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Insec(tc)ure*:
Are you insecure about your insect cures?

A UT Urban IPM Lab Newsletter for the Pest Management Industry

An Unusual Infestation of Millipedes

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Figure 1. A rural Tennessee school surrounded by forest on three and a half sides. To the east is a septic drain field and parking lot.

Figure 2. The millipedes found at this school were Oxidus gracilis *(C. Koch), a common invasive species.*

A facility director from a rural Tennessee school district contacted us about a millipede issue. He described millipedes entering the school in large numbers. I told him pesticides could help, but getting control would depend on removing the moisture surrounding the school and sealing entry points. Well, little did I know what this would entail.

Let me give you a tour of what we encountered during a site visit. The school was surrounded by forest on three and a half sides. On the northeast side was a septic drain field, and to the east, a parking lot (Figure 1). Tree leaves and needles in these forests could retain moisture on the ground and provide a source of decaying organic matter for these arthropods to feed. So right away, we were concerned.

We started walking around the school's perimeter on our way to the gym in the northeast corner. It didn't take long for us to encounter the first of many *Oxidus gracilis* (C. L. Kock), commonly called a garden, greenhouse, hothouse or short-flange millipede (Figure 2). We saw millipedes just about everywhere we looked. Occasionally we would stop to take a photo (Figure 3).

Figure 3. Dead millipedes from insecticide applications to the exterior perimeter.

Figure 4. Living and dead millipedes scattered across the interior of a classroom.

We reached the gym to find it being used, but still found many millipedes scattered about. Figure 4 shows an example of these pests scattered over a classroom floor.

Figure 5. Chalk art drew us to this section, but it wasn't the main attraction.

Figure 6. A tremendous number of millipedes were found in this corner close to the downspout.

The more we explored, the more we discovered this place was a paradise for millipedes. As we continued our inspection, we saw chalk on the sidewalk and set out to observe the artwork (Figure 5). However, we very quickly noted the art was not our main attraction; a tremendous number of millipedes were enjoying the art too (Figure 6).

Figure 7. Condensation from the AC unit is led to the drain.

Figure 8. Upon closer inspection, millipedes were also abundant here.

Figure 9. The drainage system runs through the grass on the north side of the school and before the red shale bank.

Figure 10. Peaking between the drain slats we noticed a clump of living millipedes.

Moisture sources were abundant at this school. Drain pipes ran through the area behind the school. That is, between the school and a steep red shale bank. Condensation from the AC unit emptied into a drain (Figure 7) and sure enough, millipedes were enjoying this area too (Figure 8). Observation through a drain covering in the grass (Figure 9) yielded the same result of numerous millipedes, but this time they were alive (Figure 10).

Figure 11. Moss growing on the exterior of the building was probably due to a prior drainage system or damaged roof.

We were impressed with the downspouts and the drainage system at this school. We typically find downspouts stopping before ground level and leaving draining water to create giant puddles below, concerning us about mosquito larvae living in the puddle, or springtails, millipedes, and pillbugs feeding on the moist, decaying matter that follows. However, these downspouts were in reasonably good shape and appeared to lead neatly into an underground drainage system. Moss growing on the side of this building (Figure 11) indicates moisture problems above. The millipedes were abundant here too (Figure 12).

Figure 12. Millipedes were abundant at the base of this downspout too.

As we made our way around the school, we noticed a few more areas possibly conducive to millipedes. Northwest of the school, I'm uncertain if it's on their property or not, we noted a small wet area (Figure 13). Sure enough, we lifted a board sitting on the ground (Figure 14), and found an abundance of thriving millipedes (Figure 15). But the story doesn't end there.

Figure 13. A small wet area on the northwest corner of the school.

Figure 14. A board sitting on the ground in the wet area.

Figure 15. An abundance of millipedes living under the board in Figure 14.

If you look at the image in Figure 1, note the bare area on the north side of the school. That's a steep bank of red shale (Figure 16). The many cracks and crevices in this bank could provide harborage for millipedes. Poking around in a shady part of this bank led us to a scorpion, probably *Vaejovis carolinianus* (Beauvois), the southern unstriped scorpion also called the southern sun devil. We brought it and some of the rocks and soil, along with a few millipedes, back to the lab to observe interactions between the two. We were surprised that our scorpion was a female - the young we later found on her back led us to this discovery (Figure 17).

Figure 16. A steep red shale bank with many cracks and crevices for millipedes to hide, runs the entire north side of the school about 20 - 40 feet from the building.

We had envisioned the scorpion acting as a potential biocontrol agent, but our dreams were dashed. It did not appear that millipedes were on her dinner menu. Look closely at Figure 17 and you'll note that a millipede rests near a joint just before the scorpion's pedipalps or pinchers.

So now that you see this is a paradise for millipedes, what can we do to prevent millipedes from entering the structure when reducing moisture in the environment and removing food sources (decaying vegetation) and harborage is nearly impossible? As I look through the long list of management options in W357 Occasional invaders: Millipedes, improving pest-proofing could be helpful. Doors have gaps and lack sweep brushes (Figure 18), so this could be remedied. But unfortunately, each exterior room has a vent that will be difficult to seal well enough to prevent millipede entry and still allow air flow (Figure 19). Sealing doors and windows will be helpful, but will the millipedes just walk through the vent? The moisture problem allowing moss to grow on the wall could be repaired. Perimeter treatment of quick-acting pesticides such as pyrethroids kill these pests, but often the pests enter the living space before dying and still need to be swept or

vacuumed, whether dead or alive. I can't find a good solution for this situation, but I'm open to any suggestions. Anyone wanting to sponsor a research study, please contact me.

Figure 17. The southern sun devil with young on her back. Note that a millipede rests in the joint just before her pedipalps or pinchers (arrow) leading us to believe that scorpions do not prey on millipedes.

Figure 18. Damaged door sweeps and gaps between doors. Brush sweeps and astragal (brush between the doors) would seal the doors better.

Figure 19. Each exterior room has a vent that would be difficult to screen, allow air flow and keep millipedes out.

For more details on managing millipedes, see

Phillips, G, R.J. Pivar, K. Vail and R. M. Shelley. 2016. W357 Occasional invaders: Millipedes. UT Extension https://extension.tennessee.edu/publications/Documents/w357.pdf

Vail, K. 2013. Moisture-loving millipedes. Pests and Pesticides in Child-serving Facilities: An IPM Newsletter, 6(7): 3-4. https://schoolipm.tennessee.edu/wp-content/uploads/sites/207/2020/12/07-July_2013.pdf

The ACE Prep Course is a great opportunity to learn more about urban pests, whether you're taking the ACE exam or not.

ACE (Associate Certified Entomologist) Prep Course

Fall 2023

Are you certified in pesticide applicator category 7 with a minimum of 5 years of verifiable pest management experience in the United States? Then you may be ready to become an ACE, an associate certified entomologist. Before you can become an ACE, you will need to provide two letters of professional reference, be willing to adhere to the ACE Code of Ethics, complete the application and pay the application fee to the Entomological Society of America and pass an online test of your knowledge of structural pest control. The program and its benefits are explained in its entirety at https://entocert.org/ace. The application process is separate from the training offered below.

To help you prepare for the exam, Dr. Karen Vail, Extension Urban Entomologist of the UT Department of Entomology & Plant Pathology will provide an ACE Prep Course this fall. All training sessions will be virtual and held 5 – 6 pm on select Mondays via Zoom. A new Zoom link will be sent each week. By offering online training, we no longer limit participants to be within a few hours' drive of campus!

2023 Training Date	Subject
September 11	Integrated Pest Management and Tools
September 18	Insecticides and Modes of Actions
September 25	Pesticide Safety, Laws & Labels
October 2	Insect Biology and Morphology
October 9	Ants
October 16	Cockroaches
October 23	Flies
October 30	Stinging and Biting Arthropods
November 13	Stored Products Pests
November 20	Occasional Invaders
November 27	Wood-destroying Organisms
December 4	Common Commensal Pests/Review
December 10	Specimen review in the afternoon
December 11* 5 pm – 8 pm	**Exam (limited to 15)***

*The ACE exam will be given in room 243 Computer Lab of the Brehm Animal Science Building.

You can register for all classes of the ACE Prep Course at one time for a discounted price of $300 or pay $30 for each class as long as you register at least one week before the training date. Enrollment is limited to 25 per training date. One Tennessee recertification point per session. The course will only be held if at least 5 register before August 31st.

Register for the UT ACE Prep Course online at
https://tiny.utk.edu/ACEPrepFall2023

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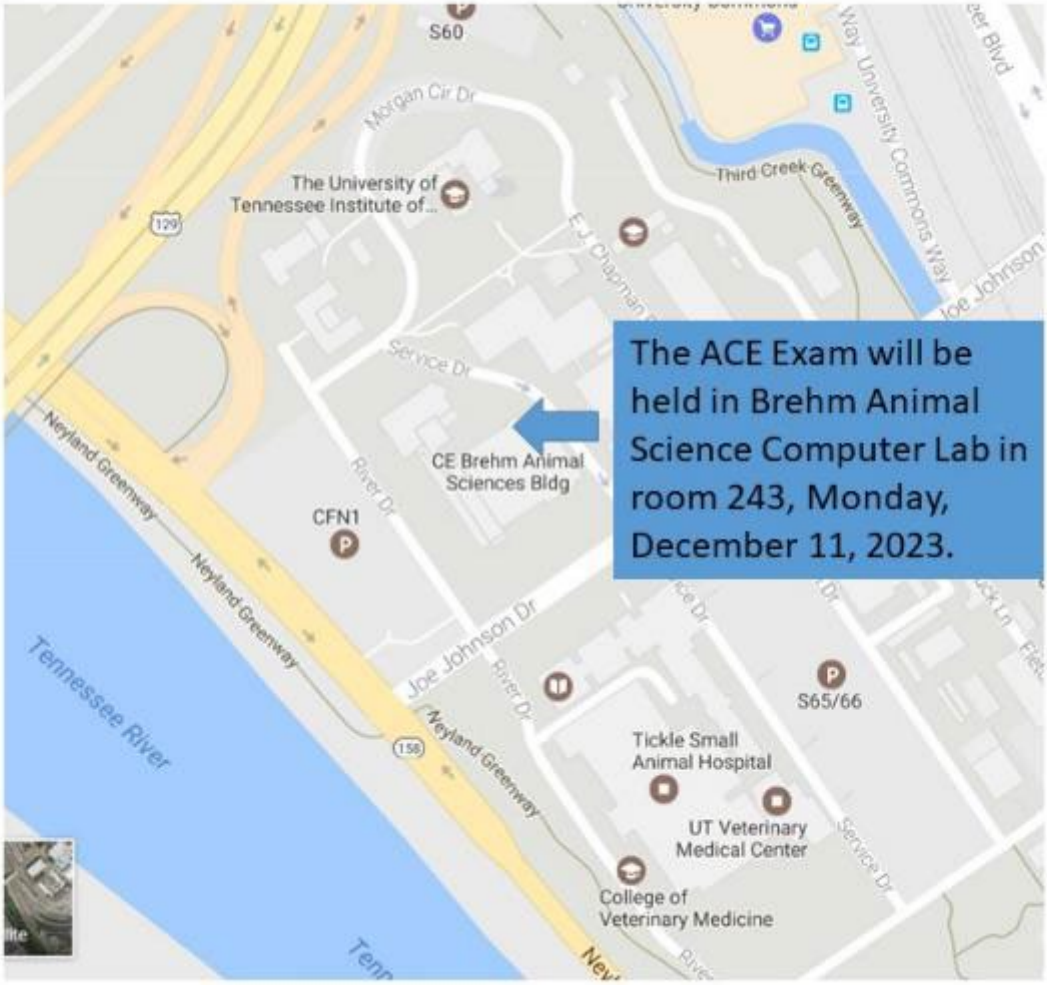
ACE Exam Location - UT Institute of Ag Campus Map



As long as it's after 5pm, you can park in lot CFN1.

We suggest you purchase the *IPM for the Urban Professional: A Study Guide for the Associate Certified Entomologist* from ESA (https://entocert.org/ace/resources) and the *NPMA Field Guide to Structural Pests* (https://ebiz6personal.npmapestworld.org/UI/ProductDetails.html?productId=703) prior to taking the training. The NPMA manual is also available as a downloadable phone app (available for Apple iOS or Google) and comes with an annual fee. The ESA study guide is discounted when you purchase it with your ACE application. In the past, shipping of the manuals has been greatly delayed, so order the manuals as soon as you sign up for the class!

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Precautionary Statement

To protect people and the environment, pesticides should be used safely. This is everyone's responsibility, especially the user. Read and follow label directions carefully before you buy, mix, apply, store or dispose of a pesticide. According to laws regulating pesticides, they must be used only as directed by the label and registered for use in your state.

Disclaimer

This publication contains pesticide recommendations that are subject to change at any time. The recommendations in this publication are provided only as a guide. It is always the pesticide applicator's responsibility, by law, to read and follow all current label directions for the specific pesticide being used. The label always takes precedence over the recommendations found in this publication.

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