The Pesticide Label

Cooperative Extension Service
College of Tropical Agriculture and Human Resources
University of Hawai'i at Mānoa

Key to Pesticide Safety and Education

January–March 2015

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REGULATORY UPDATES

Special Local Need Registration

NEW since the last issue of this newsletter:

For growers of **sunflower grown for seed**—use of the pesticide **ADMIRE® PRO Systemic Protectant** (Bayer CropScience; EPA Reg. No. **264-827**), which expires at the end of 1/6/2020—requires having a copy of **HI-150001**, valid 1/7/2015–1/6/2020—some notes: • For soil application only. • Instructions explain allowed and prohibited methods of application; the maximum dosage per acre; the maximum number of applications per crop season; and timing of the applications. • No part of the treated crop may be used as food or feed. • This is an agricultural use pesticide and so the Worker Protection Standard applies.

EXPIRED January 1–March 31, 2015:

EPA SLN Number HI-100001, for the product ReTain® Plant Growth Regulator Soluble Powder, with EPA Reg. No. 73049-45, to treat pre-flowering pineapple, expired January 13, 2015. (A similar or exact substitute is the manufacturer's "Supplemental Label" for the same product.)

EPA SLN Number HI-100002, for the product Provado® 1.6 Flowable Insecticide, with EPA Reg. No. 264-763, to treat field corn grown for seed production, expired March 8, 2015.

RECERTIFICATION CREDITS may be earned by certified applicators who score at least 70% on the set of comprehension evaluation questions about the "recertification" articles in this newsletter. These articles have a title followed by "(recertification)." However, credits may not apply to the following categories: Private 2, Private 3, Commercial 7f, and Commercial 11. The question sets (quizzes) are written and administered by the Hawaii Department of Agriculture staff. To ask about earning recertification credits on Hawaii, call the Hilo office at (808) 974-4143 or (808) 333-2844; on Oahu, Kauai, Maui, Lanai, and Molokai, call the Honolulu office at (808) 973-9409 or 973-9424.

Adjuvants: Making Pesticides More Effective

(recertification)

This is the third of four articles about spraying crops and weeds. It is based on the Purdue Extension publication, "Adjuvants and the Power of the Spray Droplet (PPP-107)."

In the first two articles of this series we discussed the properties of water and pesticide molecules. Water is not usually pure and can affect performance of the spray. Spray equipment, especially nozzle type and pressure, determine droplet size and whether the pesticide reaches the plant or is able to remain on its surface long enough to be absorbed. Leaf surfaces themselves are a barrier to pesticides that may need to enter the plant to be most effective.

Adjuvants are materials added to the spray tank before an application and can make the pesticide more effective. Adjuvants help overcome problems created by water in the pesticide mixture, leaf surface structure, application equipment, and environmental conditions.

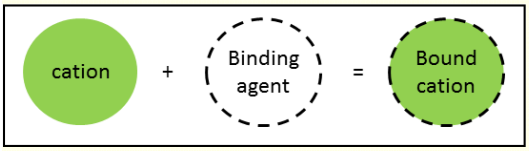
Some of the ways adjuvants can improve a spray application and its effectiveness are by:

- Preventing pesticide molecules from binding to minerals in the tank water.
- Adjusting the pH of the water to slow break down of the pesticide.
- Changing droplet size to reduce the off-site movement of pesticide.

To read the first two articles in this series, "Preparing an Effective Spray Mixture," see:

The Pesticide Label

October–December 2014



A binding agent, or chelate, added to water containing positively charged cations (Mg^{++}, Ca^{++}) will bind with the cations. This "chelation" protects negatively charged pesticide molecules from being inactivated by the cations.

- Reducing factors that cause droplets to bounce or roll off leaves.
- Changing the surface tension of spray droplets so they spread out on leaves.
- Minimizing evaporation of spray droplets.
- Preventing spray droplets from being washed off of leaves.
- Protecting pesticide in spray droplets from being degraded by sunlight.
- Improving pesticide absorption and uptake by the plant.

Classification of Various Adjuvants

1. **Water Conditioning Agents**. Pesticide molecules usually have a negative charge. They can bond with and become inactivated by positively charged molecules (cations) in water such as magnesium, calcium, and iron. Conditioning agents are adjuvants that bond with dissolved cations in water, leaving most of the pesticide molecules free to be absorbed by plants. In chemical terms this process is called chelation.
2. **Surfactants (wetter-spreaders).** These adjuvants reduce the surface tension of spray droplets. This reduced tension allows the droplet to spread out, bringing more of the pesticide into contact with the leaf surface. Surfactants can also reduce the amount of "bounce" when a droplet hits the leaf, increasing the amount deposited.
    - Surfactants mainly work where the droplet, leaf surface, and surrounding air meet. They also work, however, inside and outside the leaf or target pest.
    - The most commonly used are the nonionic surfactants, which work especially well on waxy plant surfaces. Of these, the organosilicones are most often tank-mixed with pesticides. They are called super-spreaders or super-wetters because of their exceptional ability to decrease surface tension and increase a droplet's leaf contact.

- Surfactants are one of the most commonly recommended adjuvants on pesticide labels. Water-soluble, systemic herbicides like glyphosate are a good example. As far as leaf penetration, however, nonionic surfactants are usually not as good at penetrating leaves as adjuvants that contain oil. To increase penetration using a nonionic surfactant, try to match the polarity of the pesticide with the polarity of the surfactant. Some pesticide formulations already contain surfactants with matched polarity.

3. Oil Concentrates. Oil concentrates help pesticides penetrate leaf barriers. They do this by softening or disrupting the plant's waxy surface. These products are divided into three basic groups:

- Crop Oil Concentrates (COC) that contain petroleum-based (low-volatility) oils.
- Modified (or Methylated) Seed Oils (MSO) are adjuvants derived from plant seed oils, such as soybean, canola, cotton, sunflower oils. Biodiesel is also considered an MSO. Their high seed oil content of 50 to 90 percent enhances cuticle softening, but inhibits spreading. Therefore extra surfactant is often added to increase wettability.
- High-surfactant Oil Concentrates (HSOC) were developed to provide results using lower rates than are needed for COCs and MSOs. The nonionic surfactant concentration may be as high as 20 to 40 percent in premium HSOC products, with 60 to 80 percent oil.

If the amount of surfactant is too low, the oils in the mixture will tend to separate and move to the top of the tank. Continuous agitation may be necessary.

4. Humectants (Evaporation Retardants). Humectants are adjuvants that slow the evaporation of water in the air or from the leaf. They may be naturally derived or synthetic. Keeping the leaf surface moist enhances the uptake of a pes-

Canola: a source of Modified Seed Oil

The word canola can refer to any plants in the *Brassica* genus called "rape," or "rapeseed," that are grown for their edible oil, such as *Brassica napus* or *B. rapa* subsp. *oleifera*. It also refers to the oil itself. Wild canola, however, has some disagreeable characteristics as a food oil, so breeders in Canada developed more acceptable cultivars free of these traits. Due to negative associations with the words rapeseed and rape, Canadians coined the term "canola" (can=Canada + ola=oil; or can=Canada + o=oil + l=low + a=acid).
Photo courtesy of Wikimedia commons.org

Foaming When Mixing

"During mixing and application, foaming of the spray solution may occur. To prevent or minimize foam, avoid the use of mechanical agitators, terminate by-pass and return lines at the bottom of the tank and, if needed, use an approved anti-foam or defoaming agent."

—from the "Mixing" section of an herbicide label

Marking Agents

Blue dye in a backpack sprayer shows the applicator areas that have been treated and areas that have not been treated. Photo courtesy of USDA Forest Service, Bugwood.org

ticide. This is especially important for highly polar and water-soluble pesticides. Once dried, polar pesticides crystallize and their entry into the plant is greatly reduced. For pesticides that are absorbed only slowly, it is important to keep them from drying.

5. **Ammonium Fertilizer Solutions.** These fertilizer solutions contain 25 to 30 percent nitrogen in forms such as urea ammonium nitrate and ammonium sulfate (see above item 1, water conditioning agents). Adding an ammonium fertilizer to certain herbicides can greatly increase plant absorption and translocation of the pesticide. At high enough levels it can also act as a water conditioner and keep pesticide molecules from binding with minerals such as magnesium and calcium in the tank water.

6. **Compatibility Agents.** Compatibility refers to the physical and chemical interactions between two or more products in a spray mixture. In complex tank mixtures of multiple products, the problem of incompatibility is increased. This commonly occurs with high concentrations of dissolved fertilizer, water conditioners, or micronutrients.

   When using a compatibility agent it is important to add products to the spray tank in the proper order (see Chart on page 7). If there is a mixing order listed on the product label, however, it always has precedent over this or any other chart.

7. **Defoamers / Antifoamers.** These adjuvants help keep air from being trapped in the mixture during preparation, mixing, and applying. Antifoamers are best added to the mixture to prevent foaming, defoaming agents to reduce foam that has already been formed.

8. **Scents (Masking Agents).** These agents mask the unpleasant odors of the pesticide product or solvents in the mixture.

9. **Marking Agents.** Foam markers or spray pattern indicators are adjuvants containing dyes or foams that show where a pesticide is being applied. They are especially useful for spot spraying or targeting invasive species.

CAUTION: Ammonia + chlorine bleach = toxic chlorine

Spray distribution research using a high-pressure, single-nozzle ground sprayer (no drift suppressants). Photo courtesy L.R. Barber, USDA Forest Service, Bugwood.org

10. **Formulated Tank Cleaners.** Various adjuvants are available for cleaning spray tanks, screens, strainers, and hoses. Some cleaners degrade or deactivate active ingredients. Detergents remove oily residues from equipment surfaces, hoses, and pipes. Other cleaners can remove mineral deposits in spray equipment that may contain pesticide residues. Read the cleaning instructions for each product and make sure the cleaning solution remains in the tank long enough to be effective.

11. **Stickers.** These adjuvants help spray droplets adhere to leaf surfaces. They usually incorporate latex or resin that helps keep the dry spray deposit stuck to the leaf. A **spreader-sticker** is also available to increase the surface area covered as well as maintain contact.

12. **pH Adjusters (Acidifiers, Buffers).** Acidifiers or buffers help maintain or lengthen pesticide stability by modifying the final pH of the solution. Most of these are acidifiers and lower the pH. Either a buffer or an acidifier can be used, but their actions are different. Water has very little buffering capacity, so even a small amount of pH adjuster can alter the pH. On the other hand, adding a buffer can stabilize the pH even though other compounds are added.

13. **Drift Suppressing Agents (Deposition and Retention Aids).** Drift suppressants help keep spray from drifting off-target. A number of different adjuvant products are available and may work better with some nozzles than with others. Spray droplet distributions may vary among pesticide mixtures and application equipment, so different products and rates may be needed for best results. Some products thicken in the solution and help the droplets to stick to the target, other products reduce the number of small spray droplets but don't increase the size of the larger droplets.

Mixing Order for Ingredients of a Spray Mixture.

1. Sulfonylurea herbicides

2. Compatibility Agents

- Buffers
- Acidifiers

3. Dry Products

- Ammonium sulfate (AMS)
- Water-soluble packets (WSP)
- Wettable powders (WP)
- Dry flowables (DF)
- Water dispersible granules (WDG)
- Soluble powders (S)

4. Liquid Products

- Suspension fertilizers/micronutrients
- Flowables (F)
- Suspension concentrates (SC)
- Drift retardants
- Micro-encapsulated (ME)
- Emulsifiable concentrates (E, EC)
- Solutions and soluble liquids
- Liquid fertilizers
- Chelated micronutrients
- Growth hormones

5. Adjuvants

- Crop oil concentrates (COC)
- High-surfactant oil concentrates (HSOC)
- Methylated seed oils (MSO)
- Nonionic surfactants (NIS)
- Water conditioning agents

Adjuvants: What to Add and When

(recertification)

This is the last of four articles about spraying crops and weeds. It is based on the Purdue Extension publication, "Adjuvants and the Power of the Spray Droplet (PPP-107)."

Pesticide products on the market contain more than just active ingredients. They contain other ingredients added by manufacturers to stabilize the product and protect its performance. Glycol may be included in water-based formulations, for example, to stabilize them during a freeze-thaw cycle. Glycol won't keep the pesticide from freezing, but will protect it from degrading when the product thaws. There may be additives to thicken a formulation or stabilize chemicals. Surfactants or other adjuvants may also be included in pesticides to improve their function.

The addition of adjuvants to pesticide products by the manufacturer, however, has disadvantages. An adjuvant that is compatible with the active ingredient under dilute conditions may be incompatible in the concentrated product. Similarly, an organosilicone surfactant may be stable in a spray tank, but unstable on a shelf after several years.

The active ingredient, or ingredients, is the most valuable component of the pesticide product. Therefore, manufacturers strive to present the most effective product in a stable, easy to use formulation. Adding adjuvants, however, increases the cost of the product and may make it less competitive on the market.

Manufacturers have several reasons to leave the addition of adjuvants to the applicator. Therefore, applicators must consider a number of factors when preparing a spray mixture.

- Local water quality features, such as pH and hardness.
- Final volume of the spray. The amount of adjuvant is usually calculated on a volume-to-volume rate and the manufacturer cannot know the requirements of the individual applicator.

Adjuvants

"Unless specific tank mix directions are given in Corn Use Directions, always use a methylated seed oil (MSO) or a petroleum-based vegetable seed-based oil concentrate (COC) with [product name]."

—from the "Additives" section of an herbicide label

- Local differences in the target pest. A pest may be more difficult to control in some areas and require more or less of an adjuvant. Timing and crop tolerance also need to be considered.
- Local or regional weather conditions that may influence the amount of adjuvant needed. In hot, dry weather for example, humectants (evaporation retardants) and drift retardants may be needed. They usually are unnecessary in wetter, more humid climates, however, and adding them would be an unnecessary expense for the manufacturer.

The pesticide label gives the applicator information developed over years of testing by the manufacturer. This information may include: a specific recommendation to use an adjuvant, whether adjuvants are prohibited, or provide no information about an adjuvant.

Labels Prohibiting Specific Adjuvants

Sometimes pesticide labels will state that the use of an adjuvant is unnecessary, will make the pesticide less effective, or may injure the crop. If spray drift control is a component of a new pesticide, manufacturers may warn that adding other adjuvants may increase drift.

Labels on some adjuvant products may warn users as follows:

- "High relative humidity may increase the risk of temporary discoloration. Use of surfactants is not recommended."
- "Use only nonionic surfactant on ornamentals. Do not use a crop oil concentrate with [product name] on ornamentals."
- "Do not add surfactants, additives containing surfactants, buffering agents, or pH-adjusting agents to the spray solution when [product name] is the only pesticide used."
- "Certain spray tank additives (adjuvants, wetting agents, surfactants), liquid fertilizers, and tank mixtures containing emulsifiable concentrates may reduce the selectivity

on turfgrass. Use adjuvants and spray additives or tank-mix combinations only when your experience indicates that the tank mixture will not result in objectionable turf injury."

If adjuvants are already included in a pesticide product, adding more may be unnecessary, reduce effectiveness, or cause crop damage. For example, adding a surfactant to a fast-acting herbicide can increase the risk of injury to the crop. The label of one herbicide has the following warning: "Temporary discoloration of some turf types may result from use of surfactants or adjuvants with [product name]. High temperatures and high relative humidity may increase the risk of temporary discoloration. Use of surfactants is not recommended."

When Labels Say Nothing About Adjuvants

The manufacturer may not recommend or prohibit the use of adjuvants to its product. If the label does not prohibit the addition of an adjuvant, it is not against state or federal law to do so. Pesticide products are often formulated for various types of applications and some situations may require adjuvants when others do not.

There is a wide range of adjuvants on the market and they are constantly changing. Pesticide manufacturers cannot test them all. Changing the pesticide label is also time-consuming and must be approved by the U.S. Environmental Protection Agency. Therefore, manufacturers may only make general recommendations on their labels, to give more flexibility of use to the consumer and not to discourage the makers of adjuvants from developing new products.

If an adjuvant is not recommended on the pesticide label, however, the responsibility for its use is the applicator's alone. The manufacturer of the adjuvant may specify on their label that the surfactant "is recommended for use with those pesticides whose label recommends a nonionic wetter/spreader-type adjuvant," or "Always refer to the label on the product before using [name of adjuvant product] or any other product."

Tank Mixes

"If this product is used in combination with any other product except as specifically recommended in writing by [the manufacturer] then [the manufacturer] shall have no liability for any loss, damage, or injury arising out of its use in any such combination not so specifically recommended."

—from the "Uses With Other Products" section of an herbicide label

Spray Drift

"The best drift management strategy and most effective way to reduce drift potential is to apply large droplets that provide sufficient coverage and control. Applying larger droplets reduces drift potential but will not prevent drift if applications are made improperly or under unfavorable environmental conditions."

—from the "Managing Off-Target Movement" section of an herbicide label

Though the applicator takes full responsibility for possible unintended consequences, the use of adjuvants can produce excellent results. The decision is assisted by knowing the following:

- Set-up of the sprayer
- Properties of the water in the tank mix
- Main pests being targeted
- Rate of pesticide and volume of water used
- Environmental conditions.
- Previous experience with the pesticide and adjuvant.

Pesticide labels may describe conditions that suggest a type of adjuvant may be effective. For example, it may state that when applying the pesticide in low relative humidity the equipment should be adjusted to produce larger spray droplets. You may be able to accomplish this, however, by using a humectant to keep smaller droplets from evaporating. Or you might use a deposition or retention (drift suppressing) agent that would increase the overall size of the droplets.

Representatives from pesticide manufacturers, consultants, local crop advisors, or university extension agents may offer important advice. They not only have the experience, they may know if research has been done with the pesticide product or adjuvant for a specific pest and on a particular crop.

For more information about buying and using adjuvants get the September 2014 publication,

"Adjuvants and the Power of the Spray Droplet: Improving the Performance of Pesticide Applications"

This colorful booklet, PPP-107, is available from Purdue Extension Publications at https://edustore.purdue.edu/newsearch.asp . It can be purchased for $5, or downloaded for free.

Paraquat Dichloride: One Sip Can Kill.

(recertification)

The Accidental Poisoning Problem

The California Poison Control System and the Central California Children's Hospital reviewed data from 1998–2009 and identified more than 1,400 cases of accidental poisonings caused by storage of non-food substances in soda bottles, unmarked bottles, cups or glasses. Several of the deaths involved the accidental ingestion of pesticides, including paraquat.

Recent Deaths from the Accidental Ingestion of Paraquat

The California Poison Control System and the American Association of Poison Control Centers (AAPCC) recently sent letters of concern to EPA regarding a series of deaths from accidental ingestion of the pesticide paraquat in the San Joaquin Valley of California. AAPCC cited 50 deaths from paraquat; at least 12 were from accidental ingestion of paraquat from a beverage container.

This is a major concern to EPA because paraquat is a Restricted Use Pesticide that should not be accessible to the general public and, as with all pesticides, should never be placed into a beverage container. Paraquat is highly toxic to humans; one small accidental sip can be fatal and there is no antidote.

The product labels clearly prohibit pouring paraquat into food or beverage containers with the prominently-placed statements "NEVER PUT INTO FOOD, DRINK OR OTHER CONTAINERS" and "DO NOT REMOVE CONTENTS EXCEPT FOR IMMEDIATE USE."

Paraquat Use Profile

Paraquat dichloride, commonly referred to as "paraquat," is an herbicide registered in the United States since 1964 to control weeds in many agricultural and non-agricultural use sites. It is also applied as a preharvest desiccant on some crops including cotton.

All paraquat products registered for use in the United States are Restricted Use Pesticides (RUPs), which can only be sold to and used by certified applicators (and applicators under their direct supervision). There are

no homeowner uses and no products registered for application in residential areas.

EPA Incident Investigation

The fatalities resulting from paraquat products transferred into beverage containers in California prompted EPA to investigate all reported cases. EPA conducted an investigation of all reports of fatal and high-severity paraquat incidents. EPA identified 27 paraquat fatality reports to date in its Incident Data System (IDS). The IDS database contains all registrant submissions of adverse health effects from pesticide products, as required by federal law (FIFRA §6(a)(2)). More than 80% of all identified paraquat fatality cases reported to IDS were due to ingestion of the product.

At least 8 of these 27 deaths were due to the accidental ingestion of paraquat. All eight of these accidental deaths involved transfer of paraquat into a beverage container. Several of these cases have occurred recently. A review of the SENSOR-Pesticides data identified additional ingestion cases, including the fatal case of an 8-year-old child who drank the paraquat out of a soda bottle.

EPA Response

While EPA determines the appropriate regulatory response, we want to warn the applicator community about the high toxicity of paraquat.

It is the responsibility of pesticide applicators to ensure that RUP products are used safely and appropriately, including never transferring any pesticide product, including paraquat, into a beverage container.

The Solution is YOU

ONE SIP CAN KILL!

To prevent the severe injury and/or death from paraquat ingestion, a paraquat product must:

- Be used only by a certified applicator or under the direct supervision of a certified applicator;
- Never be transferred to a food, drink or any other container;
- Always be kept secured to prevent access by children and/or other unauthorized persons;
- Never be stored in or around residential dwellings; and
- Never be used around home gardens, schools, recreational parks, golf courses or playgrounds.

Paraquat Dichloride Information Resources

EPA's Paraquat Dichloride Registration Review Docket, EPA-HQ-OPP-2011-0855, for information on EPA's current re-evaluation of paraquat. This docket includes a letter from Dr. Gellar (California Poison Control System), the EPA response, and the AAPCC letter. http://www.regulations.gov/#!docketDetail;D=EPA-HQ-OPP-2011-0855

Syngenta's Paraquat Information Center: www.paraquat.com/safety

EPA Registers New Alternative to Neonicotinoids

By Environmental Protection Agency January 22, 2015

The EPA is registering a new insecticide, *flupyradifurone*, that is safer for bees. It is expected to be an alternative to more toxic products including certain pyrethroid, neonicotinoid, organophosphate and avermectin insecticides.

As an insecticide, flupyradifurone is unusual in that laboratory-based studies indicate that the compound is practically nontoxic to adult honeybees. Studies show no adverse effect on overall bee colony performance or overwintering ability when compared to untreated colonies.

EPA's decision meets the rigorous Food Quality Protection Act standard of "reasonable certainty of no harm" to human health. On the basis of protective and conservative human health and ecological risk assessments for the uses of the pesticide, EPA confirmed the safety of the use for the public, agricultural workers and wildlife. EPA coordinated its evaluation with our counterparts in Canada and Australia.

This decision was one of the first to incorporate newly-required bee studies and involved evaluating the largest number of bee-related studies ever for the registration of a new chemical. EPA reviewed 437 studies including 38 different tests on bees to analyze the potential exposure and effects of flupyradifurone. These included evaluation of the sublethal effects of pesticides on all life stages of bees, as well as effects on colony health in field studies. The field studies examined pollinator-attractive crops while bees were actively foraging after the crops had been treated through various application methods (seed, soil and foliar) to demonstrate very high exposure.

Flupyradifurone is registered for a large number of crops such as citrus, cotton, potatoes and many others to protect against piercing and sucking insects such as aphids, whiteflies, thrips, and pysllids, all of which have become increasingly resistant to other pesticides and are difficult to control. The registration of flupyra-

difurone will provide growers across the U.S. with a new pest resistance management tool that presents an effective countermeasure to resistance development. No residential uses have been proposed.

More information on this regulatory action can be found at www.regulations.gov, Docket ID: EPA-HQ-OPP-2013-0226-0044.

To learn more about EPA's actions to protect pollinators, visit their Pollinator Protection website at http://www2.epa.gov/pollinator-protection

Note: According to the Hawaii Pesticide Information Retrieval System (27 January 2015) pesticides containing flupyradifurone are not yet available in Hawaii.

Hawaii Turf Pest Management Survey

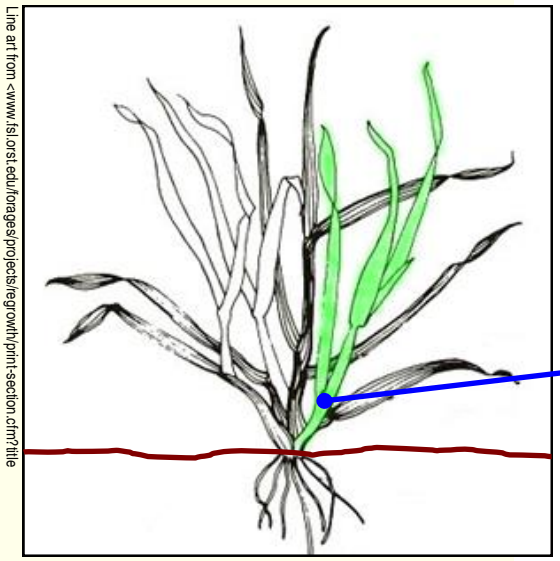
Dr. Zhiqiang Cheng is the Assistant Specialist in turf and landscape pest management at the University of Hawaii at Manoa. He is conducting a survey to identify the latest turf pest management problems and educational needs for the state. Turf pests include insects, weeds, pathogens (diseases), and others.

The goal of this survey is to establish priorities for improving the turfgrass industry in Hawaii. To take part in the survey, go to

http://goo.gl/forms/vC1fspXrMi

The survey should take about 10 minutes.

ILLUSTRATED GLOSSARY
Terms from Pesticide Labels (Recertification)



Line art from <www.fsl.orst.edu/forages/projects/regrowth/print-section.cfm?title=Developmental%20Phases>

First tiller (colored green) arising from the grass's crown.

Tiller: A grass's upward-growing side shoot arising from the parent plant's stalk, creeping stem, or crown.

Label example: *Hand-held Sprayer Application for Spot Treatments— Example: Apply 0.46 fluid ounce of [herbicide name] per gallon of water when the grassy weed has 1 to 2* ***tillers****.*

Plant drawings courtesy of River Partners. "Restoration Planting Design: Vegetation Structure" <www.riverpartners.org/resources/riparian-ecology/veg-wildlife-habitat/vegetation-structure/>

Canopy formed by a group of trees and shrubs.

Canopy: A one or several layers of branches and foliage of a group of trees or shrubs or both.

Label example: *Using long poles or other devices or by hand, bait-filled bags* [of rat bait] *should be placed in the* ***canopy*** *of trees or shrubs.*

Interiorscape with ferns, palms, and other tropical plants.

Interiorscape: A planting grown or maintained inside a building usually to decorate a living, working, or shopping area.

Label example: *Not for use in greenhouses, shadehouses, or* ***interiorscapes****.*

M. Merchant, Texas A&M University.

Space spraying with an aerosol spray can.

Space spray: Dispersal of an insecticide into the air in a room or other enclosed space by foggers, misters, aerosol devices, or vapor dispensers to control visible flying and crawling insects.

Label example: *Do not use* [this insecticide] *as a* ***space spray*** *indoors.*

The definitions in this glossary are intended to help understand the terms used on pesticide labels. Other definitions may be available for these terms.

The Pesticide Label

PREVIOUS RECERTIFICATION ARTICLES

October–December 2014: Preparing an Effective Pesticide Spray Mixture: Part One (p. 2); Preparing an Effective Pesticide Spray Mixture: Part Two (p. 7).

July–September 2014: Pesticide Use and Your Personal Protective Equipment (p. 10).

April–June 2014: How to Find Bed Bugs (p. 2), Protecting Children From Poison Emergencies (p. 5),

January–March 2014: Proper Disposal of Pesticides (p. 2), Proposed Changes to Worker Protection Standard: EPA Requests Your Input (p. 6), Do You Need a Permit Before Applying a Pesticide to "State Waters" of Hawaii? (p. 10)

July–September 2013: Application of IPM Principles to Structural Pests (p. 2), How Pest Treatments Fail (p. 6), Restricted Use Pesticides Require an Extra Level of Care (p. 12)

January–June 2013: Bedbugs and Pesticide Misuse (p. 2), Maintaining Personal Protective Equipment (p. 7), Diluting Pesticides (p. 11)

September–December 2012: Recordkeeping for Restricted Use Pesticides (p. 2), Pesticide Decisions: Preapplication Checklist (p. 9), Plant Diseases Caused by Living and Non-living Factors (p. 15), Glossary (p. 20)

April–August 2012: Pesticides, EPA, and the Endangered Species Act (p. 2), Pesticide Decisions: Safety Checklist (p. 7), Choosing Pesticides for Greenhouses and Nurseries (p. 12, Glossary (p. 15)

Archived issues of "The Pesticide Label" available for free download at

http://pestworld.stjohn.hawaii.edu/pat/Newsletter_main.html

This newsletter was developed for the Pesticide Risk Reduction Education program of the College of Tropical Agriculture and Human Resources, University of Hawaii at Manoa. Please direct any question or comment to:

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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, and their mention is for information purposes only and should not be considered a recommendation. Read the pesticide's labeling to ensure that the intended use is included on it and follow all labeling directions.

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