

## IPM Action Plan for Eastern U.S. Ticks

### Identification

The black-legged tick (*Ixodes scapularis*), also known as the deer tick, is a small tick without white markings. The abdomen of the female appears reddish. It is the principal vector of *Borrelia burgdorferi*, the Lyme disease spirochete (type of bacterium) in the northeastern United States. Ticks must remain attached to the host for at least 24 hours in order to pass this pathogen to the host. The early signs of the disease usually show up as a rash at the bite site followed by flu-like symptoms. Untreated cases may lead to arthritic conditions and possible neurological problems. Medical care should be sought when a person is bitten by a deer tick or exhibits Lyme disease symptoms.

The American dog tick (*Dermacenter variabilis*), is larger than a deer tick and the un-engorged female has a whitish shield on its back. This tick readily attaches itself to humans and may carry the organism that causes Rocky Mountain spotted fever, a serious disease that can be transmitted to humans. Symptoms of this disease are headache, fever, and aching muscles 2 to 14 days after tick attachment. Two to three days after the fever starts, a rash develops on the wrists and ankles, spreading to the palms, soles, and trunk of the body. American dog ticks are most likely to be found in open areas with tall grass or brush. All ticks have some stage that is active during the summer. At any time of the year, some life stage of the American dog tick can be

### General Information

Ticks are sometimes of concern on school properties, especially those species that can transmit pathogens that cause serious diseases to humans such as Rocky Mountain spotted fever, Lyme disease, babesiosis, ehrlichiosis, and Powassan encephalitis. Approximately 12 species are considered to be of major public health or veterinary concern.

Ticks are blood-feeding arthropods related to spiders and mites. The adult tick has eight legs compared to insects which have six legs. Ticks can feed on a variety of animals including birds, amphibians, reptiles, and mammals

(including people). The primary habitats for ticks are wooded areas and the open or grassy areas at the edges of wooded areas. On school properties, ticks are most often found on playgrounds, athletic fields, cross-country trails, paths, and school yards located in and adjacent to wooded areas, especially where deer and other wildlife hosts are abundant.

As ticks go through their life stages (egg, larva, nymph, and adult), they usually change hosts. Young ticks will attach to small animals and be dispersed by them. Nymphs and adults will climb onto grasses, herbaceous plants, and shrubs which enable them to latch onto larger hosts. Adult ticks remain in an area for months for an appropriate host.

On humans, ticks migrate around the hairline, the area behind the ears, or in the armpits. It takes five to six hours for a tick to become firmly attached and up to ten days for it to become fully engorged with blood. The female needs a blood meal in order to lay her eggs. Ticks have been known to survive for months without a blood

## Removing Ticks

- Use fine-tipped tweezers to remove attached ticks. Grasp the tick as close to the skin surface as possible and pull upward with steady, even pressure. Do not twist or jerk the tick; this may cause the mouthparts to break off and remain in the skin. If this happens, remove mouthparts with tweezers or consult the school nurse.
- Do not squeeze, crush, or puncture the body of the tick because its fluids may contain infectious organisms.
- Do not handle the tick with bare hands because infectious agents may enter through mucous membranes or breaks in the skin.
- Apply rubbing alcohol to the bite and wash hands with soap and water
- The tick may be saved for future identification should disease symptoms develop within 2-3 weeks. Place the tick in a small vial containing rubbing alcohol. Write the date of the bite on a piece of paper with a pencil and place it in the vial. (Writing in pen will disappear once placed in alcohol.)

Note: Folklore remedies such as petroleum jelly or hot matches do little to encourage a tick to detach from skin. In fact, they may make matters worse by irritating the tick and stimulating it to release additional saliva, increasing the chances of transmitting a tick-borne disease. These methods of tick removal should be avoided. Also, a number of tick removal devices have been marketed, but

## Monitoring and Inspection

Landscape management practices designed to make the landscape more inhospitable to primary tick hosts may reduce a tick population. However, these practices alone will not eliminate all ticks and the risk of associated diseases. Therefore, other tick control practices must be integrated with the overall program to reduce the risk of disease. It may be impractical and expensive to institute tick control measures and landscape management practices in all areas of the school grounds. Efforts should be focused on frequently used areas (playground, ball fields, area immediately surrounding the school building, etc.).

A “tick drag” or “tick flag” may be used to determine if ticks are present since ticks are usually found within 18 inches of the ground. To construct a tick drag, attach a 3” x 3” white cloth, white heavy flannel, or corduroy material stapled to a dowel and weighted with a second dowel or curtain weights and tie a rope to each end of the wooden dowel. Then drag it across an area of grass or low brush. At fixed intervals (for example, every 10 meters at high tick density or every 100 yards at low density) examine the cloth and count the number of ticks. This method catches about one out of every ten ticks. involves brushing higher vegetation with a cloth attached to one end of a pole. Such areas include the understory in wooded areas and brush and shrubs in open areas, along edge habitats, and along property borders.

## Nonchemical Control Measures

### Tips to Avoid Tick Bites

- Wear light-colored clothing with long-pants tucked into socks when going into tick-infested areas.
- Educate students, families, and school staff about ticks, tick-vectored diseases, and the proper use of repellents.
- Keep to the center of trails to minimize contact with brush and tall grasses.
- Wash and dry clothing at the highest temperature setting upon returning from a tick-infested area.
- At the end of the day after being outdoors, carefully inspect the entire body. Carefully remove any attached ticks using fine-tipped tweezers to gently grasp the tick as close to the skin as possible. Pull the tick straight upward with steady even pressure. Save the tick for future identification by placing it in a waterproof, crush-proof container with alcohol.



## Habitat Modification

- Manage landscape to reduce humidity where ticks are likely to be found.
- Reduce cover for mice. Eliminate wooded, brush-covered habitat, prune lower branches of bushes, clean-up storage areas, woodpiles and junk piles.
- Reduce deer habitat or erect deer-exclusion fencing.
- Rake leaf litter and use wood chips or plant shade-tolerant grass under shade trees to reduce tick abundance.
- Trim trees and brush to open up wooded areas in and around areas of human activity, allowing sunlight to penetrate to reduce moisture and thus reduce tick habitat.
- Keep grass mowed.
- Remove leaf litter, brush, and weeds at the edge of the lawn.
- Restrict the use of groundcover such as pachysandra in areas frequented by people.
- Discourage rodent activity. Cleanup and seal stone walls and small openings on school properties.
- Move bird feeders away from school buildings.
- Avoid landscape plantings that attract deer or use deer-exclusion fencing to keep deer off school properties.
- Keep playground equipment away from woodland edges and place them on wood-chip or mulch-type foundation.
- Trim trees and shrubs on the school properties and at the woodland edges to permit more sunlight.
- Create three foot or wider wood chip, mulch, or gravel border between turf and woods.
- Widen woodland trails/walkways to permit trail-users to avoid contact with woody vegetation and tall grasses.

## Chemical Control Measures

If tick-vectored disease risk is high, a targeted barrier treatment can reduce tick populations along wooded property edges where human activity is also high. These locations can include along edges of sports fields, along cross-country running trails, and along margins of playgrounds. These applications should be timed to coincide with peak nymphal populations.

Restrict application of pesticides to high-risk tick habitat such as edges of lawn and woodlands. Spraying open fields and lawns is not necessary. The product must be labeled for area-wide tick control.

## Emerging Issues, New Strategies and Priorities

Tick vectored diseases are on the rise in the US, therefore tick management issues are likely to be increasingly important for schools. For instance, Lyme disease is now found in 46 states and the number of new cases reported increased by 9.6% over the three-year period 2003-2005. Rocky Mountain spotted fever has been reported in 40 states. The number of cases reported in the US more than tripled between 2000 and 2003.

Current IPM strategies for tick management place an emphasis on pesticides used as repellents for treatment of skin and clothing, and as landscape barrier treatments. Most repellents are not recommended for use on young children. Research and surveillance is need to improve understanding of tick ecology and epidemiology of tick-borne diseases.