

Propane Torches for Controlling Invasive Barberrry to Reduce the Spread of Lyme Disease

Safely, effectively reduces tick populations

Japanese barberry is an invasive shrub that can provide protective cover for white-footed mice, known hosts for blacklegged ticks (commonly known as deer ticks), the causal agents of Lyme disease and other serious illnesses. In 2006, there were more than 20,000 reported cases of Lyme disease in the United States. Tick-borne illnesses threaten human health, causing short-term illness (fever, aches, rashes), and in some cases, long-term, disabling symptoms. Tick-borne illnesses can also damage livestock, causing joint pain and weight loss in cattle and horses.

Removing Japanese barberry reduces the protective environment that allows white-footed mice, and the blacklegged ticks they carry, to flourish. A new solution for removing Japanese barberry is the use of propane-fueled torches. Propane torches are safe and highly effective, providing targeted treatment of selected plants without soil disturbance or chemical residue.

In addition to reducing the potential spread of Lyme disease, propane torch treatment of Japanese barberry also reduces the ecological threat posed by the shrub. Japanese barberry can adapt to a wide range of habitats, including farmland and forests. Once it invades, it changes soil's pH, nitrogen content, and biological activity, and it reduces wildlife habitat and forage by displacing native plants. Removing barberry restores a natural balance that supports healthy agriculture and forests.

Propane torch treatment of barberry represents a large new potential market for propane. Japanese barberry is found in 32 states in the eastern and midwestern U.S.* Each of these states may have hundreds of thousands of acres infested by barberry. In Pennsylvania alone, more than 500,000 acres likely require barberry control.

Project Description

To address the health and ecological hazard that Japanese barberry presents, the Propane Education & Research Council (PERC) commissioned *Reducing Blacklegged Tick Populations with Propane Torches in Controlling Invasive Barberrry* (**Docket 12580**). Phase One of this study aimed to:

- Evaluate the effectiveness and costs of controlling Japanese barberry using propane torches on 5+ acre areas.
- Evaluate the tick and rodent population reduction following barberry control.

* USDA. NRCS, 2008. PLANTS Database, Profile for *Berberis thunbergii* (Japanese barberry). <http://plants.usda.gov/java/profile?symbol=BETH>

The Benefits of Propane Torches for Barberrry Removal

Managing Japanese barberry with propane torches offers numerous benefits:

- **Minimally disruptive** - Does not disturb soil through digging, tugging, or wrenching.
- **Nontoxic and insoluble in water** - Protects soil, aquifers, and surface water.
- **Portable** - Easy to maneuver over densely-covered terrain.
- **Selective** - Allows treatment of target plants only.
- **Effective** - A single treatment reduces barberry cover by 85%.
- **Long-lasting** - Provides permanent removal of barberry by destroying root systems.

Propane torch control of Japanese barberry



Captured white-footed mouse with larval ticks attached to its ears



Project Implementation

Two five-acre study areas in Connecticut were divided into eight 50-meter by 50-meter plots of barberry-infested ground. Each plot received an initial treatment with propane torches. A follow-up treatment will be applied to kill new sprouts developing from the root crown of treated plants. All treatments will be timed, and the amount of propane will be recorded.

The project will also include the following:

- A barberry cover analysis to determine the effectiveness of propane torch treatment in reducing barberry cover.
- A rodent density analysis to determine whether propane torch treatment reduces the number of rodents in treated areas. White-footed mice will be trapped and counted, and their blood will be analyzed for the agents that cause Lyme disease (human babesiosis) and anaplasmosis.
- A tick population analysis to determine whether propane torch treatment reduces the number of adult blacklegged ticks in treated areas. Ticks will be collected, counted, and analyzed for the agents that cause Lyme disease in humans.

Project Status: In Progress

The results of the first phase of this project include the following:

Barberry Analysis

Initial treatment with propane torches

- Reduced barberry cover (percentage of plot covered by barberry) by an average of 85 percent.
- Reduced barberry frequency (percentage of plots with barberry) by 42 percent.
- Reduced average height of barberry clumps by 35 percent.

Propane torch treatments before and after leaf-out were equally effective at reducing cover and frequency.

Propane Usage

The amount of propane used and the number of treatment hours required correlated with the plots' initial barberry density.

For every 1 percent cover with barberry, treatment required approximately 0.52 gallons/acre of propane and 0.6 hours/acre of labor. Using these ratios, a stand with 25 percent cover requires 13 gallons/acre of propane and 15 hours/acre of labor for initial treatment. Stands with more entrenched (layered) barberry required additional propane for treatment. The five-acre study area with extensive layering required approximately 0.6 gallons/acre for every 1 percent cover with barberry.

Rodent and Tick Analysis

Initial rodent and tick surveys confirmed that the areas with barberry (both treated and untreated) had higher baseline mouse and tick populations than areas without barberry. Torch treatment is expected to reduce barberry cover, which will reduce mouse and tick populations in treated areas.

Next Steps

The project will continue through spring 2009. The team will:

- Complete follow-up treatments to kill new sprouts developing from surviving root crowns.
- Continue rodent and tick population surveys.
- Complete analyses of the effectiveness and cost of barberry control using propane torches.
- Complete analyses of the impact of propane torch control on tick populations.

Blacklegged tick (magnified)



Photo courtesy of CDC (www.cdc.gov)/James Gathanay, William Nicholson. Found at <http://static.howstuffworks.com/gif/tick-5.jpg>

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