

PESTICIDE REPORTS

Division of Agricultural Sciences and Natural Resources • Oklahoma State University
<http://pested.okstate.edu>



January, 2018

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NEW OKLAHOMA CITY TESTING LOCATION FOR 2018

There is a new location for the Oklahoma City area testing site for 2018. Testing in the Oklahoma City area will now be conducted at the Oklahoma Food and Forestry building (ODAFF) just north of the Oklahoma state capitol building on Lincoln Blvd. The address is 2800 Lincoln Blvd. January 8 will be the first test session held at the new location.

ODAFF TEST AND LICENSE CHANGES FOR GOVERNMENT EMPLOYEES

As of November 1, 2017 there is no longer an exemption from pesticide applicator testing fees and pesticide license fees for government entities in Oklahoma. This change to the Oklahoma Combined Pesticide Law and Rules now means **all applicators must pay \$50 for each exam they take**. This also means that government entities must pay a \$50 annual non-commercial license fee per category to ODAFF. This applies to all city, county, state, and federal groups that hold certification and licenses with ODAFF.

JANUARY TEST HELP SESSIONS

Happy New Year the first test help sessions the OSU Pesticide Safety Education Program will conduct for 2018 will be held at the end of January and first of February. The workshops will be held January 30th in Tulsa and February 1st in Oklahoma City.

The Tulsa session will be at the Tulsa County Extension Office at 4116 E. 15th. The Oklahoma City Test help session will at the Oklahoma County Extension Office 2500 NE 63rd.

The help sessions will focus on information covered in the core and service tech tests. OSU PSEP will answer any questions over other category tests during this session.

Applicators should acquire and study the manuals before coming to the help session for optimum success. Study manuals can be purchased by using the manual order form available at our website <http://pested.okstate.edu/pdf/order.pdf> or by calling University Mailing at 405-744-5385.

ODAFF Testing fees are not included in the registration fee and must be paid separately.

Register online at the Pesticide Safety Education Program (PSEP) website at <http://pested.okstate.edu/html/practical.htm>. Registration forms can also be downloaded from the website.

Registration will start at 8:30 and the program will run from 8:45 am to 12:30 pm at both locations. Testing will begin at 1:30 pm at both locations.

NO CEU's will be given for this program!

Reminder that Service Technicians must recertify before December 31, 2017 to stay certified for the next cycle that starts January 1, 2018.

<http://pested.okstate.edu/html/practical.htm>

EPA INITIATES RULEMAKING TO REVISE CERTAIN ASPECTS OF THE AGRICULTURAL WORKER PROTECTION STANDARD (WPS) AND THE CERTIFICATION AND TRAINING (C&T) RULE; IMPLEMENTATION DATES FOR WPS AND C&T REMAIN IN EFFECT

Agricultural Worker Protection Standard (WPS)

EPA has initiated a process to revise certain requirements in the WPS. By the end of FY2018, EPA expects to publish a Notice of Proposed Rulemaking to solicit public input on proposed revisions to the WPS requirements for minimum ages, designated representatives, and application exclusion zones. The compliance dates in the revised WPS published on November 2, 2015, remain in effect; the Agency does not intend to extend them.

Certification and Training (C&T, or Certification of Pesticide Applicators) Rule

EPA has initiated a process to revise the minimum age requirements in the C&T rule. EPA expects to publish a Notice of Proposed Rulemaking to solicit public input on proposed revisions to the rule by the end of FY2018. The implementation dates in the January 4, 2017, final rule, (1) for certifying authorities to submit revised certification plans and (2) for EPA to act on those plans remain in effect; EPA has no plans to change those implementation dates. (EPA December 14, 2017)

<https://www.epa.gov/pesticides/epa-initiates-rulemaking-revise-certain-aspects-agricultural-worker-protection-standard>

EPA RELEASES DRAFT RISK ASSESSMENTS FOR GLYPHOSATE

The U.S. Environmental Protection Agency (EPA) is releasing for public comment the draft human health and ecological risk assessments for [glyphosate](#), one of the most widely used agricultural pesticides in the United States.

The draft human health risk assessment concludes that glyphosate is not likely to be carcinogenic to humans. The Agency's assessment found no other meaningful risks to human health when the product is used according to the pesticide label. The Agency's scientific findings are consistent with the conclusions of science reviews by a number of other countries as well as the [2017 National Institute of Health Agricultural Health Survey](#).

EPA's human health review evaluated dietary, residential/non-occupational, aggregate, and occupational exposures. Additionally, the Agency performed an in-depth review of the glyphosate cancer database, including data from epidemiological, animal carcinogenicity, and genotoxicity studies.

The ecological risk assessment indicates that there is potential for effects on birds, mammals, and terrestrial and aquatic plants. EPA used the most current risk assessment methods, including an evaluation of the potential effects of glyphosate exposure on animals and plants. Full details on these potential effects as well as the EPA's methods for estimating them, can be found within the ecological risk assessment.

To read the draft risk assessments and supporting documents, go to www.epa.gov/ingredients-used-pesticide-products/draft-human-health-and-ecological-risk-assessments-glyphosate. The draft risk assessments and supporting documents will be available in glyphosate's registration review docket EPA-HQ-OPP-2009-0361 on www.regulations.gov in early 2018. EPA will open a 60-day public comment period for the draft risk assessments, evaluate the comments received, and consider any

potential risk management options for this herbicide.

EPA is scheduled to publish the proposed interim registration review decision for glyphosate in 2019. The proposed interim registration review decision will outline any proposed mitigation measures to reduce risk, if any are needed. (EPA December 18, 2017) <https://www.epa.gov/pesticides/epa-releases-draft-risk-assessments-glyphosate>

EPA RELEASES NEONICOTINOID ASSESSMENTS FOR PUBLIC COMMENT

The U.S. Environmental Protection Agency (EPA) is releasing preliminary ecological and human health risk assessments for these neonicotinoid insecticides -- clothianidin, thiamethoxam, and dinotefuran -- and a preliminary ecological risk assessment for imidacloprid, assessing risks to birds, mammals, non-target insects, and plants. Preliminary pollinator-only risk assessments for these chemicals were published for comment in 2016 and 2017, and preliminary human health and ecological assessments (for aquatic species only) for imidacloprid were also released in 2017.

The Agency is also releasing new cotton and citrus benefits assessments for foliar applications of the neonicotinoids as well as its response to public comments on the [2014 Benefits of Neonicotinoid Seed Treatment to Soybean Production](#).

These documents are all being made available in the dockets in advance of the forthcoming Federal Register Notice that will open the public comment period.

Once the comment period opens, EPA is especially interested in public comment on the benefits for cotton and citrus, since previous assessments identified potential risks to pollinators. We believe early input from the public will be helpful in developing possible mitigation options that may be

needed to address risks to bees. Among the benefits identified, the neonicotinoids were found to be critical for management of Asian citrus psyllid -- which causes citrus greening, a devastating pest for citrus growers, and for control of plant bugs and stink bugs in cotton.

The Agency encourages stakeholders and interested members of the public to provide comments on these assessments in the dockets linked below. The comment period begins when the Federal Register notice is published and will be open for 60 days. EPA may revise the assessments based on information and comments received. The Agency plans to release the final pollinator risk assessments and proposed interim decisions for these chemicals in mid-2018.

[Imidacloprid registration review docket EPA-HQ-OPP-2008-0844](#)

[Clothianidin registration review docket EPA-HQ-OPP-2011-0865](#)

[Thiamethoxam registration review docket EPA-HQ-OPP-2011-0581](#)

[Dinotefuran registration review docket EPA-HQ-OPP-2011-0920](#)

(EPA, December 15, 2017)

<https://www.epa.gov/pesticides/epa-releases-neonicotinoid-assessments-public-comment>

COCKROACHES: BORN SURVIVORS!

While very few cockroach species are considered pest species, those that are can cause considerable damage. According to Robert Snetsinger, author of *The Ratcatcher's Child*, it was not until about 1840 that the human population of the United States was sufficiently large to support a professional pest control industry. Many of the pest species that are still the bane and boon of pest management professionals today were already established, but because American cities were in their infancy and

the population was isolated on farms, plantations, and in small communities, the spread of introduced pests was slow.

Today, however, the economic consequences of cockroach infestations are significant in hotels, restaurants, supermarkets, private homes, apartments, cruise ships, railroad cars, and warehouses. Besides pilfering food, cockroaches apprise humans of their presence with odor and fecal pellets. The “attar of roaches,” the unpleasant odor so well associated with these insects – and so familiar to PMPs – is the combined product of their excrement, which includes odoriferous microbial metabolites, the fluid they exude from their abdominal scent glands, and a dark-colored fluid they regurgitate from their mouths while feeding.

Cockroaches stain their runways with these secretions, ruining any surface they repeatedly contact. Other material losses occur when cockroaches stain or contaminate food dishes, utensils, packaging, clothing, and stored items.

In the high-tech world of electronics, moreover, cockroaches have found new methods of destruction. They are attracted to the warmth and shelter of electronic equipment, and can short-circuit cash registers, telephones, and computers with their bodies and excrement. They also chew through wiring of television and computers and can cause electrical fires. Computer hard drives and disks have been destroyed when cockroach bodies were caught under the disk heads that read and write data.

The domiciliary cockroaches are well-adapted to indoor life. They are dorso-ventrally depressed (flattened), which allows them to enter tight cracks and crevices, and their head is directed downward with antennae pointing forward. However, the popular mass media has bestowed upon cockroaches some undeserved characteristics. Their reproductive rate does not exceed that of many other insects, including household pests like house flies. They are not unique in being able to survive protracted periods of starvation, and cockroaches are no more resilient to radiation and drowning than most other insects. Nevertheless, cockroaches have been portrayed as out-surviving humans and other

organisms, perhaps because of their tenacity and reappearance in urban structures from which they had been repeatedly eliminated.

Despite advances in technology and pesticide development, cockroaches continue to maintain an admirable position as a major structural pest. The need for cockroach control remains the backbone of the structural pest management industry, especially in metropolitan centers, as other pests rise and fall in significance. As a result, the likelihood any major pest species of cockroach will ever appear on the endangered species list is remote.

The preceding article was excerpted from Chapter 2 (Cockroaches) of the Mallis Handbook of Pest Control by Contributing Editor Dr. Coby Schal of North Carolina State University. (PCT Online, December 15, 2017)

<http://www.pctonline.com/article/cockroaches-born-survivors/>

US RESIDUE COMPLIANCE OVER 98% IN 2015

Some 98.2% of domestic food samples tested by the US Food and Drug Administration (FDA) in fiscal 2015 (ended September 30th) complied with pesticide tolerances, according to data issued last month. That was similar to the 98.6% figure seen in fiscal 2014 and slightly up on the 97.2% compliance rate in fiscal 2013 and 2012.

Domestic food testing in 2015 found that 49.8% of 835 samples tested contained no detectable residues. Some 48.4% had residues within tolerance limits and 1.8% had illegal residues. Of the 15 illegal samples, 13 contained residues for which no tolerance was established and two exceeded tolerance limits.

The FDA tested imported food from 111 countries. Of the 4,737 samples of imports tested, 56.8% had no detectable residues, 33.8% had residues within tolerance limits and 9.4% had illegal residues. Among the 444 illegal samples, 436 contained residues for which no tolerance was established and

19 exceeded tolerance limits. There were 11 samples that violated both criteria.

The FDA found 207 pesticides out of the 696 pesticides and industrial chemicals that could have been detected during routine monitoring. The analytical methods used for the FDA's total diet study found residues of 157 pesticides, all well below tolerance levels. It analysed 1,061 items in four market basket surveys. The most frequently detected pesticides were the fungicide, boscalid (32%), the insecticides, imidacloprid (30.1%), the insecticide synergist, piperonyl butoxide (20.8%), and the fungicide, azoxystrobin (20.8%).

(Pesticide & Chemical Policy/AGROW, December 21, 2017)

US LAWMAKERS UPSET WITH IARC OVER GLYPHOSATE REVIEW

US lawmakers are threatening to withdraw funding for the UN WHO's International Agency for Research on Cancer (IARC). They could cut funds if officials fail to respond to their queries about the group's determination that the herbicide, glyphosate, is a probable human carcinogen. Congress has appropriated some \$48 million to the IARC since 1985 and \$22 million of that funding has gone to the monograph programme, which reviews whether substances can cause cancer.

Republican leaders of the US House Science, Space, and Technology Committee say that their frustration with the IARC's refusal to provide witnesses for a hearing on the glyphosate monograph could jeopardise US funding of the international agency. "If IARC does not provide a full response to the request for potential witnesses, the Committee will consider whether the values of scientific integrity and transparency are reflected in IARC monographs and if future expenditures of federal taxpayer dollars to this end need to continue," according to a December 8th letter sent by the Committee to IARC director Dr Christopher Wild.

The letter is the latest salvo in the Committee's effort to investigate the IARC and its glyphosate assessment. Committee chair Lamar Smith, a Texas Republican, sent a letter to the IARC on November 1st asking for "IARC-affiliated individuals" who could testify before the panel about how the Agency conducts its cancer reviews and to provide details about the glyphosate monograph.

The letter noted controversy surrounding a Reuters article that reported a draft version of the glyphosate document, which included comments questioning the link between the herbicide and cancer in laboratory animals. Those comments were deleted for the final IARC review; a move that critics say undermines the validity of the assessment.

Mr Smith's letter also voiced concern about the role of Dr Christopher Portier, a cancer expert and biostatistician who served on the IARC committee that conducted the glyphosate review. Dr Portier has been vocal with his concern about glyphosate's potential carcinogenicity and has consulted for plaintiffs suing Monsanto for alleged harm from exposure to the herbicide.

In a November 20th letter responding to the Committee, Dr Wild defended the IARC process and the glyphosate review without directly addressing concerns about Dr Portier. "The cancer hazard classifications made by the IARC monographs are the result of scientific deliberations of working groups of independent scientists, free from conflicts of interest," he wrote. "The resulting monograph represents the working group's consensus conclusions, based on their critical review of the published scientific literature, agreed upon by all working group members in plenary sessions."

Dr Wild also declined to offer any names of potential witnesses for the Committee to question. "Although IARC is not in a position to provide witnesses for any potential hearing, I welcome this opportunity to respond to your various points and in so doing to correct repeated misrepresentations of the monographs promoted by some sections of the media over an extended period of time," he wrote.

Committee leaders would be welcome to "visit the Agency" and pose their questions directly to him and his staff, Dr Wild added.

The letter has not gone down well with Mr Smith and other top Republicans on the panel, prompting the warning that the IARC funding could be pulled. "Given the serious nature of [our] concerns related to expenditures of taxpayer dollars, the Committee's request for a witness to provide testimony regarding this matter should not be disregarded by IARC," Mr Smith said in his latest letter. "As such, we reiterate the request in our November 1st 2017 letter."

Mr Smith has asked for a response from the IARC by December 15th. (Pesticide & Chemical Policy/AGROW, December 11, 2017)

GENETIC CHANGES HELP MOSQUITOES SURVIVE PESTICIDE ATTACKS, UCR REPORTS

For decades, chemical pesticides have been the most important way of controlling insects like the Anopheles mosquito species that spreads malaria to humans. Unfortunately, the bugs have fought back, evolving genetic shields to protect themselves and their offspring from future attacks.

The fascinating array of genetic changes that confer pesticide resistance in Anopheles mosquitoes is reviewed in an article published today in Trends in Parasitology. The paper is written by Colince Kamdem, a postdoctoral scholar, and two colleagues from the Department of Entomology at the University of California, Riverside. The findings highlight the interplay between human interventions, mosquito evolution, and disease outcomes, and will help scientists develop new strategies to overcome pesticide resistance.

DICAMBA AND THE TREADMILL OF HERBICIDE RESISTANCE

In 2015, there were roughly 212 million malaria cases and an estimated 429,000 deaths due to malaria, according to the World Health Organization. While increased prevention and control measures have led to a 29 percent reduction in malaria mortality rates globally since 2010, the increase in pesticide resistant insects underscores the need for new strategies.

One of the main obstacles to malaria eradication is the enormous diversity and adaptive flexibility of the Anopheles mosquito species, therefore a better understanding of the genetic, behavioral, and ecological factors underlying its ability to evolve resistance is key to controlling this disease,” Kamdem said.

In sub-Saharan Africa, multiple factors, including the widespread use of long-lasting insecticidal nets, indoor residual spraying, exposure to chemical pollutants, urbanization, and agricultural practices, are contributing to the selection of malaria mosquitoes that are highly resistant to several classes of insecticide.

Kamdem’s article highlights several ways that mosquitoes are adapting to insecticide exposure. Advantageous mutations in the insecticide target site are a major source of resistance, highlighting the direct impact of human interventions on the mosquito genome. Other mutations boost the activity of enzymes that degrade or sequester the insecticide before it reaches its target in the cell. In some cases, mosquitoes change their behaviors to avoid coming into contact with pesticides.

“These changes are occurring at the molecular, physiological and behavioral level, and multiple changes are often happening at the same time. With the accessibility of DNA sequencing we can now pinpoint these evolutionary changes at the genomic level,” Kamdem said.

Read the full release here:

<https://ucrtoday.ucr.edu/50736>

(PCT Online, January 3, 2018)

<http://www.pctonline.com/article/genetic-change-mosquitoes-survive-pesticide-attacks/>

Many reports have circulated the US concerning widespread dicamba injury to off-target crops, particularly in the Mid-South and Midwest. According to a national survey led by Kevin Bradley, weed scientist at the University of Missouri, 3.1 million acres of crops were reported injured by dicamba in 2017, which was legally applied to dicamba-resistant soybeans for the first time this year.

According to [weed specialists at the University of Minnesota](#), this issue is concerning for several reasons beyond injury to crops. These include neighbor disputes about drift, pressure to purchase dicamba-resistant beans as a defensive tactic, and the complicated dicamba label and associated regulations. We have also seen [misleading manufacturer claims](#) that dicamba-related technology is the stand-alone solution for herbicide resistant weeds. There is no silver bullet for herbicide resistant weeds.

If growers come to over-rely on dicamba products, history suggests that the cycle of resistance will continue, and we will face increased weed resistance to dicamba as we have with glyphosate, triazine, and ALS-inhibitor herbicides. It is important to remember that there is still no silver bullet for resistant weeds, and dicamba is no exception.

Over the winter months, farmers, extension educators, crop consultants, industry and government officials will discuss how to approach this issue for next year. Dicamba application to dicamba-tolerant soybeans will remain an option in most states; the EPA recently announced added regulations to be applied in 2018 for continued use of this product. It is predicted that many farmers will continue to plant dicamba-resistant soybeans and apply dicamba. Some may be applying it as a direct tactic to target herbicide-resistant pigweed in their fields. In order to ensure sensible use of dicamba and slow the development of weed resistance to it, it is important that we recognize

how we got to this point: the development of highly competitive weeds that are resistant to multiple groups of herbicides.

Over about the past two decades, farmers have had to deal with increasing numbers of resistant weeds, particularly weeds that are resistant to multiple popular herbicide groups. Some of the most challenging examples include multiple-resistant tall waterhemp, Palmer amaranth, giant and common ragweed, and kochia. Unfortunately, heavy use of triazines and ALS-inhibitor herbicides led to the selection of triazine- and ALS-resistant weeds. When glyphosate-resistant crops became available two decades ago, glyphosate use increased as it became a popular and effective tool for stubborn and resistant weeds. But weeds soon responded by developing resistance to it as well. Currently, farmers in states like Arkansas and Missouri are turning to dicamba as a solution to widespread Palmer amaranth that is resistant to multiple herbicide groups, including glyphosate and ALS-inhibitors. While dicamba products are often effective on Palmer amaranth, it is not a silver bullet for herbicide resistant weeds. If it is overused, weed populations will likely adopt resistance against it rapidly, including Palmer amaranth, continuing the treadmill of resistance that we have seen with popular herbicides over the past 25+ years.

Unfortunately, if the treadmill continues with dicamba, we will run short on remaining effective chemistries against weeds like Palmer amaranth sooner rather than later. We do not know of any new herbicide modes of action on the horizon, so conserving current effective technologies is very important.

In order to conserve effective chemistries, farmers should diversify the herbicide modes of action that they are applying within each season and between seasons.

Avoid overreliance on one or two modes of action.

By diversifying the number of effective herbicide MOA in a tank and from one application to the next, the producer is limiting the opportunities for weeds to develop resistance.

Modes of action can and should be diversified several ways: In tank mixes, between applications within a season, and rotated between seasons. Rotating crops helps facilitate the rotation of herbicide MOA.

Additionally, it is important to use the full rate of each herbicide according to the label, as incomplete control can also lead to the development of resistance.

Integrated other cultural and mechanical practices alongside herbicide control in order to reduce the introduction of new weeds, reduce the weed pressure that is put on herbicides, and to target stubborn weeds from multiple angles.

For more information on the development and spread of herbicide resistant weeds: [What is Herbicide Resistance?](#)

For more information on diversifying modes of action: [Herbicide Control page](#)

To find a list of herbicide resistant weeds in your state: [Search by State](#)

(Integrated Weed Management Resource Center, November 14, 2017)
<http://integratedweedmanagement.org/index.php/2017/11/14/dicamba-and-the-treadmill-of-herbicide-resistance/>

“BUYER BEWARE” AS CALIFORNIA STARTS RECREATIONAL MARIJUANA SALES WITHOUT PESTICIDE RESIDUE TESTING

As California prepares to open up retail sales for its legal cannabis market, experts are urging consumers to be cautious, as the state has yet to fully phase-in its pesticide testing protocols. Donald Land, PhD, a chemistry professor at the University of California, Davis, who also works as a consultant for pesticide testing company Steep Hill Labs Inc. told the Associated Press, “Buyer beware.” Along with local news station KNBC 4, his company purchased cannabis products from 15 dispensaries in Southern California in early 2017, finding that 41 out of 44 samples tested, 93%, tested positive for pesticide residue higher than legal limits in Oregon, Washington state, Massachusetts, and Nevada.

The California Bureau of Cannabis Control’s (CBCC) emergency rules implementing its legal cannabis market phases in quality testing for cannabis throughout 2018. However, when shops open on January 1st, retailers will be allowed to sell cannabis products without laboratory testing for pesticides or other contaminants, though they will have to be labeled as such. Any cannabis products harvested after January 1, 2018 will be tested for “contaminants with a high public health risk.” By July 1, 2018, “moderate relative health risk” contaminants will be tested, and by the end of the year the state will include “minor relative health risk” testing, according to a fact sheet released by the CBCC. A list of what pesticides are considered under each of those categories is available on page 92 of CBCC’s emergency regulations.

Despite concerns and uncertainties when shops open in the New Year, California’s approach to pesticide use on legal cannabis has been lauded by health groups for limiting the list of products legally allowed to be used to control cannabis pests. In 2015, California released its guidelines for pesticide use on cannabis, limiting allowed products only to those considered to be “minimum risk” by the U.S. Environmental Protection Agency (EPA), and thus

not subject to pesticide registration. In addition to suggesting which minimum risk products should be used for individual pests, the state also provided growers with suggested non-toxic integrated pest management practices to address pest problems without hazardous chemicals.

Beyond Pesticides has long maintained that no EPA registered pesticides are legally allowed for use on cannabis, and that only minimum risk products can be legally applied because they are exempt from registration. In July 2017, EPA Administrator Scott Pruitt issued a notice of intent to disapprove use of four registered pesticides on cannabis. This action effectively endorsed Beyond Pesticides’ interpretation of current law; though motivations may have been different, EPA’s denial of these four registrations provides an opportunity for the industry to flourish based on organic principles.

Dr. Land’s experience as reported by the AP provides hope for that outcome. Steep Hill Laboratories also conducted pesticide testing on cannabis concentrates a few years ago, finding toxic extracting solvents in 132 out of 135 samples. “At first they were mad because they couldn’t sell their stuff the way they wanted to,” Dr. Land told the AP. However, the exposure caused manufacturers to look at their production procedures, and develop a method to prevent contamination of their finished product. Two years later, and the laboratory reported that all samples by the same manufacturers passed.

If growers can continue to adjust to consumer and patient concerns over pesticide contamination after decades of operating on the black market, the burgeoning cannabis industry has the potential to become one of the safest agricultural products in the U.S. For more information about Beyond Pesticides’ approach to pesticide use in cannabis production, read the 2015 article on the subject in Pesticides and You, which evaluates state-level cannabis laws at the time of its release. Additional developments can be found through coverage on Beyond Pesticides’ Daily News. (Beyond Pesticides, December 20, 2017)

<https://beyondpesticides.org/dailynewsblog/2017/12/buyer-beware-california-starts-recreational-marijuana-sales-without-pesticide-testing/>

SCIENTISTS USING GENETIC TECHNOLOGY TO CONTROL PESTS

Rodents have joined mosquitoes in the cross-hairs of scientists working on a next-generation genetic technology known as “gene drive” to control pests, [Reuters reported](#).

Researchers in Scotland said they had developed two different ways to disrupt female fertility in rats and mice, building on a similar approach that has already been tested in the lab to eliminate malaria-carrying mosquitoes.

So-called gene drives push engineered genes through multiple generations by over-riding normal biological processes, so that all offspring carry two copies. Usually, animals would receive one copy of a gene from the mother and one from the father.

The technique is extremely powerful but also controversial, since such genetically engineered organisms could have an irreversible impact on the ecosystem.

Concerns about the proliferation of mutant species have led some to call for a gene drive ban, but Bruce Whitelaw of the University of Edinburgh’s Roslin Institute told Reuters that would be short sighted.

“A moratorium would prevent the research which is required for us to understand if and how this can be used in an advantageous way for our society,” he told reporters in London.

[CLICK HERE](#) to read the entire article.

(PCT Online, January 2, 2018)

<http://www.pctonline.com/article/researchers-genetic-technology-control-pests/>

CEU Meetings

Date: January 4-5, 2018

Title: 2018 Annual Arkansas-Oklahoma Turfgrass Short Course

Location: Don Tyson Center for Agriculture Sciences, Fayetteville AR

Contact: Mike Richardson (479) 841-6169

Course #:

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

Date: January 10, 2018

Title: 2018 Professional Applicator Training

Location: Redlands Community College El Reno OK

Contact: Tammy Ford-Miller (580) 233-9516

Course #: OK- OK-17-148 A-F

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

Date: January 15-17, 2018

Title: OAAA Annual Conference

Location: Embassy Suites Norman OK

Contact: Sandy Wells (405) 341-3548

Course #:

CEU's:	Category(s):
9	A
8	1A
4	2
3	3A
2	3C
1	4
1	5
3	6
1	8
8	10
1	11A
1	12

Date: January 17-18, 2018

Title: Red River Crops Conference

Location: Southwest Technology Center Altus OK

Contact: Gary Strickland (580) 482-0823

Course #:

CEU's: Category(s):

3 1A

3 10

Date: February 3, 2018

Title: Integrated Pest Management for the Food Environment

Location: Holiday Inn Express Denton TX

Contact: FISA Deborah Murphy (913) 397-1185

Course #:

CEU's: Category(s):

4 7A

2 7C

5 10

Date: February 3-8, 2018

Title: 2018 Golf Industry Show and Education Conference

Location: Henry B. Gonzalez Convention Center San Antonio TX

Contact: Katie Schuster (800) 472-7878

Course #:

CEU's: Category(s):

47* 3A

*OK Applicators can only earn 10 CEUs in 3A in a year.

Date: February 8-9, 2018

Title: DBi Services 2018 Annual Training

Location: Hilton Garden Inn & Edmond Conference Center

Contact: Jeri Richards (405) 478-1100

www.dbiservices.com

Course #:

CEU's: Category(s):

10 6

Date: February 14, 2018

Title: 2018 Ensystem CEU Workshop

Location: Holiday Inn Express Durant OK

Contact: Donald Stetler Jr. (281) 217-2965

www.ceuworkshop.com

Course #:

CEU's: Category(s):

2 3A

2 7A

1 7B

1 8

6 10

Date: September 18, 2018

Title: 2018 Ensystem CEU Workshop

Location: Hampton Inn & Suites 85th Ave Tulsa OK

Contact: Donald Stetler Jr. (281) 217-2965

www.ceuworkshop.com

Course #:

CEU's: Category(s):

2 3A

2 7A

1 7B

1 8

6 10

Date: September 19, 2018

Title: 2018 Ensystem CEU Workshop

Location: Holiday Inn Express Durant OK

Contact: Donald Stetler Jr. (281) 217-2965

www.ceuworkshop.com

Course #:

CEU's: Category(s):

2 3A

2 7A

1 7B

1 8

6 10

ODAFF Approved Online CEU Course Links

PestED.com

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

CEU School

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

Technical Learning College

<http://www.abctlc.com/>

Green Applicator Training

<http://www.greenapplicator.com/training.asp>

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/>

Univar USA

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

Southwest Farm Press Spray Drift Mgmt

<http://www.pentonag.com/nationalsdm>

SW Farm Press Weed Resistance Mgmt in Cotton

<http://www.pentonag.com/CottonWRM>

Western Farm Press ABC's of MRLs

<http://www.pentonag.com/mrl>

Western Farm Press Biopesticides Effective Use in Pest Management Programs

<http://www.pentonag.com/biopesticides>

Western Farm Press Principles & Efficient Chemigation

<http://www.pentonag.com/Valmont>

For more information and an updated list of CEU meetings, click on this link:

<http://www.oda.state.ok.us/cps-ceu.htm>

ODAFF Test Information

Pesticide applicator test sessions dates and locations for January/February are as follows:

January 2018		February 2018	
8	OKC	1	Enid
9	Goodwell	5	OKC
9	McAlester	6	McAlester
10	Lawton	8	Tulsa
11	Tulsa	13	Altus
16	Ardmore	20	Ardmore
22	OKC	20	OKC
25	Tulsa	22	Tulsa

Altus: SW Research & Extension Center
16721 US HWY 283

Ardmore: Carter County Extension Office
107 1st Ave Ardmore OK

Enid: Garfield County Extension Office,
316 E. Oxford.

Goodwell: Okla. Panhandle Research &
Extension Center, Rt. 1 Box 86M

Hobart: Kiowa County Extension Center
Courthouse Annex, 302 N. Lincoln

Lawton: Great Plains Coliseum,
920 S. Sheridan Road, Prairie Bldg

McAlester: Kiamichi Tech Center on
Highway 270 W of HWY 69

OKC: ODAFF Building 2800 N Lincoln
BLVD Oklahoma City OK (**New Location**)

Tulsa: NE Campus of Tulsa Community
College, (Apache & Harvard)
Large Auditorium

**Pesticide Safety
Education Program**