

# Benign *Berberis*

*Shrub trials at Longwood Gardens help identify Japanese barberry cultivars with limited invasive potential.*

**J**apanese barberry (*Berberis thunbergii*) is a popular and attractive ornamental garden plant. It is a slow-growing, deciduous shrub that displays brilliant fall color in striking shades of red and orange. Among the more than 20 cultivars available, there is much variation in leaf color, including variegated greens and reds, and size, ranging from 6 feet tall to dwarf selections that top out at 10 inches.

Habit also varies from open and upright to compact and dense. Further, the prominent spines on the stems allow this species to serve a utilitarian purpose as a formidable barrier, while its tolerance of assorted environmental conditions and minimal maintenance requirements make it all the more desirable as a landscape plant.

Unfortunately, Japanese barberry has become recognized as invasive in many parts of the country. Many organiza-

tions and references, including the Southeast Exotic Pest Plant Council; the *Invasive Plant Atlas of New England* compiled by the Department of Ecology and Evolutionary Biology at the University of Connecticut, Storrs; the Virginia Department of Conservation and Recreation; the Wisconsin Department of

Natural Resources; the Invasive Plant Council of New York State; the Maryland Invasive Species Council; The Nature Conservancy; the USDA Forest Service southern region; and others, have included Japanese barberry on their lists of plants that are invasive or have high potential to become so. The con-

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cern of these groups is warranted based on the increased frequency of the observation of dense thickets of Japanese barberry in mature forest locations in New England and mid-Atlantic states since the mid-20th century.

Japanese barberry has both physiological and anatomical characteristics that increase its invasive potential by helping it to become established in disturbed environments, as well as in natural woodlands, floodplains and grasslands. The plant grows in both sunny and shady locations and spreads vegetatively to form dense colonies through the adventitious rooting of stems that touch the ground. Further, it can tolerate both wet and dry situations.

This species also affects soil chemistry: By changing the pH and nitrogen availability of the soil in the areas it has invaded, it has a detrimental effect on neighboring, established plants. Additionally, because of its formidable thorns and unpalatable foliage, it is avoided by browsing deer. While this is a benefit for gardeners, deer browsing on the native plants surrounding Japanese barberry may actually help the plant to continue spreading, shading and crowding out other vegetation.

The fruit produced by this species is attractive to birds, who thus function as the plant's seed-dispersal mechanism. The plant traditionally has been promoted as a garden selection for



*B. thunbergii* 'Monlers' produced an average of less than one fruit per 2 inches of stem length, which earned it a spot in the low-fruiting category.

people who wish to attract birds to their yards: Many backyard-bird books list Japanese barberry as beneficial, both as a food-producing plant and as shelter for feathered friends.

**Barberry on trial.** All in all, Japanese barberry's characteristics make it well-suited to being designated an invasive plant. Nevertheless, its value as an ornamental landscape selection contin-

## All in all, Japanese barberry's characteristics make it well-suited to being designated an invasive plant.



*B. thunbergii* 'Concorde' was found to set no fruit and thereby has limited means to escape from a cultivated setting. It is a preferred *B. thunbergii* selection.

ues to be promoted. In response to growing concern regarding the aggressiveness of Japanese barberry, Longwood Gardens in Kennett Square, PA (Zone 6), set out to determine if there are selections with limited potential to be invasive. Longwood acquired 41 selections of barberries available in the trade, 18 of which were selections or hybrids of *B. thunbergii*, and planted them in field trials for observation.

Trials consisted of planting three specimens of each selection in an open field location in 12-foot-wide, mulched test plots separated by 8-foot-wide turf strips. The trial area is surrounded by a perimeter fence to prohibit the entrance of deer; however, access by birds is in no way inhibited. The plants have received minimal maintenance, such as occasional weeding, and care, such as watering during the first growing season, in a manner similar to what would be expected to be provided by an average homeowner. Data were then collected on the barberries' fruit production, as seed is a primary means of spreading.

In the Longwood Gardens *Berberis* trials, *B. thunbergii* 'Bogozam' produced less fruit than other selections, thus showing little potential for invasiveness.



A very floriferous plant, *B. 'Tara'* produced the greatest amount of fruit of all of the barberries in Longwood's trial. Its planting should be avoided in areas where Japanese barberry is known to be invasive.

Even though *B. thunbergii* 'Rose Glow' is a striking plant with rosy-pink new foliage, its production of more than three fruits per inch of stem length diminishes its value because of the potential for invasiveness.



Two aspects of fruit production were considered: total fruit set and germination potential. Fruit set was determined by counting the number of fruits per length of stem during the 2001 and 2003 growing seasons. These numbers were then averaged to attain comparable data on number of fruit per stem inch. Next, germination tests were performed following a three-month period of stratification at 35°. The tests showed that seed from all of the selections were viable. Seed had high germination rates — from 70 to 100 percent — with the exception of *B. julianae*, which had a 33 percent rate.

from cultivated settings more than seed viability does, so determining which selections have low fruit production became the goal of the project.

**Finding an alternative.** Of the 41 selections of *Berberis* in the trial, 11 were found to not produce fruit. Of these, *B. buxifolia* 'Nana', *B. gagnepainii* and *B. hookeri* grew poorly, while *B. aggregata*, *B. dictyophylla*, *B. manipurana*, *B. × stenophylla* and *B. thunbergii* 'Bagatelle' succumbed to harsh winter conditions. The three remaining plants, *B. thunbergii* 'Concorde', *B. verruculosa* and *B. wilsoniae* var. *guhtzu-*

they pose minimal risk of becoming invasive by means of seed dispersal.

While it is understood those selections that produce seed have the ability to escape from cultivation via seed dispersal, the risks they pose correlate with their levels of seed production. In the trial, *B. thunbergii* cultivars found to have low fruit set — by producing on average no more than one fruit per 2 inches of stem length — include 'Bogozam' (Bonanza Gold®), 'Kobold' and 'Monlers' (Golden Nugget™). In contrast, the most prolific producer of seed in the trial, at more than six fruit per stem inch, was *B. 'Tara'* (Emerald Carousel®), a hybrid of *B. thunbergii* and *B. koreana*. It is followed in productivity by *B. thunbergii* 'Golden Ring', *B. thunbergii* 'Rose Glow', *B. thunbergii* 'Crimson Velvet' and *B. thunbergii* 'Sparkle', all of which produced more than three fruit per stem inch.

We recommend these selections be avoided in locations where Japanese barberry is known to be invasive. We also advise against mentioning fruit production as an asset when promoting the ornamental value of these landscape plants.

Even though *B. thunbergii* has become recognized as invasive in parts of

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Thus, any barberry that sets seed has the potential to spread via that seed. It was concluded that total fruit set affects Japanese barberry's ability to escape

*nica*, have survived satisfactorily in the trial for the past seven years. Because no fruit was observed being produced by these plants, it is safe to assume

## Barberry background

Although Japanese barberry (*Berberis thunbergii*) is a common sight in American gardens, as its common name indicates it is native to southern and central Japan. The shrub first arrived in the US in 1875 as seed sent to the Arnold Arboretum, Boston, from Russia. At that time however, its cousin, European barberry (*B. vulgaris*), was the commonly planted species in this country. This species was familiar to European settlers, who planted it around their homes both for ornamental value and for the fruit that was used to produce dye and jam.

European barberry fell out of favor after it naturalized throughout much of the northeastern US and was discovered to be a host of black stem rust of wheat. The plant's role as an overwintering host in the life cycle of this rust problem was proved in 1864, at which point an eradication campaign successfully removed almost all of the naturalized species. Also, due to the importance of wheat to American agriculture, the federal government enacted legislation to restrict the movement of all known host plants of this rust, including species and cultivars of *Berberis*, *Mahoberberis* and *Mahonia*. As an alternative to *Berberis vulgaris*, cultivars of *B. thunbergii* known not to host black stem rust of wheat began to be promoted.



The dark purple foliage of *B. thunbergii* 'Crimson Velvet' contrasts with abundant flowers that foretell plentiful fruits for the coming fall.

the US, its beautiful fall color and attractive habit make it difficult to banish this plant from the modern garden. By developing, promoting and planting only selections of Japanese barberry that produce little or no seed, however, gardeners and the green industry alike may help to limit further spread of this problematic plant.

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### Want more?

For a list of the *Berberis* evaluated in Longwood Gardens' study — including a ranking of species and cultivars based on their potential for invasiveness due to fruit production — visit our Web site at [www.amerinnursery.com/onlinextras.html](http://www.amerinnursery.com/onlinextras.html).

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