Ticks and Mosquitoes: Should they be included in School IPM programs?

Northeastern Center SIPM Working Group

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Discussion topics

- Overview on ticks and mosquitoes as vectors & highlights on ticks (especially Blacklegged ticks in the Northeast)
- EPA Region 1 tick-related research
- School IPM considerations
Background

• Significant problems associated with ticks and mosquitoes in the Northeast
  • New Vectors
  • New Diseases
  • Risks to children

• Some Agencies are including vector education and outreach in their communications but little is targeted directly at schools
  • CDC training
  • Region 1 Tick – related activities
  • Northeastern state/land grant research and outreach

• Ticks and mosquitoes present different types of challenges

• Schools may offer unique opportunities
Ticks Issues in the Northeast

Some Highlights on Biology, Management & Research

School IPM Considerations
Some important ticks in the Northeastern States

- Blacklegged Tick (*Ixodes scapularis*)
  - Adult female
  - Adult male
  - Nymph
  - Larva

- Lone Star Tick (*Amblyomma americanum*)

- Dog Tick (*Dermacentor variabilis*)
Blacklegged Tick

Vectors: Lyme disease, Anaplasmosis, Babesiosis
CDC Lyme Disease Fast Facts
In 2011, 96% of Lyme disease cases were reported from 13 states:

- Connecticut
- Delaware
- Maine
- Massachusetts
- New Hampshire
- New York
- New Jersey
- Pennsylvania
- Wisconsin
- Maryland
- Minnesota
- Vermont
- Virginia

Lyme disease is the most commonly reported vector borne illness in the United States--in 2011, it was the 6th most common Nationally Notifiable disease. However this disease does not occur nationwide and is concentrated heavily in the northeast and upper Midwest.
Reported Cases of Lyme Disease -- United States, 2001

1 dot placed randomly within county of residence for each reported case
Lyme disease has become a state-wide problem
Massachusetts Department of Public Health

Children and people older than fifty most at risk
Spring: Eggs

Eggs (deposited)

Summer: Nymph

Nymph on squirrels, birds, and small mammals

Fall: Larvae

Larvae on mice, birds, and small mammals

Winter: Adult

Adult on deer and large mammals
Black-legged tick nymph and adult
White-footed Mouse
White-tailed Deer
Deer Tick Feeding
Babesiosis in Massachusetts

Incidence Rates (per 100,000 population) for Confirmed Babesiosis in Massachusetts: 2008-2012

- Data as of 11MAR2013 and are subject to change.
- Using 2010 Census data.
- Case counts less than 5 in populations less than 50,000 are suppressed to maintain patient confidentiality.

Incidence Rate
(per 100,000 pop)
- No Reported Cases
- IR Suppressed ~
  - 0.1 - 10.0
  - 10.1 - 100.0
  - > 100.0

1 inch = 20 miles

Bureau of Infectious Disease Prevention, Response and Services
Office of Integrated Surveillance & Informatics Services
Incidence Rate of Confirmed Babesiosis Cases Reported in Massachusetts, by Age Range, 2012
Anaplasmosis in Massachusetts
Incidence Rate of Confirmed HGA Cases Reported in Massachusetts, by Age Range, 2012

Cases (per 100,000)
Lone Star Tick, *Amblyomma americanum*

Vectors STARI, ehrlichiosis, tularemia, Rocky Mountain Spotted Fever (?)
Managing risks posed by ticks

- No single solution, either pharmacological or non-pharmacological
- Variety of tactics including general landscape decisions, behavior changes (e.g., avoid tick habitat, walk in center of trails, etc.), take personal protections (e.g., repellents, tick checks and bathing, pesticide treated clothing), pesticide tools (e.g., perimeter landscape reatments, 4-poster, Damminex tubes)
- Goal is preventing tick bites
- Education and outreach
EPA Region 1 Tick-related Activities

• Pesticide Program Regulatory Activities
• Regional Research
  • RARE – 4-Poster Deer Feeding Station project
    • Do 4-posters reduce tick populations over time?
      • *Ixodes scapularis* pathogens
      • Borrelia, Babesia, Anaplasma
      • Rates in nymphs and adults
    • How are stations utilized by wildlife at various locations
  • Small Mammal Testing for pathogens
    • Trapped “hot spots” for small mammals
    • Identify reservoir hosts species for several pathogens
EPA Pesticide Program Roles
Tick Control Efforts

- Pesticide Product Registration
- Pesticide Applicator Certification and Training
- IPM support and implementation
The effectiveness of permethrin-treated deer feeding stations for control of the Lyme disease vector *Ixodes scapularis* on Cape Cod and the Islands

EPA ORD Regional Applied Research Effort (RARE)

Regional Contacts: Robert Koethe, Bart Hoskins, Robert Hillger
ORD Contact: Jason Grear
What is a “Four Poster”? 

- A “Four Poster” is a plastic device consisting of a large feed corn bin with a narrow feed trough at either end. Each trough has a PVC post on either side covered with a paint roller, which is soaked in permethrin. Deer feeding at the troughs will have their neck and ear area coated in permethrin. The four poster may reduce tick populations locally by targeting adult ticks that would otherwise lay eggs using the blood meal from a deer.

- Four-poster feeding stations have been shown to reduce tick abundance, but deployment is challenging.
Tick Pathogens

- Lyme is prevalent in the study area, but Babesia and Anaplasma are also present.
- Ticks collected for four poster study evaluation were analyzed at the UMASS Laboratory of Medical Zoology by Dr. Steven Rich for presence of all three pathogens.
- Some sites appeared to have greater incidence of co-infection with Lyme and other pathogen(s).
Co-infection Host Study

- Research supported by EPA Region 1, ORD and UMASS Amherst
- Pilot conducted in 2012
  - EPA working with Dr. Stephen Rich of UMASS Amherst to identify competent small mammal tick hosts for the various pathogens.
  - In 2012 EPA sampled small mammals (voles, shrews, mice, rats) and collected replete ticks and blood samples for presence of Lyme, Anaplasma, and Babesia.
- This work continuing in summer/fall of 2013
School IPM: Reasons to include Tick IPM in overall School IPM programs

- Ticks widespread and common and can spread serious diseases to students, faculty and staff
- School grounds and properties may contain significant tick populations
- School might not have a plan and approach that easily accommodates vector control
- School nurses can serve as a useful resource
- Children can help increase awareness and educate parents
- People sometimes take unnecessary or inappropriate actions
- Simple actions can reduce risks
Possible Tick Topics for Schools

- Managing School Properties
  - Vegetation
  - Pesticides
  - Playground and sports equipment placement and storage
  - Limit access and attractiveness to alternative hosts (mice, dogs, deer, etc.)

- Monitoring for Ticks

- Guidance for Prevention; Precautions for Outdoor Activities
  - Clothing – (e.g., light colored, pants tucked in socks, long sleeves, pesticide treated)
  - Behavior (e.g., walk in center of trails, tick checks, bathing)
  - Special policies (e.g., dedicated clothing, recommendations before outings)

- How to Remove Ticks

- How to Identify ticks
Examples of potential products to support Schools

- Guidance on Landscaping
- Outreach Materials for students to take home
- Outreach material for school nurses
- Educational Materials for Curricula
Both deer kicking the station.