



*Key to Pesticide Safety and Education*

# The Pesticide Label

## July–August 2016

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### Regulatory Updates

#### *EPA proposes further restrictions on Paraquat to prevent accidental poisoning*

Paraquat dichloride is a highly toxic pesticide used as a crop defoliant and for weed control in agriculture and non-crop areas. Since 2000 there have been 17 deaths associated with paraquat being illegally transferred to beverage containers and consumed. One to two teaspoons can be lethal if ingested and there is no known antidote. To prevent accidental consumption, the EPA is proposing

new closed-system packaging, special training for certified applicators, and label changes to highlight the products’ toxicity. To reduce exposure to applicators, the proposals include restricting use to licensed pesticide applicators (no direct supervision allowed) and prohibiting application with hand-held or backpack equipment. A public comment period ended in May. Comments emphasized the importance of paraquat in controlling resistant weeds in agriculture. Action on the proposal is expected later this year.

*Source:* PEP-Talk, July, 2016 (Volume 20, Issue 3), Ohio Pesticide Safety Education Program, The Ohio State University. <http://pested.osu.edu/archives.html>

See **REGULATORY**, page 13

## Herbicide Carryover in Hay, Manure, Compost, and Grass Clippings (recertification article)



Article starts on the next page.

*The recertification article is on the next eight pages. It is a reprint of a leaflet titled Herbicide Carryover in Hay, Manure, Compost, and Grass Clippings (AG-727W Revised). J. Davis, S.E. Johnson, and K. Jennings. 2015. North Carolina State University. It explains how crops on farms and home gardens can be damaged by residues of certain herbicides remaining active in manure, compost and mulch containing grass from pastures, hayfields, commercial turf-grass, and lawns. The crop damage is not the result of spray drift. The original leaflet may be downloaded from either*

<https://content.ces.ncsu.edu/herbicide-carryover.pdf>

or

<https://gardening.ces.ncsu.edu/weeds/>

### Recertification credits may be earned by certified applicators

who score at least 70% on the open-book quiz about the recertification articles in this newsletter. These articles have a title followed by “(recertification article).” However, credits may not necessarily apply to the following categories: Private 2, Private 3, Commercial 7f, and Commercial 11. (The credits are also known as *continuing education units* or *CEU* credits.) The quizzes are administered by the Hawaii Department of Agriculture’s staff. See the full explanation and a link to the “List of Available Quizzes” at the bottom of the Department’s webpage

<http://hdoa.hawaii.gov/pi/pest/pesticide-applicator-certificationrecertification-2/>  
under the subtitle “QUIZ SESSIONS.”

To ask about earning recertification credits, call one of the Department’s phone numbers:

**Kauai** applicators—Call the Honolulu office, either directly (808) 973-9409 or 973-9411, or through the Kauai State Toll Free Access number 274-3141; and then enter extension 39409 or 39411 followed by “#.”

**Oahu** applicators—Call the Honolulu office directly (808) 973-9409 or 973-9411.

**Maui, Molokai** or **Lanai** applicators—Call the Honolulu office, either directly (808) 973-9409 or 973-9411; or through the Maui State Toll Free Access number 984-2400 and then extension 39409 or 39424 followed by “#.”

**Hawaii** island applicators—Call the Hilo office directly (808) 974-4143 or (808) 333-2844.

\* \* \*

recertification article

# HERBICIDE CARRYOVER IN HAY, MANURE, COMPOST, AND GRASS CLIPPINGS:

## Caution to Hay Producers, Livestock Owners, Farmers, and Home Gardeners

Many farmers and home gardeners have reported damage to vegetable and flower crops after applying horse or livestock manure, compost, hay, or grass clippings to the soil. The symptoms reported include poor seed germination; death of young plants; twisted, cupped, and elongated leaves; misshapen fruit; and reduced yields. These symptoms can be caused by other factors, including diseases, insects, and herbicide drift. Another possibility for the source of these crop injuries should also be considered: the presence of certain herbicides in the manure, compost, hay, or grass clippings applied to the soil.

### THE HERBICIDES OF CONCERN

Aminopyralid, clopyralid, and picloram are in a class of herbicides known as *pyridine carboxylic acids*. They are registered for application to pasture, grain crops, residential lawns, commercial turf, certain vegetables and fruits, and roadsides (Table 1). They are used to control a wide variety of broadleaf weeds including several toxic plants that can sicken or kill animals that graze them or eat them in hay. Based on USDA-EPA and European Union agency evaluations, when these herbicides are applied to hay fields or pasture, the forage can be safely consumed by horses and livestock—including livestock produced for human consumption. These herbicides pass through the animal’s digestive tract and are excreted in urine and manure. They can also remain active in the manure even *after* it is composted. The herbicides can also remain active in hay, straw, and grass clippings taken from

**Table 1. Herbicides registered for use in North Carolina that contain picloram, clopyralid, and aminopyralid**

Pasture and hayfields	Commercial turf and lawns	Commercial vegetables and fruits
Curtail (2,4-D + clopyralid)	Confront (triclopyr + clopyralid)	Clopyr AG (clopyralid)
Forefront (aminopyralid + 2,4-D)	Lontrel (clopyralid)	Stinger (clopyralid)
GrazonNext (aminopyralid + 2,4-D)	Millennium Ultra Plus (MSMA + 2,4-D + clopyralid + dicamba)	
Grazon P + D (picloram + 2,4-D)	Millennium Ultra and Ultra 2 (2,4-D + clopyralid + dicamba)	
Milestone (aminopyralid)		
Redeem R&P (triclopyr + clopyralid)		
Surmount (picloram + fluroxypyr)		

All products listed are manufactured by Dow Agrosciences, LLC with the exceptions of the Millennium products by Nufarm Americas Inc. and Clopyr AG by United Phosphorus, Inc.. Herbicide product names and formulations change; always check labels for active ingredients.

treated areas. The herbicides leach into the soil with rainfall, irrigation, and dew. As with many other herbicides, they can remain active in the treated soil.

Picloram, clopyralid, and aminopyralid can remain active in hay, grass clippings, piles of manure, and compost for an unusually long time. These herbicides eventually break down through exposure to sunlight, soil microbes, heat, and moisture. Depending on the situation, the herbicides can be deactivated in as few as 30 days, but some field reports indicate that complete deactivation and breakdown can take *several years*. Hay has been reported to have residual herbicide activity after three years' storage in dry, dark barns. Degradation is particularly slow in piles of manure and compost. When mulches, manures, or composts with residual herbicide activity are applied to fields or gardens to raise certain vegetables, flowers, or other broadleaf crops, potentially devastating damage can occur (Table 2).

**Table 2. Crops known to be sensitive to picloram, clopyralid, or aminopyralid**

Beans	Carrots	Compositae family
Cotton	Dahlias	Eggplant
Flowers, in general	Grapes	Legumes
Lettuce	Marigolds	Mushrooms
Peas	Peppers	Potatoes
Roses, some types	Spinach*	Sugar beets*
Strawberries*	Sunflowers	Tobacco
Tomatoes	Umbelliferae family	Vegetables, in general

\*Applies to aminopyralid and picloram only.

This information was obtained from product labels of many of the herbicides listed in Table 1, the DowAgriSciences article for cattlemen: ([http://www.dowagro.com/PublishedLiterature/dh\\_02a6/0901b803802a69fd.pdf?filepath=/PublishToInternet/InternetDOWAGRO/range/pdfs/noreg/010-57689](http://www.dowagro.com/PublishedLiterature/dh_02a6/0901b803802a69fd.pdf?filepath=/PublishToInternet/InternetDOWAGRO/range/pdfs/noreg/010-57689)) and the DowAgriSciences Manure Matters Web site (<http://manurematters.co.uk>).

## HOW TO PREVENT HERBICIDE DAMAGE TO NON-TARGET PLANTS

The label on every herbicide contains detailed instructions, including animal feeding restrictions and safe use of manure or crop residues. When used as directed on the labels, these herbicides should not cause the problems noted above.

The manures and plant residues are safe to apply to grass pastures and grass hayfields, effectively recycling them. Most of these herbicides have a crop rotation restriction of at least 12 months before certain vegetable or forage legume crops can be planted in treated land.

The problems arise when the hay, manure, grass clippings, or other affected materials are sold or given to others who have

no knowledge of the herbicides used or of the adverse effects their residues can have on other plants. The information about the herbicide persistence and effects on broadleaf plants does not always follow the hay, manure, compost, or other materials. Every individual in the chain of use of products treated with these herbicides should provide detailed information on the herbicide restrictions to prevent potentially catastrophic problems for other farmers, gardeners, and for themselves (including possible liability).

### Hay Producers and Dealers

If you raise hay, make sure you know if any herbicide used has the potential to remain active in the manure or urine after consumption. Communicate —verbally and in writing— if manure is not suitable for use as a fertilizer, soil amendment, or compost for broadleaf plants. Landowners should know and have a written record of the herbicides applied to their fields.\* Custom applicators must use all registered herbicides

in a manner consistent with their labeling and should communicate what products are applied to customers' fields and provide a copy of the herbicide label(s). The labels provide all the information on restrictions.

The herbicides of concern can also remain active on the hay itself. Do not sell or give away treated hay (even if it is several years old) for use as mulch or for making compost. The hay can be sold for consumption by livestock and horses, but be sure the purchaser is aware that the herbicide may pass through into the manure. Advise people feeding this hay to their animals to spread the manure on *grass* pastures or *grass* hayfields, being sure to follow all safety guidelines and regulations. According

to the labels, plant materials treated with these herbicides should not be considered safe for growing sensitive crops until the plant materials are completely decayed. Breakdown of the herbicides is most rapid in sunlight under warm, moist conditions and may be enhanced with irrigation. Accelerate breakdown of plant residues by incorporating them evenly into the *surface* soil.

\* EPA's Office of General Counsel recently interpreted section 12(a)(2)(G) of the Federal Insecticide Fungicide and Rodenticide Act (FIFRA), "It shall be unlawful for any person to use any registered pesticide in a manner inconsistent with its labeling" as it relates to a grower hiring an applicator to apply a pesticide and whether the grower can be held liable under FIFRA if there is not compliance on the grower's treated land with post application label requirements such as pre-harvest intervals, plant back restrictions, crop rotation restrictions, and restricted entry intervals. The Office of General Counsel believes a grower can be held responsible for any violations associated with these post application requirements.

**Livestock and Horse Owners**

If you buy hay for your animals, ask the farmer or seller which herbicides, if any, were used in producing the hay. Consult a copy of the herbicide label. A simple indicator that these herbicides were likely *not* used in the production of hay is the presence of legumes such as lespedeza, clovers, or alfalfa. If the hay has legumes in it, it has probably not been treated with any of these herbicides. The absence of legumes in hay, however, does not mean that these herbicides are present. If you do not know the herbicide history of the hay, do not sell or give away the manure from animals who consumed the hay for use in growing plants or to make compost, as it may contain one of the herbicides of concern. Manures that contain these herbicides can be safely spread on *grass* pastures or *grass* hayfields. Contact your local Extension agent or NRCS office to develop a manure management plan. Note: It takes three to seven days for most animals' digestive tracts to clear and the manure produced to be free of any herbicide residue.

**Farmers and Gardeners Wanting to Use Manure or Compost**

Before acquiring or using manure—fresh, aged, or composted—ask what the animals were fed, the origin of the hay, and what, if any, herbicides were used on the hay or pasture. Some livestock owners can tell you this, but many might not know the products used or origin of the hay they purchased. They may suggest the manure is “safe” because their animals have not been affected. If you don't know which, if any, herbicides were used, use the bioassay described below to test for the presence of these herbicides. Do not use the manure or compost to grow sensitive crops without knowing its herbicide history or testing to see that it is safe. If you find yourself with a small quantity of contaminated manure or compost, spread it on a *grass* pasture, *grass* hayfield, or nonsensitive, non-food crop area.

Take great care in using contaminated manure or compost to grow nonsensitive commercial food crops. Consult the herbicide product label to determine if the pesticide is registered for use (legally permitted to be applied) to that crop. If the product has already been applied to the soil, tilling it several times during the growing season, irrigating the area, and planting it into a non-sensitive cover crop for a year or two will help the herbicides break down. Conduct a pot or field bioassay, as described below, before planting any sensitive crops in the area.

**Farmers and Gardeners Wanting to Use Hay or Grass Clippings**

If you want to use hay or grass clippings as mulch or in your compost pile, find out what, if any, herbicides were used on the field or turf area. Be particularly careful about obtaining grass clippings from golf courses and other commercial turf fields where these herbicides are commonly used. Most homeowners do not use these herbicides because they are not labeled for use on residential lawns. Be careful about obtaining hay or grass clippings from sites where herbicides of concern may be commonly used. For instance, clopyralid-containing products have not been registered for use in residential lawns since 2002, so if pesticide applicators have followed label directions, clippings from residential lawns should not present a problem to use as mulch around vegetables and ornamentals.

As previously mentioned, the safest practice in residential lawns is to return grass clippings to the lawn. If you find yourself with contaminated hay or grass clippings, spread them on non-sensitive, non-food crop areas, burn them, or arrange to have them disposed of safely. If the hay or grass clippings have already been applied to the field or garden, remove them if possible, till the soil (multiple times will enhance degradation), sow a non-sensitive cover crop, and let it grow for a year or two to help the herbicide break down. Conduct a pot or field bioassay, as described below, before planting any sensitive crops in the area.

**HOW TO TEST FOR THE PRESENCE OF HERBICIDES: POT AND FIELD BIOASSAYS**

Some laboratories can test for the presence of these herbicides, but the tests are expensive and may not be as sensitive as a plant bioassay that you perform yourself. This simple pot bioassay involves growing beans, peas, or tomatoes, which are very sensitive to the presence of these herbicides, in the aged manure or compost.

First, take a number of random, representative samples (small shovelfuls) from throughout the pile of aged manure or compost, being sure to get deep inside the pile. Mix thoroughly. If there are separate sources of manure or compost, conduct individual assays for each. Prepare three to six small (4- to 5-inch) pots with a 1:1 mix of the manure or compost with a commercial potting mix containing fertilizer. Fill several control pots with only the commercial potting mix. Put saucers underneath each pot, or position the pots far enough apart so that water running out of the bottom will

not reach another pot. Plant three pea or bean seeds in each pot, water, and let them grow for two to three weeks. There should be at least three sets of true leaves on the peas or beans.

If the plants in the control pots grow normally and the ones in the pots with manure or compost do not, you can assume the manure or compost is contaminated with an herbicide that will adversely affect sensitive plants. If they all grow normally, it would be reasonable to assume that the manure or compost is fine. A similar test can be done with young tomato transplants, but herbicide damage may not appear until the plants first set fruit. In our studies, fruiting occurred five to seven weeks after the plant had been set in the mix. Keep in mind that these tests will be only as good as the samples you take. It would be better to err on the side of too many samples than too few (at least 20 per pile). You can create a similar test for hay or grass clippings by filling the pot with commercial potting mix and spreading a thick layer of the hay or grass clippings on top. This bioassay is explained in detail on the DowAgrisciences Manure Matters Web site (<http://www.manurematters.co.uk/>) and on the Washington State University Web site at <http://www.puyallup.wsu.edu/soilmgmt/Pubs/CloBioassay.pdf> (it recommends two parts manure or compost to one part potting soil).

If a field or garden site has previously been treated with one of the herbicides of concern or been contaminated through the application of treated manure, compost, hay, or grass clippings, a field bioassay can be conducted. Plant peas or beans in short rows scattered throughout the affected area. If herbicidal symptoms appear, do not plant sensitive plants; plant grasses. Test again the following year. If the test plants grow normally, it should be safe to grow broadleaf crops.

## RESPONSIBLE HERBICIDE USE = HEALTHY FARMS AND GARDENS

Animal manures and composts made from them are excellent sources of nutrients and organic matter for growing food crops. Soils mulched or amended with manure and compost become dark, aromatic, fertile, and active with earthworms and beneficial microorganisms. Farmers and gardeners are encouraged to use these products but must exercise proper caution to prevent damage.

Herbicides are important tools that hay producers use to produce quality, weed-free hay. The use of these herbicides is no more likely in North Carolina than in any other state. Many

North Carolina hayfields and pastures do not have herbicides applied on a regular basis. Hay and pasture acreage is among the “greenest” in North Carolina, delivering multiple environmental benefits.

Remember that each pesticide product label states, “It is a violation of Federal law to use this product in a manner inconsistent with its labeling.” Everyone should read an herbicide’s product label instructions before use. All parties need to be aware of the possibility of residual herbicide activity. Hay producers should inform buyers about herbicides they have applied to their fields and provide them with a copy of the herbicide label with the restrictions. Likewise, livestock and horse owners who give or sell manure for composting or crop production should be aware of what they are feeding their livestock and horses and share that information. All parties should communicate with the end users of the hay and manure. Farmers and gardeners should ask about the herbicide history of manure, compost, hay, or grass clippings they acquire. Farmers and gardeners need to be fully informed about what they are applying to their soil because the results can be disastrous for a farm business or gardener if one of these herbicides has been applied.

*Much of the information for this article came directly from the herbicide product labels and the United Kingdom DowAgrisciences Web site devoted to this issue (<http://manurematters.co.uk>).*

## RESOURCES FOR MORE INFORMATION

Washington State University Web site on clopyralid carryover.

Includes pictures of affected vegetables, research results, and the bioassay protocol:

<http://www.puyallup.wsu.edu/soilmgmt/Clopyralid.htm>

Article from Minnesota Extension explaining the problem in hay and how to avoid it. The article is devoted to “ditch hay,” but the information is relevant to all hay:

<http://www.extension.umn.edu/agriculture/horse/nutrition/harvesting-ditch-hay/>

CDMS Agro-chemical database with access to all the herbicide labels:

<http://www.cdms.net/LabelsMsds/LMDefault.aspx?t>

Dow Agrisciences United Kingdom Web site with information on aminopyralid:

<http://www.manurematters.co.uk/>

2014 NC Agricultural Chemicals Manual for information on recommended pesticides for use in NC:

<http://content.ces.ncsu.edu/north-carolina-agricultural-chemicals-manual/>

Herbicide Carryover in Manure—Last of the Tomato Study

Results: <http://ncalternativecropsandorganics.blogspot.com/2010/08/herbicide-carryover-in-manure-last-of.html>

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Published by

**North Carolina Cooperative Extension**

**NC STATE  
UNIVERSITY**

College of Agriculture  
and Life Sciences

## Protecting Your Cats and Dogs from Pesticide Poisoning (recertification article)



Article starts on the next page.

*The recertification article is on the next 5 pages. It is a reprint of the leaflet titled Protecting Your Cats and Dogs from Pesticide Poisoning (E. Bauer, C. Ogg, M. Carlson, J. Hyingstrom, E. Dorn, B. Beckman, University of Nebraska–Lincoln, and D. Stone, Oregon State University. May 2015.) It is about how cat and dog pesticide poisoning occurs, flea and tick collars, signs of pet poisoning, poisoning prevention, and what to do in case of poisoning. The original leaflet may be downloaded from*

<http://extensionpublications.unl.edu/assets/pdf/g2260.pdf>

## Landscape Plant ‘Doctor’ App



*Landscape MD*, a new, free app for iPhone, allows users to diagnose common diseases and insect pests of Hawaii landscape plants. It includes symptoms, IPM recommendations, pictures, and links to more information. Get it from

<https://itunes.apple.com/us/app/landscape-md/id1128558619?mt=8>

Credit for this app goes to Scot Nelson, Arnold Hara, and Ruth Niino-Duponte of the College of Tropical Agriculture and Human Resources, University of Hawaii at Manoa.

\* \* \*





recertification article

G2260

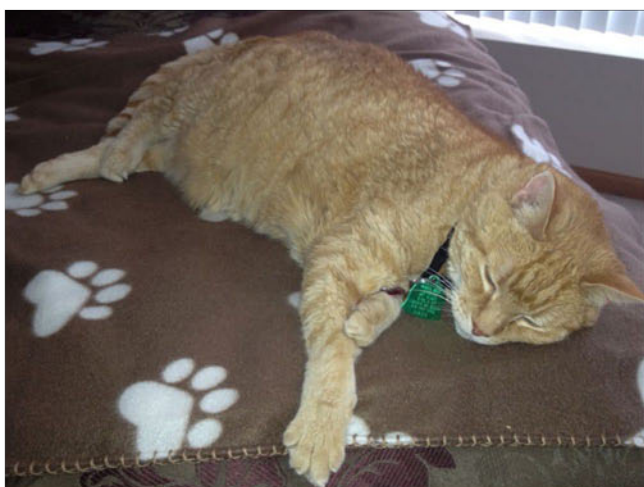
## Protecting Your Cats and Dogs from Pesticide Poisoning

Erin C. Bauer, Extension Associate; Clyde L. Ogg, Extension Educator; David L. Stone, Associate Professor, Oregon State University; Michael P. Carlson, Associate Professor of Practice; Jan R. Hygnstrom, Project Coordinator; Emilee A. Dorn, Extension Assistant; and Ben W. Beckman, Extension Assistant

This NebGuide discusses concerns about pesticide poisoning in pets, how to prevent accidental exposure, and what to do if poisoning does occur. Examples include pesticide poisoning through contact with pesticides in yards or homes (including ingestion of snail/slug baits), and misuse of flea and tick collars or spot-on treatments.

Pets are an integral part of our lives, and historically, pets have been recorded as living with humans for thousands of years. The American Veterinary Medical Association estimates there are over 69 million dogs and 74 million cats in the United States, with 36.5 percent of U.S. households owning dogs and 30.4 percent owning cats.

Pet owners wish to keep their pets healthy, which includes preventing and treating infestations by pests such as fleas and ticks, and reducing the potential for accidental poisonings from household or yard pesticides (*Figure 1*). This NebGuide will discuss how dog and cat pesticide poisonings occur, how they can be prevented, and precautions to take when using pesticides on or around pets. It also will examine how to re-



**Figure 1.** Pets are an integral part of our lives; protect them from pests and pesticide poisoning. Photo: University of Nebraska–Lincoln

duce the risk of exposure to humans when handling pets that have been treated with pesticides. This publication focuses on pet dogs and cats; many of the same precautions apply when preventing poisoning in other pets, such as reptiles, birds, rabbits, or rodents.

### How Cat and Dog Pesticide Poisoning Occurs

Dogs and cats can be exposed to pesticides that are used in and around the home, including antibacterial/antimicrobial cleaning products, garden and lawn care products, and snail/slug and rodent baits. Homeowners and pesticide applicators *must* read and follow the label when using these products, and store pesticides out of reach of pets and children. This can significantly reduce the risk of exposure.

Some common pesticides that can cause poisoning in dogs and cats are products used to control rodents; baits applied for slug and snail control; herbicides applied to lawns; and insecticides used in flea collars and spot-on products.

**Integrated Pest Management** – Although sometimes using pesticides is necessary, an Integrated Pest Management (IPM) approach can minimize pesticide use and greatly reduce the risk of accidental pet poisoning. IPM is an environmentally friendly approach that uses a variety of methods to control pests, including sanitation practices, exclusion, trapping and other mechanical controls, and less toxic pesticides. Using strategies such as snap traps for mice instead of rodenticides, or sticky traps instead of spraying to kill insects can greatly reduce the risk of accidental pet poisoning.

**Outdoor Pesticide Applications** – If other approaches have been tried and applying a pesticide is the most effective choice for controlling pests in or around the home, take precautions to protect your pet. Pick up all toys and food and water dishes from areas to be treated to avoid contaminating these objects with pesticide residue. Confine animals to areas where they will not be exposed. For example, keep them inside

when applying pesticides to the yard until liquid pesticides are dry, granular pesticides have been incorporated into the soil, or dusts have settled. This may take several hours. When walking dogs, keep them on the sidewalk and away from yards that have been treated (*Figure 2*).



**Figure 2. Keep pets off the yard after applying pesticides; wait for pesticides to dry or be integrated into the soil before allowing access. Photo: University of Nebraska–Lincoln**

**Baits** – Baits commonly used in pest control that can be harmful to animals include those for rodents and snails/slugs. Put any rodent baits used indoors or outdoors in tamper-proof stations in places inaccessible to pets. Dogs and cats are very susceptible to poisoning if they eat rodenticides such as brodifacoum, as these products are formulated to kill mammals. In addition, a pet can receive secondary poisoning if it is exposed to or eats a poisoned rodent, although this is more commonly seen in wildlife predators. Preferably, use snap traps instead of bait, but still keep traps in tamper-proof stations to prevent injury.

If controlling snails or slugs using molluscicides, such as metaldehyde, be especially careful applying these products around dogs. Dogs tend to be voracious consumers of bait products, whereas cats are more selective. Many times, baits are formulated with bran or molasses to make them more attractive to slugs and snails; these materials are also very attractive to dogs.

**Indoor Pesticide Applications** – To control pests like cockroaches indoors, use crack and crevice treatments, such as gel baits or dust treatments, to reduce the risk of exposure to pets. In general, these are less toxic products and are formulated for use in areas where pests hide but that people and animals can't access. Household cleaners designed to kill microbes are considered pesticides and could be harmful to pets. Be sure to keep these chemicals in locations that are locked or otherwise inaccessible to dogs and cats.

If other types of pesticide treatments are necessary, keep pets in another area of the home, away from the treated site, until the liquid pesticide is dry. Remember that the label is the law. When using any pesticide, follow the label information on the proper application procedure for that product, as well as how to protect people and your pets from exposure.

**Spot-on Treatments** – A spot-on treatment is a pesticide-containing solution that is applied somewhere on the animal's body that the animal cannot lick, such as between the shoulder blades (*Figure 3*). These products may contain pyrethrins, fipronil, imidacloprid, selamectin, dinotefuran, or permethrin, plus, in some products, additives that make the active ingredient more effective. These pesticides help control adult insects, but some products also contain an insect growth regulator (IGR), which stunts or prevents growth of insects or keeps them from developing properly, thus controlling the insects' immature life stages. IGRs might include methoprene, fenoxycarb, or pyriproxfen.

After application, some pesticides can penetrate the skin and enter the blood stream (e.g., selamectin, which also controls heartworm), spreading throughout the pet's body. Other pesticides can remain in the sebaceous (oil) glands of the skin or on skin surrounding the shafts of hair (e.g., fipronil). Either way, a flea or tick that contacts or bites the treated animal is exposed to the pesticide and killed. This reduces irritation caused from pest bites and the diseases transmitted by them.

Pet owners must use these products according to label directions or as directed by a veterinarian. The spot-on treatments may be used for several months (follow a vet's recommendation) during times when fleas or ticks are known to be active in the pet's locale.



**Figure 3. Applying spot-on treatment to a small dog. Photo: University of Nebraska–Lincoln**

Spot-on products are generally safe when used as directed, but excessive or unintended exposures may occur. For example, over-application may occur when one person does not know another has already applied a treatment, or there is pet-to-pet or human-to-pet contact with the treated site. Follow application instructions provided by the product manufacturer or consult a veterinarian if you have questions.

**Pet-to-pet Transfer** – Pet-to-pet transfer can occur if one animal comes in contact with the spot-on treatment site on another animal. Risk of exposure would be greater if oral contact is made; this might occur during mutual grooming. Dog-to-cat transfer of permethrin can result in a neurotoxic reaction. Keep a treated pet separated from other pets until the pesticide product has had time to dry.

**Pet-to-human Transfer**—The potential for human exposure to spot-on treatments exists when people handle the dog or cat soon after treatment. Children are especially vulnerable because they often sit at the animal's level and interact with the pet at close range, making them more apt to touch the spot-on application site. In addition, children are less likely to wash hands after petting the animal and before eating, using the restroom, or sucking a thumb. Because of children's developing bodies, including respiratory, endocrine, nervous, and other systems, they are more susceptible to the effects of pesticides (Gouge and Lee-Melk, 2008; Green and Gouge, 2011). Keep children away from the pet until the pesticide has dried and been absorbed into the animal's skin and fur. This may take several hours. The pesticide label will provide instructions for proper and safe use.

**Pet Weight and Age**—Because of the wide variety of dog and cat breeds, spot-on treatments are available for different animal weights. The owner must know the weight of the pet before purchasing a product. Many spot-on products give a weight range (for example, up to 22 lbs or 23-44 lbs) for applying the product, and have separate products available for different weight ranges. Do not divide a product meant for a larger breed into two doses for a smaller breed; the dosage amount may be too high for the smaller dog and such use violates label directions.

Product labels may state age and weight restrictions for use of the product (*Figure 4*). For example, you may not be able to apply a pesticide to very young puppies. Other restrictions may apply for pregnant or lactating females. It is very important to follow these instructions closely.

A product labeled for use in one species should not be used in another unless specifically instructed by a veterinarian. For example, cats are more susceptible to poisoning by certain active ingredients than dogs, so if a spot-on treatment intended for a dog is used on a cat, the cat may be excessively exposed to these ingredients. One example of this is permethrin, used in some spot-on dog formulations. Exposed cats can exhibit signs involving the nervous system, such as tremors, muscle twitches, and seizures (Richardson, 2000). If these signs occur and a cat has been around permethrin, take the animal to the vet for assessment and treatment.

Consult your veterinarian if you have questions about your particular pet's needs and follow label directions carefully to ensure the product is used effectively and safely (*Figure 5*).

**Protect Yourself when Applying Spot-on**—To reduce risk of exposure when applying spot-on treatments, wear chemical-resistant gloves to prevent absorption into the skin. Immediately after applying the pesticide, dispose of the product applicator by enclosing it in plastic wrap or, if you wore disposable gloves, wrap those around it, before discarding. Deposit this waste in a trash container outdoors, not in the house or garage. Finally, thoroughly wash your hands.

### Flea and Tick Collars

Some flea and tick products are impregnated in a collar that the pet wears for several months. These collars slowly



Figure 4. Age and weight requirements will be listed on flea and tick products. Photo: University of Nebraska–Lincoln



Figure 5. Always follow label directions when applying flea and tick products to pets. Photo: University of Nebraska–Lincoln

release the pesticide to provide pest control over an extended period. Using a flea collar is less messy than applying spot-on treatments and may require fewer applications, as these collars provide treatment for 3-8 months, depending on the active ingredient, compared to 1-2 months with spot-on. However, some studies have shown that pesticide residues from flea and tick collars can remain in the pet's fur, exposing the pet, other household pets, and the owners to pesticides (Dyk, Liu, Chen, Vega, & Krieger, 2012). Some pets dislodge and chew their own or other pets' collars, thus ingesting pesticide. You may wish to discuss the disadvantages and advantages of flea and tick control options with your veterinarian before deciding on a product formulation.

### Signs of Pet Poisoning

Because animals are unable to tell their owners that they aren't feeling well, they can't describe symptoms, or what they are experiencing, after a pesticide exposure. Instead, the owner or vet must rely on signs, or observations of physical changes, seen in the cat's or dog's behavior. Some common signs seen in pets after being exposed to pesticides include drooling, vomiting, diarrhea, tremors, uncoordinated walking, and seizures. If you observe any of these signs in your pet and have recently applied pesticides in or around the house or yard or through a spot-on or flea and tick collar treatment, seek advice from a veterinarian and consider bathing the pet to remove surface residue that could contribute to ongoing exposure, before taking further steps. If signs indicate a severe reaction, don't wait, take the pet to the vet immediately for assistance.

## Poisoning Prevention

To reduce the risk of pesticide poisoning in dogs or cats, follow these steps:

- Keep pets out of areas (yard or home) when liquid or granular pesticide products are being applied. Remove any food and water, toys, or bedding from the treatment area prior to application.
- After the application, let the pesticide solution dry completely or let granular dust settle before allowing pets into the area again. The label may provide guidance on re-entry intervals.
- Keep pesticide containers tightly sealed and store pesticides out of reach of pets. A good location is a locked cupboard. Many pets can figure out how to open doors in lower cabinets and therefore encounter pesticide containers or flea/tick treatment boxes. After use, deposit trash in outside trash containers.
- Put rodent and snail/slug baits in tamper-proof stations in areas that are out of reach. Rodenticides are poisonous to all mammals if swallowed. Secondary poisoning can occur if pets eat poisoned rodents. Consider using snap traps or other nonchemical methods rather than poison baits if you have pets.
- Apply flea and tick products according to the label and only on the animal intended (*Figure 3*). Do not use a dog product on a cat, a product meant for a large animal on a small animal, or a product intended for an adult on a very young animal. In addition, do not apply a product on an animal that is intended for application to indoor or outdoor sites, even if the active ingredient is the same.
- Notify all family members when a pet or a yard will be treated.

### What to Do in Case of Poisoning

If you suspect your pet has been poisoned by flea and tick products or other pesticides, follow the label directions for first aid and take the pet to your veterinarian immediately. If you know the source of the poisoning, bring the label with you to help medical personnel determine the proper treatment.

You can call the National Animal Poison Control Center (University of Illinois) at 1-800-548-2423, the ASPCA Animal Control Center at 1-888-426-4435, or the Pet Poison Helpline at

1-800-213-6680 in case of emergencies. A fee may be charged for services. When calling an emergency hotline, provide as much of the following information as possible:

- Your contact information, including name, address, and telephone number;
- Information concerning the pesticide exposure (when the exposure occurred, the amount of product swallowed, etc.);
- The species (cat or dog), breed, sex, age, and weight of the animal(s);
- The name of the pesticide your pet was exposed to, and;
- The signs of exposure your animal is showing.

### References and Resources

- American Veterinary Medical Association, <https://www.avma.org/Pages/home.aspx>
- ASPCA, *Animal Poison Control*, <http://www.aspc.org/pet-care/animal-poison-control>
- Dyk, M.B., Y. Liu, Z. Chen, H. Vega, & R.I. Krieger (2012). Fate and Distribution of Fipronil on Companion Animals and in their Indoor Residences Following Spot-on Flea Treatments. *Journal of Environmental Science and Health, Part B: Pesticides, Food Contaminants, and Agricultural Wastes*. 47:10, 913-924.
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- OSU Extension Publication, *Keep Pets Safe Around Pesticides* (Stone & Bunch, August 2012).
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- Richardson, J.A. (2000). Permethrin Spot-On Toxicoses in Cats. *The Journal of Veterinary Emergency and Critical Care*. 10:2, 103-106.

**This publication has been peer reviewed.**

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**Index: Pesticides  
General Safety  
Issued May 2015**

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## REGULATORY

Continued from page 1

### Special Local Need (SLN) Registrations

New or Renewed since the last issue of this newsletter

None.

Expired or Expiring June 1–November 30, 2016

For users of the product **Prozap® Zinc Phosphide Oat Bait** (HACCO; **61282-14**)—to treat **rangeland, pasture, uncultivated agricultural areas, and rural non-crop sites surrounding residential and resort areas**—as permitted by the SLN registration **HI-010001**—is not allowed on or after the expiration date **7/26/2016**.

For users of the product **Dupont™ Assure® II Herbicide** (DuPont; **352-541**)—to treat **corn**—as permitted by the SLN registration **HI-110001**—is not allowed on or after the expiration date **8/1/2016**.

For users of the product **GoalTender® Herbicide** (Dow AgroSciences; **62719-447**)—to treat **non-bearing pineapple**—as permitted by the SLN registration **HI-070001**—is not allowed on or after the expiration date **8/17/2016**.

For users of the product **Admire® Pro Systemic Pesticide** (Bayer CropScience; **264-827**)—to treat **field**

**corn grown for seed production, research and breeding purposes**—as permitted by the SLN registration **HI-110002**—is not allowed on or after the expiration date **11/9/2016**.

### Video “Getting up to speed on the new Worker Protection Standard”

(July 6, 2016. Forrest Laws, Delta Farm Press)

<http://deltafarmpress.com/government/getting-speed-new-worker-protection-standard>

This is a 4-minute video about the updated rules for agricultural *employers* to protect certain agricultural *employees* from pesticides used to grow *agricultural plants*. Agricultural *field workers* and *pesticide handlers* should be protected from pesticide products, dust, spray drift, fumes, and residues in soil and water or on surfaces in the treated area. The rules will take effect nation-wide in two phases, the first starting January 2, 2017 and the second starting January 1, 2018. The speaker, Kim Pope Brown (Louisiana State University), was recorded at the Louisiana Farm Bureau Annual Convention in June 2016.

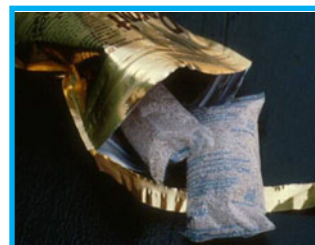
\* \* \*

recertification article

## Plans to Update Water Soluble Packet Handling Instructions (recertification article)

The U.S. Environmental Protection Agency (EPA), in a July 21, 2016 email message, explained why it is planning to take two actions that will lower the risk of exposure when handling certain pesticides sold in water soluble packaging (WSP). The actions would affect manufacturers and users of only those WSP products which are powders to be diluted with water. Although it has not yet set a schedule for its actions, the Agency wants the manufacturers to update mixing and loading instructions on their products' labels and it wants users of the products to get training on the updated handling procedures.

The WSP products are labeled for application with spray equipment. Outer packaging is typically a waterproof foil-like envelope or pouch, or a plastic jar or bucket, each containing one to many packets of a specific amount of a powdered pesticide, such as 0.33 ounce, 2¼ ounces, or 1 pound. The packet itself is a sealed bag made of a film of *polyvinyl*



See WSP, page 20

## Pesticide Labels from the Internet

The webpages listed below allow you to download and review labels of pesticide products. A downloaded label can give you an idea of how the pesticide could be used because it is similar to the label actually attached to the product's container. But because they may be different, you should follow the instructions on the label attached to your container whenever you store, use, or dispose of the product or its container.

Two differences involve the product's *Net Weight* or *Net Contents* and the *EPA Establishment Number* or *EPA Est. No.* They will be on the container's label because federal and state rules require it but they are usually missing from a specimen label. Two other possible difference are that it may be an earlier or a later version of the one on your product's container, or it may have been written for another state or region of the U.S. Definitely expect differences between your container's label and any document identified as a *specimen label* (usually by the wording of the hyperlink to the document or by a stamp, watermark, or words on the document itself).

Another disadvantage of a downloaded label is that it is usually not considered a legal substitute for the container's label. This is important because the Hawaii Department of Agriculture's pesticides inspectors mainly base their inspections on the labels attached to your pesticide containers.

Caution! Labels for Canada, Australia, or other countries are not correct for the U.S. So focus on labels that show an *EPA Registration Number* or *EPA Reg. No.* They were written to account for U.S. laws and regulations, words and phrases, place names, and institutions.

### Various manufacturers websites

Find the homepage of the product's manufacturer. Then browse for a list of product names. For each product, look for a link to the "label and SDS."

<http://agrian.com/home/label-lookup/overview>

Start near the bottom by finding the wide box for Quick Product Label Search. Type in that box as much of the product name as you're sure of. Then click on the green button for Search.

<http://cdms.net/LabelsMsds/LMDefault.aspx>

In the narrow left column, click on the product manufacturer's name to start; then click on the product's name. If you already know the product's name, click on the small black triangle next to "Product Search."

<http://greenbook.net>

You will be asked to register or log in before you can search this website.

<http://hdoa.hawaii.gov/pi/pest/licensed-pesticides>

This is for the searchable list of pesticides that are licensed for sale and use in Hawaii by the State of Hawaii Department of Agriculture. Instructions for downloading a label are on the next page. Names of restricted use pesticides are in all capital letters, like this: **MAVINOL SYSTEMIC INSECTICIDE**

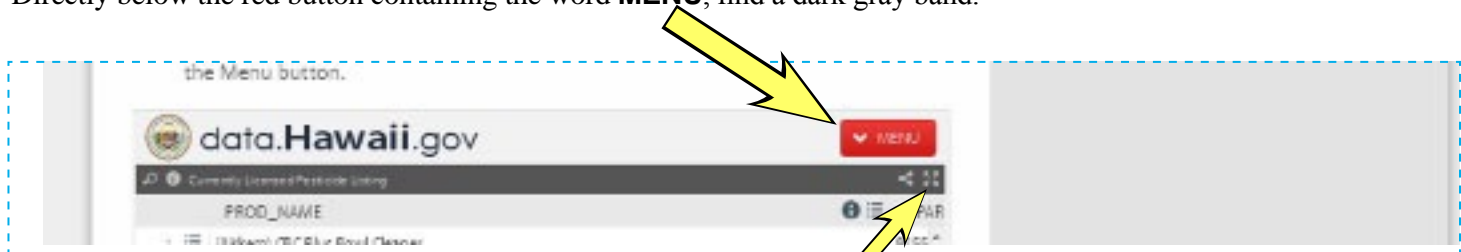
*Continued on page 15*


Continued from page 14

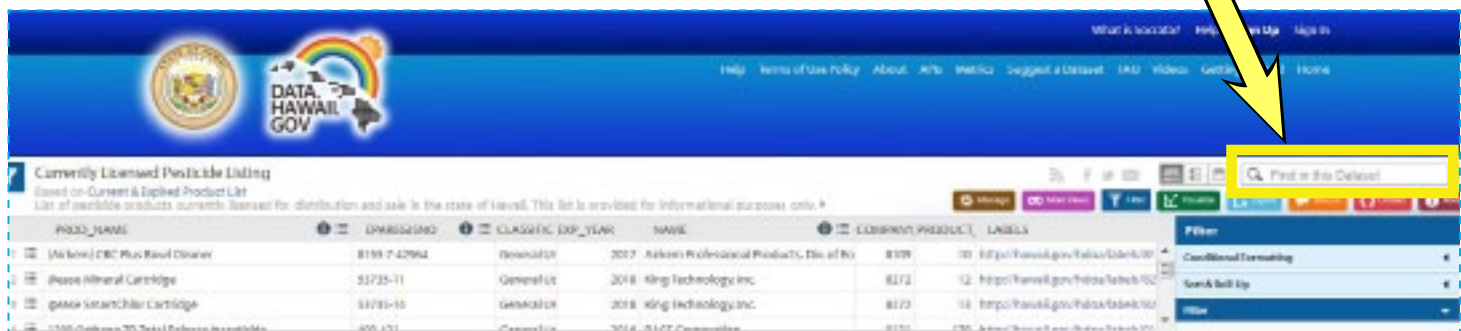
## State of Hawaii Department of Agriculture's Webpage for LICENSED PESTICIDES

To download a label of a pesticide that is licensed for sale and use in Hawaii, use the Hawaii Department of Agriculture's website. Here's how:

1. View the webpage at <https://hdoa.hawaii.gov/pi/pest/licensed-pesticides>.
2. Directly below the red button containing the word **MENU**, find a dark gray band.



3. Near the right edge of the dark gray band, click on the tiny image  containing four outward pointing arrows.
4. Another webpage will open. Near the top right corner above the row of colorful buttons, find a **flat box**. Type in that box as much of the product name as you're sure of. Press your ENTER key.



5. Still another webpage will open. Wait for it to finish loading. Look under **PROD\_NAME** (left column) for a list of product names that contain whatever you typed. Then, under **LABELS** (right column), find a link in light blue lettering for each product name. If it's not visible, scroll to the right or widen your web browser.



6. Click on the link of your choice to download a PDF of the label. But if you just want to know whether or not the pesticide is a restricted use product, check the spelling of the product name. All capital letters means that the product is a restricted use pesticide. Or, look under **CLASSIFIC** (column 3) for either State Restricted or Federal Restricted.
7. Instead of the product name, you can search for the product's EPA Registration Number or the Company Name of the product's manufacturer by starting at step 4 (above).

**Caution! Before you use any pesticide, read and heed the directions printed on the container's label. Those may be different from the ones on a label you get from the Internet. Remember: Enforcement of pesticide rules is mainly based on the label attached to your product's container.**

## Rainfastness of Pesticides (recertification article)



Article starts on the next page.

*The recertification article is on the next three pages. It is a reprint of a leaflet titled Rainfastness of Pesticides (B. Wells and F.M. Fishel. University of Florida. August 2014. Publication #PI238). It explains what make a spray stick to the treated foliage and not wash off with rain or irrigation. The original leaflet may be downloaded from this University of Florida webpage:*

<http://edis.ifas.ufl.edu/pi238.pdf>

OR

[http://edis.ifas.ufl.edu/topic\\_general\\_pesticide\\_information](http://edis.ifas.ufl.edu/topic_general_pesticide_information)



recertification article

## Rainfastness of Pesticides<sup>1</sup>

Bonnie Wells and F.M. Fishel<sup>2</sup>

### Introduction

Applicators of pesticides often question whether an application they have made will be effective if rainfall occurs too soon after the application. But what is too soon? Is it 10 minutes, an hour, 4 hours, 24 hours, etc.? Rainfall occurring after application can have a significant effect on the residual activity and efficacy of pesticides. A pesticide's rainfastness, or its ability to withstand rainfall, is an important factor affecting the efficacy of foliar-applied pesticides. Generally, it is best to avoid pesticide application when rainfall is likely; however, weather can be unpredictable, so it is best to choose a product with good rainfast characteristics.

### Definition of Rainfastness

A pesticide is considered rainfast after application if it has adequately dried or has been absorbed by plant tissues so that it will still be effective after rainfall or irrigation. The degree of rainfastness of pesticides is highly variable. The best source for determining rainfastness for a particular product is to consult its label. Some products contain statements that specifically address the length of time necessary for rainfastness to occur (Figure 1). In many cases, limited or no information about rainfastness is included on the label, and the wording is often vague (Figure 2). Some product labels will expressly prohibit an application if rainfall is expected within a stated timeframe (Figure 3).

Others may *recommend* that a product is not applied within a stated timeframe (Figure 4).

**Rainfastness**  
**Fusilade DX Herbicide is rainfast one hour after the application.**

Figure 1. Label wording example seen on a pesticide label.  
 Credits: CDMS Agrochemical Database, <http://www.cdms.net/LabelsMsds/LMDefault.aspx?t=>

**Rainfastness: Heavy rainfall soon after application may wash this product off of the foliage and a repeat application may be required for adequate weed control.**

Figure 2. Label wording example seen on a pesticide label.  
 Credits: CDMS Agrochemical Database, <http://www.cdms.net/LabelsMsds/LMDefault.aspx?t=>

#### USE PRECAUTIONS

- DO NOT apply this product through any type of irrigation system.
- DO NOT apply this product if rainfall is expected within 24 hours of application.
- DO NOT feed gin trash, treated foliage or immature crops to livestock.

Figure 3. Label wording example seen on a pesticide label.  
 Credits: CDMS Agrochemical Database, <http://www.cdms.net/LabelsMsds/LMDefault.aspx?t=>

**FOLEX 6 EC is effective when applied to cotton with a heavy dew. Once FOLEX 6 EC has dried on the leaf, subsequent rainfall or dew does not adversely affect its activity. Application of FOLEX 6 EC is not recommended when heavy rainfall is expected within 1 hour after treatment. Conditions which delay absorption into the leaves are primarily those which caused the cotton leaves to be wilted, toughened, or leathery. When these conditions prevail use diesel oil instead of water.**

Figure 4. Label wording example seen on a pesticide label.  
 Credits: CDMS Agrochemical Database, <http://www.cdms.net/LabelsMsds/LMDefault.aspx?t=>

1. This document is PI238, one of a series of the Agronomy Department, UF/IFAS Extension. Original publication date August 2011. Reviewed August 2014. Visit the EDIS website at <http://edis.ifas.ufl.edu>.
2. Bonnie Wells, graduate student, Doctor of Plant Medicine program, and F. M. Fishel, professor, Agronomy Department, and director, Pesticide Information Office; UF/IFAS Extension, Gainesville, FL 32611.

The use of trade names in this publication is solely for the purpose of providing specific information. UF/IFAS does not guarantee or warranty the products named, and references to them in this publication do not signify our approval to the exclusion of other products of suitable composition. Use pesticides safely. Read and follow directions on the manufacturer's label.

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U.S. Department of Agriculture, UF/IFAS Extension Service, University of Florida, IFAS, Florida A & M University Cooperative Extension Program, and Boards of County Commissioners Cooperating. Nick T. Place, dean for UF/IFAS Extension.

## Impact of Rainfastness on Pesticide Performance

Rainfall can adversely affect a pesticide application by (1) directly washing the pesticide away or physically removing it, (2) diluting the product to a less effective form, (3) redistributing the active ingredient, or (4) extracting the pesticide from the plant tissue altogether. The overall rainfastness of a pesticide depends on which of these factors or combinations of these factors are occurring, the time between the application and the rainfall event, the amount of rainfall, the formulation of the pesticide, and the properties of the target surface. Research conducted in Michigan suggests that the duration of a precipitation event is relatively unimportant, but the amount of rainfall will significantly impact the insecticide residues remaining on the fruit and leaves of the plant (Table 1) (Wise 2010). Removal of pesticides is greatest when rainfall occurs within 24 hours after application (McDowell et al. 1985).

While it is important to know the rainfastness of a pesticide when considering re-application following a rainfall event, the target pest's biology, behavior, and threat to the crop must also be considered. For example, a pesticide may be highly susceptible to wash-off, but the pest may be highly sensitive to the active compound, and adequate residues remain on the crop for protection. Also, the potential for wash-off can be different for foliar, fruit, or soil-applied compounds.

## Effects of Formulation on Rainfastness

The formulation of a pesticide is the mixture of active ingredients with other inert ingredients, and it has a significant effect on the rainfastness qualities of the product. Inert ingredients are added for ease of applicability and safety and to improve the accuracy and effectiveness of the pesticide. Solvents, wetting agents, stickers, powders, and granules can be added to active ingredients to yield a more durable and effective product. Some modern pesticides are formulated for slow release. A single pesticide can have many formulations, so the best formulation for each job overall should be considered.

Dusts and wettable powders are more susceptible to wash-off than emulsion formulations of pesticides (Ebeling 1963). Dusts are finely ground mixtures of the active ingredient with clay, talc, or other such materials, and they usually contain a low percentage of active ingredients. This would allow rain to easily wash off the active compound. Wettable

powders (W or WP) are similar to dusts, but contain a wetting and dispersing agent. Wettable powders have a more concentrated active ingredient than dusts, but are still generally prone to wash-off. For emulsifiable concentrates (E or EC), the active ingredient is dissolved in an oil or a solvent, and then an emulsifier is added so that it can be mixed with water for application. Emulsifiable concentrates and wettable powders are the most commonly used formulations. Biopesticides are generally not as rainfast as modern conventional products.

## Adjuvants to Improve Rainfastness

Adjuvants that increase absorption of the product into plant tissues can be added to increase the rainfastness and overall performance of a pesticide. Adjuvants can either be included in the formulation or added to the spray tank before application. Adjuvants to enhance rainfastness of pesticides can include surfactants, oils, deposition agents, and thickeners. In particular, organosilicone surfactants are commonly used to improve rainfastness, reduce surface tension, and enhance spreading ability (Figure 5). A simulated rainfall study showed that several latex-based adjuvants improved rainfastness of chlorpyrifos, an organophosphate insecticide, when it was applied in its emulsifiable concentrate formulation (Thacker and Young 1999). Some products' labels will state to use an adjuvant to improve the rainfastness characteristics.

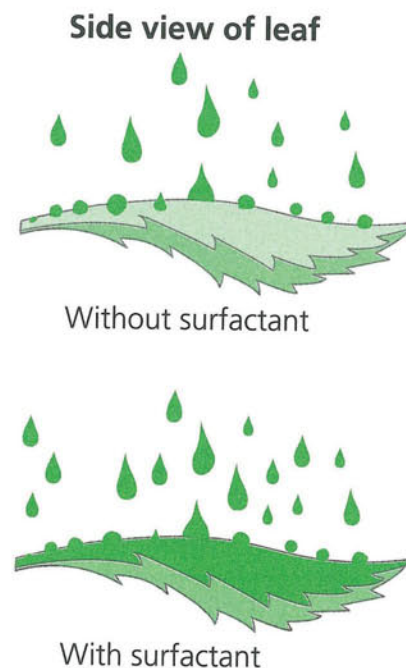


Figure 5. Surfactants increase spreading a pesticide evenly over a leaf. Credits: National Pesticide Applicator Certification Core Manual, <http://www.nasda.org/workersafety/>

## Conclusions

Always consult the product's label for information if there is any question regarding rainfastness of a pesticide. If the label states a specific length of time is required following the application for rainfastness to occur, never make an application if a rainfall event is scheduled to occur within that timeframe. If no such specific information exists on the label, or the information is stated in vague terms, use common sense. For such products, don't make foliar applications if a rainfall event is forecasted within the next 24 hours.

## References and Additional Information

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Wise, J. 2010. "Rainfast Characteristics of Insecticides." Crop Advisory Team Alert: 2-4. Michigan State University. [http://msue.anr.msu.edu/news/rainfast\\_characteristics\\_of\\_insecticides](http://msue.anr.msu.edu/news/rainfast_characteristics_of_insecticides) [15 November 2012].

Table 1. Insecticide rainfastness ratings.<sup>1</sup>

Insecticide class	Rainfastness ≤ 0.5 inch		Rainfastness ≤ 1.0 inch		Rainfastness ≤ 2.0 inch	
	Fruit	Leaves	Fruit	Leaves	Fruit	Leaves
Organophosphates	L <sup>2</sup>	M	L	M	L	L
Pyrethroids	M	M	L	M	L	L
Carbamates	M	M	L	M	L	L
Insect growth regulators	M	H	ND	ND	ND	ND
Neonicotinoids	M, S	H, S	L, S	L, S	L, S	L, S
Spinosyns	H	H	H	M	M	L
Diamides	H	H	H	M	M	L
Avermectins	M, S	H, S	L, S	M, S	L	L

<sup>1</sup> Source: 2010 Michigan Fruit Management Guide E-154 (Wise 2010).

<sup>2</sup> H – Highly rainfast (≤ 30% residue wash-off), M – moderately rainfast (≤ 50% residue wash-off), L – low rainfast (≤ 70% residue wash-off), S – systemic residues remain within plant tissue, ND – no data available.

## WSP

*Continued from page 13*

alcohol (PVA), a clear plastic-like substance that will dissolve in water. Typical instructions on products' labels explain how to handle a packet when making the tank mix, something like this:

**MIXING:** Within each pouch is a clear inner packet containing [PRODUCT NAME]. The clear inner packet is water soluble. Do not allow packets to become wet prior to adding to the spray tank. Do not handle the clear inner packets with wet hands or wet gloves. Rough handling may cause breakage. Reseal pouch to protect remaining packets.

To prepare the spray mixture, drop the required number of unopened clear water soluble packets, as determined under "Recommended Applications", into the spray tank while filling with water to the desired level. Operate the agitator while mixing. Depending on the water temperature and the degree of agitation, the packets should be completely dissolved within a few minutes from the time they are added to the water. Cooler water temperatures increase the time needed for the packet to dissolve completely.

**CAUTION:** Do not use [PRODUCT NAME] in a tank-mix with products that contain Boron or release free chlorine. The resultant reaction of the polyvinyl alcohol (PVA) packaging and boron or free chlorine is a plastic which is not soluble in water or solvents such as diesel oils, kerosene, gasoline or alcohol. [PRODUCT NAME] is compatible with chlorinated water. Do not attempt to use the WSP packets directly in diesel oils or summer spray type oils as in ULV or LV uses. PVA packets are water soluble not oil soluble.

The Agency also explained its concerns arising from recent findings of the Agricultural Handler Exposure Task Force (AHETF):

*During monitoring in the early phases of this study, AHETF observed that some workers placed the WSPs in removable baskets hanging from the open hatch, or placed WSPs directly into the tank, and then used streams of water from hoses or overhead recirculation systems as agitation methods to break open and dissolve the WSPs. These procedures caused visible amounts of airborne powder and liquid aerosol that came out of the mix tanks where the mixer/loader was working. Breaching the packets to facilitate release of the powders is contrary to the intent of packaging the powdered formulation in WSPs and circumvents the engineering control properties of WSPs. The increased exposures from the unacceptable work practices are visually depicted in the slide in attachment 1 [reprinted above] for SFIREG's background information. The current labels are silent or unclear on the use of baskets in the hatch and methods of agitation.*

*Beyond the above, AHETF found that out-of-order tank mixing, specifically the addition of WSPs after already loading fertilizer, resulted in poor dissolution; product labels instruct users to dissolve WSPs prior to including other spray tank additives such as fertilizer. Also, in a couple of instances during the study, as a result of rough handling, the packaging of the WSPs was broken/breached and no longer constituted WSPs.*

U.S. Environmental Protection Agency



Photo from EPA's attachment 1: The small white cloud coming out of the sprayer tank's opening is an aerosol of airborne powdered pesticide formed after the stream of water broke open a water soluble packet that was placed in the removable basket (not visible) hanging inside the sprayer tank's open hatch.

*Continued on page 21*

*Continued from page 20*

EPA also asked states' pesticide regulatory agencies for comments on the instructions it proposes for updating labels:

Draft Revised Mixing/loading Instructions for WSPs

1. Do not handle cartons or packages of WSPs roughly.
2. Remove any basket/strainer from the tank hatch.
3. Fill tank to approximately one-third to one-half of the desired final volume of spray.
4. Stop adding water and any agitation.
5. Add WSPs to the surface of the water in the tank.
6. Start mechanical and recirculation agitation from the bottom of tank without using any overhead recirculation. If overhead recirculation cannot be turned off, close the hatch before starting agitation. Do not direct water from a hose or fill pipe to break the bags.
7. Dissolving the WSPs may take up to 5 minutes or longer, depending on water temperature, hardness and intensity of agitation. Check periodically, avoiding any dusts or recirculating spray mix.
8. When the bags have fully dissolved and the powder has gone into suspension in the water, other products may be added.
9. Resume filling the tank with water to the desired level.
10. Maintain agitation while filling and driving/flying to the spray site and during application.
11. Follow all other label instructions regarding the handling of WSPs.

The set of 11 instructions was drafted by the AHETF in consultation with representatives from EPA, California's Department of Pesticide Regulation and the Canadian Pest Management Regulatory Agency

*Source: EPA's July 21, 2016 email message "Water Soluble Packaging Issue: Soliciting SFIREG comments by August 26, 2016"*

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## Articles in Previous Issues

Recertification articles are underlined.

You may download the issues free of charge from <http://pestworld.stjohn.hawaii.edu/pat/oldissue.html>.

### 2015 January–March issue

- Regulatory Updates, p.1
- Adjuvants: making pesticides more effective, p.2 (recertification article)
- Adjuvants: what to add and when, p.8 (recertification article)
- Paraquat dichloride: one sip can kill, p.12 (recertification article)
- Illustrated Glossary, p.17 (recertification article), for these terms: *tiller, canopy, interiorscape, space spray*
- EPA registers new alternative to neonicotinoids, p.14
- Hawaii turf pest management survey, p.16
- Previous recertification articles, p.19

### 2015 April–December issue

- Regulatory Updates, p.1
- Engineering Controls for Pesticide Exposure, p.2 (recertification article)
- Reducing Spray Drift: Windbreaks and Buffer Zones, p.7 (recertification article)
- Labeling Secondary Containers and Service Containers, p.10 (recertification article)
- Illustrated Glossary, p.18 (recertification article), for these terms: *organic-vapor-removing cartridge, prefilter, canister, lamina, petiole, pressure rinsing nozzle*
- Previous recertification articles, p.20

### 2016 January–March issue

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- Rodents and Rodent Control in Hawaii, p.3 (recertification article)
- Selecting a prefilter for your respirator, p.8 (recertification article)
- Pesticide shelf life, p.10 (recertification article)
- Pesticide storage and security, p.12 (recertification article)
- Illustrated glossary, p.26 (recertification article), for these terms: *foundation, footing (footer), slab, crawl space, stoop*
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- Laundering Pesticide Contaminated Work Clothes (recertification article), p.4
- Maintaining Clothing and Personal Protective Equipment (recertification article), p.13
- Summary of Revisions to the Worker Protection Standard—2015 (recertification article), p.16
- Illustrated Glossary, p.22 (recertification article) for these terms: *rinsate, washwater, placard, nonrefillable container, refillable container, stover*
- Articles in Previous Issues, p.24

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This newsletter is published by the College of Tropical Agriculture and Human Resources' *Pesticide Risk Reduction Education* program. • <http://pestworld.stjohn.hawaii.edu/epp/pat.html> • cynagami@hawaii.edu • 808-956-6007 • Pesticide Safety Education Program, Department of Plant and Environmental Protection Sciences, University of Hawaii at Manoa, 3190 Maile Way Room 307, Honolulu, HI 96822.

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CAUTION! Pesticide use is governed by state and federal regulations. Pesticides and pesticide uses mentioned in this newsletter may not be approved for Hawaii. They are mentioned for information purposes only and should not be considered as recommendations. Read the pesticide's labeling to ensure that the intended use is included on it and follow all labeling directions.