

PESTICIDE REPORTS

Division of Agricultural Sciences and Natural Resources • Oklahoma State University

<http://pested.okstate.edu>



August, 2023

CHEM

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PRIVATE APPLICATORS CAN NOW START TESTING AT PSI TEST CENTERS

Private Applicators that need to take the Private Applicator Exam to renew their certification before the December 31 expiration date may now do so at PSI test centers around the state.

Private Applicators should have received a notice from the Oklahoma Department of Agriculture Food and Forestry (ODAFF) if testing is needed.

All applicator testing is to be completed at PSI test centers in state. Private applicators must take a 50 questions closed book test at the PSI test centers.

Testing fees are \$65 per exam for Private Applicators. Once passed, Private Applicator certification cards will be emailed by ODAFF to the applicator. Private applicator certifications renewed will be good through December 31, 2028.

For more information and links to the PSI test centers can be found at <https://extension.okstate.edu/programs/pesticide-safety-education/odaff-pesticide-applicator-testing-procedure/>. (OSU PSEP August 1, 2023)

EPA RELEASES DRAFT STRATEGY TO BETTER PROTECT ENDANGERED SPECIES FROM HERBICIDE USE

Today, the U.S. Environmental Protection Agency (EPA) released the draft Herbicide Strategy for public comment, a major milestone in the Agency's work to protect federally endangered and threatened (listed) species from conventional agricultural herbicides. The Strategy describes proposed early mitigations for more than 900 listed species and designated critical habitats to reduce potential impacts from the agricultural use of these herbicides while helping to ensure the continued availability of these important pesticide tools.

"Ensuring safe use of herbicides is an important part of EPA's mission to protect the environment," said **Deputy Assistant Administrator for Pesticide Programs for the Office of Chemical Safety and Pollution Prevention Jake Li**. "This strategy reflects one of our biggest steps to support farmers and other herbicide users with tools for managing weeds, while accelerating EPA's ability to protect many endangered species that live near agricultural areas."

The Strategy released today is part of EPA's ongoing efforts to develop a multichemical, multispecies approach to meeting its obligations under the Endangered Species Act (ESA). EPA's traditional chemical-by-chemical, species-by-species approach to meeting these obligations is slow and costly. As a result, EPA has completed its ESA obligations for less than 5% of its actions, creating legal vulnerabilities for the Agency, increased litigation, and uncertainty for farmers and other pesticide users about their continued ability to use many pesticides. The Strategy — which is primarily designed to provide early mitigations that minimize impacts to over 900 listed species — is one of EPA's most significant proposals to help overcome these challenges.

EPA focused the Strategy on agricultural crop uses in the lower 48 states because hundreds of millions of pounds of herbicides (and plant growth regulators) are applied each year, which is substantially more than for non-agricultural uses of herbicides and for other

pesticide classes (e.g., insecticides, fungicides). Additionally, hundreds of listed species in the lower 48 states live in habitats adjacent to agricultural areas. The proposed mitigations in the Strategy would address the most common ways that conventional agricultural herbicides impact these listed species.

EPA expects that the Strategy will increase the efficiency of future ESA consultations on herbicides with the U.S. Fish and Wildlife Service (FWS), which has authority over most listed species that could benefit from the proposed mitigations. Under the Strategy, EPA proposes to identify and begin mitigating for potential impacts even before EPA completes ESA consultations. These early mitigations should expedite EPA's ability to fully comply with the ESA by reducing impacts to listed species before EPA conducts most of its ESA analysis. Adopting mitigations earlier will also allow EPA and FWS to use their resources far more efficiently in ESA consultations.

The Strategy's proposed mitigations reflect practices that can be readily implemented by growers and identified by pesticide applicators and that provide flexibility for growers to select the mitigations that work best for them. The Strategy also gives credit to landowners who are already implementing certain measures to reduce pesticide runoff. For example, existing vegetated ditches and water retention ponds will qualify for credits that reduce the need for additional mitigation. Similarly, the Strategy would require less mitigation on flat lands, which are less prone to runoff, and in many western states, which typically experience less rain to carry pesticides off fields. The Strategy also describes how the Agency could add other mitigation practices to the menu of mitigation options in the future, particularly to incorporate emerging technology or new information on the effectiveness of specific practices.

Draft Herbicide Framework Document

The draft framework document includes a discussion of both the proposed scope of the Herbicide Strategy and the proposed decision framework to determine the level of mitigation needed for a particular conventional agricultural herbicide. The draft framework document also includes examples of how the proposed herbicide mitigation would apply to some of the herbicides for

which EPA has conducted case studies as well as EPA's proposed implementation plan.

The draft herbicide framework and accompanying documents are available in docket [EPA-HQ-OPP-2023-0365](#) for public comment for 60 days.

In its ESA Workplan and ESA Workplan Update, EPA outlined this and other ESA initiatives to develop early mitigations that provide listed species with practical protections from pesticides. The Strategy complements those other initiatives, such as targeted mitigations for listed species particularly vulnerable to pesticides and Interim Ecological Mitigations that EPA has begun incorporating under the Federal Insecticide, Fungicide, and Rodenticide Act. The draft framework describes how EPA would apply the mitigations in the Strategy compared to mitigations in the other initiatives.

[Visit EPA's website to learn more about how EPA's pesticide program is protecting endangered species.](#)

(EPA, July 24, 2023)

<https://www.epa.gov/pesticides/epa-releases-draft-strategy-better-protect-endangered-species-herbicide-use>

EPA POSTS PESTICIDE INCIDENT DATA PUBLICLY

Today, the U.S. Environmental Protection Agency (EPA) took a major step to increase transparency by posting 10 years of pesticide incident data on its website. Sharing this information advances EPA's commitment to environmental justice and aligns with EPA's [Equity Action Plan](#) by expanding the availability of data and capacity so the public and community organizations can better understand pesticide exposures, including exposures to vulnerable populations.

This action also advances the President's transparency goal of ensuring that the public, including members of communities with environmental justice concerns, has adequate access to information on federal activities related to human health or the environment, as charged in Executive Order 14096, [Revitalizing Our Nation's Commitment to Environmental Justice for All](#).

The [data sets](#), which pull information from EPA's Incident Data System (IDS), allow users to access raw data on pesticide exposure incidents such as the incident date, the reason for the report (e.g., adverse effect, product defect), and the severity of the incident. It may also provide information on the location of the incident, the pesticide product, and a description of the incident(s). EPA has not verified the raw data for accuracy or completeness, so users should be aware of this limitation before drawing any conclusions from the data.

"People have the right to know when accidental pesticide exposures or other incidents are reported to the Agency," said **EPA Assistant Administrator for the Office of Chemical Safety and Pollution Prevention Michal Freedhoff**. "It is particularly critical to share how pesticides may have impacted our most vulnerable populations, including children and farmworkers."

EPA considers a pesticide incident as any exposure or effect from a pesticide's use that is not expected or intended. Pesticide incidents may involve people, domestic animals (e.g., pets or livestock), wildlife, or the environment (e.g., air, soil, water, plants). Reporting a pesticide incident provides EPA with additional information on the effects and consequences of exposures to pesticides affecting people and the environment.

EPA receives information about pesticide incidents from a variety of sources. The incident reports contained in IDS include data from:

- pesticide manufacturers (registrants), as they are required to submit reports of unreasonable adverse effects from their products;
- reporting by the public through other entities (including state regulators for pesticide enforcement);
- information submitted when individuals send an email directly to EPA;
- the National Pesticide Information Center (NPIC); and
- the American Association of Poison Control Centers.

Prior to today's action, EPA generally only provided incident information to the public when responding to requests under the Freedom of Information Act (FOIA)

or as an incident summary as part of EPA’s pesticide registration review process. EPA has made these data accessible to expand the public’s access and understanding of pesticide incidents and pesticide-related illnesses. Releasing these data is responsive to many long-standing requests to share incident data with farmworker organizations and public health officials.

EPA has made the last 10 years of incident data accessible because incident data older than 10 years may not reflect pesticide product labels currently on the market due to label changes that may occur during registration review. EPA plans to update the data monthly going forward.

Background on EPA’s Review and Use of Incident Data

EPA completes a periodic review of pesticide registrations — including pesticide incidents — at least every 15 years to ensure that, as the ability to assess risk evolves and as policies and practices change, all registered pesticides continue to meet the statutory standard of no unreasonable adverse effects. EPA’s analysis may result in label changes to address any identified risks of concern. As mentioned above, this process is known as registration review.

During registration review, EPA conducts human health and environmental assessments to ensure that pesticides will not cause unreasonable adverse effects to human health or the environment. Human health risk assessments evaluate the nature and probability of adverse health effects occurring in people who may be exposed to chemicals in their daily activities (e.g., from food and water they consume, air they breathe, contact at work, or other activities). Ecological risk assessments evaluate how a pesticide is expected to move through and break down in the environment, and whether potential exposure to the pesticide will result in unreasonable adverse effects to wildlife and vegetation.

In addition, incident reports, both those submitted to the Agency and those available in open literature, can help EPA determine whether pesticides have adequate use directions and restrictions, protective safety equipment requirements for farmworkers and/or pesticide applicators, and any other necessary mitigation measures to reduce risk to humans and the environment.

Background on the Incident Data System

EPA is making two data sets public. The first data set contains incidents that were submitted to EPA with a description of the incident (e.g., who was involved, how it happened, and where the incident occurred). The second data set contains incidents that were submitted in aggregate to the Agency. Aggregate incidents are submitted in bulk, as outlined in the Agency’s PR Notice 98- 3 and only contain information on the product and the severity of the incident, with no narrative description. For either data set, a single submission may contain one or more incidents. EPA is publishing these data sets to increase transparency to the public, but the Agency does not currently have the resources to answer individual questions about its content.

It is important to recognize that the data sets contain raw data that have never been reviewed for their validity or modified to facilitate public review. The Agency did not design the incident reporting system to cover only information known to be valid, and as such, cannot guarantee the accuracy, completeness, or adequacy of the contents of the data sets. People who download and use the data should exercise caution in drawing conclusions from the data.

For incident reports that contain personally identifiable information, EPA has made every effort to remove this information before making the records public. EPA will continue to redact this information as it updates the data sets each month.

To learn more, view the [data sets](#) and/or visit our [that explains how to search the data sets](#).

(EPA, July 27, 2023)

<https://www.epa.gov/pesticides/epa-posts-pesticide-incident-data-publicly>

EPA REQUIRES ADDITIONAL MITIGATION MEASURES FOR SERESTO PET COLLARS

Today, the U.S. Environmental Protection Agency (EPA) is requiring the implementation of additional measures for Seresto pet collars. The new measures will alert veterinarians and consumers of potential risks and provide more information about how to prevent and report adverse reactions from Seresto collars. The new measures will also improve the quality of adverse incident data reported to EPA to aid in the continued review of this product.

EPA conducted an extensive analysis of incidents and other data, with the assistance of the Food and Drug Administration (FDA). From this analysis, EPA concluded that these collars continue to meet EPA's standard under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). However, with the implementation of today's mitigations, EPA expects to receive higher quality data in the coming years. EPA has approved Seresto collar registrations for five years to allow for the continued evaluation of incident reports, which could result in further regulatory action in the future.

Background

Seresto collars offer flea and tick prevention for dogs and cats, as well as lice control for dogs. This use is important because fleas and ticks are considered significant public health pests that can transmit many serious diseases, such as Lyme disease and Rocky Mountain spotted fever, to pets and humans.

Under FIFRA, EPA is required to consider the benefits, as well as the risks, of the use of a pesticide. In addition to its protection against several serious public health pests, Seresto works for up to 8 months per collar, is available without the need for a prescription, and is relatively easy to apply compared to other flea and tick products. For cats and dogs, there are very few flea and tick collar alternatives that can be used for such a prolonged time.

Over the past several years, EPA has been improving its method for considering pet product-incidents, such as those reported for Seresto collars, in the pesticide registration and re-evaluation process. As part of this effort, and due to the number of Seresto-related incidents reported to EPA, the Agency began an in-depth review of the incidents of Seresto collars in 2021.

EPA has reviewed an extensive set of data it required Elanco, the current registrant of Seresto collars, to submit and reviewed the many incidents reported to EPA's Incident Data System to determine whether the collars may contribute to an elevated number of pet-related incidents. Throughout the review process, EPA consulted with FDA, which regulates similar products for cats and dogs, including flea and tick products that are ingested. EPA used information gathered during this review process to make its determination about the product.

EPA's Risk Findings and New Measures to Reduce Risk

EPA's scientific review of Seresto-related incident reports identified the need for more detailed incident reporting and public outreach. EPA analyzed all incidents that reported death for Seresto. This included 1,400 deaths reported to EPA from 2016-2020, which represent 2 percent of all Seresto incidents reported for these years. In many of the death-related incidents, critical details of the incident were often missing, preventing the Agency from determining the cause of the death.

The only reported deaths that were found to be "probably" or "definitely" related to Seresto product use were associated with mechanical strangulation or trauma caused by the collar, often associated with a failure of the release mechanism.

For all other deaths, EPA did not identify cases with a probable or definite association between collar use and death, often due to other factors impacting the animal, such as an existing medical condition. In addition, the rate of deaths reported for Seresto was similar to that for other pet products reviewed.

EPA also analyzed all non-lethal incidents, such as neurological symptoms. In some incidents with moderate or severe clinical sign removal of the collar seemed to alleviate symptoms and/or reapplication of the collar coincided with a reoccurrence of symptoms. Based on these findings, Elanco, the registrant of Seresto, has agreed to implement the following measures:

- **To alert veterinarians and consumers of potential risks**, the terms of continued registration require Elanco to include label warnings on Seresto products that describe common adverse effects that have been reported, along with instructions to remove the collar if those effects occur and instructions on how to report the incident. Elanco also must develop an outreach program to more effectively communicate with veterinarians and the public on the risks of using the product and other similar pesticides on pets.
- **To improve the quality of data reported when receiving reported incidents from consumers**, Elanco must pursue additional information to the greatest extent possible to ensure that complete details of each event are captured. This information includes whether the pet had any pre-existing conditions or previous history of the reported condition. The Seresto collar registration has also been split into two registrations, one for cats and one for dogs, to make comparison of incident data across products easier in the future. Elanco must report incident and sales data to EPA on an annual basis.
- **To reduce the risk of strangulation**, Elanco must evaluate potential changes to the emergency release mechanism of Seresto collars to prevent death by strangulation or choking. The company must submit a report detailing the data and analysis collected and performed in pursuit of this effort within one year. Based on this evaluation, EPA may require a modified release mechanism for the Seresto collar.
- **To allow for the continued evaluation of reported incidents**, EPA has limited its current approval of Seresto collar registrations to five years. EPA will continue to evaluate Seresto incident data over that period.

Elanco must implement the new registration requirements by the next printing of Seresto pet collar labels, which must occur in the next 12 months. To learn more, read [EPA's decision document](#), [EPA's scientific review document](#), or [EPA's frequent Q&As](#).

EPA Denies Petition to Cancel and Suspend Seresto Pet Collars

Based on the Agency's scientific review of incident data, EPA is denying a [2021 petition](#) from the Center for Biological Diversity (CBD) that requests the cancellation of Seresto collars and the suspension of Seresto collars pending cancellation. EPA received and reviewed more than 5,400 comments on the petition. Read [EPA's full response to the petition and public comments](#).

EPA and FDA Continue to Discuss Pet Product Jurisdiction

EPA and FDA jointly released a whitepaper in February 2023 that outlines an updated approach to clarify regulatory oversight of certain animal products to better align with each agency's expertise. One aspect of that proposed modernized approach includes a process for transferring oversight of flea and tick pet products, such as Seresto collars, from EPA to FDA.

The agencies started discussing a modernized approach to product oversight years before the current review of Seresto collars. However, EPA's review of Seresto pet-related incident reports has highlighted that, as compared to FDA, EPA has less expertise and resources (staff, infrastructure, and funding) to evaluate animal safety and conduct ongoing monitoring of marketed products. Read the [whitepaper](#) to learn more.

Safety Tips for Using Pet Collars

EPA encourages pet owners to discuss with their veterinarian when flea and tick control is needed for their pets and which type of control product they should use. Pet owners should read the entire label before using the recommended product and follow all directions carefully, as well as monitor the pet after treatment.

EPA understands and shares the public's concerns about reported incidents with Seresto pet collars. Pets are part of the family in many American households and the Agency is committed to following the science and the law as we work on this issue and pursue our mission. [Learn more](#) about how to use these products safely. (EPA , July 13, 2023)
<https://www.epa.gov/pesticides/epa-requires-additional-mitigation-measures-seresto-pet-collars>

RESEARCH SHOWS TICKS USING STATIC ELECTRICITY TO LATCH ONTO HUMANS, ANIMALS

While it's common for humans and animals to pick up static electricity, a study published in the journal [Current Biology](#) show those charges are enough to give ticks a lift in the air to their next meal.

AP reported that researchers studied the castor bean tick, which [are most active in warm months](#), showing a normal level of static, an electric charge that clothes or fur can pick up in movement, could pull ticks a fraction of an inch.

Although the distance is small, "it's the equivalent of us jumping three or four flights of stairs in one go," study author Sam England, an ecologist now at Berlin's Natural History Museum, stated in the AP article.

Stephen Rich, a public health entomologist at the University of Massachusetts Amherst, told AP these ticks, "hang out on a branch or a blade of grass with their legs outstretched — a behavior known as "questing" — and wait for people or animals to pass by so they can grab on and bite."

Rich added in the AP article that people should keep using classic tick prevention measures, including repellents, to keep themselves safe from bites.

(PCT Online, July 7, 2023)
<https://www.pctonline.com/news/research-shows-ticks-using-static-electricity-to-latch-onto-humans-animals/>

BAYER SETTLES ROUNDUP ADVERTISING CASE

Bayer settled with the state of New York on allegations the company falsely advertised the glyphosate-based Roundup, agreeing to pay \$6.9 million in fines and removing various claims from advertisements in the state.

In the settlement announced by New York Attorney General Letitia James, the state uses a variety of studies that purport to show glyphosate is dangerous to wildlife -- despite claims made by Bayer the herbicide is safe.

Those studies point to alleged harm to bee populations and other animal species from the use of Roundup on lawns and gardens.

Although Bayer has started to remove glyphosate-based Roundup for lawn and garden use from the shelves and intends to use a different active ingredient, the company continues to stand by the efficacy and safety of glyphosate. In addition, the company said it plans to continue selling glyphosate-based Roundup for agricultural use.

"We are pleased to resolve this matter, which focused on advertising practices and made no findings regarding the safety of Roundup products and no scientific conclusion that they have caused harm to the environment including pollinators or aquatic species," the company said in a statement to DTN.

"As the assurance of discontinuance recognizes, Monsanto disagrees with the conclusions and import of the studies the attorney general relied upon and supplied the AG's office with recent studies that more accurately reflect the current state of the relevant science."

The settlement dates back to a 1996/1998 agreement the company had with the state to discontinue certain advertising claims.

"Under the current settlement, Monsanto neither admits nor denies these allegations," Bayer said in the statement.

"Neither the prior AOD nor the current investigation were related to personal-injury cases. While Bayer agrees to make a payment to resolve this matter, all those funds will be allocated to prevent, abate, restore, mitigate, or control prior or ongoing water, land, or air pollution affecting pollinators, threatened or endangered aquatic species, and their habitats."

The New York attorney general's office launched an investigation in 2020, looking at whether the company violated the 1996 agreement.

The attorney general asked the company in 2020 to substantiate advertising claims made about Roundup.

Among the many advertisements identified by the state was an Oct. 1, 2019, YouTube video that asserted, "Roundup weed and grass killer products won't harm anything but weeds." The state said in the settlement it identified "at least five" examples of other videos that made the same claims.

"Bayer also maintains a website that claims that glyphosate allows farmers, by virtue of reduced tillage, to 'protect the environment for insects, birds, and wildlife' including 'pollinator species,' with no indication as to what actual product formulations (and what inert ingredients) are included in these applications," the settlement said.

The state's Consumer Protection from Deceptive Acts and Practices prohibits false and misleading advertising in the state.

James said in a statement that pesticides can "cause serious harm" to human health and the environment.

"It is essential that pesticide companies -- even and especially the most powerful ones -- are honest with

consumers about the dangers posed by their products so that they can be used responsibly," she said.

"Once again, Monsanto and the company's current owner, Bayer, made false and misleading claims about the safety of their products, but we will not allow them to get away with endangering our environment."

(Progressive Farmer, June 15, 2023)

<https://www.dtnpf.com/agriculture/web/ag/crops/article/2023/06/15/bayer-settles-claims-roundup-false>

STUDY: MOSQUITO SPRAYS REDUCE WNV RISK

The mosquito truck, a vehicle equipped with spraying equipment, has long been common in regions of the U.S. in an attempt to reduce mosquito populations and the diseases they spread in urban and suburban neighborhoods throughout the summer.

But a team from the University of Wisconsin at Madison has gathered data on how well these ultra-low volume (ULV) truck-mounted insecticides work and revealed a surprising result. In a [study published last week in the *Journal of Medical Entomology*](#), the researchers found that, while the trucks did not necessarily reduce overall numbers of mosquitoes, they could reduce the proportion of older, blood-fed mosquitoes within the population, thereby lowering the risk of diseases like West Nile virus (WNV).

The research team evaluated how well ULV trucks in the Chicago, Ill., area could reduce mosquito populations and disease risk. Using a range of measurements, they discovered that, after five weekly applications of a pyrethroid derivative common in ULV treatments in two sites in Cook County, Ill., during the summer of 2018, the abundance of *Culex* mosquitoes (known for being WNV vectors) did not change significantly. In fact, abundance changes after short-term (up to five days) treatment at sites ranged from a 99 percent reduction to 616 percent increase. For long-term treatments, abundance ranged from a 30 percent reduction to 2,009 percent increase.

However, the proportion of “nulliparous” mosquitoes — those that have neither had a bloodmeal nor produced offspring — increased significantly, and WNV infection rates decreased at one site, [according to *Entomology Today*](#).

The increase of nulliparous insects is important, as their lack of previous feeding means they have not acquired and therefore cannot spread WNV. The virus remains a significant problem in the Chicago area, and Illinois in general. Between 2002 and 2018, 2,634 human infections and 176 deaths were reported. Chicago and its suburbs have been classified as a “hotspot” for the virus in the U.S. Midwest, because of recent outbreaks and consistently high annual infections in some areas.

In Illinois, WNV is spread by two mosquito species: *Culex pipiens* and *C. restuans* — commonly known as the common house mosquito and the white-dotted mosquito, respectively. These species feed mostly on birds and occasionally mammals, including humans.

To control the mosquitoes, abatement districts usually employ public information efforts, source reduction, larval surveillance, and removal of larvae from storm water basins. Active controls such as ULV truck-based applications come into play when the risk of infection is high. Few studies, however, have fully evaluated the effectiveness of these active controls, and those that have been conducted have yielded contradictory results — just like this team’s abundance data appeared contradictory. For the study, the team used a number of measures, including abundance, age of mosquitoes and WNV transmission.

For the study, Dr. Bartholomay’s team used a number of measures, including abundance, age of mosquitoes and West Nile virus transmission.

“We were really impressed that, of all the things we measured, it was the age-structure shift that was most remarkably different between control and treated sites,” says Dr. Lyric Bartholomay, a professor of pathobiological sciences at Wisconsin who led the research team. “This is an ‘invisible’ impact of adulticide use for mosquito control, because it takes some additional effort to dissect the mosquitoes and check the ovaries for evidence of having a previous

bloodmeal. And that invisible impact could have real-world consequences for West Nile virus transmission.”

For mosquito control districts, this could help tailor control measures to reduce disease risk. If a large proportion of mosquitoes after treatment are nulliparous, then WNV reduction will more likely appear, even though overall mosquito populations remain high. In this study, older mosquitoes that had produced offspring appeared to be more susceptible to the insecticide.

“We view this as a win for public health because there is less risk of people and animals being exposed to an infected mosquito,” Dr. Bartholomay said in the news release. “A reduction in West Nile virus ... would also impact whether or not mosquito control operations would have to implement additional mosquito control measures.”

(Pest Management Professional, July 28, 2023)

<https://www.mypmp.net/2023/07/28/study-mosquito-sprays-reduce-wnv-risk/>

TANK-MIXING ALONE WON’T STOP HERBICIDE RESISTANCE

A study by the University of Illinois and USDA Agricultural Research Service weed scientists in 2015 moved the industry toward mixing multiple herbicides in the same spray tank. That study showed that rotating herbicides but sticking with a one-chemical solution was increasing resistance to glyphosate in weeds like waterhemp. The 2015 study involved 105 Illinois fields and concluded that tank-mixing was 83 times less likely to lead to glyphosate resistance.

However, just eight years later, Aaron Hager, weed scientist at U of I and an author of that study, sounds an alarm, cautioning that tank-mixing only delays weed resistance.

Hager notes that waterhemp is now resistant to at least seven herbicide modes of action. Some waterhemp populations are resistant to herbicides that were never sprayed on the weeds. One theory is that weeds like

waterhemp can develop metabolic resistance. This nontarget resistance allows them to produce enzymes that detoxify herbicides. Hager believes herbicide resistance is the direct result of relying too much on chemical control. He urges farmers to diversify tactics, including eliminating weed seed production.

Meanwhile, Bill Johnson, weed scientist at Purdue University, also expresses concern. Without significant change, he foresees the day in the not-so-distant future when waterhemp may be resistant to every chemical herbicide.

(FarmProgress, July 12, 2023)

<https://www.farmprogress.com/crop-protection/tank-mixing-alone-won-t-stop-herbicide-resistance>

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: August 1, 2023

Title: Ensystem 2023 CEU Workshop

Location: Hampton Inn 4333 SW 15th OKC

Contact: DON STETLER (281) 217-2965

<https://ceuworkshop.com/#95d40a97-d688-4731-9d1a-1e00ab8de51e>

CEU's: Category(s):
2 7B

Date: August 2, 2023

Title: Ensystem 2023 CEU Workshop

Location: Holiday Inn Express Tulsa 2201 N Stonewood Cir. Tulsa

Contact: DON STETLER (281) 217-2965

<https://ceuworkshop.com/#95d40a97-d688-4731-9d1a-1e00ab8de51e>

CEU's: Category(s):
2 7B

Date: August 10, 2023

Title: Cimarron Ag Conference 8:30 am to 4:00 pm

Location: Noble County Fairgrounds Women's Building, 1 Ivanhoe St, Perry, OK.

Contact: Noble County Cooperative Extension Office (580) 336-4621 RSVP by August 4th, 2023. The cost of the conference is \$20

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

Date: August 10, 2023

Title: Central Oklahoma Turfgrass Conference
Location: Will Rogers Gardens 3400 NW 36th St.
Oklahoma City Ok
Contact: Oklahoma County Extension Office to Register
(405) 713-1125 \$100 fee

CEU's: Category(s):
6 3A
2 6
6 10

Date: August 18, 2023

Title: Corteva Wheat Herbicide and Seed Treatment Seminar
Location: Farmers Cooperative Association Ponca City
Contact for Exact Location
Contact: Kody Leonard (918) 244-8250

CEU's: Category(s):
1 Private
1 1A
1 4

Date: August 15, 2023

Title: Canadian County OSU Extension Fall Agronomy
Location: Canadian County Extension Office 220 N.
Country Club Rd, El Reno, OK 73036
Contact: Kyle Worthington (405) 262-0155

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

Date: September 14-15, 2023

Title: OPMA Fall Conference
Location: Hard Rock Hotel & Casino Catoosa OK
Contact: (405) 726-8773
<https://www.ok-pca.com/conferences>

CEU's: Category(s):
Pending Pending

Date: August 15, 2023

Title: Muskogee County CEU /SMIPLLOT
Location: Muskogee County Extension Office
Contact: Todd Trennepohl (918) 686-7200

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

Date: October 4-5, 2023

Title: OKVMA FALL Conference 2023
Location: Hard Rock Hotel & Casino Catoosa OK
Contact: Kiersten Riggs (918) 314-9032
<https://okvma.com/conferences/>

CEU's: Category(s):
6 1A
1 1B
1 2
6 3A
1 3C
6 5
7 6
2 7A
1 7B
1 7C
8 10
6 Private

Date: August 17, 2023

Title: 2023 Oklahoma Fumigation Workshop
Location: Oklahoma State University Greenhouse
Learning Center Stillwater OK
Contact: Edmond Bonjour (405) 744-8134
https://secure.touchnet.com/C20271_ustores/web/store_c at.jsp?STOREID=15&CATID=402

CEU's: Category(s):
4 7C
4 10

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

Wood Destroying Organism Inspection Course

www.nachi.org/wdocourse.htm

CTN Educational Services Inc

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>

Find us on Twitter at @OkstatePestEd

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/ 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

Norman Moore Norman Technology Center, 4701 12th Ave NW, Norman, Oklahoma, 73070

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

Kevin Shelton
405-744-1060 kevin.shelton@okstate.edu or

Charles Luper
405-744-5808 charles.luper@okstate.edu

**Pesticide Safety
Education Program**