

Japanese Barberry Control Methods

Reference Guide for

Foresters and Professional
Woodland Managers



Special Bulletin – February 2013



Jeffrey S. Ward

Chief Scientist, The Connecticut Agricultural Experiment Station

Scott C. Williams

Assistant Scientist, The Connecticut Agricultural Experiment Station

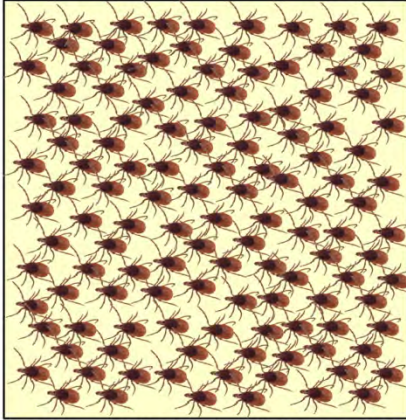
Thomas E. Worthley

Associate Extension Professor, University of Connecticut

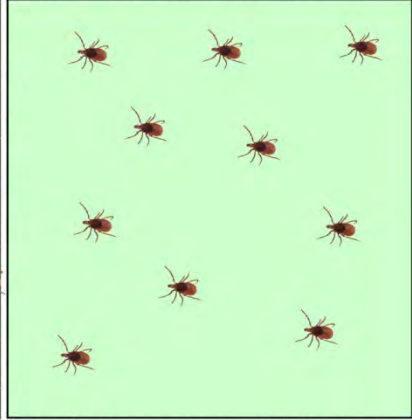
Japanese barberry (*Berberis thunbergii*) Overview

Japanese barberry is classified as invasive in twenty states and five Canadian provinces, and it is well established in another twelve states. It forms dense thickets that alter soil and site conditions, inhibiting forest regeneration and native herbaceous plant populations. Forests infested with barberry can adversely affect human and pet health because they have enhanced levels of blacklegged ticks (*Ixodes scapularis*), which are known to transmit the causal agents of several diseases including Lyme disease.

Density of ticks with *Borrelia burgdorferi* – the causal agent of Lyme disease



Barberry infested forest ~ 120 ticks per acre



Forest without barberry ~ 10 ticks per acre



Dense Japanese barberry stands are also associated with a lack of both tree regeneration and herbaceous plants – severely limiting biodiversity in some forests.

Native species recovery will be severely limited after barberry control in areas of high deer density unless deer populations are also controlled.





Japanese barberry becomes established in fields and forest understories through the dispersal of seeds by birds and small mammals.

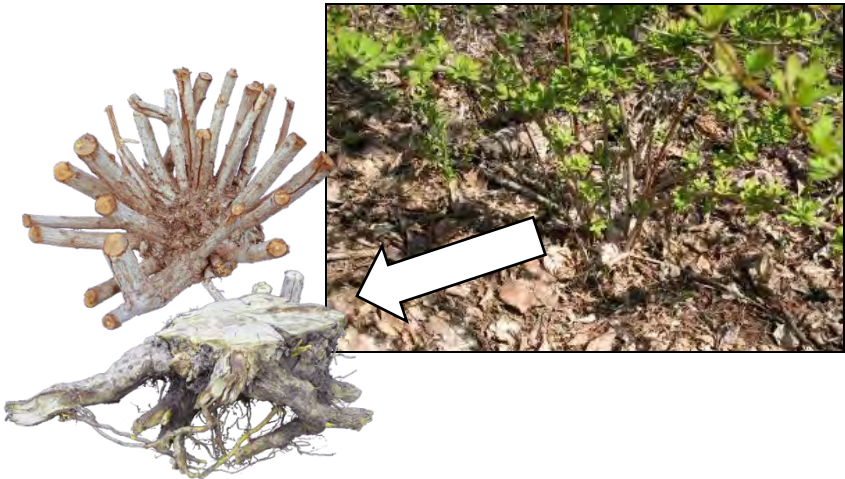
Once established, it spreads both by the establishment of new seedlings and vegetatively by layering.

Japanese barberry is highly competitive with native wildflowers and tree seedlings in forested settings for several reasons, including:

- Few, if any native animal, disease, or insect enemies;
- The ability to photosynthesize efficiently under variable light conditions;
- Phenological advantage – breaks bud and leafs out earlier (late March) and retains green leaves later in the growing season than native species (mid October).

Simply cutting it will not control it!

Japanese barberry grows as a clump of semi-woody stems, or ramets, that emerge from a basal root crown. Like most hardwood shrub species, barberry quickly grows new sprouts after cutting.



Barberry Control Methods:

Barberry infestations can be addressed by various methods, including mechanical treatments, herbicide applications, and burning by directed flame with propane torches, used alone or in various combinations.

Control technique categories are described as follows:

- **Mechanical:** Cutting or severing the aboveground portion of the plant by means of loppers, chainsaw, brush saw, brush mower, or drum chopper. Pulling aboveground stems and roots together using a mattock or weed wrench can also be considered a mechanical treatment.
- **Herbicide:** Broadcast foliar spray, targeted foliar spray, or cut-stump applications of liquid herbicides containing the active ingredients glyphosate or triclopyr.
- **Directed Flame:** Propane torches or flame weeders used to apply high-intensity heat to aboveground portions and root crown of barberry clumps. Intended to kill basal buds as well as aboveground portions of plants.
- **Combination:** Use of two or more of the above techniques in a two-step process that treats existing barberry clumps in a first step, and then treats re-sprouts in a follow-up step.
- **Prescribed Fire/Controlled Burning:** Under carefully controlled conditions, prescribed fire can be an effective initial step to reduce the size and density of barberry infestations. This method requires highly specialized skills, planning and trained personnel and is beyond the scope of most land managers and forest practitioners.



Treatment Method Technical Notes

Mechanical Treatments:

- Mechanical cutting alone is the least effective way to control barberry. Effective control can only be achieved through repeated cutting of new sprouts throughout the growing season. Multiple follow-up cutting treatments will be required to exhaust the reserves of most plants.
- Mechanical treatments are optimally used as initial treatments with a follow-up treatment (see: Combination Treatments).
- A heavy-duty, hand-held brush saw (but not a “weed-whacker”) is effective in all but the largest and densest infestations, where a brush mowing machine will be required.
- A three- or four-lobed brush blade is best on hand-held brush saws as opposed to string heads or saw-tooth blades.
- Infestations with clumps over chest high are difficult to treat using a brush saw because of multiple spine strikes to the face and many low-growing stems will be missed.



- Always use eye and ear protection when using power equipment.
- Mowing large areas with a track machine and drum chopper or brush mower will require follow-up with a hand-held brush saw to cut missed stems near trees, stone wall, boulders, etc.
- Pulling entire plants is very effective for small clumps and individual plants, but extremely labor-intensive. Leaves exposed soil that can be colonized by other invasives. Spot replanting with native shrubs recommended.
- Cutting in the dormant, leaf-off season is more efficient because the plant base, rocks, and potential hazards are easier to see.



Treatment Method Technical Notes

Herbicide Treatments:

- Done correctly, broadcast foliar spraying can provide effective control in one step.
- Broadcast foliar spraying with a mist blower can negatively affect desirable native vegetation.
- To avoid accidentally treating non-target desirable vegetation, broadcast spraying should be limited to narrow seasonal windows at the very beginning and very end of the growing season when barberry has green foliage and most native wildflowers and tree seedlings are dormant.
- Vegetable (or tracker) dye added to the herbicide mix increases spray precision, minimizing overspray (spraying non-target native wildflowers and tree seedlings) and waste of chemical.
- Targeted foliar spraying with a hand-pump backpack sprayer is effective on small clumps, individual plants and new sprouts.
- Cut-stump applications by brush or sprayer must be accomplished immediately after cutting. This requires well-coordinated teams of cutters and applicators. Will be labor-intensive in large areas.
- Commercial herbicide application requires an applicator license. Some property owners do not allow herbicide/pesticide usage.
- Targeted foliar spraying with a hand-pump backpack sprayer is an effective follow-up treatment on new stems that grow after mechanical cutting.



Treatment Method Technical Notes

Directed Flame:

- Directed flame can be an effective alternative to chemical treatments under certain circumstances, but labor-intensive and expensive.
- Method is only recommended during wet, damp and high-humidity conditions when risk of ground-fire is minimal.

- Must use ear and eye protection, heavy gloves, leather boots, and clothes made of natural fibers (cotton or wool). Fire-control tools and equipment (Indian or other spray tanks, fire rakes) must be readily available.

- Backpack-mounted propane torches are available in 30,000 to 400,000 BTU models; the higher BTU unit is recommended for most situations. A squeeze-trigger valve that permits a pilot flame is suggested.

- Flame is directed to the base of the barberry clump, to heat-girdle stems and kill basal buds at the top of the root-crown. There is no need to treat upper branches and leaves.

- As an initial treatment, this method is most effective for small or scattered clumps, where heat can be directed to all sides of the base of the plant.



- A 10 to 20 second “blast” is suggested on each side of the clump. Heat until stems begin to glow.
- Some new sprouts from the base can be expected and a follow-up step is often needed.
- Targeted flame can be an effective follow-up on new sprouts that develop after mechanical treatment.
- Not as effective for barberry growing in full sun or in canopy gaps in the forest.

Combination Treatments

A two-step control process is recommended in most situations. This includes an initial treatment to remove or reduce the aboveground portion of the barberry clump, and a follow-up step to treat new sprouts. The process of growing new sprouts draws upon stored reserves from the root system – weakening the plant.

Treating the new sprouts of a weakened plant is often sufficient for control. Various combinations of techniques work well under different circumstances. Technique combinations can, and should, be tailored to site characteristics, infestation size/density, and personnel qualifications.

2-Step Procedure to Control Japanese Barberry



**Initial
healthy
plant**



**Step 1 – Kill
aboveground
tissues with
heat or by
cutting**



**Root reserves
used to grow
new sprouts,
weakening
plant**



**Step 2 – Kill
much smaller
plant with
heat or
herbicides**

Mechanical with Mechanical Follow-up:

Use a mowing machine or brush saw to sever aboveground portions of the plant. This can be done any time of year. The clump will usually re-sprout almost immediately as growing conditions permit. Two or more follow-up cutting treatments will be required, timed two or three weeks after the plant has re-sprouted.

Mowing machines are limited to sites that are not too steep or rocky. Stems that are near stumps, rocks, or layering near the ground might be missed by mowers and must be cut by hand. Monitor the site for continued re-sprouting and cut repeatedly until plant reserves are exhausted and no new sprouts are observed.



Combination Treatments

Mechanical with Chemical Follow-up:

Use a mechanical (cutting) treatment method, as described above, for the initial step to reduce the size of the barberry clump. Reduced size of plant enhances accessibility and visibility and minimizes chemical use vs. foliar spray of a large uncut clump.

Herbicide follow-up treatments:

- Herbicide applications to cut “stumps” - Must be done immediately to be effective. Most effective during the mid-to late growing season. Apply chemical using a backpack sprayer or spray bottle. Mix vegetable dye with chemical to avoid over-spray. Requires only one visit to site by field team.
- Foliar herbicide applications to new sprouts – Applied 3 to 6 weeks after new sprouts emerge. Apply chemical using a backpack sprayer or spray bottle. Mix tracker dye with chemical to avoid over-spray. Single follow-up treatment generally sufficient for good control. Requires revisiting site after cutting.

Mechanical with Directed Flame Follow-up:

Use a mechanical (cutting) treatment method, as described above, for the initial step to reduce the size of the barberry clump. Reduced size of plant enhances accessibility and visibility and minimizes treatment time relative to larger uncut clump.

- Directed Flame applications to new sprouts – Applied as soon as possible after new sprouts fully emerge, generally 3 to 6 weeks following initial cutting.
- Aim propane torch wand outlet at base of plant, holding tip of wand 8 to 12 inches away from target area. Apply from two sides if possible. Two 10-second blasts (one from each side) should be sufficient, depending on size of clump. Heat stems until they begin to glow.



New sprouts that developed after cutting a clump that had been nearly 7 feet tall and 7 feet wide.

Treating this much smaller clump greatly reduces chemical use or directed flaming treatment time.

Combination Treatments

Chemical with Chemical Follow-up:

Throughout the infested area, spray strips about 30-100 feet apart in early October. This will result in clearly defined 'controlled zones' of dead barberry. The width of the controlled zone will vary depending on the height of infestation being treated. Twenty-foot wide controlled zones can be expected in tall (shoulder high) infestations and as much as 40-foot wide controlled zones where barberry is less than waist high.

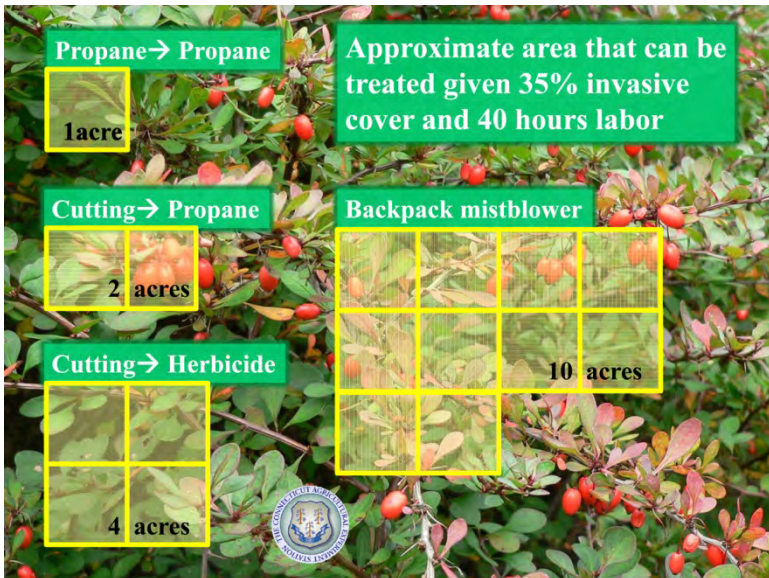
Walk the edges of the controlled zones and spray into the live barberry in early spring or October of the following year. Within the controlled zones, treat any plants that may have survived the initial treatment.

Foliage turns brown over several weeks as herbicide takes effect, leaves on missed clumps and stems will remain green.

Spraying in October will minimize damage to native herbaceous plants and tree regeneration.

Estimated treatment times:

- Treatment times vary with severity of infestations, i.e., areas with denser and/or taller barberry will require more time to treat.
- Treatment times are increased by steep or uneven terrain, downed trees, stone walls, large rocks, and other physical obstructions.



Quick Reference Table

Japanese barberry control methods

Method	Relative effectiveness ¹	Relative cost ²	Notes
Initial treatments			
Pulling	Low	High	Limited to small plants, exposes bare soil readily that is colonized by other invasives
Cutting (brush saw)	Medium	Medium	Use a 3- or 4-lobed blade, difficult in barberry patches taller than chest high
Cutting (brush mower)	Medium	Medium	Useful in dense patches but limited by steep terrain, wet soils, rocks, downed logs/branches
Cutting (drum chopper)	Medium	High	Useful where barberry taller than 5 feet, limited usefulness on steep slopes and in wetlands
Heat (prescribed fire)	Medium	Low	Trained professionals, detailed plan, specialized equipment, and one or more permits required
Heat (propane torch)	Medium	High	Labor intensive, must be done during damp conditions to preclude accidental wildfire
Chemical (backpack sprayer)	High	High	License may be required, non-target native vegetation and tree regeneration may be killed
Chemical (mist blower)	High	Low	License may be required, some native vegetation and tree regeneration <u>will</u> be killed
Follow-up treatments			
None	None	None	Except after initial chemical treatment, barberry quickly recovers without a follow-up treatment
Mechanical	Low	Medium	Labor intensive, will require several follow-up treatments
Directed flame (propane torch)	Medium	High	Labor intensive, may require several follow-up treatments
Chemical (painting cut stems)	High	High	Must be done immediately after cutting, dye in herbicide mix increases application efficiency
Chemical (backpack sprayer)	High	Low	Dye added to tank mix increases efficiency
¹ Relative Effectiveness - anticipated success killing barberry compared to other methods			
² Relative Cost - overall time, labor and material expenses as compared to other methods			

100% control would be very expensive and require several years of follow-up treatments. A realistic goal is 90% control and returning every few years to treat plants taller than one-foot.

Remember – controlling Japanese barberry in an area with a large deer population will not result in a return of native species until the deer population is controlled or fenced out.



Personal Safety:

Connecticut Agricultural Experiment Station Technician
J.P. Barsky suggests,

“Remember YES for personal safety!”

Before undertaking any potentially dangerous activity, assess **Y.E.S.**

- **Y**ourself – are you up to the task, well rested, properly trained, focused, have proper clothing and personal protection equipment?
- **E**quipment – properly maintained and in good working order? No leaks, breaks or malfunctions? Is it the right equipment for the job? First aid kit and safety equipment accessible?
- **S**urroundings – addressed hazards overhead, at eye level, and on or near the ground? Weather conditions appropriate? Prepared for emergency? Escape route planned?

TECHNICAL and FINANCIAL assistance for barberry control may be available for qualified landowners under the USDA Natural Resources Conservation Service Environmental Quality Assistance Program (EQIP). Contact at (<http://www.ct.nrcs.usda.gov>).

For more information, see:

<http://www.ct.gov/CAES/> or <http://www.ctforestry.uconn.edu/>

Acknowledgements:

This publication is made possible with funding support from USDA NRCS. The information is based on research partially sponsored by Aquarion Water Company, Connecticut Chapter – The Nature Conservancy, Propane Education and Research Council, South Central Connecticut Regional Water Authority, and Weed-It-Now Program – TNC with additional assistance from CT Department of Energy and Environmental Protection-Division of Forestry, Towns of Mansfield and Greenwich, Norcross Wildlife Foundation, New England Propane Gas Association of New England, Providence Water, and Lord Creek Farm.

Contacts

Jeff Ward – CAES (203) 974-8495, jeffrey.ward@ct.gov

Scott Williams – CAES (203) 974-8609, scott.williams@ct.gov

Tom Worthley – UConn (860) 345-4511, thomas.worthley@uconn.edu

The Connecticut Agricultural Experiment Station and the University of Connecticut are affirmative action/equal opportunity employers, providing programs and services in a fair and impartial manner. In conformance with the Americans with Disabilities Act, we make every effort to provide equally effective services for persons with disabilities. Individuals with disabilities needing auxiliary aids or services, or for more information by voice call CAES at (203) 974-8442 or by TTY/TDD call UConn at (860) 424-3000.



University of
Connecticut

COOPERATIVE EXTENSION SYSTEM