



Japanese Barberry

Berberis thunbergii

Looking at world map, it is clear that the US and Japan are at similar latitudes. It makes sense then that much of the flora of Japan can thrive here too. Species like [Japanese knotweed](#), oriental bittersweet, Japanese honeysuckle, and multiflora rose can run roughshod over native ecosystems. One of the earliest to be introduced here is Japanese barberry, and it has a strong foothold in several NETN parks and the woodlands, pastures, and fields in many states. It is considered to be invasive in at least 30 states, and is particularly problematic in the northeastern US and parts of the Midwest.

It Seemed Like a Good Idea at the Time

Like so many origin stories for invasive plants, when barberry was first introduced in the mid 1800's (accounts of its initial arrival vary), it was highly lauded. People loved its attractive foliage, small yellow flowers, and bright red leaves and berries in the fall. Japanese barberry was touted for erosion control as well as its benefits to wildlife and birds because of its berries. Oh how naive we were. Since then it has entrenched itself into all New England states, with populations extending from Maine to North Carolina, and westward to states like New Jersey, Minnesota, Iowa, and parts of Washington state. It's such a problem that in at least six states it is illegal to cultivate or sell, and that list will likely continue to grow. So why so much hubbub over this shrub?

A Dystopic Trophic Downgrade Cascade

One of the reasons invasive plants become so is that few native life-forms eat them. For various reasons, they are avoided by species as small as bugs and insects to as large as deer and moose (barberry's thorny spikes keep these at bay), and lead to a reduction in the complexity of the local food web. Invertebrates that feed, reproduce, and develop on native plant foliage, the foundation of the food-web, avoid invasive woody plants like Japanese barberry, and the predators that would otherwise consume them have to look elsewhere for nourishment. A study published in the journal *Environmental Entomology* showed that the bottom-of-the-food-web arthropods (e.g. insects and spiders) species richness in the leaf litter under barberry is substantially lower than surrounding native understories. In ecology speak, this is known as "trophic downgrading", and it detrimentally restructures the transfer of energy in a food web, throwing it out of balance and causing disruptions that cascade up throughout the network. A forest floor choked in Japanese barberry reshapes whole communities of plants and animals in, on, and above the soil by altering its structure and function. Nutrient cycling, soil acidity, and decomposition rates are also changed with negative impacts on area ecological relationships.



Japanese Barberry in the fall.

We're Just Worming Up

Barberry has a somewhat unexpected influence on another uninvited, invasive life form in our forests - the [earthworm](#). Surprising to many, there are no native earthworms in the northeast. The reason being that after the ice sheets retreated 12,000 years ago they left naught but barren land in their wake. It was only four hundred years ago or so that earthworms were introduced here as hitchhikers in ship ballast or the root balls of plants brought over from abroad. In the garden, earthworms are a boon - churning and aerating soil, distributing nutrients, and breaking down organic matter. But these actions go from boon to boondoggle in a forest. Northern forests have adapted to organic matter that is slowly decomposed over years by fungi, gradually releasing nutrients. Earthworms, however, can consume the leaf-litter (or "duff") layer in a single summer. With no leaf-litter to slow down runoff, gullies form, sediment washes into streams, nutrients leach, and water evaporates quicker during hot, dry spells. Ground-nesting Ovenbirds, duff-inhabiting salamanders, and wildflowers like spring beauty, trillium, and trout lily decline; soil compaction occurs; and beneficial fungi die. Even the carbon dioxide stored in soil is released to the atmosphere by earthworm activities.

Worms and barberry make cozy bedfellows. The disturbed soils worms create are perfect seedbeds for invasive plants that prefer bare soil for germination, unlike many native species that need a duff layer. Earthworm feeding also creates excessive amounts of nitrates. Invasive plants like barberry and glossy buckthorn are more capable of taking advantage of increased nitrogen than native plants. Rapidly decomposing barberry/buckthorn leaf-litter only continues to increase soil nitrogen levels, creating a beneficial feedback to further buckthorn/barberry invasion, and opening the door to other invasives like Japanese honeysuckle and garlic mustard. Barberry and buckthorn plants also increase soil PH (reducing acidity) - important because earthworms can't tolerate acidic soil. As one might expect, more than one study has shown earthworm density is greater closer to invasive barberry/buckthorn thickets.



Left to right: The NETN forest health team drowning in a sea of barberry in Morristown NHP. | A professional uses a propane torch to kill the crown of a small barberry shrub. | The coffee-ground like soil created by earthworms that invasive shrubs like barberry and buckthorn thrive in.

And It's not Berry Good for the Birds.

Beyond reducing potential insect food sources for raising chicks, barberry is bad for adult birds too because its berries are far less nutritional than native ones. This is significant especially for migratory birds which need to bulk up before embarking on their long journeys. Natural fats are essential sources of highly concentrated energy that are 8 to 10 times more energy-dense than carbohydrates or proteins per unit of mass. Birds can quickly build-up and utilize fat reserves at high rates to support long-distance, multi-day flights. A barberry berry contains almost no natural fats - less than 1%. Northern bayberry, an ideal native alternative in many places, berries are as high as 50% fats. Where available, birds will seek out native berries before migration, even in late autumn with plentiful fruits of barberry and multiflora rose. A 2014-15 Utah State University study tracked the fruiting schedule of 25 plants (16 native, 9 exotic) on a migratory stopover spot in Massachusetts. Simultaneously, they examined over 450 bird droppings from migratory birds including several thrush species, Yellow-rumped warblers, and Baltimore Orioles. Overwhelmingly, the birds fed on native berries practically ignoring the less nutritional non-native fruit. The same study found that the native plants bore maximum fruit in late summer/early autumn, and invasive plant fruits peaked several weeks later in mid-October. But this timing is in jeopardy. Migratory birds have relied on these native fruiting schedules for thousands of years. The warming climate is causing some birds to leave later however, meaning they could miss prime native fruiting times, which concurrently are happening earlier. This also means that later migrating birds are more likely to be encounter invasive fruits. When native berries are rare, birds will consume less nutritional invasive shrub fruits, putting them at risk of not being prepared for their long journeys ahead. If they must eat them, both residential and migratory birds will accidentally disperse berry seeds over miles, further spreading invasives.

This Outta Tick You Off Even More

It gets worse. Dense thickets of barberry are virtual tick-borne disease incubation centers. They provide ideal habitat for both black-legged ticks, and a primary host for Lyme disease, white-footed mice. Thickly growing barberry shrubs keep light levels low and humidity high. Ticks love these microclimates as it

prevents them from drying out in hot, dry weather and allows them to be more active more often increasing chances of questing success, procuring a blood meal, and thus producing more ticks.

As for the mice - dense, thorny, near impenetrable stands of barberry provide posh protection from predators and make for excellent nesting sites. The very structure of barberry increases the likelihood of ticks coming into contact with mice, which are the primary hosts for larval ticks and key carriers of the Lyme-disease bacteria. Incredibly, multi-year studies have found forests full of Japanese barberry can host up to a whopping 12 times the quantity of Lyme-infected ticks per acre as nearby uninvaded forests (120 Lyme-infected ticks/acre to 10/acre). In addition to Lyme, other horrible sounding diseases like Rocky Mountain spotted fever, anaplasmosis, babesiosis, Powassan virus, tularemia, and others can be also be spread by ticks. The science is clear: want to greatly reduce risk of tick-borne disease transmission? Get rid of your tick Taj Mahal, worm welcoming, bird busting, forest failing barberry.

It's Time for a Barberectomy.

Okay so you have barberry, how do you get rid of it? That depends on how established it is. The best way to remove barberry remains the good old-fashioned mechanical method. Though a combination of mechanical, the careful use of herbicides, and spot-fire treatment work best in heavily infested areas. Manual control of barberry is easiest to achieve when the plant is still small and can be pulled out early in the season before seed set. This is can be done either by hand (wear gloves! Those spines are nasty even on small plants) for small sprouts, or using a tool know as a weed wrench. Mowing in combination with a foliar treatment on resprouts can be effective. Once removed, it may take three to five years of returning to the same site to make sure the seed bank has been exhausted. Unfortunately there are no good options for a biocontrol at this time. Any potential insects would gladly consume native plant species too, leading to an old-lady-who-swallowed-a-fly scenario.

For more

- [Find good native alternatives](#) to Japanese barberry.
- Learn more [barberry control methods](#) from a Uconn informational article.