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The Flowering Crabapple

R.E. Durham, R.E. McNiel, J.R. Hartman, D.A. Potter, and W.M. Fountain

There are several reasons why flowering crabapples are considered excellent landscape trees. Most crabapples are considered four-season trees. They bloom in early-to-mid April for two days to almost two weeks, depending on cultivar and weather conditions. They have attractive green, reddish, or bronze leaf color in the summer. Fruits begin to color in August and range in size from 1/4 inch to 2 inches in diameter. In the winter, plant form and bark characteristics provide beauty and interest to the landscape.

Flowering crabapples are generally small trees, although some may grow 30 to 40 feet tall. Since most residential lots are relatively small, use of small trees (10 to 25 feet) is more practical than use of large shade trees (90 feet).

A number of tree shapes are available from the nursery trade, including common rounded dense forms, narrow upright forms, pendulous forms, moundlike forms, and upright spreading forms. Moderate textural differences exist in the foliage of each form, allowing for greater variability and landscape interest. Crabapples are adaptable to most site conditions.

White Crabapple

Culture and Maintenance

Many crabapples are sold as bare root plants, 3 to 6 feet in height. Every effort should be made to prevent the roots from drying out before planting. Following purchase, keep them wrapped in wet burlap or wet sawdust until planting can be accomplished. Spring is preferred over fall for planting bare-root trees. Wait to plant trees until the soil is crumbly; don't mud them in, because tree roots rarely become established when soil is compacted.

Flowering crabapples are adapted to a wide range of soil conditions. The best site has well-drained soil with a pH of 5.5 to 6.5. Flowering crabapples will thrive in moist soils or, with a little extra care during the first year of establishment, will do satisfactorily in dry soils. However, don't place them in excessively wet soils and expect long-term survival.

Whether bare-root or balled-and-burlapped plants are purchased, the planting hole should be dug wide and deep enough so that roots don't have to be forced into the hole and to allow for the natural extension of the root system. The tree should be placed at the same depth as the original planting. Look for darker color on the trunk to determine nursery planting depth. Place the original soil back into the planting hole, filling it in and tamping it lightly around the roots. Add water gradually so that good root-to-soil contact is accomplished.

Mulching around the newly planted tree helps reduce water loss from the soil. During the first year, water the plant when needed so total moisture received weekly is equal to 1 inch.

Container-grown plants receive similar treatment at planting. The important thing is to disturb roots which are circling the container by cutting through the root ball at four to six locations, 1 inch deep, or manually pulling the roots apart to encourage them to grow out into the native soil.

Fertilization is not necessary in the first year after planting. After the first year, about 15 to 20 pounds of 10-10-10 per 1,000 square feet of root area should be sufficient on most Kentucky soils. Avoid excessive fertilization. It causes excessive succulent growth, and thus increases susceptibility to fire blight. Keep in mind the formula for figuring the area of a circle when you want to determine how many square feet of root area are under your trees. Feeder roots on mature trees generally reach two to three times the distance from the tree trunk to the drip line of the branches. If the distance between the trunk and the drip line is 10 feet, the feeder roots likely stretch 20 to 30 feet from the trunk.

With this information you can then figure the area like this:

$A = \pi r^2$
$A = 3.14 \times 20^2$
(use 20 feet from trunk as average distance where roots exist)
$A = 3.14 \times 400$
A = approximately 1,200 square feet of root area under the tree.

So, for a tree of this size, 15 to 20 pounds of 10-10-10 fertilizer should be broadcast by your gloved hand or distributed using a fertilizer spreader across the entire root area under the tree.

If growth problems are encountered, a soil test will help reveal if nutrient deficiencies are involved. Because it is easier to prevent many nutrient problems than to correct them, a soil test taken prior to extensive landscape planting is recommended. Other causes of growth problems include improper site selection and insect or disease problems.

Diseases

Many flowering crabapples are made unsightly or are severely injured by one or more of four common diseases—apple scab, fire blight, cedar-apple rust, and powdery mildew. Unless resistant crabapples are selected and grown, fungicide sprays used as disease preventatives must be included in the maintenance program.

Apple Scab

This common fungal disease is a serious problem in Kentucky on many flowering crabapple varieties, causing spotting of the leaves, premature defoliation, and unsightly corky spots on the fruit. Spots on the new leaves appear olive-colored and velvety. Later, the infections appear as olive-green or brown circular spots, with raised or puckered leaf tissue underneath. Scab spots may appear on leaves anywhere on the tree.

When severe infections take place, the leaves yellow and the tree may lose almost all its leaves by midsummer. Typical fruit lesions are distinct, almost circular, rough-surfaced, olive-green spots, which later turn brown to black.

The apple scab fungus, *Venturia inaequalis*, overwinters in old, infected, fallen leaves. In spring, the fungus produces spores which land on crabapple foliage or fruit and infect the plant if the tissue surface is wet for several hours. The fungal infection results in leaf lesions, where more spores are produced to begin additional cycles of infection throughout the growing season. Secondary infection may also occur from spores produced on scab lesions found on the twig growth of extremely susceptible crabapples such as *Malus* 'Almey,' *M.* 'Hopa,' and *M.* x *purpurea* 'Eleyi.'

Control: Use scab-resistant varieties in new plantings. Scab infection on established trees may be prevented by three to five applications of fungicides at 10 to 14 day intervals starting as soon as bud growth appears and continuing until mid June. Scab is most severe during wet growing seasons.

Fire Blight

Fire blight can be a damaging disease of flowering crabapples; however, its occurrence is sporadic. When severe infection does occur it may be devastating; several branches or even entire trees may be killed.

The infection first appears on blossoms as petals fall or soon after. Infected blossoms are killed rapidly, with accompanying shriveling and browning. Shortly after bloom, wilting and brownish-black discolorations may occur on terminal growth, on water sprouts, and on shoots at the base of the tree. Dead leaves remain attached long after the twigs have died. Infected shoots often curve near the tip, forming a shepherd's crook.

Cankers may also occur on small or large limbs, trunks, or roots. They usually start around the base of a blighted blossom spur or shoot. Cankers are slightly sunken areas of woody tissue. They vary in size and are surrounded by an irregular crack or wound callus layer.

Fire blight is caused by the bacterium *Erwinia amylovora*, which survives from year to year in the margin of cankers on infected plants. In spring, splashing rain may dislodge droplets of bacterial slime and spread bacteria to opening blossoms. Insects, attracted by the slime, can become contaminated with bacteria and spread them to open blossoms. Bacteria can move within a tree from infected blossoms and shoots to the limbs and trunk. Affected blossoms, twigs, and branches turn brown as though scorched by fire, hence the name "fire blight." In addition to crabapples, the fire blight organism attacks a number of other plants, including apple, pear, quince, fire-thorn, hawthorn, mountain ash, and serviceberry.

Control: Use fire blight-tolerant crabapples in new plantings. Cankers on old, neglected pear and apple trees are important sources for overwintering fire blight bacteria. Such trees should be removed and destroyed when in the immediate vicinity of nurseries and other areas where crabapples are grown. Antibiotic sprays which help protect open flowers or new terminal shoots from infection are an important measure in fire blight control.

Shoots killed by fire blight are best removed in winter when trees are dormant. Trees should be inspected in nurseries early in the growing season for infected shoots and branches. Those that are newly infected should be broken off several inches into the healthy tissue and destroyed at once. Suckers that develop from roots, trunk, and scaffold branches are ideal places for the fire blight bacteria to enter limbs and produce cankers. Blighted suckers must be broken off or cut with tools disinfected between cuts with a solution of one part household bleach and nine parts water. Since new growth is susceptible to fire blight, any system of culture that does not promote excessive succulent growth will aid in reducing the amount of infection.

Cedar-Apple Rust

Cedar-apple rust and its relative, cedar-quince rust, are usually a problem in areas where large numbers of native eastern red cedar or plantings of ornamental juniper are growing near crabapples. The disease is caused by the fungus *Gymnosporangium juniperi-virginianae*. Orange areas 1/8 to 3/4 inch in diameter appear on the upper surface of infected leaves. Later, on the underside of infected leaves opposite the orange spots, many 1/6-inch cup-shaped structures with fringed edges are formed in circular clusters. In late summer, spores from these cups are blown to and infect red cedar and other juniper trees. Eighteen to 20 months after infection, galls form on the cedar, and a different spore type is produced in the cedar galls that is capable of reinfecting crabapple trees. Severe leaf and twig infections may cause early leaf fall and dwarfing of the crabapple tree. On very susceptible crabapples, repeated infection may cause death of twigs and branches.

Control: Elimination of cedar trees within a mile of susceptible crabapples provides almost complete control. However, cedar trees are often located on neighboring properties or are in landscape plantings and cannot be removed. Thus, a source of spores remains for infection of the crabapple foliage. Three rust fungicide sprays applied at 10-day intervals, starting about the time color shows in the blossom buds, will give effective control of the disease. The use of resistant varieties in future plantings should be considered if cedar-apple rust has been a serious problem.

Powdery Mildew

The causal fungus, *Podosphaera leucotricha*, attacks leaves, terminals, blossoms, and fruit. The most common symptoms are twisted, narrow, cupped terminal leaves covered with a white, powdery fungus coating. Infected terminals have weak buds and will winterkill easily.

Powdery mildew is a problem on crabapples in locations where the air movement around the trees is poor or where they are growing near orchards of susceptible apples such as 'Cortland' or 'Rome.' The fungus overwinters within dormant buds. High humidity and temperatures around 70° F provide ideal conditions for development of the disease.

Control: As soon as the disease appears, which may be any time after the blossoms open until midsummer, spray three times at weekly intervals with a powdery mildew fungicide. Mildew-resistant varieties should be considered in moist, shaded locations.

Insects

Japanese beetle is the major summer insect on crabapples. This insect can strip a tree of foliage in short order and thus weaken it considerably. Adult Japanese beetles are 3/8 inch long and metallic-green with copper-brown wing covers.

Adults emerge from the ground and begin feeding on plants in June. Individual beetles live about 30 to 45 days. Activity is concentrated over a four to six week period, beginning in July, after which the beetles gradually die.

Adults feed on the upper surface of foliage, chewing out tissue between the veins. This gives the leaf a characteristic skeletonized appearance. Adult beetles tend to do little feeding on thick, tough leaves. Odor seems to be a very important factor in the selection of suitable food plants.

The spread of Japanese beetle infestation in Kentucky is primarily the result of flight by the adults. They can fly as far as 5 miles, but 1 to 2 miles is more likely. Usually they make only short flights as they move about to feed. Local infestations spread as beetles move to favored food and suitable sites for egg laying.

University of Kentucky Research

Forty-six cultivars of crabapples were transplanted to UK's Spindletop Research Farm by Dr. Robert E. McNiel and Dr. John R. Hartman several years ago as part of the national Flowering Crabapple Evaluation Project. Ongoing ratings have been done on their growth, ornamental characteristics, and disease resistance.

The Japanese beetle damage data, on the other hand, are based on a single season of observation. The data are presented here to provide high priority information and guidelines for those making sizeable investments in crabapples. Whether the same crabapple cultivars from many different nursery sources would perform similarly was not a potential part of this investigation. Limited numbers of plants from one nursery source were used in the study. The University of Kentucky will continue to collect data on Japanese beetle damage and will provide updates.

Scab, fire blight, cedar rust, powdery mildew, and frogeye leaf spot (black rot) are all threats to flowering crabapples in most parts of Kentucky. During a recent four-year evaluation period of the plots at Spindletop farm, scab and leaf spot were the most important diseases. The reactions of the cultivars in this test to fire blight, cedar-apple rust, and powdery mildew have been determined at several other U.S. locations.

Table 1 illustrates the results of the ongoing studies as well as selected disease resistance data from other states. Disease and insect problems vary from state to state, and therefore national lists of outstanding crabapples don't always fit the bill for Kentucky. These data are the best available for Kentucky conditions. Use this chart as a guide for selecting plants to meet your specific needs. It is our recommendation that disease and insect resistance become your top priorities. When using this table, be aware that cultivars such as 'Hopa,' 'Radiant,' and 'Ruby Luster' were included in the test as scab-susceptible checks and should not be considered desirable cultivars. 'Royalty' and 'Indian Magic' also should be used with caution because of scab susceptibility.

This test is not necessarily representative of the hundreds of different flowering crabapples; however, it includes many of the scab-resistant types available a few years ago. New cultivars not listed here may also be useful, but be sure they have passed reliable tests for disease and insect resistance.

Table 1. Data from University of Kentucky research trials on crabapple cultivars.

Cultivar	Height (Feet)	Form[1]	Foliage Color[2]	Bloom Color	Fruit Color	Resistance to Japanese Beetle Feeding	Disease Resistance				
							Scab	Fire Blight	Cedar Rust	Mildew	Leaf Spot
'Adams'	20	R	R/G	Red	Red	Fair	Excel	Good	Excel	Good	Good
'Beverly'	20	R	G	White	Red	Poor	Excel	Good	Excel	Excel	Excel
'Bob White'	20	R	G	White	Yellow	Fair	Excel	Excel	Good	Excel	Good
'Candied Apple'	15	W	R/G	Pink	Cherry Red	Poor	Excel	Good	Excel	Excel	Good
'Christmas Holly'	10-15	US	G	White	Bright Red	Good	Excel	Excel	Excel	Excel	Good
'David'	12	R	G	White	Bright Red	Excel	Excel	Good	Good	Excel	Good
'Dolgo'	30-40	R	G	White	Red/Purple	Poor	Good	Good	Excel	Excel	Fair
'Donald Wyman'	20	R	G	White	Bright Red	Good	Excel	Excel	Excel	Excel	Good
'Harvest Gold'	18-20	US	G	White	Yellow	Excel	Good	Fair	Excel	Excel	Excel
'Henningii'	25	US	G	White	Orange Red	Fair	Excel	Good	Excel	Excel	Good
'Hopa'	30	US	R/G	Pink	Bright Red	Poor	Poor	Good	Fair	Excel	Good
'Indian Magic'	15	R	R/G	Deep Pink	Red	Fair	Fair	Good	Excel	Excel	Good
'Jewelberry'	8	S	G	Pink/White	Bright Red	Excel	Excel	Good	Good	Good	Good
'Liset'	15	R	R/G	Pinkish/Red	Dark Red	Poor	Excel	Good	Excel	Good	Excel
M. baccata 'Jackii'	30	US	G	White	Maroon Red	Excel	Excel	Excel	Excel	Excel	Good
M. floribunda	18-25	R	G	Pink/White	Yellow/Red	Good	Excel	Fair	Good	Excel	Excel
M. halliana 'Parkmanii'	15	US	G	Pink	Dull Red	Excel	Excel	Fair	Fair	Good	Excel
M. hunnanensis 'Veitchii'	20-40	NS	G	White	Red with white dots		Excel	Excel	Excel	Good	Good
M. hupehensis	20-25	US	G	Pink/White	Yellow/Red		Excel	Poor		Excel	Good
M. sargentii	6-10	M	G	White	Bright Red		Good	Good	Excel	Excel	Good
M. zumi 'Calocarpa'	20	US	G	White	Bright Red	Good	Excel	Good	Excel	Excel	Good
'Mary Potter'	10	S & R	G	White	Red	Fair	Good	Good	Excel	Good	Excel
'Molten Lava'	10	S & W	G	White	Red/Orange	Good	Excel	Good	Excel	Good	Excel
'Ormiston Roy'	20	U/R	G	White	Orange Yellow	Good	Excel	Good	Good	Good	Excel
'Professor Sprenger'	20	US	G	White	Orange/Red	Good	Excel	Good	Excel	Excel	Fair
'Profusion'	15-20	U	R/G	Pink/Purple	Red	Good	Excel	Good	Good	Excel	Good
'Radiant'	25	R	R/G	Deep Pink	Bright Red	Poor	Poor	Good	Excel	Good	Excel
'Ralph Shay'		R/W	G	White		Fair	Excel	Good	Poor	Excel	Fair
'Red Barron'	18	NS	R/G	Reddish Pink	Dark Red	Fair	Good	Good	Excel	Good	Fair
'Red Jade'	15	W/S	G	White	Bright Red	Excel	Excel	Fair	Excel	Good	Good
'Red Jewel'	15	US	G	White	Red	Excel	Excel	Good	Good	Good	Good
'Red Splendor'	20-30	US	R/G	Pink	Red	Poor	Good	Good	Excel	Excel	Good
'Robinson'	25	US	R/G	Pink	Dark Red	Fair	Excel	Excel	Excel	Excel	Good
'Royalty'	15	US	R	Crimson/Purple	Red Purple	Poor	Fair	Good	Excel	Excel	Good
'Ruby Luster'		US	R	Pink/Red		Poor	Fair	Good	Excel	Good	Fair
'Selkirk'	25	US	R/G	Rose Red	Purplish Red	Poor	Excel	Good	Excel	Good	Fair
'Sentinel'		NS	R/G	Pink	Bright Red	Good	Excel	Excel	Excel	Excel	Excel
'Silver Moon'	20	NS	G	White	Purplish Red	Good	Excel	Good	Excel	Excel	Excel
'Snowdrift'	20	R	G	White	Orange Red	Good	Good	Poor	Good	Excel	Good
'Strawberry Parfait'	20	US	G	Pink	Yellow	Good	Excel	Excel	Good	Excel	Good
'Sugar Tyme'	18	R	G	White	Red	Fair	Excel	Good	Good	Excel	Excel
'Tschonoskii'	30	NS	G	Pink/White	Yellow-green	Good	Excel	Excel	Excel	Fair	Poor
'Velvet Pillar'	20	US	R	Pink	Reddish	Fair	Good	Good	Excel	Excel	Good
'White Angel'	20	R	G	White	Red		Excel	Excel	Good	Excel	Good
'White Cascade'	10-15	W	G	White	Yellow	Fair	Good	Good	Excel	Excel	Good
'Winter Gold'	20	P	G	White	Yellow		Excel	Good	Excel	Good	Excel

[1]R = round; US = upright spreading; W = weeping; S = shrub form; NS = narrow upright spreading; P = pyramidal; M = mounded.
[2]R = red; R/G = red new leaves; green mature leaves.

Table 2. Flowering crabapple cultivars that should not be planted because of extreme susceptibility to several diseases. These crabapples would be a liability in most Kentucky landscapes.

Malus:			
'Alamata'	'Golden Hornet'	*M. ioensis* (including cultivars)	'Pink Beauty'
'Almey'	'Goldfinch'	*M. lancifolia*	'Pink Cacade'
'American Beauty'	'Gwendolyn'	*M.* x *micromalus*	'Pink George's'
'Amisk'	'Henrietta Crosby'	*M. platycarpa*	'Pink Perfection'
'Arrow'	'Henry F. DuPont'	*M. prunifolia* 'Fastigiata'	'Purple Wave'
'Brier'	'Hopa'	*M.* x *purpurea* 'Eleyi' and 'Lemoinei'	'Pygmy'
'Cowichan'	'Irene'	*M.* x *robusta* 'Persicifolia'	'Radiant'
'Crimson Brilliant'	'Jay Darling'	*M. sargentii* 'Rosea'	'Red Silver'
'Dainty'	'Jubilee'	*M.* x *scheideckeri*	'Royal Ruby'
'Dauphin'	'Katherine'	*M. sieboldii* 'Fiji'	'Ruby Luster'
'David'	'Kelsey'	*M. sikkimensis*	'Scugog'
'Dolgo'	'Leslie'	*M.* x *soulardii*	'Snowcloud'
'Dorothea'	*M. angustifolia*	*M. spectabilis* 'Plena'	'Sparkler'
'E. H. Wilson'	*M.* x *arnoldiana*	*M.* x *sublobata*	'Strathmore'
'Ellwangeriana'	*M.* x *atrosanguinea*	'Morning Sun'	'Turesi'
'Erie'	*M. brevipes*	'Neville Copeman'	'Vanguard'
'Evelyn'	*M. coronaria* (including cultivars)	'Oakes'	'Wabiskaw'
'Flame'	*M. florentina*	'Oekonomierat' 'Echtermeyer'	'Wynema'
'Frau Luise Dittmann'	*M. glaucescens*	'Patricia'	'Young America'
'Geneva'			

Table 3. The following is a list of good quality, acceptable, or new flowering crabapples not found in Table 1. They should be used with caution, as they have not been evaluated under Kentucky conditions.

'Adirondack'	'Candymint'	*M.* x *zumi* 'Wooster'	'Sargent Tina'
'Amberina'	'Coralburst'	'Naragansett'	'Serenade'
'Ames White'	'Doubloons'	'Pink Princess'	'Sieboldii'
'Anne E'	'Indian Summer'	'Prairiefire'	'Silver Drift'
'Autumn Glory'	'Lollipop'	'Purple Prince'	'Sinai Fire'
'Blanche Ames'	'Louisa'	'Red Swan'	'Snow Magic'
'Brandywine'	*M. baccata* 'Gracilis'	'Royal Fountain'	'Spring Snow'
'Callaway'	*M. baccata* 'Walters'		

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