

# PESTICIDE REPORTS

Division of Agricultural Sciences and Natural Resources • Oklahoma State University  
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CHEM

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## APPLICATOR CATEGORIES RE-CERTIFYING IN 2024

A new year brings new categories up for re-certification. Categories that renew in 2024 are 3a Ornamental & Turf, 3b Interiorscape, 3c Nursery/Greenhouse, 6 Right of Way and 7a General Pest.

The total amount of CEUs for each category required to complete on a full 5-year cycle are listed below. These have to be completed by December 31, 2024.

Category	CEUs needed
3a	20
3b	10
3c	15
6	15
7a	20

<https://extension.okstate.edu/programs/pesticide-safety-education/pesticide-applicator-certification-categories/> (OSU PSEP January 5, 2024)

## EPA UPDATE ON NEXT STEPS FOR CHLORPYRIFOS

In light of the November 2, 2023, Eighth Circuit Court of Appeals' decision to vacate the U.S. Environmental Protection Agency's (EPA) 2021 final rule effectively prohibiting the use of the pesticide chlorpyrifos on food or feed crops, EPA is issuing an update on its intended next steps.

### Background

In April 2021, the Ninth Circuit Court of Appeals ordered EPA to issue a final rule in response to a 2007 petition filed by the Pesticide Action Network North America and the Natural Resources Defense Council. The Ninth Circuit ordered EPA to issue—within 60 days—a that final rule addressing the use of chlorpyrifos in food or feed crops, without taking public comment or engaging in “further fact-finding.”

Accordingly, given the deadline and instruction provided by the Ninth Circuit, on August 30, 2021, EPA issued a [final rule](#) revoking all chlorpyrifos tolerances (tolerances are federal rules that allow for a maximum level of pesticide residues on food). The revocation of those tolerances meant that any food or animal feed treated with chlorpyrifos after February 28, 2022 (the date the tolerances expired) could be considered adulterated and thus could not be distributed in interstate commerce.

That tolerance revocation rule was challenged by a chlorpyrifos registrant and several grower groups in the Eighth Circuit. On November 2, 2023, the Eighth Circuit [issued a ruling](#) vacating EPA's final rule and remanding the matter to EPA for further proceedings. The ruling did not include a timeframe or specific instructions for EPA to take a final action on the use of chlorpyrifos in food or feed crops without public comment.

### Next Steps

Upon issuance of the Eighth Circuit's mandate (which has not occurred as of the date of this update), all chlorpyrifos tolerances would automatically be in effect

once again. In conformance with the Eighth Circuit's ruling and after issuance of the mandate, EPA intends to issue a notice correcting the Code of Federal Regulations to reflect the court's reinstatement of chlorpyrifos tolerances.

The Eighth Circuit's decision stated that EPA should have considered modification of tolerances in addition to complete revocation and noted that the Agency had “identified 11 specific candidates” of food and feed crop uses whose tolerances could be so modified in a Preliminary Interim Decision EPA issued in 2020. Consequently, the Agency expects to expeditiously propose a new rule to revoke the tolerances associated with all but the 11 uses referenced by the court. These uses may be found in the [December 2020 Chlorpyrifos Proposed Interim Decision](#). Prior to the 2021 tolerance revocation, these uses represented about 55% of the total chlorpyrifos usage (average pounds applied) on agricultural commodities between 2014-2018.

EPA is also engaged in discussions with the registrants to further reduce exposures associated with the 11 uses of chlorpyrifos that were referenced by the Eighth Circuit, a process that will also include taking into account the 2020 draft document and public comments received thereto. This approach would allow use on alfalfa, apple, asparagus, cherry (tart), citrus, cotton, peach, soybean, strawberry, sugar beet, wheat (spring), and wheat (winter) with potential additional restrictions for geographic location, rate of application, farmworker and other vulnerable populations, and vulnerable species and their habitats that may be needed to address safety of the tolerances.

In addition, chlorpyrifos is currently under registration review and the Agency continues to work to implement the National Marine Fisheries Service's [2022 Biological Opinion](#) on chlorpyrifos, diazinon, and malathion. EPA will continue to work to protect farmworkers, endangered species and their habitats, and the nation's most vulnerable populations (including children) through its ongoing registration review and Endangered Species Act processes for chlorpyrifos uses.

At this time, final cancellation orders, including their terms for existing stocks of products subject to those

cancelation orders and related return programs for chlorpyrifos products, remain in place, unless and until amended by EPA.

EPA will continue to keep the public updated as it evaluates and takes any actions related to chlorpyrifos pesticide use.

Find more information about chlorpyrifos on the [EPA website](#).

(EPA, December 19, 2023)  
<https://www.epa.gov/pesticides/epa-update-next-steps-chlorpyrifos>

## **EPA RELEASES DRAFT BIOLOGICAL EVALUATION OF 11 RODENTICIDES' EFFECTS ON ENDANGERED SPECIES**

The U.S. Environmental Protection Agency (EPA) is releasing a draft Biological Evaluation (BE) that includes EPA's draft effects determinations for federally listed and proposed threatened and endangered ("listed") species and critical habitats for 11 rodenticide active ingredients. The draft BE (once finalized) will serve as the Agency's Rodenticide Strategy as outlined in EPA's Endangered Species Act Workplan to guide how the Agency addresses mitigation for rodenticides going forward and will be available for public comment for 60 days.

Each year, rodents cause significant damage to property, crops, and food supplies across the United States. They may also spread diseases, posing a serious risk to public health. Rodenticides are used in residential, agricultural, and non-agricultural settings to control a variety of pests including house mice, Norway rats, roof rats, moles, voles, pocket gophers, prairie dogs, ground squirrels, feral hogs, and mongooses.

The 11 rodenticides evaluated in the draft BE are:

- chlorphacinone,

- diphacinone and its sodium salt,
- warfarin and its sodium salt,
- brodifacoum,
- bromadiolone,
- difenacoum,
- difethialone,
- bromethalin,
- cholecalciferol,
- strychnine, and zinc phosphide.

EPA released a draft human health and ecological risk assessment on these rodenticides in 2020, which was followed by a public comment period during which EPA received valuable feedback. In November 2022, EPA proposed measures for multiple rodenticides—including the requirements of tamper-resistant bait boxes and rodent carcass collection—based on the assessment that addressed protections for specific listed species and critical habitat as part of a pilot program, and has received valuable feedback on those measures as well.

In the draft BE released today, EPA evaluated these rodenticides to determine whether they may affect any listed species or their critical habitats. These evaluations include all listed species and critical habitats as well as all registered uses and currently approved product labels for pesticide products containing these chemicals. The draft BE also identifies species that could potentially be jeopardized and be subject to incidental take.

Based on the findings in this draft BE, EPA determined some changes were needed including adding new measures not in the pilot (i.e., prohibiting application directly to water) and modifying measures (i.e., no longer prohibiting application in areas adjacent to species range or critical habitat because drift is not anticipated). EPA built upon the previous mitigation proposals from the 2022 proposed measures and pilot program to develop a list of mitigation options to be considered in this draft BE and will include a definitive list of measures upon finalizing the BE, which will serve as the Rodenticide Strategy. The finalized materials will help EPA meet its obligations under the Endangered Species Act (ESA).

As part of this analysis, EPA evaluated the effects of the 11 rodenticides on 1,784 listed species and 904

designated critical habitats in the United States and its territories. EPA determined that these rodenticides:

- will cause no effect (NE) on 1,576 listed species (88%) and 857 critical habitats (95%).
- are not likely to adversely affect (NLAA) 72-199 listed species (4%-11%, depending on the chemical and application type) and 9 critical habitats (1%).
- are likely to adversely affect (LAA) 9-136 listed species (1%-8%, depending on the chemical and application type) and 38 critical habitats (4%).

The “likely to adversely affect” (LAA) determination means that EPA reasonably expects that at least one individual animal or plant, among a variety of listed species, may be exposed to the pesticide at a sufficient level to have an adverse effect. The likely “take,” which includes unintentional harm or death, of even one individual of a species, is enough to trigger an LAA determination. As a result, there are often a high number of LAA determinations in a BE. An LAA determination, however, does not necessarily mean that a pesticide is putting a species in jeopardy.

For those species and critical habitats where EPA made an LAA determination, EPA also included its prediction of the potential likelihood of future jeopardy (J) for a listed or proposed species, or adverse modification (AM) of any designated or proposed critical habitat (collectively abbreviated as J/AM). EPA predicts that currently labeled uses of the 11 rodenticides may lead to the potential likelihood of future jeopardy of less than 5% of listed species and the potential likelihood of future adverse modification of less than 1% of the critical habitats. While EPA is not required to include J/AM predictions or draft mitigation measures in its effects determinations, EPA is including this analysis to help expedite the consultation process with the U.S. Fish & Wildlife Service and the National Marine Fisheries Service (the “Services”). The Services are responsible for making the J/AM findings contained in any biological opinion.

This draft BE will be open for public comment for 60 days on [www.regulations.gov](http://www.regulations.gov) at docket ID [EPA-HQ-OPP-2023-0567](https://www.regulations.gov/document/EPA-HQ-OPP-2023-0567). After considering the public comments received on the draft BE, EPA will make appropriate

changes to the assessment and revisions to the mitigation measures, issue a final BE, and initiate formal consultation, as appropriate, with the Services. During formal consultation, the Services use EPA’s effects determinations to inform their biological opinions, which would include the final determinations of whether a pesticide jeopardizes listed species and/or adversely modifies critical habitats.

Learn more about EPA’s plans to meet its ESA obligations on the [EPA website](https://www.epa.gov/pesticides/epa-releases-draft-biological-evaluation-11-rodenticides-effects-endangered-species).

(EPA, December 1, 2023)

<https://www.epa.gov/pesticides/epa-releases-draft-biological-evaluation-11-rodenticides-effects-endangered-species>

## **DRONES CITED AS FUTURE FOR AERIAL APPLICATION**

Matthew Ashcroft has seen the future.

“This is it; this is the future,” says Ashcroft, who refers to himself as a crop duster transitioning to unmanned aerial vehicles in the near future.

Ashcroft, owner of [Aerial Ag Services](https://www.aerialag.com), Hill County, Texas, discussed UAV technology during the opening session of the [Texas Plant Protection Association](https://www.texasplantprotection.org)’s 35<sup>th</sup> annual conference Dec. 5 in Bryan.

“I started last year with a drone manufactured in China,” he said. That unit ended up in the dustbin following an unfortunate encounter with a guy wire supporting a cell tower. He plans to replace that one with a Hylion drone, manufactured in Texas. “I want to deal with a company that provides service and will communicate with me in English,” he said.

Last year’s experience offered insights into advantages and limitations that drones bring to aerial applications.

Ashcroft said drones improve application safety since unmanned vehicles do not put a pilot in jeopardy.

Other drone advantages include:

- Impervious to adverse soil conditions
- No soil compaction
- They are quiet and remain in the field. “No complaints about flyovers.”
- Less expensive than aircraft and large ground spray rigs
- Improved spray accuracy. “Practically no overspray or streaks.”

### **Precision application**

Ashcroft said drones currently provide precision spraying with herbicides, fungicides, and insecticides, and can operate in congested areas.

They also offer field management services such as crop monitoring, soil assessments, evaluating irrigation and drainage, crop protection, and surveying.

He concedes that drone use comes with a few limitations. “We have short flight times because of battery capacity, and hoppers are relatively small.”

He said a critical limitation is line of sight requirements. Drone operators must maintain line of sight, according to FAA restrictions. “And obstacle avoidance systems have much room for improvement.” He said the crash that doomed the drone last year could have been averted with a better obstacle avoidance system.

Ashcroft said drone operators must be certified by FAA to operate drones as agricultural aircraft under part 107 Drone Pilot Certification. He says the process is not hard. “Operators also must have a state pesticide applicator’s license.”

### **Improvements needed**

Ashcroft anticipates improvements and enhanced capabilities. He said range and capacity will expand. He also expects the line of sight restrictions to be removed and referred to military use where drones are controlled

from thousands of miles away. Obstacle avoidance will be better, too, he said.

Ashcroft said artificial intelligence will play an important role in improving UAV capabilities, especially for spot applications.

“Things change,” Ashcroft said. “I was 46 years old before I got a cell phone. My son grew up with them and my dad is skeptical of this technology.”

Arthur Ericson, CEO of Hyllo, Inc., Houston, said UAV application provides a safer option compared to spraying by hand. Using a backpack sprayer, he said, results in “prolonged, direct contact with chemicals and poses health risks to operators. It’s also very slow and human error may lead to imprecise treatments.”

Ericson added that a “rapidly decreasing labor force,” is another concern with manual applications.

He said drones are more capable of spot treatments than ground-based machinery, which is also expensive to purchase and operate. Those rigs also may damage crops, cause soil compaction and are less useful as the crops mature.

He said aircraft applications also have limitations on spot treatments and come with high capital and maintenance costs. Pesticide drift can be an issue.

Ericson echoed Ashcroft’s concern about pilot safety. “We also have a diminishing supply of pilots.”

### **Enhancements coming**

He listed key technological advantages he anticipates.

Improved battery technology will include lighter, more powerful batteries that extend the range and load capacity.

He said flight stability and control, including gyroscopic stabilizers, will enhance control and allow for mapping and data collection.

Other advances include autonomous navigation, real-time data transmission, and integration with agricultural software.

Ericson said drones will allow operators to reduce spray drift, improve canopy penetration, and provide precision application.

“Quick deployment also “allows farmers to respond rapidly to changing weather conditions, pest outbreaks and other urgent needs,” Ericson said.

“Cost efficiency is an advantage,” he added. “Both the initial investment and the operational costs of drones are typically significantly lower than for traditional methods.”

He agrees with Ashcroft that advanced technology is coming and will include artificial intelligence, increased payload, improved energy sources, more process automation, and advanced sensing technologies.

(FarmProgress, December 8, 2023)  
<https://www.farmprogress.com/technology/drones-cited-as-future-for-aerial-application>

## **ENLIST RESTRICTIONS EASED IN 10 STATES**

Farmers in 10 states where the use of Enlist One and Enlist Duo herbicides had been restricted will have access to the products for the upcoming season.

The final biological opinion (BiOp) from the U.S. Fish and Wildlife Service (USFWS) determined that the registration of Enlist products is not likely to jeopardize the continued existence of endangered or threatened species or adversely modify their critical habitat.

The U.S. Environmental Protection Agency (EPA) announced Friday, Dec. 1, that it had posted the USFWS's final BiOp to the docket. The document outlines the removal of all countywide prohibitions for Enlist products in Arizona, Colorado, Louisiana, New

York, Pennsylvania and South Carolina. It also establishes subcounty-level restrictions for counties in Alabama (1), Georgia (11), Tennessee (1) and Texas (16). In Florida, previous restrictions remain in place in 22 counties for both Enlist One and Enlist Duo, with restrictions on Enlist Duo only in two other counties.

### **OPINION CONSIDERATION**

In its BiOp, USFWS considered 22 threatened or endangered species -- from the Attwater's greater prairie chicken and dusky gopher frog to Virginia sneezeweed and the Panama City crayfish -- and analyzed if the registration of Enlist herbicides would jeopardize the continued existence of any of the species.

"While we expect that a number of individuals of some species will experience mortality or sublethal effects (i.e., reduction in growth), or indirect effects, which will result in reduced fitness, reproduction and dispersal for some individuals and populations, we do not expect these effects will appreciably reduce the likelihood of survival and recovery of these species in [the] wild," the USFWS wrote in its conclusion. "Thus, it is the Service's biological opinion that the registration of Enlist One and Enlist Duo, as proposed, is not likely to jeopardize the continued existence of endangered or threatened species."

In January 2022, the EPA initially granted seven-year registrations and labels for both Enlist Duo and Enlist One. Each contains the active ingredient 2,4-D choline and is intended for post-emergent application over genetically modified corn, cotton and soybeans.

The labels were among the first to include mitigation measures intended to protect federally threatened and endangered species. This "pick list" included off-field conservation buffers, such as vegetative filter strips, grassed waterways and field borders intended to reduce runoff and erosion. Also included were on-field conservation practices, such as reduced tillage in the form of no-till and strip-till, as well as planting cover crops.

These general mitigation measures remain in effect for all applications of Enlist One and Enlist Duo. In its analysis of the 22 species included in the final BiOp,

USFWS concluded that only two -- the Attwater's greater prairie chicken and the Spring Creek bladderpod -- required species-specific mitigations to provide necessary protection. When considering the species' designated critical habitats, it was determined that a species-specific mitigation was necessary to protect the whorled sunflower critical habitat.

## REACTION TO FINAL OPINION

In a press release, Corteva Agriscience stated that the company anticipates expanded farmer access to Enlist herbicides for the 2024 growing season following the release of the USFWS's final BiOp.

"The issuance of the final BiOp supports the EPA's review and the removal of countywide restrictions, ultimately providing more farmers with certainty and access to effective, and more sustainable, weed-control options," said Robert King, Corteva executive vice president for crop protection, in the release, which reminded applicators that they should continue to abide by current product labels until supplemental labels are issued.

Soybean farmers who have rapidly adopted Enlist E3 soybeans as a means of combatting herbicide-resistant weeds also applauded news of the USFWS's final BiOp.

"The Fish and Wildlife Service's final Biological Opinion on Enlist confirms what we strongly suspected all along -- that Enlist can be used safely and in a manner that does not risk jeopardizing endangered species," said Alan Meadows, American Soybean Association director and soybean grower from Halls, Tennessee, in a statement to DTN. "The thoughtful, reasoned approach the agencies took to reach these conclusions should greatly reassure wildlife advocates, farmers, and in fact, all of us, that these important tools can be used safely and sustainably to support American agriculture. We look forward to working with EPA to incorporate these findings into the registrations for Enlist One and Enlist Duo in the months to come."

In an email to DTN, Brett Hartl, government affairs director at the Center for Biological Diversity, said that his organization was satisfied that USFWS "finally finished the BiOp and will help ensure that the EPA is

doing what needs to be done to protect endangered species." He noted that the measures seem generally protective.

"The whole point of the BiOp is to ensure there is a monitoring and reporting regime that allows us to gauge the efficacy of the protections," Hartl wrote. "We think having an adaptable and responsive approach that allows for modest changes if they turn out to be needed will be best."

He added that when pesticide use limitation areas (PULAs) are created to protect a specific endangered species or its designated critical habitat, those areas should be targeted and below county level whenever possible "so that the areas that are vital to endangered species are fully protected, but areas that are not proximate to those lands are not encumbered.

"This is a work in progress," Hartl continued. "We should not expect the maps of PULAs to be perfect everywhere, but the more targeted, the better."

## LAST STEP IN PROCESS

The issuance of the final biological opinion is the last step in EPA's formal consultation process with USFWS. In its announcement of the final BiOp for Enlist pesticide products, EPA stated that the agency will work with the registrant to implement the biological opinion. EPA intends to have label revisions approved in advance of the next growing season. Pesticide users should visit EPA's Bulletins Live! Two (BLT) website to determine if specific mitigation measures are required within the geographic area where they intend to apply Enlist herbicides.

(Progressive Farmer, December 4, 2023)

<https://www.dtnpf.com/agriculture/web/ag/crops/article/2023/12/04/usfws-concludes-enlist-herbicides>

# RESEARCH SHOWS COMPLEX STRUCTURAL, PHYSIOLOGICAL CHANGES IN COCKROACHES

Biologists at the University of Cincinnati (UC) were part of an international team examining the complex structural and physiological changes that take place in Hawaii's beetle-mimic cockroaches, which give birth to live young. Researchers included multiple students from UC, including contributions from graduate students Emily Jennings and Ezemuoka Chiamaka and undergraduate Ronja Frigidar.

"It's not just immunology," co-author and UC College of Arts and Sciences Professor Joshua Benoit said.

Biologists see similar changes in the insect's trachea, its immune system and the outer layer of its exoskeleton called a cuticle, which transforms to make room for the babies.

The study was published in [the journal iScience](#).

Cockroach mothers not only incubate their babies until they are the equivalent size of a 2-year-old human toddler, but they also feed them a milk-like nutrient they produce through secretory glands.

Nature has devised a myriad of reproductive strategies across the animal kingdom, said Bertrand Fouks, a postdoctoral fellow at the University of Muenster and the study's lead author. From birds and reptiles to fish, lots of animals lay eggs. In mammals, egg laying is limited to echidnas, sometimes known as spiny anteaters, and the platypus.

"The beetle-mimic cockroach is one of the rare insects which has developed a complex structure to host the growing embryo similar to placenta in mammals, which made it a perfect model to investigate the evolution of live-birth," Fouks said.

For the study, researchers sequenced the genome of the Pacific beetle-mimic cockroach, just the third species of cockroach studied in this way, Fouks said.

"This is really a low number of cockroach species with their genome sequenced, considering their high diversity," he said.

While many people are familiar with German cockroaches and a handful of other species that are universal symbols of squalor in the United States, Fouks said these pests represent a tiny fraction of the 4,500 species found globally.

"Cockroaches are not restricted to the pest species that most people know. They can be really colorful, come in various shapes and live in different ecosystems," he said. "The high diversity of cockroaches makes them a perfect system to study the evolution of their traits."

Baby roaches have big advantages compared to those that hatch from eggs, Benoit said. Tinier babies that hatch from eggs are exposed to the elements where they're vulnerable to far more parasites and predators and must immediately find food on their own.

"The class of predators really narrows when you give birth to live young," Benoit said.

But live births require a far bigger parental commitment.

"It's a pretty big investment. They can produce 10 juveniles per reproductive cycle compared to 70 to 150 eggs for other roaches," Benoit said. "So their strategy is to produce fewer higher-quality individuals compared to more individuals with less investment."

Researchers found that the biological changes that allow beetle mimic cockroaches to give birth to live young are similar to those found in aphids and tsetse flies, demonstrating convergent evolution, Benoit said.

Whether it's a cow, a lizard or a roach, all undergo remarkably similar urinary and genital organ remodeling, enhanced heart development and altered immunity to accommodate their growing babies, the study found.

Researchers are interested in the link between our immune system and pregnancy. Women are less susceptible to infectious diseases but are far more likely than men to have autoimmune disorders such as lupus.



Benoit said some genes dealing with the immune system are down-regulated (the process of reducing or suppressing a response to a stimulus) during pregnancy. That can explain why some women who suffer from autoimmune disorders might see symptoms go away during pregnancy.

Benoit said they see similar effects in the cockroaches.

“These changes may facilitate structural and physiological changes to accommodate developing young and protect them from the mother’s immune system,” he said. (PCT, December 27, 2023)

<https://www.pctonline.com/news/research-shows-complex-structural-physiological-changes-in-cockroaches/>

## **UF/IFAS RESEARCHERS PROVIDE REMINDERS TO PREVENT BED BUG HITCHHIKERS**

With recent media exposure of bed bug activity impacting travelers worldwide, the public perception of this species tends to draw some concerns over its potential for harming humans and pets.

University of Florida experts at the Institute of Food and Agricultural Sciences (UF/IFAS) weigh in with science-based research on recognizing the species, their impacts on humans and pets and how to keep them from hitchhiking home with you after traveling.

“Bed bugs are blood-sucking insects, well adapted to life indoors, especially within homes and apartments. Blood is their only food, and they can extract it from several animals, including those we usually keep as pets,” said Roberto Pereira, a UF/IFAS urban entomologist who conducts research and extension programs on the biology and control of ants, cockroaches, bed bugs and other insects that live in and around human structures.

The resurgence of the bed bug is also linked to a recent change in pest management programs for other insects, particularly the use of insect baits and growth regulators instead of sprays.

They populate very quickly, making it difficult to identify and control, said Pereira, because one female can produce 200 to 500 eggs in her lifetime, laying from 10 to 50 eggs at a time. Also, bed bugs live through five stages, starting from a tiny egg, measuring about 1 mm in length, until they hatch as nymphs measuring about 1.5 mm.

“The key to bed bug prevention and management is vigilance and recognizing all stages of the bed bug,” said Faith Oi, a world-renowned UF/IFAS urban entomologist and the director of UF/IFAS Pest Management University based out of Apopka at the UF/IFAS Mid-Florida Research and Education Center. “While adults can be as large as 3/16 of an inch, nymphs can be as small as a pen tip. Their appearance changes depending on whether they recently fed or not.”

Bed bugs appear flat and yellowish before they bite a host and consume a blood meal, then become engorged and transform into a deep red color after feeding.

Bed bugs do not transmit diseases, but they can cause a lot of discomfort because of the itching that results from the bites, said Pereira.

“If the infestation is extreme, and a person is exposed to bed bug bites for a long period of time, that person may develop anemia and symptoms of low blood volume, known as hypovolemia,” he said. “This can lead to other complications, including heart problems that can be dangerous. Fortunately, this occurs very rarely.”

### **How to keep bed bugs out of your home after travel.**

Bed bugs enter homes when we bring them in on items such as luggage, furniture, books, computers, even in the waffled bottom of sneakers. They can travel on trains, planes and automobiles.

To keep bed bugs from joining travels, Oi and Pereira offer consumers these tips:

- When entering a place you may stay overnight, spend a few minutes inspecting surrounding areas for signs of bed bugs.
- Protect your belongings by not keeping them on carpeted areas or sofas for extended periods of time. Before leaving, inspect your belongings.
- When purchasing a used item or product like luggage, pillows or furniture, check seams, folds and crevices. Use a lint roller to pull up anything suspicious.
- After visiting places, check your person, purse and luggage before bringing these into the house.
- Clothing and some other items can be placed in a dryer in the highest heat possible for 20 to 30 minutes to eliminate any potential hitchhikers.

### **Myths and misconceptions when bed bugs emerge.**

Some myths and incorrect perceptions make it into some people’s conversations and on social media about bed bugs and how to treat them. Oi and Pereira summarize what research has discovered, should you cross paths with the critters.

**Foggers are generally ineffective.** Bed bugs are significantly resistant to the active ingredients in most insecticide fogging products. Foggers are not the same as fumigants. Fumigants are gasses that can penetrate surfaces. Fog will not penetrate surfaces, so unless the fog directly settles on the bed bug, it will not be exposed or impacted.

**Do I have to throw out my mattress?** This measure is not necessary. There are several effective mattress encasements that can protect you against bed bugs once you have treated for bed bugs. Make sure the encasement’s zipper is tight enough to keep any future nymphs from entering or escaping. Make sure the encasement fabric is sturdy enough to keep from tearing with repeated use.

**Don’t panic.** If you discover just one adult bed bug, simply crush it and discard, but be on the alert for others. An introduction is one adult bed bug. An infestation means you’ve found more than one and in various stages of the life cycle, including eggs, nymphs and adults.

**Simplify your living environment.** Keeping a clutter-free home helps in bed bug management, providing them with fewer places to hide. This makes inspections and treatment more effective if you do encounter a problem. Some people associate bed bug infestations with a lack of good hygiene and good housekeeping, but that is not necessarily the case.

**A vacuum and clothes dryer are your friends.** If the infestation is localized, it may be possible to vacuum up the bed bugs. Remember to empty the bag or canister outside. Bed bug infestations are commonly found where you spend most of your time such as a bed and favorite recliner or chair. Vacuum seams of cushions well. Bedding and clothing can be put in a clothes dryer run on high for 20 to 30 minutes to destroy bed bugs.

(PCT Online, December 12, 2023)

<https://www.pctonline.com/news/ufifas-experts-provide-reminders-to-prevent-bed-bug-hitchhikers/>

## CEU Meetings

Please note that some of these meetings are virtual using Zoom or Microsoft Teams. Please contact the meeting host directly if you have any questions.

### Date: January 15-16, 2024

Title: 2024 OAAA Ag Aviation Expo  
Location: Embassy Suites Norman OK  
Contact Sandy Wells (405) 341-3548  
<http://www.okaaa.org/>

CEU's:	Category(s):
4	A
5	1A
1	6
5	10
5	Private

### Date: January 17-18, 2024

Title: Red River Crops Conference  
Location: Jackson County Expo Center  
Contact: Maxwell Smith (580) 482-2120  
<https://www.facebook.com/people/Red-River-Crops-Conference/100063571574226/>

CEU's:	Category(s):
2	1A
2	10
2	Private

### Date: January 24, 2024

Title: OARA Professional Applicator Training  
Location: Cimarron Electric Cooperative 19306 US Hwy 81 N Kingfisher OK 73750  
Contact: Tammy Ford Miller (580) 233-9516  
<https://www.oklahomaag.com/oklahoma-agribusiness-retailers-association.html>

CEU's:	Category(s):
TBA	1A
TBA	Private

### Date: January 25, 2024

Title: East Central Pesticide Applicator Meeting  
Location: Adair County OSU Extension contact for exact location  
Contact Jennifer Patterson (918) 696-2253  
<https://extension.okstate.edu/county/adair/>

CEU's:	Category(s):
1	1A
1	Private

### Date: January 25, 2024

Title P&K Customer Sprayer Clinic  
Location: Autry Technology Center contact for exact location  
Contact Kurt Mendel (580) 242-2750  
<https://www.pkequipment.com/about-us/2024-pk-sprayer-planter-clinics/>

CEU's:	Category(s):
3	1A
3	Private

### Date: January 30, 2024

Title P&K Customer Sprayer Clinic  
Location: Canadian County Expo & Event Center, El Reno OK  
Contact: Heath Hull (405) 668-0108  
<https://www.pkequipment.com/about-us/2024-pk-sprayer-planter-clinics/>

CEU's:	Category(s):
3	1A
3	Private

**Date: March 27, 2024**

Title ENSYSTEEX 2024 Workshop  
Location: Holiday Inn 613 University Place Durant OK  
Contact: Don Stetler (281) 217-2965  
<https://ceuworkshop.com/>

CEU's:	Category(s):
3	3A
3	7A

**Date: October 1, 2024**

Title ENSYSTEEX 2024 Workshop  
Location: TBA Tulsa OK  
Contact: Don Stetler (281) 217-2965  
<https://ceuworkshop.com/>

CEU's:	Category(s):
1	7A

## ODAFF Approved Online CEU Course Links

Online Pest Control Courses  
<https://www.onlinepestcontrolcourses.com/>

PestED.com  
<https://www.pested.com/>

Certified Training Institute  
<https://www.certifiedtraininginstitute.com/>

WSU URBAN IPM AND PESTICIDE SAFETY EDUCATION PROGRAM  
<https://pep.wsu.edu/rct/recertonline/>

CEU University  
<http://www.ceuschool.org/>

Technical Learning College  
<http://www.abctlc.com/>

All Star Pro Training  
[www.allstarce.com](http://www.allstarce.com)

Wood Destroying Organism Inspection Course  
[www.nachi.org/wdocourse.htm](http://www.nachi.org/wdocourse.htm)

CTN Educational Services Inc  
[http://ctnedu.com/oklahoma\\_applicator\\_enroll.html](http://ctnedu.com/oklahoma_applicator_enroll.html)

Pest Network  
<http://www.pestnetwork.com/>

Veseris  
<http://www.pestweb.com/>

AG CEU Online  
<https://agceuonline.com/courses/state/37>

Target Specialty Products Online Training  
<https://www.target-specialty.com/training/online-training>

MarKev Training <https://www.markevtraining.com/>

For more information and an updated list of CEU meetings, click on this link:  
<http://www.kellysolutions.com/OK/applicators/courses/searchCourseTitle.asp>

## ODAFF Test Information

Testing will be done at testing centers in multiple locations around the state by PSI Services LLC.

For more information and instructions, please go to <https://bit.ly/3sF4y0x>.

**Reservation must be made in advance** at [www.psiexams.com/](http://www.psiexams.com/) or call **855-579-4643**

### PSI locations.

Oklahoma City 3800 N Classen Blvd, Ste C-20,  
Oklahoma City, OK 73118

Tulsa 2816 East 51st Street, Suite 101, Tulsa, OK  
74105

McAlester 21 East Carl Albert Parkway (US Hwy 270),  
McAlester, Oklahoma 74501

Woodward 1915 Oklahoma Ave, Suite 3, Woodward,  
OK 73801

Lawton Great Plains Technology Center, 4500 West  
Lee Blvd Building 300- RM 308, Lawton, OK 73505

Enid Autry Technology Center, 1201 W. Willow Rd,  
Enid, OK 73703

Ponca City Pioneer Technology Center, 2101 N Ash,  
Ponca City, OK 74601

If you have questions on pesticide certification. Please  
email or call:

Kevin Shelton  
405-744-1060 [kevin.shelton@okstate.edu](mailto:kevin.shelton@okstate.edu) or

Charles Luper  
405-744-5808 [charles.luper@okstate.edu](mailto:charles.luper@okstate.edu)

**Pesticide Safety  
Education Program**