Managing Ticks on School Grounds

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THE CONCERN ABOUT TICKS ON SCHOOL GROUNDS

Like fleas and lice, ticks are small pests that feed on the blood of animals, including humans. It is important to manage and avoid ticks at all locations, even on school grounds, because tick bites often cause irritation at the bite site, may transmit a variety of disease-causing organisms or may lead to other health problems. Students are likely to encounter human-biting ticks when playing outdoors, especially near animal habitats, because their time outdoors overlaps with the ticks' active periods. While people are susceptible to many tick-borne diseases, students may be more vulnerable to severe symptoms from these diseases. Since wildlife and companion animals frequently visit areas with outdoor play equipment, it is important to inspect these areas often. Since information regarding tick avoidance is generally geared towards adults, it is especially important for adults to help students avoid contact with ticks.

This publication explains the importance of managing and avoiding ticks (and thus their potential pathogens) on school grounds. Here, the risks associated with faculty, staff and students encountering ticks are described as well as precautions taken to decrease the chances of being bitten by a tick. The identification and activity patterns of human-biting ticks in Tennessee are described to help prevent exposure in the environment.



DISPELLING MYTHS ABOUT TICKS

Although ticks can be dangerous, there are many misconceptions about the biology of ticks.

Common Myths	Facts
Ticks can jump.	Ticks have feet that are made for crawling and holding onto vegetation and host fur, not for jumping.
Ticks climb trees.	Ticks will only climb to the tops of shorter vegetation or the base of trees to find hosts nearby.
Ticks spend more time on a host than in the environment.	Ticks temporarily live on their hosts as they take a blood meal which usually lasts 5-12 days, but take several months to molt to their next life stage.
Ticks can fly.	Ticks do not have wings, so they cannot fly.
Crush ticks in your hands to kill them.	Do not crush ticks, this could increase the chance of exposure to pathogens. Store attached ticks in a vial with 80 percent ethanol or freeze in a plastic baggie to identify the tick and potential health-related problems.
Ticks are active only in the summer months.	Ticks are present year-round and are often searching for a host in every season. Some ticks, such as the blacklegged tick or the winter tick, prefer to search for hosts in colder months.
Once bitten by a tick you immediately become sick.	You should always remove attached ticks as soon as possible. It can take more than 24 hours of tick feeding for a tick to transmit a pathogen. Additionally, most ticks do not carry pathogens that will make you sick.
Burning attached ticks on hosts is an acceptable method of removal.	Burning ticks when they are feeding does not cause ticks to detach themselves, but you could burn yourself or kill the tick while it is in your skin. This could also cause the tick to inject more pathogens.
Covering a tick with alcohol or petroleum jelly causes the tick to back out when feeding.	Do not apply any substances to ticks while they feed. In many instances this does more harm to yourself because the tick will inject more compounds to stay attached. Simply remove the tick with tweezers.
Pulling ticks out by grabbing onto the body is the best way to remove a tick.	Use tweezers to grasp the head of the tick instead of the body so the mouthparts are removed and you don't accidently push the contents of the tick into your skin.

TENNESSEE TICKS, THEIR ASSOCIATED PATHOGENS AND HEALTH-RELATED PROBLEMS

Ticks

Five tick species are of concern on Tennessee school grounds: the lone star tick (Amblyomma Americanum), the Gulf Coast tick (Amblyomma *maculatum*), the American dog tick (*Dermacentor* variabilis), the blacklegged tick (Ixodes scapularis), and the longhorned tick (Haemaphysalis *longicornis*). Images of each are found in Figure 1, drawings and descriptions of each species are found in Table 1, and tick parts are indicated in Figure 2 to help identify the ticks. Identification can be challenging because of their small size and change in appearance based on engorgement.

Unfed larvae (commonly referred to as seed will search for a host, feed from it and individually ticks) are about half the size of a poppy seed, detach from the host into the environment to molt and individuals are often overlooked. Most people to the eight-legged nymphal stage. The next season, encounter many larvae at the same time while nymphs find another host and blood feed, and the larvae are searching for a host (questing). then detach from the host into the environment to Nymphal ticks may look similar to a poppy seed or molt into an adult. As an adult, a third host is found freckle and are typically two or more times the size and fed upon, mating occurs on the host while the of larvae. Adult unfed ticks are usually the width of female feeds, and then the satiated and mated a pencil eraser, but when fed they might resemble female will detach from the host laying her large egg a grey blueberry. Adult females are slightly larger clutch off the host in the environment. For each tick than males, and females can take a much larger species and life stage of the tick, different species blood meal compared to males due to their of hosts may be fed upon (Table 1). The months in which each tick's life stage is active are indicated shortened scutum. in Table 2. Knowing when each tick species and All five of these ticks are three-host ticks, meaning life stage feeds on specific and preferred hosts is that they parasitize a new host with each subsequent important because we can limit host populations or life stage. Briefly, after females lay an egg mass of exclude them from areas, including those in which more than 2,000 eggs, the six-legged larvae will students are present.

hatch next to one another. Together, the larvae





Figure 1. Females of the Gulf Coast tick (A), the American dog tick (B), the lone star tick (C), blacklegged tick (D) and the longhorned tick (E). The lone star, Gulf Coast, and blacklegged ticks have long protruding mouthparts, while the American dog and longhorned ticks have short mouthparts. (Credit: www.cdc.gov/ticks/gallery/index.html)

TICKS TRANSMIT PATHOGENS THAT CAUSE DISEASE AND CAUSE OTHER HEALTH-RELATED PROBLEMS

Each tick species is known to carry pathogen(s) which can cause disease in humans (Table 1).

The incidence of spotted fever rickettsiosis (SFR) has increased from two to more than 12 cases per million persons since 2000 with more than 50 percent of cases occurring in Tennessee and its four adjacent states. SFR is transmitted by more than 10 tick species and includes multiple Rickettsia bacteria including R. parkeri, R. andenae, R. amblyommatis and the highly pathogenic R. rickettsii causing Rocky Mountain spotted fever (RMSF). Symptoms of SFR include fever, rash and/or headaches and are less severe than RMSF. RMSF is transmitted through the bite of an infected American dog tick or Gulf Coast tick and there is still debate as to whether lone star ticks can transmit it. RMSF causes a high fever and severe headache among other symptoms and 2-4 days after the onset of fever a pink-spotted rash occurs. In some cases the rash will spread around the bite site (ankles, forearms and wrists). Although the majority of RMSF cases occur in middle-aged and elderly individuals, students are more likely to have severe symptoms and can potentially die if not treated within five days of the start of symptoms.

Traditionally found in the northeastern and midwestern United States, several east and middle Tennessee counties have reported *Borrelia burgdorferi* in field-collected blacklegged ticks. This is the bacteria that causes **Lyme disease**, and although Lyme disease is the most common vector-borne disease in the United States, the arrival of the pathogen in Tennessee is fairly recent. A bulls-eye rash frequently occurs around the bite site with this disease as does fever, headache and tiredness. If treated early with antibiotics, potential long-term effects on the joints, nervous system and heart may be avoided.

Several species of *Ehrlichia* bacteria spread through the bite of infected blacklegged ticks or lone star ticks. Infection with an *Ehrlichia* bacteria can cause **ehrlichiosis**, a disease with flu-like symptoms including fever, headache, muscle aches, chills and possibly vomiting. Although ehrlichiosis occurs more frequently in older populations, individuals who are less than 10 years old or more than 70 years old are more likely to die from the disease. Alpha-gal syndrome (AGS) is an allergic reaction to alpha-gal (galactose- α -1,3-galactose) a sugar found in many mammals but not usually in people, fish, birds or reptiles. Products from mammals such as gelatin, cosmetics, milk products and others, may also contain alpha-gal and some evidence indicates the saliva of some ticks may contain alpha-gal. AGS, also referred to as alpha-gal allergy, red meat allergy or tick bite allergy, occurs when people with this allergy eat red meat or are exposed to alphagal products. AGS symptoms, including rash, hives, nausea or vomiting, difficulty breathing, blood pressure drop, dizziness and severe stomach pain, usually occur 3-6 hours after the alpha-gal exposure. AGS reactions vary from mild to severe, and may be life-threatening. Most cases are reported in adults after the bite of a lone star tick, although bites from other tick species may trigger an AGS reaction. If you suspect you suffer from AGS, consult a medical professional and avoid red meat and other alpha-gal products.

RMSF, Lyme disease and ehrlichiosis are the three most common tick-borne diseases in Tennessee. Other tick-borne diseases caused by bacteria (e.g., anaplasmosis and tularemia), viruses (e.g., Heartland and Bourbon viruses), and protozoan (e.g., babesiosis) occur in Tennessee but are much less common. In addition to alpha-gal syndrome, tick paralysis is another example of a health-related problem caused by a tick bite. In this case, while Dermacentor ticks feed, neurotoxins are released into the host's bloodstream causing temporary paralysis. Once the tick is removed the paralysis stops. For information on tick-borne diseases, see the Center for Disease and Prevention's (CDC's) website on tick-borne diseases of the United States at www.cdc.gov/ticks/ tickbornediseases/index.html.

Table 1. A description of the common human-biting ticks, their habitat, hosts by life stage, and potential diseases caused by pathogen/parasite transmission and other tick-related health problems.

The four life stages of Tennessee ticks are egg, larva, nymph, and adult (male or female), but only the larva, nymph and adults bite.

	Female: About 3.1 mm long. Eight legs. Prominent white	1		problems
Image: Additional system of the system of	circle on back. Long palps. Male: About 2 mm long. Eight legs. Red-brown with white/iridescence around perimeter of body and festoons. Long palps. Nymph: About 1.5 mm long. Eight legs. Red-brown. Long palps. Larvae: About 0.5 mm long. Six legs. Red-brown. Long palps.	Forest-field edges, forests, fields	All stages feed on humans Adults: Feed on variety of medium-sized (e.g. canines, felines) and large-sized (e.g. deer and livestock) mammals, and ground-feeding birds (e.g. turkey) Nymphs: Small-sized to large-sized mammals and ground-feeding birds Larvae: Small-sized (e.g. squirrels and rabbits) to large-sized mammals and ground-feeding birds	anaplasmosis, ehrlichiosis, RMSF and SFR, babesiosis, theileriosis, tularemia, alpha-gal syndrome
Image: Second system Image: Second system Image: Second	Female: About 3 mm long. Eight legs. Long palps. Red-brown with white scutum. Male: About 2.5 mm long. Eight legs. Long palps. Red-brown with elaborate white/ iridescent markings/ lines on back. Nymph: About 1.3 mm long. Eight legs. Long palps. Red-brown with no markings. Larvae: About 0.5 mm long. Six legs. Long palps. Red-brown with no markings.	Grass prairies, upland habitats, Gulf coast prairie regions, meadows and grasslands	Adults: Humans, deer, companion animals, medium-sized wildlife, livestock and wild hogs Nymphs: Variety of songbirds and rodents Larvae: Variety of songbirds and rodents	ehrlichiosis, SFR, hepatozoonosis
American dog tick	Female: About 5 mm long. Eight legs. Short palps. Dark brown with white scutum. Male: About 3.6 mm long. Eight legs. Short palps. Dark brown with elaborate white markings on back. Nymph: About 0.9 mm long. Eight legs. Short palps. Dark brown with white scutum. Larvae: About 0.6 mm long. Six legs. Short palps. Dark	Urban environments, fields, parks, forested habitats	Adults: Humans, deer, medium-sized (e.g. canine and raccoons) to large-sized mammals (e.g. livestock) Nymphs: Rodents and medium-sized mammals Larvae: Rodents and medium-sized mammals	RMSF and SFR, ehrlichiosis, Bourbon virus, Heartland viruses, tularemia

Table 1 (continued). A description of the common human-biting ticks, their habitat, hosts by life stage, and potential diseases caused by pathogen/parasite transmission and other tick-related health problems.

The four life stages of Tennessee ticks are egg, larva, nymph, and adult (male or female), but only the larva, nymph and adults bite.

Table 2.	Genera	l monthly	occurrence	of	common	Tennes
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Tick species	Life stage	Monthly occurrence											
		Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	larva						*	*	*	*	*		
Lone Star Tick	nymph			*	*	*	*	*	*	*			
	adult		*	*	*	*	*	*					
	larva					*	*	*					
Gulf Coast Tick	nymph					*	*	*					
	adult				*	*	*	*	*	*			
	larva			*	*			*	*				
American Dog Tick	nymph			*	*			*	*				
	adult				*	*	*	*	*				
	larva							*					
Blacklegged Tick	nymph				*	*	*						
	adult	*	*	*	*						*	*	*
Longhorned Tick	larva			*	*	*	*	*	*	*	*		
	nymph			*	*	*	*	*	*	*	*		
	adult				*	*	*	*	*				



Figure 2. A hard tick with labeled parts to aid identification. (Credit: American Society for Microbiology)

Common human-biting ticks in Tennessee	Characteristics	Habitat	Host by life stage	Diseases or other tick-related health problems
<u> </u>	Female: About 3.1 mm long. Eight legs. Long palps. Black legs. Reddish-orange body with a black scutum.	Forest-field edges, forested habitats	Adults: Humans, canines, deer, medium-sized animals Nymphs: Rodents,	Lyme disease, anaplasmosis, babesiosis, Powassan virus
	Male: About 1.5 mm long. Eight legs. Long palps. Black legs. Black body.		nzards, birds, medium-sized mammals	
* *	Nymph: About 1.6 mm long. Eight legs. Long palps. Black legs. Brown body with a black scutum.		Larvae: Rodents, lizards, birds, medium-sized mammals	
Blacklegged tick (Ixodes scapularis)	Larvae: About 0.8 mm long. Six legs. Long palps. Black legs. Brown body with a black scutum.			
×××	Female: About 2.7 mm long. Eight legs. Short palps. Red-brown with no markings. Fangs present on underside of palps. Male: has not been found in	Forest-field edges, forests, field habitats	Adults: predatory birds, small-sized (e.g. rabbits), medium- sized (e.g. raccoons and canines), and large-sized mammals including humans	anaplasmosis, ehrlichiosis, RMSF and SFR, babesiosis, theileriosis
* *	the United States. Nymph: About 1.7 mm long. Eight legs. Short palps. Red-brown with no markings. Fangs present on underside of palps.		Nymphs: livestock, medium-sized mammals Larvae: Medium- and large-sized mammals	
Longhorned tick (Haemaphysalis longicornis)	Larvae: About 0.5 mm long. Six legs. Short palps. Fangs present on underside of palps. Red-brown with no markings.			

Adult males and females will have a genital aperture and anus while nymphs and larvae will have an anus only. Tick drawings provided by NYSIPM except for the Gulf Coast tick which was provided by Chris Madden, Christopher Madden Design, LLC.

ssee ticks by life stage. Active periods indicated by asterisk.

MANAGEMENT

Due to the difficulty of controlling ticks in large spaces, environmental manipulation or application of pesticides is not always practical. The best methods for management include actions that prevent tick bites and establishment at a site in order to prevent potential pathogen transmission.

Personal protection and removing ticks

There are a variety of methods that can be used to reduce the occurrence of tick bites or remove ticks before they are able to take a blood meal.

Personal Protection with Repellents

Repellents are a form of chemical control that can, and should, be used to help protect people from tick bites. They do not kill the tick, rather they keep ticks away from an area or site.

The Environmental Protection Agency (EPA) has approved several active ingredients that can effectively prevent tick bites. These include DEET, IR3535, Picaridin, 2-undecanone, and some Oil of Lemon Eucalyptus (OLE) and PMD products. Product effectiveness and longevity will vary depending on the concentration used. Products containing OLE should not be used on people under the age of three.

Before going into a potentially tick-infested area:

- Select and wear light-colored clothing including long sleeve shirts and pants.
- Select and wear tall white socks.
- Spray selected clothing the day before with appropriately labelled permethrin to repel ticks.
 (Permethrin products applied to clothing the night before, and allowed to dry before use, may maintain potency up to two weeks after treatment regardless of washing.)
- Select and properly apply tick repellents to skin following the label. Use the information in the text box to the right to select the best repellent for you.
- Duct tape pants around boots or duct tape top of socks to pants to prevent ticks from crawling on your skin.

At home, after being in a potentially tick-infested area:

 In order to avoid bringing ticks into your home, remove clothing and place it directly into a dryer rather than placing in a dirty clothes hamper or basket. If you do not have a dryer, place clothing into a 2-gallon zip lock bag until one is accessible.

- Take a shower after being outdoors and check yourself for ticks.
- Get a partner or use a mirror to check for ticks in areas that you cannot see or reach well (behind legs, hair, back, etc.).
- Limit companion animals without tick prevention in areas where students play and sleep.

At school:

- Avoid areas of high vegetation and work with maintenance/facilities personnel to identify areas that need mowing.
- Report any ticks seen on school grounds to the pest logbook overseer and to the pest management technician.

Personal Protection with Repellents (continued)

For a complete list of repellents that prevent tick bites, you can visit the EPA website (epa.gov/insect-repellents/find-insectrepellent-right-you) and find the repellent that is best for students, faculty and staff.

Additional Considerations for Repellents:

- When choosing the best repellent, it is important to consider the length of time spent outdoors, location and risk of pathogens.
- Caregivers/guardians should apply a repellent to their child.
- Make sure to apply sunscreen before applying repellents.
- Do not use products that combine sunscreen and repellent because sunscreen needs to be reapplied more frequently. Additional repellents could be kept in the school nurse's office if reapplication is necessary.
- Most importantly, always follow the instructions on the label. This will prevent any negative effects due to exposure. If a rash or other irritation occurs, wash the repellent off with soap and water and contact a local poison control center.

School personnel:

Educate faculty, staff, students and guardians about wearing repellents (npic.orst.edu/ingred/ptype/repel.htm). Decide where repellents can be stored, who will apply them and what formulations (spray or lotions) are suggested.

- Avoid using areas with high numbers of ticks.
- Encourage teachers and students to walk single-file in the center of trails.
- If outdoor environmental classrooms are on campus, ensure students are treated with repellents before using shaded areas or areas with tall vegetation and leaf litter. If possible, replace leaf litter with gravel or small rocks to dry out the area.
- Check for ticks after visiting outdoor areas and remind caregivers/guardians to check their children for ticks at home.
- Use an extra-sticky lint roller to remove ticks climbing on clothing or skin.
- Suggest families implement many of the suggestions listed above when not at school.

How to remove ticks:

- Remove ticks as soon as possible.
- If ticks are attached, use tweezers to remove them (see Figure 3).
- Use tweezers to grasp ticks as close to an individual's skin as possible, but do not get so close that you rip skin.

 The closer you are to the skin the less likely the tick's head will be left in the skin during removal, as shown in the figure below. Ensuring that the head of the tick is removed with the tick's body decreases the chances of obtaining a harmful pathogen or causing infection. It's also difficult to identify a headless tick. Be careful to not scrape at the bite site as that could lead to a bacterial infection as well.



Figure 3. Steps to removing a tick. (Credit: cdc.gov)

- After removal, wash around the wound with soap and water or similar substances recommended by medical professionals. Place ticks in a vial with a cotton ball soaked in 80 percent ethanol for transport. Save attached ticks in a sealable bag in the freezer if ethanol is not available and write the date and name of the person the tick attached to on the outside of that bag. Also watch the site for several days for signs of infection. It is normal for a red spot to appear in response to the bite, but if it becomes larger or a person begins to feel ill within a month of the bite, they should seek the advice of a doctor or other medical professional. The tick can be provided to the doctor's office to narrow the potential list of tick-borne diseases because certain species are better than others at transmitting pathogens.

Monitoring - dragging

Ticks such as lone star tick, American dog tick and the blacklegged tick are commonly encountered on school grounds. The Gulf Coast tick is becoming more widespread and abundant in Tennessee and, recently, the invasive longhorned tick was discovered here as well. Monitoring for ticks regularly will help determine which ticks are present on school grounds and the risks posed by their presence.

School grounds can be monitored for the number of ticks and the species present by dragging a 3 feet by 3 feet light-colored corduroy drag cloth on the ground through the environment. Drag cloths can be constructed by assembling thick corduroy cloth onto a wooden pole with a thick string for pulling through vegetation (Figures 4 and 5). Methods for simple drag design, without sewing, are provided by the University of Illinois (medical-entomology. inhs.illinois.edu/files/2021/05/Tuten_INHS-MELtick-dragging-for-partners.pdf). Ticks can be collected from the environment by using their biology, collecting those ticks that are searching (or questing) for a host. Questing is a tick behavior where ticks crawl up vegetation and hold up their first pair of legs waiting for a host to walk by and attach. Ticks will assume the cloth is a moving host and as the cloth brushes past the tick, the tick will attach onto the drag cloth making it easy to collect ticks from the environment. The collector with the drag will need to walk beside the drag cloth as it is



Figure 4. Dragging for ticks with a corduroy drag cloth. (Credit: R. A. Baxter)



Figure 5. Removing nymphal ticks from a corduroy drag with a lint roller. (Credit: R. A. Butler)

pulled through the vegetation so that ticks are more likely to get on the cloth and not the individual. The drag will need to be checked for ticks every 30 feet and both sides of the cloth checked. Collect ticks with forceps and place into vials containing 80 percent ethanol or use a lint roller and place the sheet into a plastic bag (Figure 5). The collector will also have to check themselves for ticks every 30 feet walked to capture encountered ticks and to avoid tick bites.

Individuals will need to pick up the drag cloth to avoid dragging it over thorny brush or branches that could rip the cloth. Ticks will not quest in the rain or on wet



Figure 6. Transects that represent prime tick habitat are outlined in white lines on school grounds. (Credit: R. A. Butler)

vegetation nor soil, so dragging should take place when vegetation is dry. Ticks are more likely to be found in areas frequently visited by wildlife such as forest-field edges, areas with abundant leaf litter, areas near water, forested regions, areas where the canopy shields direct sunlight to the ground and areas with a relative humidity around 60-70 percent (Figure 6). In addition, areas around playgrounds and pockets or islands of forest in field areas where wildlife could be concentrated are prime areas to drag (Figure 6). A video on how to drag for ticks is available at **www.tnticks.org**.

Each tick species has the potential to transmit different pathogens, so it is important to identify the tick. Use the images found in Table 1 to identify the ticks collected. If help is needed, ticks can be brought or mailed to the county Extension office (utextension.tennessee.edu/office-locations-departments-centers/). Ticks can be mailed in an empty plastic container such as a medicine vial. If ethanol was used to preserve a tick, it should be poured off before shipping but keep a cotton ball soaked in ethanol inside the package with the tick to keep it from drying out. If ethanol is not available, freeze the tick in a plastic baggie until it is shipped.

Students should be advised to avoid areas that are found to harbor ticks. If tick numbers are high, these areas may be treated with insecticides and students should still be restricted from accessing this space.

Habitat modification

Ticks are susceptible to harsh environmental conditions and spend most of their lives hiding in leaf litter or under ground cover to avoid desiccation. After feeding on a blood meal, ticks will detach themselves from their host and remain in the environment until their next life stage or until a female lays her eggs. Tick numbers may be reduced in an area by modifying the environment to increase air flow and reduce moisture. Reducing food and habitat for the tick's hosts may also help. Specific actions to reduce the number of ticks in an area frequently visited by students may include:

- Mowing areas around facilities or playgrounds weekly.
- Trimming trees and shrubs to allow additional sunlight to penetrate the canopy and dry the vegetation below.
- Trimming shrubs and other vegetation hanging over walkways.
- Moving play equipment to open sunny areas with well-maintained vegetation.
- Using an artificial shade structure instead of natural shade.
- Replacing wood chips or mulch with gravel to reduce moisture.
- Fencing wooded areas to reduce traffic for wildlife in areas frequented by students.

- Fencing off or strategically placing food for wildlife, such as bird feeders or food plots for deer, so that students do not get close to ticks. Using a gravel path near these sources is ideal.
- Removing or strategically placing fruit-bearing plants (blackberry, persimmon, apple, etc.) around facilities to discourage feeding by potential host animals and keeping vegetation low around these plants.
- Removing invasive shrubs, such as Japanese barberry, honeysuckle and multiflora rose, along forest edges.
- Raking ground material (leaf litter, pine needles, etc.) and moving it to an area not frequently visited by students.
- Regularly removing trash that may attract animals.
- Otherwise managing vegetation to reduce wildlife visits.

Pesticide application

Tick pesticides, referred to as acaricides, can be used to control ticks and decrease the chances of tick bites. Typically, it is unnecessary to apply acaricides to wide expanses of lawn where it is unlikely for ticks to be found. Acaricides should be used strategically in areas that are known tick habitats such as the edges of wooded areas and where ticks are found during tick drags or reported by school personnel. Pyrethroids are examples of

Pests should be managed at schools using integrated pest management, and pesticides should be applied in a manner that targets the pest and reduces exposure information about managing pests at schools, see schoolipm.tennessee.edu.

If a pesticide applicator is charging a fee for their services at schools, they need to be certified by the Tennessee Department of Agriculture (TDA) or working under someone licensed by TDA and have a charter with bond and insurance. Applying pesticides indoors licensee. Applying pesticides outdoors requires category 3 certification and an HLT licensee.

relatively inexpensive acaricides that should be effective when used in the environment and applied by trained personnel. Pesticides should be labelled for the intended school site. It is often difficult to direct the acaricide to where the tick is harboring/hiding so it is important to modify the environment before making an application. It is also suggested for the school's neighbors to use acaricides on companion and livestock animals to reduce tick incidence on school grounds.

Although controlling populations of ticks in the environment can be a considerable task there are changes that an individual can make to decrease the chance of getting a tick bite and obtaining a tick-borne disease. Wearing appropriate clothing and repellent can decrease the chances of being bitten by a tick. Avoiding prime tick habitat can reduce exposure to ticks and proper management of the environment can help decrease their numbers in areas that are frequently visited by individuals around school grounds. Finally, applying acaricides to areas where ticks are found in combination with the methods above should further reduce tick numbers.

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ADDITIONAL RESOURCES

al	See the Center for Disease Control and Prevention at cdc.org for more information about ticks and tick-borne diseases and Tick Encounter Resource Center at web.uri.edu/tickencounter for help with tick identifications.
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	Follow Tennessee Ticks (#tnticks) at www.tnticks.org for updates on tick research in Tennessee. A searchable database of Tennessee tick-borne illness occurrences can be accessed at www.tn.gov/health/cedep/reportable- diseases/ehrlichiosis.html.
1. 7:	For information on managing pests in schools, see schoolipm.tennessee.edu .
	Check the UT Extension publication page, extension.tennessee.edu/publications/ Pages/default.aspx , for updated versions of this printed publication.

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