Managing Japanese Barberry Infestations Reduces Blacklegged Tick Abundance and Infection Prevalence with *Borrelia burgdorferi*

Scott C. Williams¹, Jeffrey S. Ward¹, Thomas E. Worthley², and Kirby C. Stafford, III¹

¹The Connecticut Agricultural Experiment Station
²University of Connecticut Cooperative Extension
Japanese barberry (*Berberis thunbergii*)

- Escaped ornamental
- Native to Japan
- Forms dense stands
- Forests, wetlands, and fields
- Displaces native vegetation
- Reduces litter layer in forests
- Alters soil pH and N
- Reduces habitat and forage.
Objectives

- Blacklegged tick (*Ixodes scapularis*) abundances > in barberry?
- White-footed mice (*Peromyscus leucopus*) abundances > in barberry?
- *Borrelia burgdorferi* infection > in barberry?
- And will barberry control = fewer ticks, fewer mice, and lessen the Lyme disease threat?
Study Design

- 3 replicate sites
  - Storrs (Uconn Forest)
  - Redding (Aquarion WC)
  - North Branford (SCCRWA)
- 3 treatments each:
  - Full barberry ($\approx 44\%$)
  - Controlled barberry ($\approx 3.4\%$)
  - No barberry ($\approx 2.5\%$).
Barberry Control

- Initial treatment - Fecon mower
Barberry Control

- Initial treatment - Fecon mower
- Follow up treatments - Glyphosate, triclopyr, and propane torch.
Barberry Control Result
Mouse Capture

- Mice
  - Sherman traps 15 x 15 m grid
  - 20 traps/treatment
  - 15 times (Jul-Sep 07)
  - 9 times (Jul-Sep 08)
  - Sedated
  - Unique ear tagged
  - 1 cc blood
  - Released to capture location
  - IACUC & CT DEP.
Tick Counts

- **Larval ticks**
  - Larval ticks/mouse

- **Adult ticks**
  - 1 x 1 m drag cloth
  - 200 m²/treatment
  - Pre-established routes
  - 27 times (fall 07/spring 08, fall 08).

http://www.lib.uiowa.edu/hardin/md/cdc/1669.html
Borrelia burgdorferi Prevalence

- Sampled ticks retained in the lab
- Incubated in hydrator
- Used indirect fluorescent antibody (IFA) staining to detect B. burgdorferi.
Mean Larval Ticks/Mouse

- **Full Barberry**
- **Controlled Barberry**
- **No Barberry**

**Legend:**
- A
- B
- AB

**Mean # of larval ticks/captured mouse**

- Gaillard, Redding, Storrs 2007
- Gaillard, Storrs 2008

**Occurrences:**
- A
- B
- AB
Adult Ticks/ha

Mean # of Adult Ticks Sampled/ha

- Full Barberry
- Controlled Barberry
- No Barberry

Fall 2007/Spring 2008
- Fall 2008

A
B

Barberry Conditions
Borrelia Infection

% of Ticks Infected with *B. burgdorferi*

- Full Barberry
- Controlled Barberry
- No Barberry

2007
- A

2008
- A
- AB
- B

GB, TT 2008
- A
- A
- B
Density of *Borrelia* Infected Ticks

- Fall07/Spring08
- Fall 2008

**# B. burgdorferi infected ticks/ha**

- Full Barberry
- Controlled Barberry
- No Barberry

- A
- B

Barberies (Evidence of Barberry)

- Full Barberry
- Controlled Barberry
- No Barberry

- Fall07/Spring08
- Fall 2008
Conclusions

- Barberry infestations = increased BL tick abundances
  - More hosts
  - Questing habitat
- More ticks = more Lyme disease threat
- Managing barberry can reduce ticks and *B. burgdorferi* prevalence, in the interest of forest and public health.
Questions?

Dr. Scott C. Williams
Department of Forestry and Horticulture
The Connecticut Agricultural Experiment Station
123 Huntington Street  Box 1106
New Haven, CT  06504-1106
203-974-8609
scott.williams@ct.gov