

MALUS

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FROM THE EDITOR'S DESK

In previous issues I mentioned the problems that I was having in getting material for the issues of MALUS. This problem has become severe enough to affect now the timeliness of the publication of MALUS. This issue comes to you about 6 months later than it should because of this difficulty. Needless to say, I am very grateful to the authors who have presented me with the material for this issue. There is still the Fall? issue of MALUS that I am concerned about. It will have to be issued later than normal. I just hope that enough material becomes available to make it before I relinquish the position of Editor to David Guthery.

I will be giving up this position either when the last issue of 1997 is mailed, or January 1, 1998, should there be not be a second issue for 1997. Since I do not know what the future brings in this matter, I will take this opportunity to express my appreciation to you for your patience with my efforts. The Fall 1991 issue was my first effort at being an editor. It was also the first time I had used the word processing program needed for doing the layout of these issues. There was a lot of learning to do in a very short time. The proof readers helped tremendously, but even with their help I still managed to create problems. First and foremost in this help has been Floyd Swink of the Morton Arboretum. Tom Green, John Sabuco, and John Pair have been major contributors in this area also. I thank them all for their help.

MALUS 'BIRDLAND'

Michael Yanny

Malus 'Birdland' was discovered in the early 1960's by Clark Johnson, the founder of Johnson's Nursery in Menomonee Falls, Wisconsin. The original tree is still located in the front yard of his former residence on Marcy Road. It is not known from where Clark obtained this plant.

M. 'Birdland' is a large ornamental crabapple tree, reaching about thirty feet wide and twenty-five feet tall in thirty to thirty-five years. It flowers profusely every spring with no tendency towards alternate blooming. Colorful pink buds open to pure white flowers that coat the branches. In late summer, small pea-sized yellow crabapples become noticeable. The abundant fruits develop a reddish-orange blush on sides facing the sun. After several hard frosts, they turn a pleasing cider-brown color. The fruit stalks, called pedicels, remain red into midwinter, giving the tree a reddish cast. Much of the fruit remains hard and colorful all winter, though, it seems softening continues from midautumn onward. Because of the constant availability of palatable fruit and the convenient small size, *M.* 'Birdland' is relished by birds, especially cedar waxwings and robins. Lori Yanny most appropriately named the tree *M.* 'Birdland' in 1981.

Disease ratings from *M.* 'Birdland' have not been published. Observations at Johnson's Nursery have been mixed. Trees at the Menomonee Falls, Wisconsin nursery location have shown excellent tolerance to apple scab. At the Jackson, Wisconsin nursery location where scab pressure is intense, *M.* 'Birdland' has suffered severe leaf drop in most of the past ten years. Cedar-apple rust and fireblight have not been observed on the cultivar.

With the increased interest in plants for attracting wildlife, *M.* 'Birdland' may be one of the best.

DESCRIPTION OF *MALUS* 'BIRDLAND'

John H. den Boer

TRADE NAME: Birdland Crabapple
TAXON: *Malus* 'Birdland'
SYNONYM: Bob White

ORIGINATOR/DISCOVERER: Clark Johnson
YEAR DISCOVERED: 1960+
INTRODUCER: Johnson's Nursery
NAMED BY: Lori Yanny
NAMED FOR: The birds because they relished the fruit

TYPE: Single flower
COLOR OF BUD: Rose
Red
COLOR OF BALLOON: Pink to white
Rose pink
COLOR OF FLOWER: White
FADING OF FLOWER: Does not fade
FRINGE COLORED?: No
PETAL SHAPE: Flat or slightly undulate
SHAPE OF PETAL BASE: Attenuate to rounded
SHAPE OF PETAL BASE: Rounded
Bluntly rounded to retuse
PETAL POSITION: Separated from each other
Slightly overlapping
ANTHER COLOR BEFORE ANTHESIS: Yellow
ANTHER COLOR AFTER ANTHESIS: Bright yellow
STYLE LENGTH BEFORE ANTHESIS: Style longer than stamen
Style same length as stamen
Style shorter than stamen
STYLE COLOR: Greenish
STYLE BASE PUBESCENCE: Style base villous
Style base heavily villous
PEDICEL COLOR - FLOWER: Light-green
Green
PEDICEL STIFFNESS: Flexible pedicel
PEDICEL PUBESCENCE: Glabrous
FILAMENT COLOR: White

OVARY COLOR: Green
CALYX COLOR: Green with red tip
CALYX PUBESCENCE - INSIDE: Moderately pubescent
Heavily pubescent
CALYX PUBESCENCE - OUTSIDE: Glabrous
CALYX LOBE SHAPE: Lobe slightly recurved
Lobe wide spreading
CALYX TUBE CONSTRICTION: Constricted above ovary
HYPANTHIUM PUBESCENCE: Hypanthium glabrous
INFLORESCENCE POSITION: Clustered
INFLORESCENCE FORM: Umbellate
RIPE FRUIT COLOR - SHADED SIDE: Yellow
RIPE FRUIT COLOR - SUNNY SIDE: Orange-red
BLUSH INTENSITY: Obvious blush
BLUSH COLOR: Red
Orange
BLOOM INTENSITY: None
LENTICEL INTENSITY: Absent or not visible
LUSTER: Glossy
WAX ON FRUIT: Fruit not waxy
FLESH COLOR - BODY OF FRUIT: Pale yellow
FLESH COLOR - NEAR SKIN: Pale yellow
CORE-LINE INTENSITY: Prominently visible
CORE-LINE COLOR: Pale yellow
SEED COLOR AFTER MATURITY: Brown
CALYX PERSISTENCE: Calyx deciduous
CALYX DEPRESSION: Very shallow
Shallow
PEDICEL COLOR - FRUIT: Yellowish-green
Light purple
Purple
FRUIT SHAPE - LONGITUDINAL: Globose
Ellipsoid
Oblate
FRUIT SHAPE - TRANSVERSE: Round or nearly round
Slightly ribbed or angular
FRUIT PERSISTENCE ON TREE: Drops in the Spring
COLOR - YOUNG LEAVES: Green
COLOR - MATURE LEAVES: Green
COLOR - FALL LEAVES: Yellow

LEAF SHAPE: Oval
 Elliptical
 Ovate
 LEAF MARGIN: Crenate
 Serrulate
 LEAF BASE SHAPE: Rounded
 LEAF APEX SHAPE: Acuminate
 PUBESCENCE - TOP - YOUNG: Slightly pubescent
 PUBESCENCE - BOTTOM - YOUNG: Glabrous
 PUBESCENCE - TOP - MATURE: Glabrous
 PUBESCENCE - BOTTOM - MATURE: Glabrous
 LOBES - VIGOROUS SHOOTS: Not lobed
 LOBES - MATURE SHOOTS: Not lobed
 PETIOLE PUBESCENCE: Petiole glabrous
 TREE SHAPE - YOUNG: Broad-headed
 TREE SHAPE - MATURE: Broad-headed
 Round
 BRANCHING HABIT: Arching
 THORN-LIKE SPURS: Spurs present
 GENERAL TREE SIZE: Large (> 25 feet)
 MATURE TREE HEIGHT: 30.0 feet
 MATURE TREE WIDTH: 30.0 feet

MEASUREMENTS

(Dimensions in centimeters)

<u>Characteristics</u>	<u>Average</u>	<u>Standard Deviation</u>	<u>Number of Measurements</u>
NUMBER OF FLOWER PETALS:	5.000	0.000	40
FLOWER DIAMETER:	3.820	0.262	10
PETAL LENGTH:	2.107	0.137	30
PETAL WIDTH:	1.363	0.137	30
PEDICEL LENGTH:	2.750	0.302	30
SEPAL LENGTH:	0.500	0.057	30
SEPAL WIDTH:	0.266	0.049	30
OVARY DIAMETER:	0.202	0.015	20
HYPANTHIUM LENGTH:	0.441	0.049	30
NUMBER OF STAMENS:	20.200	1.175	30
NUMBER OF STYLES:	3.167	0.367	30
INFLORESCENCE NUMBER:	4.317	1.594	60
FRUIT DIAMETER:	0.812	0.089	52

MEASUREMENTS Cont.

(Dimensions in centimeters)

<u>Characteristics</u>	<u>Average</u>	<u>Standard Deviation</u>	<u>Number of Measurements</u>
FRUIT LENGTH:	0.843	0.087	52
RATIO - FRUIT LENGTH/DIA.:	1.070	0.052	20
PEDICEL LENGTH OF FRUIT:	3.240	0.745	39
CALYX SCAR DIAMETER:	0.198	0.030	50
LEAF LENGTH:	9.933	1.536	12
LEAF WIDTH:	3.425	0.428	12
RATIO - LEAF BLADE/WIDTH:	1.890	0.145	12
PETIOLE LENGTH:	3.450	0.578	12

1996 SCAB RATINGS ON CRABAPPLES

Norman Pellett and David Heleba
University of Vermont

This past year, 1996, was an especially severe scab year for crabapples, resulting in summer defoliation for many landscape trees. We surveyed our crabapple collections at the University of Vermont Horticultural Research Center in South Burlington, Vermont on September 19 and rated the scab infestations as follows: Severe - 50% defoliation or more, Moderate - Less than 50% defoliation, but many scab lesions per leaf, and Resistant - Few or no scab lesions. Most of our trees are more than 25 years old, but a few of the newer cultivars were planted less than five years ago. While numerous studies have been conducted throughout the eastern U.S. on scab susceptibility, the results have often been contrary to our local observations.

Resistant - Few or no scab lesions:

Adams	Mary Potter
Adirondack	Mercer
Beauy	Midget
Beverly	Moltan Lava®
Blanche Ames	Naragansett
Bob White	Oekonomierat Echtermeyer
Canary	Peachleaf Cherry
Centurion®	Prairie Maid
Chestnut	Prairifire
Coralburst™	Prince Georges
David	Pygmy
Dolgo	Red Barron
Donald Wyman	Red Heart
Erie	Red Splendor
Evelyn	Redbud
Golden Hornet	Sargent
Hartwig	Silver Drift
Harvest Gold™	Silver Moon
Hyslop	Snowbank
Jack	Snowcap
Japanese Flowering	Snowdrift
Liset	Sugar Tyme ®
Magdeburg	Weeping Yellow-Fruited Pearleaf
Makamik	White Cascade
Marshall Oyama	Winter Gold

Moderate - Less than 50% defoliation but lots of lesions from scab:

Aldenham	Nippon
Almata	Oproto
Candymint Sargent	Pink Beauty
Centennial	Pink Eye
Cheal's Crimson	Pinkbud Sargent
Chinese	Profusion
Chinese Double Flowering	Rurple
Column Pearleaf	Ralph Shay
Column Siberian	Red Jade
Dwarf Siberian	Red Silver
Flame	Redfield
Hillier	Robinson
Hope	Robusta No. 5
Illinois Baccata	Royal Ruby
Indian Summer	Roylaty
Jewelberry	Scheidecker
Lemoine	Selkirk
Louisa	Spring Snow
Namew	Tea
Nieuwland	Turesi

Severe - 50% or more defoliation

Almey	Indian Magic
Bechtel	Irene
Carmine	Jay Darling
Charlotte	Klehm's Improved Bechtel
Column Cherry	Macrocarpa
Column Siberian	Niedzwetzkyana
Crimson Brilliant	Pink Spires
Dorothea	Purple Wave
Eleyi	Radiant
Elise Rathke	Sparkler
Ferrill's Crimson	Strathmore
Garry	Tanner
Helen	Van Eseltine
Henrietta Crosby	Vanguard
Henry F. DuPont	Weeping Candied Apple™

1996 FIRE BLIGHT RATINGS ON CRABAPPLES

Harold Pellett and Nancy Rose

There was considerable infection of fire blight on some of the newer crabapple cultivars in 1996 in one of the evaluation plantings at the Minnesota Landscape Arboretum. Although we did not like to see the injury, it did provide an opportunity to get some good data on relative susceptibility. In general, the infection seemed to be consistent within the cultivars that are susceptible. In most cases, all plants of the susceptible cultivars had some injury. Table 1 lists the varieties that exhibited fire blight injury.

TABLE 1. Crabapple cultivars with fireblight in 1996

Cultivar	Rating	Cultivar	Rating
Adirondack	1	Pink Dawn	3
Canary	1	Prairie Maid	2-3
Candymint Sargent	1	Purple Prince	2
Carmin	2	Royal Ruby	2
Dartmouth	4	Silver Drift	1
Doublings	1	Sinai Fire	2
Edna Mullins	3	Snowcloud	1-2
Golden Raindrops™	3	Snow Magic	3
Lancelot®	1	Walters	2
Madonna®	3-4	Winter Gem	1
Morning Sun	2	Zumarang	1
Park Center	3-4		

- 1 = minor
- 2 = more than a few tips
- 3 = many tips plus entire branches
- 4 = severe; whole branches to entire tree killed

CRABAPPLES: SALES TRENDS AND CONSUMER PREFERENCES IN IOWA

Jeffery K. Iles
Joanna S. Stookey
Iowa State University

Crabapples are the most widely cultivated small landscape trees in the northern United States and southern Canada. Defined as those taxa in the genus *Malus* that bear fruits 5 cm (2 inches) in diameter or smaller, crabapples offer spectacular spring flowers, attractive summer foliage, an autumnal display of vividly colored fruit, and an array of growth habits and sizes to complement any landscape situation.

An examination of nursery catalogs underscores the popularity of crabapples. Approximately 200 taxa are currently available from nursery sources, and dozens more become available each year. But with this abundance comes confusion and skepticism over the quality and uniqueness of each selection. In addition, many homeowners and nursery professionals have developed negative attitudes toward crabapples because of inferior performance by a few widely planted selections. For instance, the cultivars 'Almey', 'Eleyi', 'Hopa', and 'Radiant' become commonplace in residential and commercial landscapes because of their showy, 7- to 10-day floral display each spring. Unfortunately, little consideration was given to their aesthetic impact at other times of the year. Thus, many established landscapes contain these and other disease-prone crabapples that defoliate prematurely, flower only in alternate years, and/or produce undesirable fruit litter.

Over the last several decades, crabapple introductions have been held to a higher standard where disease resistance, spring flowers, fall fruit display, and maintenance considerations are given equal weight. As a result, the majority of recently introduced taxa are excellent landscape plants. Still, a surprising number of undesirable selections can be found in nurseries and garden centers. Failure to purge these substandard selections from wholesale and retail inventories could further undermine the reputation of this useful plant group and erode consumer confidence in the nursery industry.

The objectives of this study were to: 1) assess the importance of crabapples to the nursery and landscape industry in Iowa and identify crabapple taxa offered for sale, and 2) characterize consumer preferences that influence crabapple inventories as perceived by nursery operators participating in this study.

Survey questionnaires were sent by first-class mail to all 180 active members of the Iowa Nursery and Landscape Association. Mailed questionnaires included a cover letter explaining the objectives of the research and instructions for returning the completed questionnaire. Association members surveyed were assured of the confidentiality of their responses. The initial mailing was sent on June 7, 1996, with follow-up mailings to non-respondents on July 1.

Completed questionnaires were received from 105 firms (58.3% response rate). However, five businesses were eliminated from the study because they neither grew nor sold crabapples. Firms were grouped according to their primary business type: retail nursery/garden center, landscape design/installation, wholesale nursery, and production nursery. Because of the low number of responses, data from wholesale nurseries, production nurseries, and lawn care businesses, were grouped and analyzed together. Incomplete data for questions unanswered were not adjusted, and percentage results presented in tables are based upon actual reported totals.

The questionnaire contained 16 numbered questions in both closed-end and open-end form, and addressed the following areas: a) the relative popularity of crabapples compared to other flowering trees, b) the number of crabapple taxa offered for sale and identification of best-selling selections, c) the number of crabapple taxa eliminated from inventories since 1990, and why, d) crabapple traits that most influence customers' decisions to purchase, e) identification of fruitless selections sold in Iowa, and f) the outlook for future crabapple sales.

Most of the questionnaires were completed by owners and/or managers (96%). Respondents grouped themselves into five business categories, with retail nurseries and landscape design/installation firms comprising 90% of all respondents. Specifically, the participant profile was distributed in the following manner: Landscape design/installation (51%) retail nursery/garden center (39%), production nursery (5%), wholesale nursery (4%), and lawn care (1%).

To gauge the relative importance of crabapples, respondents were asked to rate six species of flowering trees (rated on a scale of 1 to 6, where 1 = most and 6 = least) in order of their popularity with customers. Most believed crabapples were the preferred flowering tree, as 83% gave them a rating of 1 (Table 1). Serviceberry was the most frequent second choice.

Table 1. Rating of flowering trees in order of popularity with respondent customers.

Tree species	RESPONSE (%)					
	1	2	3	4	5	6
Callery pear (<i>Pyrus calleryana</i>)	6.1 (n=6)	19.6 (n=19)	13.5 (n=13)	19.5 (n=17)	16.2 (n=13)	19.5 (n=16)
Crabapple (<i>Malus</i> spp.)	82.7 (n=81)	11.4 (n=11)	3.1 (n=3)	2.3 (n=2)	0.0 (n=0)	1.2 (n=1)
Dogwood (<i>Cornus</i> spp.)	7.1 (n=7)	20.6 (n=20)	13.5 (n=13)	11.5 (n=10)	15.0 (n=12)	29.3 (n=24)
Japanese tree lilac (<i>Syringa reticulata</i>)	3.1 (n=3)	12.4 (n=12)	26.1 (n=25)	25.3 (n=22)	27.5 (n=22)	8.5 (n=7)
Magnolia (<i>Magnolia</i> spp.)	0.0 (n=0)	8.2 (n=8)	16.7 (n=16)	24.1 (n=21)	26.3 (n=21)	28.1 (n=23)
Serviceberry (<i>Amelanchier</i> spp.)	1.0 (n=1)	27.8 (n=27)	27.1 (n=26)	17.2 (n=15)	15.0 (n=12)	13.4 (n=11)
	n=98	n=97	n=96	n=87	n=80	n=82

^z Rating where 1 = most popular and 6 = least popular

Most nurseries feel obliged to carry crabapple selections that provide a range of flower and fruit colors, and growth habits (weeping, spreading, upright, columnar, etc.). In Iowa, retail nurseries offer the widest assortment of crabapples, averaging 13.9 selections per business. Landscape design/installation firms averaged 10.3 selections, while the combination of all other respondents averaged 11.3 selections per business.

When respondents were asked how they offer crabapples for sale, most retail nurseries (85%) and a majority of landscaping firms (55%) said they sell crabapples as container-grown trees. Over one-third (39%) of landscaping firms reported selling balled-and-burlapped crabapples, but only two offered large specimens transplanted with a tree spade.

The cultivars 'Prairifire', 'Spring Snow', and 'Snowdrift' were cited most frequently as the best selling crabapple selections (Table 2). In 1996, the Iowa Nursery and Landscape Association designated 'Prairifire' as the "Tree of the Year." Because of its disease-resistance history and bright red-purple flowers, the popularity of 'Prairifire' is not surprising; however, the "Tree of the Year" designation undoubtedly contributed to its prominent standing in Iowa. Almost one-third of retail (30%) and landscape design (29%) respondents also chose 'Prairifire' as their personal favorite.

The demand for fruitless flowering trees is great. The selection 'Spring Snow', which is essentially sterile, satisfies this need and explains the popularity with customers of Iowa nurseries and landscaping firms. Finally, white-flowering 'Snowdrift', despite its susceptibility to the diseases apple scab (*Venturia inaequalis*) and fire blight (*Erwinia amylovora*), remains a favorite long after its introduction in 1965. Unfortunately, several respondents listed the cultivars 'Pink Perfection', 'Radiant', 'Royalty', and 'Sparkler' among their best selling selections. These cultivars have serious disease problems and should not be offered as viable choices.

A majority of all respondents (61%) indicated they had eliminated certain crabapple selections from their product line since 1990. Of the 34 discontinued taxa identified by respondents, the cultivars 'Radiant' (19%) and 'Royalty' (15%) were most frequently mentioned (Table 3). Disease problems were cited by 75% of respondents as the predominant reason for eliminating these and other crabapples from inventories.

A large number of retailers (77%) and landscaping firms (61%) indicated they place equal emphasis on flowering, fruiting, growth habit, and disease resistance characteristics when describing a particular crabapple to a customer. Yet, approximately three-fourths of retailers (72%) and landscapers (76%) declared their customers are still most interested in flower color. The necessity of offering a variety of crabapples with all flower colors represented was re-emphasized, as 36% of all respondents stated their customers were equally interested in white, red, and pink forms.

Fruiting characteristics of crabapples are a contentious issue in the selection process. In fact, 29% of respondents reported that 26% to 50% of their customers find crabapple fruit objectionable. Another 18% remarked that 51% to 75% of their customers found fruit objectionable. Intolerance of fruit-bearing crabapples by consumers has prompted a large number of respondents (82%) to carry a fruitless selection. For most (93%), 'Spring Snow' was the lone offering. Although a beautiful tree in bloom, 'Spring Snow' is subject to slight apple scab and mild fireblight.

Because of limitations with 'Spring Snow' and the lack of a suitable fruitless alternative, crabapples that bear small, persistent fruit should be identified and promoted.

The majority of respondents (90%) felt crabapple sales had either increased or remained the same during the period from 1990 to 1996, and a slightly larger group (93%) predicted sales would increase or remain the same during the next 5 years.

Positive feelings about past sales and optimistic perceptions for the future revealed in the study, bode well for crabapple use in Iowa, and presumably in other regions of the United States and Canada. Still, nursery and landscape businesses must continually evaluate the appropriateness of crabapple selections they offer. Fellow green industry professionals and an increasing number of sophisticated gardening clients demand crabapples with excellent ornamental utility and superior disease resistance.

Table 2. Respondents' answer to the request, "List your three best-selling crabapples."

Taxa ^z	Response %			
	Business Focus			
	Total	Retail ^y	Landscape ^x	Other ^w
<i>M. 'Prairifire'</i>	23.4 (n=67)	23.9 (n=27)	22.8 (n=34)	25.0 (n=6)
<i>M. 'Spring Snow'</i>	22.4 (n=64)	20.4 (n=23)	22.1 (n=33)	33.3 (n=8)
<i>M. 'Snowdrift'</i>	14.3 (n=41)	14.2 (n=16)	14.8 (n=22)	12.4 (n=3)
<i>M. 'Indian Magic'</i>	5.2 (n=15)	8.8 (n=10)	2.7 (n=4)	4.2 (n=1)
<i>M. 'Profusion'</i>	4.2 (n=12)	2.7 (n=3)	4.7 (n=7)	8.3 (n=2)
<i>M. 'Pink Spires'</i>	3.8 (n=11)	2.7 (n=3)	5.4 (n=8)	0.0 (n=0)
<i>M. 'Red Splendor'</i>	3.4 (n=10)	4.4 (n=5)	3.4 (n=5)	0.0 (n=0)
<i>M. 'Adams'</i>	2.1 (n=6)	0.0 (n=0)	4.0 (n=6)	0.0 (n=0)
<i>M. 'Centurion'</i>	1.7 (n=5)	2.7 (n=3)	0.7 (n=1)	4.2 (n=1)
<i>M. 'Donald Wyman'</i>	1.7 (n=5)	0.9 (n=1)	2.7 (n=4)	0.0 (n=0)
<i>M. sargentii</i>	1.7 (n=5)	1.8 (n=2)	2.0 (n=3)	0.0 (n=0)
<i>M. 'Robinson'</i>	1.4 (n=4)	1.8 (n=2)	0.7 (n=1)	4.2 (n=1)
<i>M. 'Royalty'</i>	1.4 (n=4)	2.7 (n=3)	0.7 (n=1)	0.0 (n=0)
<i>M. 'Harvest Gold'</i>	1.0 (n=3)	0.0 (n=0)	2.0 (n=3)	0.0 (n=0)
<i>M. 'Liset'</i>	1.0 (n=3)	0.9 (n=1)	1.3 (n=2)	0.0 (n=0)
<i>M. 'Red Barron'</i>	1.0 (n=3)	1.8 (n=2)	0.7 (n=1)	0.0 (n=0)
<i>M. 'Sparkler'</i>	1.0 (n=3)	0.9 (n=1)	1.3 (n=2)	0.0 (n=0)
<i>M. 'Thunderchild'</i>	1.0 (n=3)	0.9 (n=1)	0.7 (n=1)	4.2 (n=1)
<i>M. 'American Masterpiece'</i>	0.7 (n=2)	1.8 (n=2)	0.0 (n=0)	0.0 (n=0)
<i>M. 'Coralburst'</i>	0.7 (n=2)	0.0 (n=0)	1.3 (n=2)	0.0 (n=0)
<i>M. 'Golden Raindrops'</i>	0.7 (n=2)	0.9 (n=1)	0.0 (n=0)	4.2 (n=1)
<i>M. 'Pink Perfection'</i>	0.7 (n=2)	0.9 (n=1)	0.7 (n=1)	0.0 (n=0)
<i>M. 'Radiant'</i>	0.7 (n=2)	0.0 (n=0)	1.3 (n=2)	0.0 (n=0)
<i>M. 'Red Jewel'</i>	0.7 (n=2)	0.0 (n=0)	1.3 (n=2)	0.0 (n=0)
<i>M. 'Sugar Tyme'</i>	0.7 (n=2)	0.9 (n=1)	0.7 (n=1)	0.0 (n=0)
	n=286	n=1113	n=149	n=24

^w Other = wholesale nurseries, production nurseries, and one lawn care firm.

^x Landscape design/installation firms.

^y Retail nurseries/garden centers.

^z Of the 34 taxa listed by respondents, only those mentioned two or more times are included.

Table 3. Crabapples eliminated from respondents' product lines since 1990.

Taxa ^z	Response %			
	Business Focus			
	Total	Retail ^y	Landscape ^x	Other ^w
<i>M. 'Radiant'</i>	18.6 (n=22)	19.0 (n=11)	18.5 (n=10)	16.7 (n=1)
<i>M. 'Royalty'</i>	15.3 (n=18)	17.2 (n=10)	14.8 (n=8)	0.0 (n=0)
<i>M. 'Thunderchild'</i>	7.6 (n=9)	10.3 (n=6)	5.6 (n=3)	0.0 (n=0)
<i>M. 'Hopa'</i>	6.8 (n=8)	8.6 (n=5)	3.7 (n=2)	16.7 (n=1)
<i>M. 'Red Splendor'</i>	5.1 (n=6)	0.0 (n=0)	7.4 (n=4)	33.3 (n=2)
<i>M. 'Indian Magic'</i>	4.2 (n=5)	0.0 (n=0)	9.3 (n=5)	0.0 (n=0)
<i>M. 'Brandywine'</i>	3.4 (n=4)	1.7 (n=1)	5.6 (n=3)	0.0 (n=0)
<i>M. 'Adams'</i>	2.5 (n=3)	1.7 (n=1)	1.9 (n=1)	16.7 (n=1)
<i>M. 'Profusion'</i>	2.5 (n=3)	3.4 (n=2)	1.9 (n=1)	0.0 (n=0)
<i>M. 'Red Jade'</i>	2.5 (n=3)	3.4 (n=2)	1.9 (n=1)	0.0 (n=0)
<i>M. x zumi</i>	2.5 (n=3)	1.7 (n=1)	3.7 (n=2)	0.0 (n=0)
<i>M. 'Bechtel'</i>	1.7 (n=2)	1.7 (n=1)	1.9 (n=1)	0.0 (n=0)
<i>M. 'Weeping Candied Apple'</i>	1.7 (n=2)	1.7 (n=1)	1.9 (n=1)	0.0 (n=0)
<i>M. 'Dolgo'</i>	1.7 (n=2)	1.7 (n=1)	1.9 (n=1)	0.0 (n=0)
<i>M. 'Eleyi'</i>	1.7 (n=2)	1.7 (n=1)	0.0 (n=0)	16.7 (n=1)
<i>M. floribunda</i>	1.7 (n=2)	0.0 (n=0)	3.7 (n=2)	0.0 (n=0)
<i>M. 'Liset'</i>	1.7 (n=2)	1.7 (n=1)	1.9 (n=1)	0.0 (n=0)
<i>M. sargentii</i>	1.7 (n=2)	1.7 (n=1)	1.9 (n=1)	0.0 (n=0)
	n=118	n=58	n=54	n=6

^w Other = wholesale nurseries, production nurseries, and one lawn care firm.

^x Landscape design/installation firms.

^y Retail nurseries/garden centers.

^z Of the 34 taxa listed by respondents, only those mentioned two or more times are included.

PENNSYLVANIA CRABAPPLE TRIALS

Alan H. Michael
Penn State Extension

Pennsylvania is fortunate to have three crabapple trials. Two are located on Penn State University Research Farms, and the third is located at Scott Arboretum on the campus of Swarthmore College. All trials were evaluated for the IOCS National Evaluation Crabapple Project.

The first Penn State location was planted in 1969 by Professor Lestor P. Nichols at the Penn State Plant Pathology Research Farm at Rock Springs and contains about 70 cultivars, with 110 trees. Some are over 30 feet tall and have been observed and rated since 1969. Additional varieties were planted in the early 1970's and early '80's, and in 1990 and '91. This trial has been used by the Pennsylvania Game Commission to select trees for wildlife plantings, by the Pennsylvania Municipal Tree Restoration Program to recommend crabapples suitable for street tree plantings (Centurion, Sugar Tyme, Redbud), and by Pennsylvania nurserymen. The Rock Springs location is maintained by the Penn State Department of Plant Pathology.

In 1990 it was realized that we were running out of space at Rock Springs, and the trial was not being used by the industry or consumers to the extent desired. Part of the reason is its location in the center of the state, about 150 miles from the two major population centers of Pittsburgh and Philadelphia. Secondly, Rock Springs is in the ridge and valley section of the state and the environmental conditions are cooler and less humid than other areas, so cultivar responses are slightly different. To assist in correcting this situation, an additional location was then planted in 1990 at the Penn State Southeast Research and Extension Center at Landisville, Lancaster County. This is also an area where many nurserymen and landscapers are located.

Today the Landisville Trial contains 193 trees of 65 cultivars. Trees at both Penn State locations are rated two to three times a year.

The crabapple trial at Scott Arboretum is managed by the arboretum, and results have been reported in their newsletters, and is used by many gardeners and horticulture groups associated with the Philadelphia area.

The following news article is based on the ratings and observations of the Penn State trials and has been printed in newspapers and provided to garden centers. This article is not meant to be all inclusive, but has the intent of providing a short list of excellent crabs for the home landscape.

Flowering Crabapples for Pennsylvania

The ornamental flowering crabapple, *Malus* species, is among the most versatile flowering trees in the landscape, and the new cultivars have disease resistance and small persistent fruit. Crabapples handle cold winters and hot summers, and they adapt easily to various soil conditions in Pennsylvania. Only excessively wet soils or heavy shade sites should be avoided.

What is important to know is that there are many new and improved cultivars that provide landscape beauty all year long. Most old crabapple selections were based on their one week of spring bloom. Then, because of disease or objectionable falling fruit, homeowners developed negative attitudes toward planting crabapples in the home landscape. The new cultivars of ornamental crabapples have wonderful spring flower color, disease resistant leaves, persistent colorful miniature fruit, and a variety of plant habits.

Flower colors range from the reds of Prairifire and Liset, to the delicate pinks produced by Adams and Indian Magic. There are pure white flowering crabapples with attractive fall fruits typified by Adirondack, Redbud, and Snowdrift. If you are looking for outstanding colorful red fruits, try Red Jewel, which will add landscape interest and provide wildlife food during the winter.

The most overlooked attribute of ornamental flowering crabapples is the wonderful variation of growth habits. One favorite is the weeping form typified by Red Jade and Louisa. The cultivars of Adams, Donald Wyman, and Jack crabapples produce the typical rounded habit so popular in a home landscape. Vase-shaped trees provide a unique look, so try Brandywine or the Tea crab. If space is a problem, select the slow-growing (dwarf) Sargent, which will mature at about 8 feet tall and about 12 feet wide. If you need a tall narrow tree, use Centurion.

Two of the best new crabapples are Molten Lava, a white flowering tree with horizontal branches that become slightly weeping as it ages, and Golden Raindrops, a vigorous crabapple with attractive lacy leaves, white flowers, golden yellow fruit, and which is disease and insect resistant.

The new cultivars of flowering crabapples are rugged and attractive landscape plants that are highly resistant to disease. Many have beautiful fruit and fall color, and there is a form and size to fit every landscape situation.

The following is a listing of ornamental flowering crabapple cultivars that have good disease tolerance, pleasing flowers, persistent, attractive fruit, and should be utilized in Pennsylvania landscapes.

	Form	Flower	Fruit
Adams -- Dense tree habit with light-green foliage, reddish new growth, fruit persistent until spring, 20' x 20' (25 x 20)	round	single pink	red
Donald Wyman -- Compact habit with dark green foliage, flowers white annually, fruit very persistent and attractive into winter, susceptible to powdery mildew, good for birds, 20'x20' (30 x 25)	round	single white	red
Indian Magic -- Attractive flowers, dark green foliage can be affected by scab, but leaves remain on tree, fruit attractive, glossy, and persistent, good for birds, 15' x 15' (20 x 25)	upright-spreading	single pink	orange-red
Liset -- Foliage is a deep purple-green, slightly susceptible to fireblight, best red flowering crabapple, persistent fruit, 15' x 15' (30 x 35)	upright-spreading	single red	dark-red
Mary Potter -- Shrub-like growth, pink bud opens white, dark green foliage, persistent red fruit, attractive to birds, fireblight can be a problem, 15' x 20' (18 x 25)	small, low spreading	single white	red
Ormiston Roy -- Upright, but becomes spreading, medium green foliage, attractive abundant fruit, persistent and good for birds, slightly susceptible to fireblight and cedar-apple rust, 20' x 20' (20 x 20)	upright-spreading	single white	orange

	Form	Flowers	Fruit
Prairifire -- Upright and spreading habit, bright pink to red flowers, foliage purple and becomes reddish-green, red fruit. Excellent disease resistance, 20' x 20'. Highly recommended (24 x 20)	upright, spreading, rounded	bright pink to red	dark-red
Professor Sprenger -- Dense growth habit, prolific bloom. Unusual colored fruit is attractive from mid-Sept. to Christmas, 20' x 20' (45 x 30)	upright-spreading	single white	red
Redbud -- Dense and spreading, becomes graceful, dark green leaves, bud pink, flowers white and fragrant, small persistent fruit, susceptible to fire blight, 20' x 20' (25 X 20)	round-spreading	single white	red
Sargent -- Low, spreading habit, profuse bloom, leaves dark green, frequently 3-lobed, small fruit eaten by birds, 8' x 12'. The smaller Tina grows 4-5 ft. and is often grafted on 4 ft. standard, good in small gardens (8 X 12)	small spreading	single white	red
Snowdrift -- Dense vigorous habit, abundant annual flowers, foliage medium green, abundant small fruit, straight trunk, susceptible to fire blight, 20' x 20' (32 X 35)	round	single white	orange
Sugar Tyme -- Upright and oval habit, pink bud open white, medium green leaves, persistent fruit, fair disease resistance, 18' x 15' (22 X 20)	upright-spreading	single white	red

* Size is given in height x width

CRABAPPLE COLLECTION AT THE UNIVERSITY OF VERMONT

Norman E. Pellett
Professor Emeritus
University of Vermont

The crabapple collection was started in 1952 when the University Horticultural Research Center in South Burlington was first established. This Center is popularly called the Hort. Farm. The first crabapples were planted by Charles Blasberg, then Chairman of the Horticulture Department, along the road which is now the entrance to the farm.

The 1952-planted cultivars which still exist 45 years later are *Malus pumila* 'Pendula', 'Almata', 'Beauty', 'Dolgo', 'Erie', 'Mercer', 'Namew', and 'Hyslop'. Others planted in the 1950's and still existing are 'Blanche Ames', 'Chestnut', 'Henrietta Crosby', 'Mary Potter', and 'Strathmore'. Most of the collection are mature trees, planted during the 1960's by Samuel Wiggans, Harrison Flint, and Dennis Bruckel, University Horticulturists. Today 211 trees, including 140 different species and cultivars, are growing at the farm. During the last three years, 25 newer cultivars have been added. Some of the older cultivars which are not common in the nursery trade are being propagated for replacement of dead or unhealthy trees.

Most of the crabapples were purchased or donated by commercial nurseries. The rootstocks are mostly apple seedlings, resulting in standard sized trees. No crabapples were planted in the 1980's because of change in research emphasis and funding. The condition of the collection deteriorated with little or no pruning, sucker control, or pest control.

In 1994, an organization of persons interested in supporting the ornamental plant collection, Friends of the Horticulture Farm, was established. This group was interested in supporting the rejuvenation and maintenance of the mature crabapple collection. Saturday workdays were organized during the spring for pruning the crabapples, an annual activity which continues today. Instructions on pruning is given by experienced professional and University horticulturists; then the volunteers prune the trees.

University horticulturist, Samuel Wiggans, in the mid-1960's, organized an annual crabapple open house on Sunday afternoons during the peak of the flowering season. This was publicized in the local press and often featured on the evening weather news by a popular television station host. Hundreds of people came to view the spectacular display. This activity ceased in the 1980's when Wiggans left the University, but has been renewed by the Friends of the Horticulture Farm.

The Crabapple collection has been used for research as well as for display. Research in the early 1970's identified the relative cold hardiness of approximately 50 common cultivars. The relation between date of leaf drop and cold hardiness was studied. Cultivars dropping their leaves early were generally earlier in their cold hardiness development.

Crabapple bloom date and degree-day accumulation to bloom were determined for all cultivars during the years 1968 to 1971. For degree-day determination we assumed a 40°F. base temperature as the threshold above which spring flower development occurs. The difference between the average daily temperature and the threshold temperature accumulates as the degree-days to first pink stage of bloom. The bloom date and degree-day accumulation varied greatly during these years. For example, the first pink for 'Radiant' and 'Beauty' ranged from May 3 in 1968 to May 20 in 1971. The degree-day accumulation to first pink was 298 plus or minus 25 for 'Beauty' and 301 plus or minus 27 for 'Radiant'. This data were published as Vermont Agriculture Experiment Station Research Report 1, March 1980, Flowering and Fruiting of Woody Ornamental Plants in Vermont.

CRABAPPLES IN CYBERSPACE

John H. den Boer

The Internet can be a toy, or a useful tool. Maybe it can be even a mixture of the two. Whatever, since I got into this thing, and since my interest is in crabapples, I asked: "What's out there about crabapples?". I found nothing with several search engines. (That's something they call those programs that help you find something.) However, with Alta Vista, one of those search engines, I found that there were over 1000 entries containing information on crabapples, or so it said. So I did some "surfing." I can't get over all these crazy terms that are used in this business. Surfing is something you do when you skip through a lot of files just to find something possibly of interest. I browsed through a lot of these files and found, sure enough, some that were very interesting. I thought that you might be interested in some of the things that I found. It might be that the stuff I am showing below might interest you enough to cause you to do a little browsing yourself. At least you won't have to do as much surfing as I did to find something of interest relative to crabapples. Please keep in mind that these sites can be very transient. I found many that existed at one time, and then disappeared when I tried to confirm their existence.

There is junk out there in that cyberspace. While I was supposed to be supplied with information about crabapples, the engines were not very selective. It could very well be that I am not doing the correct thing when I enter the information I am seeking. Sometimes I found a real estate agent selling property, or some school wanting to tell something about themselves, or a restaurant. Sometimes I couldn't even find the word "crabapple" in the entire section. O well, I guess you have to catch a lot of fish to get one good one.

As I said, there is a lot of good information there about crabapples. Much of it is listed by University Cooperative Extension Services. Some nurseries list the material they have available, arboreta present information about themselves, people ask questions, and others provide answers. In one case, as a class assignment, a student asked a lot of questions and then answered each one of them.

What follows are summaries of some of the sites that I identified as having information about crabapples. Each site listed is identified by organization, followed by site address, a summary of its contents, and, if available, the e-mail address so that you can correspond with someone at the site. It is not a complete listing of everything available, by any means. If you are on Internet, you can go directly to any of the sites by entering the site address.

Arboreta:

Arnold Arboretum

<http://arboretum.harvard.edu/bloom.htm>

Gives the order of blossom times for the various plants in the arboretum.
web@arboretum.harvard.edu

Boerner Botanical Gardens

<http://www.stefaniak.com/milwaukee/visitors/attract.html>

Discussion of gardens, over 1000 acres in crabapples.

Callaway Gardens

<http://www.callawaygardens.com/cat/html>

Lists one crabapple in their catalog.

Dawes Arboretum

<http://dawesarb.org/taxon.htm>

Lists species located at the arboretum. Has over 100 crabs listed.

Hampton-Sydney Arboretum

<http://lion.hsc.edu/admin/plants/native.html#crabapple>

Brief description of many trees, including some crabapples.

Holden Arboretum

<http://www.lakeonline.com/holden.html>

Description of Arboretum, gives blossom schedules of many plants, including crabapples, identifies their major collections.

Morden Arboretum

<http://res.agr.ca/winn/pagetwo.htm>

Has 126 taxa of flowering crabapples.
cdavidson@em.agr.ca

Tyler Arboretum

<http://haven.ios.com/%Emckenzie/aboutyl.html>

Discussion of the Arboretum.
mckenzie@haven.ios.com

Nurseries

Lakeside Orchards

<http://gray.maine.com/apples/varieties.htm>
Lists Hyslop Crabapples as being available.

Pine Garden Bonzai Co.

<http://hamachi.pensee.com/PGB/finished/crb.html>
Shows "Malus sargentii zumi calocarpa" in bonsai form.
mbraver@aol.com

Others

Crabapple Encyclopedia

<http://fly.hiwaay.net>
Offering information on crabapples, including descriptions, disease ratings, aesthetic ratings, crabapples with specified characteristics, etc.

Timber Press

<http://www.timber-press.com/df/flocra.html>
Discussion about "Flowering Crabapples - The Genus Malus" by Fr. John Fiala.

Questions or Requests:

There were several people interested in knowing what was causing the leaves on their crabapple trees to turn yellow and fall prematurely. One gentleman, Mike Jackson, responded to one with good information about scab. Another person asked where she could purchase crabapples trees in Michigan. Another person responded to her question. In another case, someone wanted to eliminate unwanted fruit from their crabapple tree. A student, fulfilling an assignment, posed a group of questions, and answered each one.

There were many questions asked about how to obtain cuttings from apple trees. And there were many responses to these questions. The title to many of these questions quoted "Malus sieboldii", but the body of the text never did mention this name.

Dr. Gylord Mink asked for images depicting various diseases for use on his Home Page.

Universities:

Cornell University

<http://ppathw3.cal.cornell.edu/profiles/fireblight/pa2102t1.html>
Short discussion on fire blight.
<http://ppathw3.cals.cornell.edu/profiles/applescab/pa2200t0.html>
Short discussion on scab.

Iowa State University

<http://134.exnet.iastate.edu/diseases/apple.diseases.txt.html>
Recognizing common apple diseases, cedar-apple rust, fireblight, powdery mildew, scab, and other diseases discussed.
<http://hancock134.exnet.iastate.edu/1994/hort.081294.html#adironack>
Adirondack Crabapple described.

Michigan State University

<http://www.msue.msu.edu/msue/imp/mod03/01700604.html>
About insects effecting crabapples.
<http://www.msue.msu.edu/msue/imp/mod02/01700603.html>
Provides photos of 24 crabapple trees and has comments about crabapples.

Ohio State University Cooperative Extension Service

<http://www.ag.ohio-state.edu/~ohioline/hyg-fact/4004/3002.html>
Discussion on Fireblight
<http://www.ag.ohio-state.edu/~ohioline/hyg-fact/3000/3003.html>
Discussion on scab of apples and crabapples.

Purdue University Cooperative Extension Service

http://www.btny.purdue.edu/ppdl/expert/Apple_Scab.html
Apple scab discussed and includes a photograph.
sellers@btny.purdue.edu

Texas A & M University

<http://aggie-horticulture.tamu.edu/tisscult/microprop/woodypl.html>
Discussion on techniques of tissue culture on many plants, including crabapples.
dan-lineberger@tamu.edu

University of Delaware Cooperative Extension Service
<http://bluehen.ags.idel.edu/coopext/plantdis/applescab.html>
Discussion on scab on crabapples.
<http://bluehen.ags.udel.edu/plantdis/cedrrust.html>
Discussion on cedar-apple rust.

University of Florida Agriculture Information Retrieval System
<http://hammock.ifas.ufl.edu/txt/fairs/43954>
Discussion on Powdery Mildew.

University of Georgia
<http://st.ces.edu/forestry/doss/for96-32.html>
Relative tolerances of tree species to construction damage. Two crabapples are listed.
veal@smokey.forestry.uga.edu

University of Nebraska
<http://hort.unl.edu/report/crabapp.htm>
Listing of crabapples by aesthetic and scab ratings

University of Saskatchewan Extension Division and Department of Horticulture Science
<http://pine.usask.ca/cofal/departments/hort/hortinfo/fruit/prunapp.html>
Information given about pruning trees.

University of Vermont Horticulture Research Center
<http://www.uvm.edu/cals/crabappl.htm>
Short discussion of crabapples and the crabapple collection.

Now, the following has nothing to do with crabapples, but it certainly is worthy of being used as an example of what could be done for crabapples. Try it, you might like it.

<http://www.flinet.com/~grega/orchids/index/htm>

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Brady Nursery

Front Cover Photo: *Malus* 'Birdland'
Mike Yanny

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