to mid-Dec.**  
 {Cherry-red fruits, white flowers, upright spreading form}.  
Positives: nice flower display; abundant, firm fruit. Negatives: cluttered, dense branching structure; tendency toward alternating sparse and abundant yearly flower displays; awkward tree form. Diseases: Major scab on leaves and fruit.
- M. 'Ormiston Roy'** 2.5 **late Aug. to late March**  
 {Orange-yellow fruits, white flowers, broad round form}.  
Positives: very attractive glossy orange-yellow fruits with cream underside

and red blush; orangish deep-furrowed bark colors as temperatures drop; nice, consistent floral show. Negatives: tenacious mummified fruit may remain up to one year. Diseases: Trace of scab.

\* **M. 'Pink Satin'** 3.3 mid-Aug. to mid-Oct.

{Dark red fruits, pink flowers, upright spreading form}. Positives: very nice true pink bloom; fruit a pleasing red with yellow underside. Negatives: persistent blackened mummies can be overwhelming; heavy fruit scab; cluttered branch structure. Diseases: Major scab on leaves and fruit.

\* **M. 'Prairie Maid'** 2.6 early June to mid-Nov.

{Rosy-red fruits, deep pink flowers, round spreading form}. Positives: reliable wonderful flower display; abundant clusters of small fruit; emerging foliage is burgundy red. Negatives: lacking in winter appeal; waxy coating dulls fruit finish until coating weathers off. Diseases: No scab.

**M. 'Prairifire'** 2.4 late June to early Dec.

{Purple-red fruits, coral-red flowers, round form}. Positives: yearly spectacular bloom contrasts emerging red tinged green foliage; firm purplish fruits slowly age to cherry red; fall colors of orangish spur leaves contrasts fruits and other foliage; unique lenticel-speckled bark. Negatives: mediocre winter and early summer appearance. Diseases: Trace of scab in 2000; completely scab-free in other years.

**M. 'Professor Sprenger'** 3.5 late Sept. to mid-Nov.

{Orange red fruits, white flowers, upright spreading form}. Positives: dependable, large, attractive white flowers; large orange red fruits; young tree form with fruit is stunning. Negatives: muddied mummies persist until late winter; awkward growth habit and tree form with maturity; dull appearance of large yellow-green fruit during the summer. Diseases: No scab; however, extensive yearly defoliation from frog-eye leaf spot.

\* **M. 'Purple Prince'** 2.6 late June to late Dec.

{Blue- purple fruits, rose-red flowers, broad round form}. Positives: large, dark unusual colored fruit; very nice yearly fruit/flower display; fast growing tree; leaves deep purple green. Negatives: lacking fruit/foliage contrast; mediocre winter appearance. Diseases: No scab.

- M. 'Red Jade'** 2.3 late Aug. to mid-Nov.  
 {Red fruits, white flowers, weeper-spreader form}. Positives: graceful spreading growth habit add winter interest; attractive oblong fruits; yearly prolific red flower buds open to large white blossoms. Negatives: unsightly fruit rot; scab on fruit can dull appearance. Diseases: Minor scab on leaves and fruit.
- M. Red Jewel<sup>®</sup>** 2.9 early Sept. to mid-April  
 {Cherry red fruits, white flowers, narrow upright form}. Positives: Phenomenal firm fruits are appealing well into spring; very attractive blooms. Negatives: mediocre late winter to early spring appearance; very slow growing; tenacious mummies; tree form a bit awkward. Diseases: Trace of scab just in 2000; some fireblight problems.
- M. 'Red Splendor'** 3.1 late May to early Nov.  
 {Red fruits, rose-pink flowers, upright spreading form}. Positives: exceptional profuse, red fruits age to orange-salmon color by mid fall; red-tinged new, emerging foliage; reliable fruit display and lovely pink flowers. Negatives: severe Japanese beetle feeding; early defoliation due to scab; poor winter ratings due to rotted, half-eaten mummies. Diseases: Major scab on leaves and fruit.
- M. sargentii** 2.7 mid-Aug. to early Nov.  
 {Red fruits, white flowers, low wide spreading form}. Positives: greatest asset is attractive low spreading growth habit; petite snowy white blossoms; effective firm fruits in late summer to early fall. Negatives: fruits deteriorate rapidly; shriveled raisin mummies persist into winter. Diseases: No scab.
- \*M. sargentii 'Candymint'** 2.0 early July to late Nov.  
 {Purple-red fruits, pink flowers, low spreading form}. Positives: graceful low spreading form; reliable fruit/flower displays; burgundy-tinged leaves; new stems are a deep burgundy; new foliage is striking, shiny wine-red. Negatives: very slow growing; fruit display is never overwhelming; dull summer leaf appearance. Diseases: Trace of scab in years with high disease pressure.
- M. 'Sentinel'** 2.8 late Sept. to early March  
 {Red fruits, white flowers, vase-shaped form}. Positives: columnar growth habit; sensational floral display of profuse red-pink buds open to pink-tinged white flowers; pleasing yellow fall foliage contrasts fruits;

attractive firm fruits persist into early spring. Negatives: tenacious fruit mummies hang into summer; mediocre summer appearance. Diseases: Trace of scab only in years of high disease pressure.

\* *M.* 'Silver Drift' 2.6 mid-Sept. to mid-April

{Cherry-red fruits, white flowers, broad round form}. Positives: very persistent showy fruit; nice contrast of last year's fruit with emergence of new leaves in spring; fast growing tree; consistent tree form; retains leaves even though affected by scab. Negatives: tenacious mummies; fruit obscured by foliage. Diseases: Minor scab.

*M.* 'Silver Moon' 2.8 early Sept. to mid-Dec.

{Burgundy fruits, white flowers, oval upright form}. Positives: glossy unique colored fruits; peculiar dense upright candelabra growth habit; good late, snowy white floral show. Negatives: alternating yearly bloom from profuse to sparse; poor winter ratings due to somewhat cluttered growth. Diseases: No scab; occasionally fireblight can be a problem.

\* *M.* 'Sinai Fire' 2.4 mid-Aug. to late Oct.

{Red-orange fruits, white flowers, unique spreader form}. Positives: uncommon open growth habit with horizontal branches; good specimen plant; yearly floral show with large blooms. Negatives: fruit scattered and sparse; slow growing; unique form is not for every landscape. Diseases: No scab.

*M.* 'Snowdrift' 2.9 mid-Aug. to mid-Nov.

{Salmon-red fruits, white flowers, broad round form}. Positives: reliable excellent flower show; distinctly colored attractive fruits; feathery and colorful effect of pedicels in winter. Negatives: fruits shrivel by late fall; chlorotic summer foliage. Diseases: Major scab.

*M.* 'Strawberry Parfait' 2.5 mid-Aug. to mid-April

{Red-cream fruits, pink flowers, unique spreader form}. Positives: fruits age to deep red; newly emerged foliage red-tinged; unusual erratic upright spreading growth habit; good fall color; fruits remain firm through late winter. Negatives: tenacious fruit mummies; unusual shape is not for every landscape. Diseases: Trace of scab.

*M.* 'Sugar Tyme' 2.6 early Sept. to mid-April

{Brilliant red fruits, white flowers, rounded form}. Positives: stunning sugar-white floral display; showy, persistent firm fruits through late winter; good overall form; dense foliage. Negatives: general mediocrity

if flowers/fruits are not abundant; fruit drops all at once before bloom.

Diseases: Trace of scab.

**\**M. trans.* Golden Raindrops™ 2.4 mid-Oct. to early Dec.**

{Yellow fruits, white flowers, open spreading form}. Positives: petite, lemon yellow fruits; interesting cutleaf, glossy deep-green foliage; reliable fruit/flower display; great autumnal leaf color; contrasting yellow-orange bark. Negatives: bland green fruit throughout the summer; tree form unruly without pruning. Diseases: No scab; fireblight in 2000 was a problem.

***M. White Angel*® 3.1 mid-Oct. to early Feb.**

{Red fruits, white flowers, broad upright form}. Positives: reliable, attractive flowers; showy medium-sized abundant fruits; red coloration of previous season's growth. Negatives: awkward splayed growth until tree matures; tenacious mummies distract during mid-to-early spring. Diseases: No scab.

***M. White Cascade*® 2.7 mid-Sept. to mid-Nov.**

{Yellow fruits, white flowers, true weeper form}. Positives: exquisite flower display of cascading flower covered branches; appealing overall tree form. Negatives: perpetually dingy foliage throughout summer from scab; fruit scab completely destroys any potential fruit effect; early and extreme defoliation. Diseases: Major scab on leaves and fruit.

***M. x zumi* var. *calocarpa* 2.8 late Aug. to mid-Dec.**

{Bright red fruits, white flowers, round spreader form}. Positives: excellent yearly flower show; clusters of abundant tiny, shiny red fruits; feathery pedicel effect in winter. Negatives: fruits shrivel and deteriorate rapidly in early winter; lacks winter appeal. Diseases: Trace of scab.

***M. x zumi* Winter Gem™ 2.4 late Aug. to mid-April**

{Bright red fruits, white flowers, large rounded form}. Positives: dependable annual bloom; petite, firm, shiny fruit is sensational; incredibly long lasting fruit effects; fast growing, large, consistent tree form. Negatives: mediocre summer appeal. Diseases: Minor scab mainly on leaves.



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\* denotes crabapple selections for which there is only three years (1997-2000) of observations.

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<sup>6</sup> Aesthetic ratings are from 1993-2000 unless a “ \* ” is present by the crabapple name which denotes there is only data from four years (1997-2000) of observations. Ratings include flower, foliage, form, and fruit characteristics, and effects of disease and pest problems. The rating system is as follows:

1 = Exceptionally ornamental crabapple. Based on outstanding flower, foliage, fruit or form at time of rating.

2 = Highly ornamental crabapple. Good flower, foliage, fruit, or form at time of rating.

3 = Adequate as a landscape crabapple. Not highly ornamental at time of rating.

4 = Substandard as an ornamental crabapple at time of rating.

5 = Ornementally unacceptable as a landscape crabapple at time of rating. Not recommended for use in the landscape.

<sup>7</sup> Time of Effective Fruit Display derived from biweekly observations conducted October-1995 through May-1998. Effective fruit impact is defined as the period from when the tree's fruit first contributes to tree aesthetics until the fruit is no longer ornamental.

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# Disease Resistance and Adaptability of Crabapple in Coastal Alabama

by A.K. Hagan, K.M. Tilt, J.D. Williams, and J.R. Akridge

## Introduction

Spectacular spring floral displays, brilliant fall foliage, colorful and persistent fruit, and adaptability to a wide range of climatic and soil conditions have made crabapple (*Malus* spp.) a fixture in residential and commercial landscapes across the Northeast and Midwest (6). This tree, however, is rarely found in landscapes in Alabama and neighboring states, particularly in hotter, wetter regions of the Deep South (6,9).

Diseases may be largely responsible for the limited adaptability of crabapple in Alabama and surrounding Southern states. In this region, fireblight (*Erwinia amylovora* [Burrill] Winslow *et al.*) and cedar-apple rust (*Gymnosporangium juniperi-virginiana* Schwein) are recognized as common and often destructive diseases on crabapple, apple, hawthorn, and other members of the apple subfamily (*pomoidae*) (4,5,8). Other potentially damaging diseases on crabapple in residential and commercial plantings include apple scab (*Venturia inaequalis* [Cooke] Wint.), powdery mildew (*Podosphaeria leucotricha* [Ell. & Ev.] E.S. Salmon), and frog-eye leaf spot (*Botryosphaeria obtusa* [Schwein.] Shoemaker) (4,5,7,8). In contrast, apple scab is considered the most damaging disease on crabapple in the Midwest and Northeast followed distantly in importance by fireblight, cedar apple rust and frog-eye leaf spot (5,6,8).

Use of disease resistant crabapple cultivars, which is the preferred method of managing diseases in residential and commercial landscapes, greatly simplifies tree maintenance by nearly eliminating costly and time-consuming pesticide treatment programs. Resistance of crabapple to common diseases such as fireblight, apple scab and cedar-apple rust has been assessed in field trials at several sites in the mid-south and cultivars resistant to one or more of the above disease have been identified (1,2,3,7,11,12). Due to differences in regional weather patterns, cultivar adaptation, and pathogen distribution and virulence, disease ratings from those sites may not be applicable to Alabama. As part of the National Crabapple Evaluation Program, a field planting was established to assess

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adaptability and disease resistance of 60 crabapple cultivars in a Benndale (A) fine sandy loam at the Brewton Experiment Field (Plant Hardiness Zone 8a), which is located approximately 50 miles north of Pensacola, Florida.

## Materials and Methods

Prior to planting, soil fertility and pH were adjusted according to the results of a soil fertility assay done by the Auburn University Soil Testing Laboratory. In May 1992, bare-root trees were planted on 18-foot centers in rows spaced 10 feet apart. Prior to planting, the healed-in, bare-root crabapples had begun to leaf out. The experimental design was a randomized complete block with five, three-tree replications. Each spring, approximately 3 pounds of 5-10-15 fertilizer was evenly distributed around the base of each tree. And directed applications of 1 pound of Gallery DF and 2 quarts of Surflan T/O per treated acre were made down the row center to control annual weeds. Hand weeding and directed applications of recommended rates of Roundup were used to control escape weeds. Alleys between the rows were mowed periodically.

Within one year of planting, fireblight and apple scab were well established on trees in this planting. Visual ratings of fireblight were made on May 28, 1993; May 24, 1994; and May 29, 1996 on a scale of 0 to 4 where 0 = no disease, 1 = one or a few blighted branch tips, 2 = numerous dead branch tips, 3 = several major branches damaged, and 4 = major portion of tree damaged or the tree died. Apple scab severity, which was assessed on the the same dates as fireblight, was rated on a 0 to 5 scale where 0 = no disease, 1 = very few leaves with scab symptoms and no defoliation, 2 = many leaves with scab symptoms and no defoliation, 3 = most leaves with scab symptoms and moderate defoliation, 4 = most leaves with scab symptoms and heavy defoliation, 5 = complete defoliation of tree. Tree survival was recorded on each date that disease rating were taken.

In April 1997, landscape value was visually assessed on the basis of overall aesthetic appeal, flower proliferation, and disease severity on a scale of 1 to 5 where 1 = unacceptable for landscape use and 5 = highly desirable. Significance of treatment effects were tested by analysis of variance and means were compared with Fisher's protected least significance (LSD) test with a level of significance at  $P= 0.05$  unless otherwise stated.

## Results

Overall, fireblight was the predominate disease observed on the 60 crabapple cultivars screened. Significant fireblight-related spur blight and shoot

dieback was seen on selected crabapple cultivars in each of the years that the disease ratings were taken.

Over the test period, *M. baccata* 'Jackii' remained free of fireblight (Table 1). Very minor and unobtrusive blossom or spur blight was seen only one of three years on the shoots of the cultivars *M. Coralburst*<sup>®</sup>, *M. 'Pink Princess'*, *M. 'Robinson' dwarf*, and *M. 'Dolgo'*. Minimal blighting was noted in two of three years on *M. 'Spring Snow' dwarf*, *M. 'Adams' dwarf*, *M. 'Radiant'*, *M. 'Pink Spires'*, *M. 'Adams'*, and *M. 'Liset'*. In the other test year, these same cultivars were fireblight-free. Several cultivars such as *M. 'Donald Wyman'*, *M. Centurion*<sup>®</sup>, *M. zumi* var. *calocarpa*, *M. 'Indian Summer'*, *M. 'Liset' dwarf* were free of fireblight symptoms in at least one year but were lightly damaged by this disease in at least one of the other two years. Although fireblight-induced blossom and spur blight were seen in all three years on *M. 'Jewelberry'*, *M. Velvet Pillar*<sup>™</sup> (bush), *M. 'Profusion'*, *M. 'Bob White'* and *M. White Angel*<sup>®</sup>, the damage was generally light and had no impact on tree aesthetics.

In at least one year, most of the remaining taxa of crabapple suffered significant and often unsightly blossom and/or spur blight as well as a shoot dieback. Crabapple taxa that consistently had the worst fireblight damage over the three-year rating period include *M. 'Mary Potter'*, *M. 'Silver Moon'*, *M. Brandywine*<sup>®</sup>, and *M. ioensis* 'Klehm's Improved Bechtel' (Table 1). As indicated by disease ratings on *M. ioensis* 'Klehm's Improved Bechtel' of 3.5 and 3.7 in 1994 and 1996, respectively, extensive scaffold limb dieback as well as severe spur and blossom blight were recorded. Other cultivars, which were moderately to severely damaged (disease rating of 2.0 or above) by fireblight in at least one season, were *M. 'Red Jade' dwarf*, *M. 'Purple Prince'*, *M. 'Sentinel'*, *M. 'Sinai Fire'*, *M. 'Snowdrift' dwarf*, *M. 'Indian Magic'*, *M. 'Professor Sprenger'*, *M. 'Hopa'*, *M. 'Winter Gold'* and *M. 'Snowdrift'*. Moderate disease development was noted in at least one growing season on all of the remaining crabapple taxa. The severity of apple scab in this crabapple planting was much lower than that recorded for fireblight. Significant disease development was seen in all three years only on the the cultivar *M. 'Eleyi'* (Table 1). *M. 'Radiant'*, which was heavily damaged by scab in a previous study (2), suffered light scabbing in 1993 and 1994 but not in 1996. Noticeable scabbing of the leaves was seen in 1993 on *M. 'Indian Magic'*. Very light scab outbreaks were noted only one of the three years on *M. 'Royalty' dwarf*, *M. 'Red Baron'*, *M. 'Strawberry Parfait'*, *M. 'Liset' dwarf*, *M. 'Dolgo'*, *M. 'Pink Spires'*, and *M. 'Robinson' dwarf*.

Surprisingly, cedar apple rust, a common and often damaging disease in Alabama on apple and crabapple, was not a significant threat to tree aesthetics

and health. Despite nearby stands of the redcedar, which is an alternate host for the causal fungus, the diagnostic leaf spots and premature defoliation associated with severe cedar apple rust outbreaks never appeared. In 1994, aecia associated with another cedar rust disease, probably cedar-quince rust, noted on the fruit of 10 crabapple cultivars. The causal fungus (*G. clavipes*) colonized fruit of the taxa *M. floribunda* and *M. floribunda* dwarf most often. Damage on all affected trees was light.

In 1994 and 1996, light to moderate outbreaks of the frogeye leaf spot were noted on a few crabapples. In both years, moderate to heavy spotting of the leaves was observed on *M.* 'Spring Snow' dwarf, *M.* 'Louisa', *M.* 'David' and *M.* 'Ormiston Roy'. Cultivars that suffered light frogeye leaf spot damage in 1994 included *M.* 'Professor Sprenger', *M.* 'Baskatong' and *M.* 'Snowdrift' dwarf while typical leaf spotting was seen in 1996 on *M.* 'Bob White', *M.* Coralburst<sup>®</sup> and *M.* 'Indian Summer'. In a recent Tennessee study (11), *M.* 'Spring Snow' dwarf, *M.* 'Louisa', and *M.* 'Baskatong' were also moderately to highly susceptible to frogeye leaf spot as were *M.* 'Red Splendor', *M.* 'Snowdrift' dwarf, *M.* 'Donald Wyman', *M.* 'Jewelberry', *M.* 'Pink Spires', *M.* 'Red Baron' and *M.* White Angel<sup>®</sup>. *M.* 'Red Baron' also suffered significant leaf spotting in a Kentucky trial (7).

The combination of delayed planting and no irrigation certainly contributed to the loss of many trees between May 1992 and May 1993. The cultivars *M. baccata* 'Jackii', *M.* 'Donald Wyman', *M. tr.* Golden Raindrops<sup>™</sup>, *M.* 'Red Splendor' dwarf, *M.* 'Sinai Fire', *M.* 'Red Baron' and *M.* Red Jewel<sup>®</sup> had the poorest first-year survival rate (Table 2). Within the first year, 47 to 73% of the saplings of the above taxa died. With the exception of Radiant with 100% survival, one or more trees of the remaining 52 taxa were lost due to the above factors within the first year of establishment.

The level of tree survival from 1993 to 1996 declined for most cultivars. Among the cultivars suffering the sharpest decline in tree survival were *M.* 'Adirondack', *M.* 'Baskatong', *M.* Brandywine<sup>®</sup>, *M.* Coralburst<sup>®</sup>, *M.* 'Indian Magic', *M.* 'Jewelberry', *M.* 'Liset', *M. sargentii*, *M.* 'Pink Princess', *M.* 'Pink Spires', *M.* 'Red Jade', *M.* 'Red Jade' dwarf, *M.* 'Selkirk', *M.* 'Snowdrift', *M.* 'Strawberry Parfait', *M.* 'Sugar Tyme' and *M. x zumi* var. *calocarpa* (Table 2). However, several other cultivars lost only one or two trees during this same time period. For the cultivars *M.* 'Adams' dwarf, *M.* 'Eleyi', *M.* 'Radiant', *M.* 'Sentinel', *M.* 'Spring Snow' dwarf and *M.* Velvet Pillar<sup>™</sup> (shrub), no trees died between May 1993 and May 1996. Again, 100% of the *M.* 'Radiant' crabapples planted in 1992 survived through May 1996.

During this study, no specific information concerning the death of individual trees was collected. However, none of the foliar disease observed, including fireblight, are the likely cause of tree death. Undoubtedly, stress attributed to the planting delay in 1992, periodic droughts, sudden hard freezes may have contributed to tree loss. On a portion of the test site, a root and collar rot caused by the fungus *Oxyporus populinus* was also responsible for the decline and death of a number of trees. *Oxyporus* root and collar rot is characterized by an overall decline in tree vigor, yellowing, stunting of the leaves, slowed shoot elongation, and finally by tree death (8).

At advanced stages of tree decline, the white mycelial mat of the causal fungus may frequently be seen growing on the surface of the lateral and taproot and around the root collar at or just below the soil surface. During this study, the roots were often so badly rotted that the diseased tree could easily be pulled out of the ground. In many instances, the off-white to yellow fruiting bodies (basidiocarps) of *O. populinus* were found on the trunk at the base of the dead trees just above the soil line. Although the soil at this site was classified as a well-drained sandy loam, wet areas were present within the site, particularly behind several low terraces. Trees loss due to *Oxyporus* root rot appeared to have been concentrated in these wetter, poorly drained areas and was less common in the drier, higher portions of this site.

After eliminating cultivars susceptible to fireblight and cultivars with a poor survival rate, crabapples with the best landscape ratings included *M.* 'Eleyi', *M.* 'Radiant', *M.* 'Adams', *M.* 'Jewelberry', *M. floribunda* dwarf and *M.* Velvet Pillar™ (tree form) (Table 3). *M.* 'Red Splendor' dwarf and *M. baccata* 'Jackii' also had very high landscape values (4.0) but a majority of the trees of both these cultivars died shortly after establishment. *M. hupehensis*, *M.* 'Profusion', *M.* 'Red Jade', *M.* 'Snowdrift', *M.* 'Pink Spires', *M.* 'Red Jade', *M.* 'Red Jade' dwarf, *M.* 'Purple Prince', *M.* Coralburst®, *M.* 'Indian Summer', *M.* 'Robinson' dwarf, *M.* 'Liset', *M.* 'Louisa', and *M.* Brandywine® crabapples had good landscape quality ratings (3.0 or above). However, sizable numbers of many of the above cultivars succumbed between 1993 and 1996 to *Oxyporus* root rot or perhaps to some other stress-induced disorder. Clearly, the crabapples with clearly the lowest quality rating were *M. x zumi* var. *calocarpa*, *M.* 'Red Baron', *M.* 'Doubloons' and *M. tr.* Golden Raindrops™.

## Summary

The poor performance of many taxa and the prevalence of *Oxyporus* root rot clearly show that the majority of crabapples tested are not well adapted to the Coastal Plain region of Alabama. *M.* 'Eleyi', *M.* 'Radiant', *M.* 'Adams' dwarf, *M.* Velvet Pillar<sup>TM</sup> and *M. hupehensis*, all of which had good landscape ratings, high rates of survival after planting, and generally good fireblight and frogeye leaf spot resistance, would be acceptable choices for Alabama landscapes, particularly those in the southern half of the state. *M.* 'Red Splendor' dwarf and *M. baccata* 'Jackii', which were both resistant to the above diseases and had high landscape ratings, should also make good landscape trees. Windham *et al.* (11) also reported that the cultivars *M.* 'Adams' dwarf and *M. baccata* 'Jackii', as well as *M.* 'Bob White' and *M.* 'Profusion', were highly resistant to fireblight and frogeye leaf spot. In both this and the Tennessee study (7), the sensitivity of *M. hupehensis* crabapple to fireblight was also noted. Of the seven highest rated crabapples in the Alabama study, only *M.* 'Adams' and *M. baccata* 'Jackii' were recommended for use in Plant Hardiness Zones 6 and 7 (3). In South Carolina, *M.* 'Adams', *M.* 'Bob White', *M.* 'Professor Sprenger' and *M.* Red Jewel<sup>®</sup> crabapples demonstrated good resistance to all foliar disease and were recommended for urban and roadside use while *M.* 'Red Baron' was suggested for urban use only (1).

Of the recommended taxa, *M.* 'Radiant' and *M.* 'Eleyi' crabapple were slightly and moderately susceptible, respectively, to apple scab. With the exception of *M.* 'Eleyi', the level of apple scab damage on *M.* 'Radiant' and few other scab-damaged taxa were much lower than that typically associated with outbreaks of this disease on crabapples in other regions of the United States (2,7,11). However, apple scab-susceptible crabapples like *M.* 'Eleyi' are likely to suffer greater damage in the Appalachian Mountains and nearby foothills in North Alabama because weather patterns there are likely to be more favorable for the disease than those at the Brewton Experiment Field (7). Several horticulturists have suggested that the scab-sensitive *M.* 'Radiant' and *M.* 'Eleyi' crabapples should be removed from nursery production schedules (5,6). In this study, however, these cultivars had among the highest landscape ratings recorded (10).

The absence of cedar apple rust in this crabapple planting was a surprise. The trees were inspected late enough during the growing season that the characteristic spotting of the leaves would have been seen. This often-damaging disease is quite widespread on apple and crabapple, as well as on native and cultivated hawthorn in Alabama, particularly where native stands of redcedar are

found. Previous work in North Carolina has shown that *M.* 'Ormiston Roy', *M.* 'David', and *M.* 'Radiant' are susceptible to this disease (2). In a recent Tennessee study (11), the only crabapples damaged by cedar apple rust were *M.* Brandywine® and *M. ioensis* 'Klehm's Improved Bechtel'. Landscapers and homeowners must remember to choose crabapples that are not only resistant to fireblight and apple scab but also cedar apple rust.

**Table 1: Reaction of Crabapple Cultivars to Fireblight and Apple Scab in South Alabama**

Taxa	Fireblight <sup>1</sup>			Apple Scab <sup>2</sup>		
	1993	1994	1996	1993	1994	1996
<i>M.</i> 'Mary Potter'	2.5 <sup>3</sup>	2.2	2.0	0.0	0.0	0.0
<i>M.</i> 'Red Jade' Dwarf	2.5	0.8	1.3	0.0	0.0	0.0
<i>M.</i> 'Purple Prince'	2.3	0.7	0.6	0.0	0.0	0.0
<i>M.</i> 'Sentinel'	2.3	1.7	1.5	0.0	0.0	0.0
<i>M.</i> 'Sinai Fire'	2.3	1.6	0.3	0.0	0.0	0.0
<i>M.</i> 'Snowdrift' dwarf	2.2	1.8	1.5	0.0	0.0	0.0
<i>M.</i> 'Indian Magic'	2.1	0.7	0.7	0.0	0.0	0.0
<i>M.</i> 'Professor Sprenger'	2.0	0.8	0.5	0.0	0.0	0.0
<i>M.</i> 'Silver Moon'	2.0	2.4	2.0	0.0	0.0	0.0
<i>M.</i> 'Snowdrift'	2.0	1.9	0.6	0.0	0.0	0.0
<i>M.</i> 'Doubloons'	1.9	1.4	0.8	0.0	0.0	0.0
<i>M. tr.</i> Golden Raindrops™	1.8	2.0	ND <sup>4</sup>	0.0	0.0	ND
<i>M.</i> 'Red Jade'	1.8	0.3	0.8	0.0	0.0	0.0
<i>M.</i> 'Ormiston Roy'	1.7	0.9	0.6	0.0	0.0	0.0
<i>M. ioensis</i> 'Klehm's Improved Bechtel'	1.7	3.3	3.5	0.0	0.0	0.0
<i>M.</i> Sugar Tyme®	1.6	0.8	0	0.0	0.0	0.0
<i>M. floribunda</i>	1.6	1.0	1.0	0.0	0.0	0.0
<i>M.</i> 'Selkirk'	1.5	0.5	0.5	0.0	0.0	0.0
<i>M.</i> Weeping Candied Apple®	1.5	0.1	0.1	0.0	0.0	0.0
<i>M.</i> 'Wintergold'	1.5	2.0	1.2	0.0	0.0	0.0
<i>M.</i> Brandywine®	1.5	2.7	2.7	0.0	0.0	0.0
<i>M.</i> 'Hopa'	1.5	2.0	1.0	0.0	0.1	0.5
<i>M.</i> 'Royalty' Dwarf	1.5	0.1	0.5	0.0	0.0	0.0
<i>M. hupehensis</i>	1.4	0.3	0.1	0.0	0.0	0.4
<i>M.</i> 'Red Baron'	1.4	1.1	0.5	0.0	0.0	0.0
<i>M.</i> Red Jewel®	1.3	1.1	0.3	0.0	0.0	0.0
<i>M.</i> 'Baskatong'	1.3	0.1	0.0	0.0	0.0	0.0
<i>M.</i> 'Andirondack'	1.3	1.1	1.2	0.0	0.0	0.0



**Table 1: Reaction of Crabapple Cultivars to Fireblight and Apple Scab in South Alabama**

Taxa	Fireblight <sup>1</sup>			Apple Scab <sup>2</sup>		
	1993	1994	1996	1993	1994	1996
<i>M. Red Splendor</i> ' Dwarf	1.3	0.2	0.0	0.0	0.0	0.0
<i>M. 'Strawberry Parfait'</i>	1.2	0.0	0.2	0.3	0.0	0.0
<i>M. 'Beverly'</i>	1.2	0.1	0.3	0.0	0.0	0.0
<i>M. 'Donald Wyman'</i>	1.2	0.0	0.0	0.0	0.0	0.0
<i>M. floribunda</i> Dwarf	1.2	0.4	1.0	0.0	0.0	0.0
<i>M. 'Eleyi'</i>	1.1	0.7	0.0	1.2	2.1	1.7
<i>M. Centurion</i> <sup>®</sup>	1.0	0.1	0.0	0.0	0.0	0.0
<i>M. 'Prairifire'</i>	1.0	0.1	0.0	0.0	0.0	0.0
<i>M. 'Louisa'</i>	1.0	0.1	1.0	0.0	0.0	0.0
<i>M. Velvet Pillar</i> <sup>™</sup> (tree)	0.9	0.1	0.0	0.0	0.0	0.0
<i>M. White Angel</i> <sup>®</sup>	0.8	0.5	0.1	0.0	0.0	0.0
<i>M. zumi</i> var. <i>calocarpa</i>	0.8	0.3	0.0	0.0	0.0	0.0
<i>M. sargentii</i>	0.8	1.9	1.0	0.0	0.0	0.0
<i>M. sargentii</i> Dwarf	0.7	1.6	0.2	0.0	0.0	0.0
<i>M. 'Indian Summer'</i>	0.7	0.0	0.5	0.0	0.0	0.0
<i>M. 'David'</i>	0.7	0.5	0.3	0.0	0.0	0.0
<i>M. 'Bob White'</i>	0.7	0.1	0.1	0.0	0.0	0.0
<i>M. 'Profusion'</i>	0.6	0.1	0.2	0.1	0.1	0.0
<i>M. 'Liset'</i> Dwarf	0.6	0.0	0.3	0.0	0.0	0.0
<i>M. 'Liset'</i>	0.4	0.1	0.0	0.0	0.0	0.0
<i>M. 'Dolgo'</i>	0.3	0.0	0.0	0.2	0.0	0.0
<i>M. 'Pink Spires'</i>	0.2	0.1	0.0	0.0	0.2	0.0
<i>M. 'Adams'</i>	0.2	0.0	0.1	0.0	0.0	0.0
<i>M. Velvet Pillar</i> <sup>™</sup> (shrub)	0.2	0.3	0.1	0.0	0.0	0.0
<i>M. 'Radiant'</i>	0.2	0.0	0.4	0.7	0.9	0.0
<i>M. 'Adam's Dwarf'</i>	0.2	0.0	0.2	0.0	0.0	0.0
<i>M. 'Robinson' Dwarf</i>	0.1	0.0	0.0	0.0	0.0	0.1
<i>M. 'Jewelberry'</i>	0.1	0.2	0.3	0.0	0.0	0.0
<i>M. 'Spring Snow' Dwarf</i>	0.1	0.1	0.0	0.0	0.0	0.0
<i>M. 'Pink Princess'</i>	0.0	0.1	0.0	0.0	0.0	0.0
<i>M. baccata</i> 'Jackii'	0.0	0.0	0.0	0.0	0.0	0.0
<i>M. Coralburst</i> <sup>®</sup>	0.0	0.1	0.0	0.0	0.0	0.0

<sup>1</sup>Fireblight severity was assessed on a scale of 0 to 4 where 0 = no disease to 4 = major portion of tree damaged.

<sup>2</sup>Apple scab was rated on a scale of 0 to 5 where 0 = no disease to 5 = complete defoliation.

<sup>3</sup>Mean separation within columns for each variable was according to Fisher's protected least significance (LSD) test (P=0.05).

<sup>4</sup>ND = no data available due to death of all trees.

**Table 2: Survival of Crabapple Cultivars at the Brewton Experiment Field in 1993 and 1996**

Cultivar	% Survivors		Cultivar	% Survivors	
	1993	1996		1993	1996
<i>M.</i> 'Adams' dwarf	83	83	<i>M.</i> 'Prairifire'	80	60
<i>M.</i> 'Adam's'	60	47	<i>M.</i> 'Professor Sprenger'	60	53
<i>M.</i> 'Adirondack'	87	27	<i>M.</i> 'Profusion'	87	60
<i>M. baccata</i> 'Jackii'	27	13	<i>M.</i> 'Purple Prince'	73	40
<i>M.</i> 'Baskatong'	80	13	<i>M.</i> 'Radiant'	100	100
<i>M.</i> 'Beverly'	87	80	<i>M.</i> 'Red Baron'	53	27
<i>M.</i> 'Bob White'	67	60	<i>M.</i> 'Red Jade'	80	33
<i>M.</i> Brandywine®	80	33	<i>M.</i> 'Red Jade' dwarf	67	33
<i>M.</i> Centurion®	93	80	<i>M.</i> Red Jewel®	53	40
<i>M.</i> Coralburst®	80	40	<i>M.</i> 'Red Splendor' dwarf	33	25
<i>M.</i> 'David'	60	33	<i>M.</i> 'Robinson' dwarf	73	67
<i>M.</i> 'Dolgo'	87	53	<i>M.</i> 'Royalty' dwarf	87	67
<i>M.</i> 'Donald Wyman'	27	20	<i>M. sargentii</i>	73	20
<i>M.</i> 'Doublooms'	67	33	<i>M. sargentii</i> dwarf	80	60
<i>M.</i> 'Eleyi'	93	93	<i>M.</i> 'Selkirk'	80	47
<i>M. floribunda</i>	67	53	<i>M.</i> 'Sentinel'	60	60
<i>M. floribunda</i> dwarf	80	60	<i>M.</i> 'Silver Moon'	60	20
<i>M.</i> 'Hopa'	80	73	<i>M.</i> 'Sinai Fire'	47	40
<i>M. hupehensis</i>	60	47	<i>M.</i> 'Snowdrift'	73	27
<i>M.</i> 'Indian Magic'	67	33	<i>M.</i> 'Snowdrift' dwarf	80	53
<i>M.</i> 'Indian Summer'	87	73	<i>M.</i> 'Spring Snow' dwarf	67	67
<i>M. ioensis</i> 'Klehm's			<i>M.</i> 'Strawberry Parfait'	80	27
Improved Bechtel'	73	47	<i>M.</i> Sugar Tyme®	73	47
<i>M.</i> 'Jewelberry'	73	40	<i>M. tr.</i> Golden Raindrops™	33	0
<i>M.</i> 'Liset' dwarf	67	42	<i>M.</i> Velvet Pillar™ (shrub)	87	87
<i>M.</i> 'Liset'	80	27	<i>M.</i> Velvet Pillar™ (tree)	93	67
<i>M.</i> 'Lousia'	67	27	<i>M.</i> Weeping		
<i>M.</i> 'Mary Potter'	67	33	Candied Apple®	73	60
<i>M.</i> 'Ormiston Roy'	80	60	<i>M.</i> White Angel®	87	80
<i>M.</i> 'Pink Princess'	93	40	<i>M.</i> 'Wintergold'	80	73
<i>M.</i> 'Pink Spires'	67	13	<i>M. zumi</i> var. <i>calocarpa</i>	73	40

**Table 3: Landscape Value of Crabapple Cultivars at the Brewton Experiment Field, 1996**

Cultivar	Rating <sup>1</sup>	Cultivar	Rating <sup>1</sup>
<i>M.</i> 'Adams' dwarf	2.4	<i>M.</i> 'Prairifire'	2.5
<i>M.</i> 'Adams'	3.4	<i>M.</i> 'Professor Sprenger'	2.7
<i>M.</i> 'Adirondack'	2.7	<i>M.</i> 'Profusion'	3.8
<i>M.</i> <i>baccat</i> 'Jackii'	4.0	<i>M.</i> 'Purple Prince'	3.1
<i>M.</i> 'Baskatong'	2.3	<i>M.</i> 'Radiant'	3.5
<i>M.</i> 'Beverly'	2.6	<i>M.</i> 'Red Baron'	1.0
<i>M.</i> 'Bob White'	3.0	<i>M.</i> 'Red Jade'	3.0
<i>M.</i> Brandywine®	3.0	<i>M.</i> 'Red Jade' dwarf	3.0
<i>M.</i> Centurion®	2.5	<i>M.</i> Red Jewel®	2.6
<i>M.</i> Coralburst®	3.0	<i>M.</i> 'Red Splendor' dwarf	4.0
<i>M.</i> 'David'	2.6	<i>M.</i> 'Robinson' dwarf	3.0
<i>M.</i> 'Dolgo'	2.4	<i>M.</i> 'Royalty' dwarf	2.3
<i>M.</i> 'Donald Wyman'	2.0	<i>M.</i> <i>sargentii</i>	2.7
<i>M.</i> 'Doubloons'	1.4	<i>M.</i> <i>sargentii</i> dwarf	2.9
<i>M.</i> 'Eleyi'	3.5	<i>M.</i> 'Selkirk'	2.7
<i>M.</i> <i>floribunda</i>	2.1	<i>M.</i> 'Sentinel'	2.3
<i>M.</i> <i>floribunda</i> dwarf	3.4	<i>M.</i> 'Silver Moon'	2.5
<i>M.</i> 'Hopa'	2.9	<i>M.</i> 'Sinai Fire'	2.2
<i>M.</i> <i>hupehensis</i>	3.1	<i>M.</i> 'Snowdrift'	3.7
<i>M.</i> 'Indian Magic'	2.8	<i>M.</i> 'Snowdrift' dwarf	2.9
<i>M.</i> 'Indian Summer'	3.0	<i>M.</i> 'Spring Snow' dwarf	2.1
<i>M.</i> <i>ioensis</i>		<i>M.</i> 'Strawberry Parfait'	2.2
'Klehm's Improved Bechtel'	2.2	<i>M.</i> Sugar Tyme®	2.5
<i>M.</i> 'Jewelberry'	3.5	<i>M.</i> <i>tr.</i> Golden Raindrops™	1.0
<i>M.</i> 'Liset' dwarf	2.5	<i>M.</i> Velvet Pillar™ (shrub)	2.4
<i>M.</i> 'Liset'	3.0	<i>M.</i> Velvet Pillar™ (tree)	3.2
<i>M.</i> 'Lousia'	3.0	<i>M.</i> Weeping Candied Apple®	2.5
<i>M.</i> 'Mary Potter'	2.6	<i>M.</i> White Angel®	2.7
<i>M.</i> 'Ormiston Roy'	2.1	<i>M.</i> 'Wintergold'	2.7
<i>M.</i> 'Pink Princess'	2.5	<i>M.</i> <i>zumi</i> var. <i>calocarpa</i>	1.2
<i>M.</i> 'Pink Spires'	2.9		

<sup>1</sup>Landscape value ratings range from 1 to 5 where 1 = not suitable for landscape use and 5 = highly desirable for landscape use.

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Frog-eye leaf spot on *M.* 'Louisa'. (Photo by Austin Hagan)



Aecia associated with cedar-quince rust on *M. floribunda*. (Photo by Austin Hagan)

