



# Before you spray

By Matt Smith

**Editor's note:** This article grants one continuing education unit (CEU) in the Core category toward the renewal of a Florida Department of Agriculture and Consumer Services restricted-use pesticide license when the accompanying test is submitted and approved.

**W**e often think about pesticide safety and best management practices when we are in the field spraying. You're outside, you're potentially exposed to the pesticide, and a gust of wind in the wrong direction could send it flying back into your face. However, your first interaction with pesticides on spray day takes place well before you step foot in the field.

There are several things you can do before spraying to help ensure a safe and efficient application. This article will cover a few of them, including identifying the target pest, ensuring your pesticide label is up to date,

calibrating equipment, wearing the proper personal protective equipment (PPE) during mixing and loading, and testing product compatibility.

## PROPERLY IDENTIFY PESTS

The first step in a proper integrated pest management strategy is to identify the target pest.

Did you ever see *Point Break*? In this movie, Keanu Reeves plays Johnny Utah, a Federal Bureau of Investigation (FBI) agent tasked with identifying, infiltrating and dismantling a gang of surfing bank robbers. Special Agent Utah makes the critical mistake of not correctly identifying the target pest. Instead, on an uninformed instinct, he authorizes a raid of an unrelated group of surfers led by the lead singer of the Red Hot Chili Peppers that, while certainly pests, had not met the threshold to control and were under observation. The botched raid cost the FBI time and manpower while destroying a

multi-year Food and Drug Administration investigation. Meanwhile, the actual target pests — led by Patrick Swayze as the iconic Bodhi — continued to do considerable damage until they were finally properly identified and controlled.

There is no magic bullet pesticide that kills every pest and spares every crop. To properly control pests in the field, proper identification of pests is needed to select the correct product to treat them with.

## ENSURE THE LABEL IS CURRENT

While the label is the law, the label is not always consistent. This is especially true with pesticides that have been approved under a Section 18 emergency-use authorization. When a new pest strikes an area where no pesticides are registered, a state regulatory body can lobby the Environmental Protection Agency (EPA) to authorize applicators to use pesticides that may control the new target pest but are not labeled for that use.

If granted, the state pesticide regulatory agency, the Florida Department of Agriculture and Consumer Services (FDACS) in Florida's case, prescribes application rates, safety precautions and other information for applicator and environmental safety. While Section 18 authorizations resemble normal pesticide labels, they are not technically labels or labeling because the product has not been registered with the EPA.

Section 18 emergency exemptions authorize pesticides for a limited time and special use. However, a pesticide authorized under a Section 18 exemption may be granted a Section 3 (normal) registration and become authorized for normal use. When this happens, the rules and regulations for applying the pesticide may change. A recent example of this is FireWall 50 WP.

FireWall 50 WP, developed by AgroSource, is a streptomycin-based bactericide/fungicide which was granted an EPA Section 18 emergency exemption several years ago to suppress HLB in Florida citrus and to aid in controlling citrus canker in Florida grapefruit. FireWall 50 WP received a Section 3 label on April 23, 2021. The application rules are nearly the



same in the Section 3 label as the old Section 18 exemption, except that the preharvest interval has increased from 40 to 60 days. This change is especially important for growers planning to apply FireWall 50 WP close to harvest. It is also a good reminder to ensure you are up to date on changes to your pesticide's label.

## CALIBRATE EQUIPMENT

Calibrating equipment is something very few people like to do and is often the most challenging part of the pesticide exam. However, it is a critical step in proper pesticide application. Calibration is the process of learning and adjusting your equipment's output rate to ensure you are applying an even and accurate dosage.

A properly calibrated sprayer saves time and money. If, for example, a sprayer is producing more output than it should, plants will receive excessive chemicals that may cause phytotoxicity. The applicator will have to make more return trips to the mixing-loading station, costing both time and money in the form of excess chemical concentrate. An excessive application may also change the pesticide exposure levels for applicators and workers.

You can spray with confidence once you've calibrated your equipment. However, do not assume that a calibrated sprayer will remain calibrated forever. Several factors, including nozzle wear, the buildup of deposits in liquid lines or even accidental changes to the flow-rate controls, can cause the system to no longer operate at peak efficiency. You don't necessarily need to recalibrate your equipment before every spray, or even every week, but setting up a calibration schedule will help ensure an efficient and safe growing operation.

## WEAR REQUIRED PPE

The mixing and loading stage of pesticide application can be just as hazardous as the application stage, if not more so. During mixing and loading, the pesticide is being handled at its full concentrated strength. As such, any contact with the pesticide may be more hazardous than during spraying when the pesticide is diluted. This contact includes potentially breathing in fumes.

When it is deemed necessary, the label will direct you to wear more

**Keep your investments growing!**

**NEW! White Wraps**

Don't pay too much for tree bags. Call today for a quote.



**BEST BAGS, BEST PRICE, BEST SERVICE**

Mike Hurst Citrus Services, Inc. (863) 443-0531, [hurstcitrus@gmail.com](mailto:hurstcitrus@gmail.com)

**We can't wait to see you!**

Come see us at the Citrus Expo at booth #503



**FARM CREDIT**  
Financing for Farms, Homes & Land

866.824.5626  
[FarmCreditFlorida.com](http://FarmCreditFlorida.com)

**Equal Housing Lender**

**FOUR GENERATIONS of FLORIDA CITRUS NURSERIES**

Now accepting orders for 2021/2022 delivery

**EXCLUSIVE LIFETIME REPLACEMENT POLICY.**  
Every tree is hand nurtured and inspected.  
We have all available greening tolerant rootstocks, UF varieties, USDA varieties as well as all old varieties.

Call Chris at (407) 404-0355

[www.blue-heron-nurseries.com](http://www.blue-heron-nurseries.com)



**BLUE HERON**  
NURSERIES

WINTER GARDEN, FLORIDA [www.blue-heron-nurseries.com](http://www.blue-heron-nurseries.com)

**FNGLA**  
Reg. # 48006420



PPE during mixing and loading than application. In other circumstances, the label may require less or the same amount of PPE. There is no hard and fast rule, which is why it is important to consult the pesticide label.

In the example shown in Figure 1, both applicators and mixers/loaders are required to wear long-sleeved shirts and long pants, waterproof gloves, and shoes and socks. But if you are mixing or loading, you must also wear protective eyewear. A common requirement for mixers/loaders but not applicators is a chemically resistant apron. It is critically important that you treat pesticides with the same amount of respect in the mixing and loading area as when spraying in the field.

How you mix and load is also very important when it comes to pesticide safety. Chemicals should always be mixed below face level to reduce splashing and potential injury.

Like when dealing with acids, always fill your spray tank with water halfway before adding chemicals. You have the greatest risk of splashing when you first

**PRECAUTIONARY STATEMENTS**  
**Hazards to Humans (and Domestic Animals)**  
May be fatal if swallowed. Harmful if inhaled or absorbed through skin. Causes moderate eye irritation. Avoid breathing vapor or spray mist. Avoid contact with skin, eyes or clothing.

**Personal Protective Equipment:**  
Applicators and other handlers (other than mixers and loaders) must wear:

- Long-sleeved shirt and long pants
- Waterproof gloves
- Shoes plus socks

**Mixers and Loaders must wear:**

- Long-sleeved shirt and long pants
- Waterproof gloves
- Shoes plus socks
- Protective eyewear

apply high-pressure water to an empty tank. If you have pesticide concentrate in an otherwise empty tank and add water from a hose, the first drops that splash out will be highly concentrated with chemicals. To ensure the chemicals in a splashing solution are diluted and

less hazardous, add water first, then chemicals, and finish by filling the rest of the tank with water. Always leave an air gap between the hose and the water in the spray tank to prevent the pesticide solution from backflowing into the water supply.

**Figure 1.** A sample pesticide label shows different personal protective equipment requirements for applicators and mixers/loaders.



# PROTECT YOUR CROP

# THYME GUARD®

A new generation of essential oil extracted from thyme, **THYME GUARD®** is a 100% biodegradable broad spectrum contact liquid bactericide, fungicide and insecticide for use on all organic crops: food and nonfood. Its molecular structure makes it efficient, striking the cellular membrane of bacterium and fungus without generating resistance. **THYME GUARD®** has proven its high efficacy against diseases like Botrytis, Fusarium, Powdery Mildew, Downy Mildew, Citrus Canker, Citrus Greening-HLB, Fire Blight, and many others. **THYME GUARD®** also has insecticidal effects on sucking insects such as scales, white flies, psyllids, and mites.

MAKERS OF



BIOLOGICAL INOCULANT



**AGRO** RESEARCH  
INTERNATIONAL  
[AgroResearchInternational.com](http://AgroResearchInternational.com)

Distributed by





Visit us at  
**CITRUS  
EXPO**  
Booths #126,  
128 & 130



**Figure 2.** This jar test demonstrates physical incompatibility.



**Figure 3.** Chemical incompatibility is shown in this jar test.

## CONDUCT COMPATIBILITY TESTS

You may want to mix multiple chemicals like pesticides and fertilizers in your sprayer for time-efficient applications. There is no federal prohibition against this unless specified by the label. However, you need to make sure the pesticides and fertilizers you are mixing are physically and chemically compatible. Many pesticide labels have information about tank mixing, but others do not. While chemical compatibility can ultimately only be determined by spraying a test section, you can make sure the mixture is physically compatible with a jar test.

Add each product to the jar in the ratio and order that you will add them to the spray tank. Use the **W-A-L-E-S** sequence when tank-mixing herbicides:

- **W**ettable powders or water-dispersible granules
- **A**gitate then add adjuvants such as anti-foaming compounds and buffers
- **L**iquids (flowable liquids)
- **E**mulsifiable concentrates
- **S**urfactants


Jar tests are an inexpensive way to test physical compatibility. If the products are not physically compatible, they may form a sludge that can block and damage your spray system. There are two stable liquids shown in Figure 2. The white liquid forms solids

that sink to the bottom without constant agitation while mixing. Unlike certain pesticide formulations that are designed to not go into the solution but still pass through a pesticide application system, these solids can wreak havoc on your system and prevent the pesticide from being applied correctly.

There are two kinds of people in this world: 1) People who always use a jar test when tank mixing chemicals for the first time and 2) people who will in the future after they spend three days cleaning 200 gallons of toxic sludge out of their spray system. Should a sludge develop, those cleaning the system must wear full PPE at all times and dispose of the mixture as hazardous waste.

Jar tests can also be used to measure chemical compatibility, though the results are not as easy to spot. The most obvious sign would be something unexpected happening, such as a color change that doesn't seem intuitive. In Figure 3, a yellow liquid is mixed with a milky white liquid. One may guess that the resulting liquid would be a pale yellow, but instead, it has turned to deep purple. This is a sign of chemical incompatibility. Ultimately, the best way to test chemical incompatibility is to spray a test section of your crop to ensure that plant damage does not occur.

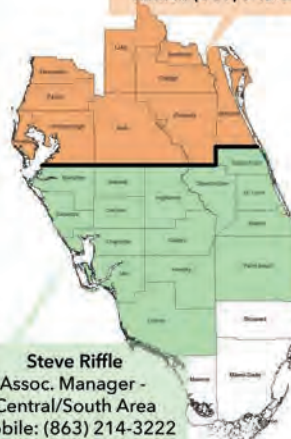
Some products may not form a perfect solution but can still work



1001 13th Avenue East, Bradenton, FL 34208

**Robert "Eddie" Wertz**  
Sr. Procurement Manager  
Office: (941) 742-2646 or (863) 494-5658  
Mobile: (863) 990-1852

**Sean McCoy**  
Manager - Northern Area  
Mobile: (863) 632-1141  
Office: (941) 742-2406



**Steve Riffle**  
Assoc. Manager - Central/South Area  
Mobile: (863) 214-3222  
Office: (863) 402-0487

## VIGIRON IRON HUMATE

Vigiron Iron Humate provides a highly effective, controlled release iron, with organic humic and fulvic acids to enhance plant growth.

If you are using Fe Humate, "then pat yourself on the back," according to a UF study.\*

Serve some to your soil today and it will stand to serve your crop tomorrow.

**AVAILABLE BULK, F.O.B., RUSKIN, FL**

**813.645.6911**  
**3033 Cockroach Bay Rd.,**  
**Ruskin, FL 33570**

\*Turfgrass Nutrition: iron, manganese and magnesium: Travis Shaddox, PhD, et al; Florida Turf Digest, March/April 2016.

**VIGIRON.COM**



SEE US AT  
CITRUS  
EXPO  
BOOTH 716



**FROSTPROOF**  
growers supply

## A WORLD OF GROWING IDEAS

Tree Wraps • Deer Nets • Budding Tape • Hand Tools  
Picking Bags • pH Testers • Bug Lenses • Shade Cloth  
Ground Cover & Staples • Mesh Bags • Tensiometers  
Bamboo • Safety Supplies • Testing Equipment  
Harvesting Supplies • Flagging Tape • Nursery Supplies

Family Owned & Operated  
Toll Free 1-800-635-3621

Local Service & Delivery  
Full Catalog @ [FROSTPROOF.COM](http://FROSTPROOF.COM)



20  
**Ca**

15  
**P**

**husion**

## Phosphorous Efficiency via a True P Complex

The only complete NPK fertilizer  
with Calcium & Micro-Nutrients

CalPhusion is the new  
technology involving a  
stable calcium and  
phosphorous fertilizer  
combined with a full  
micro-nutrient package



[www.CalPhusion.com](http://www.CalPhusion.com)  
Phone: 239.494.2126

## CalPhusion CHALLENGE!

Take the CalPhusion Challenge and get  
entered for a chance to win a  
Smith and Wesson AR 15.



Win Me!

**CITRUS  
EXPO**

Booth #430

if there is constant agitation. A tank agitator does this by distributing non-soluble chemicals evenly throughout the tank. If operating a backpack sprayer, the tank agitator is *you*.

## SUMMARY

When we think about pesticide safety and best management practices, we often think of actions we can take in the field while spraying. However, there are steps that take place before spraying that affect the overall safety and efficiency of the operation. Wear the right PPE at all stages, be sure your pesticide labels are up to date, keep equipment calibrated, test compatibility when mixing products for the first time, and try not to be like Johnny Utah. 🍊

**Acknowledgment:** Thanks to Megan Dewdney, associate professor of plant pathology and Extension specialist at the University of Florida Institute of Food and Agricultural Sciences (UF/IFAS) Citrus Research and Education Center, for spotting and informing me of the change in the preharvest interval for FireWall 50 WP.

**Sources:** Applying Pesticides Correctly, 7th Edition by F. Fishel (<http://ifasbooks.ifas.ufl.edu/p-104-applying-pesticides-correctly-a-guide-for-pesticide-applicators-core.aspx>) and Personal Protective Equipment for Handling Pesticides by F. Fishel (<https://edis.ifas.ufl.edu/publication/pi061>).

*Matt Smith is a UF/IFAS Extension sustainable agriculture and food systems agent in Bushnell.*

Return the completed test via mail or email to:

Matt Smith  
UF/IFAS Extension  
7620 State Road 471, Suite 2  
Bushnell, FL 33513  
352-569-6862  
[smith197@ufl.edu](mailto:smith197@ufl.edu)

If you have questions regarding this form, test or CEUs, email Matt Smith at [smith197@ufl.edu](mailto:smith197@ufl.edu) or call 352-569-6862. Please allow two weeks to process your CEU request.

Listen to **Citrus News** on

**Southeast  
AGNET**  
Radio Network

For airtimes, visit  
[SoutheastAgNet.com](http://SoutheastAgNet.com)

<b>Cocoa</b>	WMEL-AM 1300
<b>Lakeland</b>	WLKF-AM 1430
<b>Ocala</b>	WOCA-AM 1370 WOCA-FM 96.7
<b>Palatka</b>	WIYD-AM 1260
<b>Perry</b>	WZRE-LPFM 99.3
<b>Port St. Lucie</b>	WPSL-AM 1590
<b>Sebring</b>	WWOJ-FM 99.1 WWTK-AM 730
<b>Stuart</b>	WSTU-AM 1450
<b>Wauchula</b>	WAUC-AM 1310

## ‘Before you spray’ test

To receive one Core continuing education unit (CEU), read “Before you spray” in this issue of Citrus Industry magazine. Answer the 20 questions on the magazine’s website ([www.CitrusIndustry.net](http://www.CitrusIndustry.net)) or mail the answers and application information to the address at the end of the article. You must answer 70% of the questions correctly to receive one Core CEU. The article and test set are valid for up to one year from the publication date. After one year, this test will no longer grant a CEU.

- |                                                                                                                                                        |             |              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------|
| 1. Section 18 emergency exemptions are considered part of a pesticide’s labeling.                                                                      | <b>True</b> | <b>False</b> |
| 2. Personal protective equipment (PPE) requirements are always the same throughout the mixing, loading and application process.                        | T           | F            |
| 3. A common requirement for mixers/loaders that is not required of applicators is a chemically resistant apron.                                        | T           | F            |
| 4. Just because a sprayer is properly calibrated does not mean it will never need to be calibrated again.                                              | T           | F            |
| 5. If a jar test doesn’t show signs of chemical incompatibility, you don’t need to worry about spraying a test section of the crop.                    | T           | F            |
| 6. It is illegal to mix pesticides unless specifically authorized by the pesticide label.                                                              | T           | F            |
| 7. To mix chemicals in the proper order, use the W.A.L.E.S. sequence.                                                                                  | T           | F            |
| 8. When filling a spray tank, you can leave the hose end at the bottom of the tank.                                                                    | T           | F            |
| 9. It is critically important that you treat pesticides with the same amount of respect in the mixing and loading area as while spraying in the field. | T           | F            |
| 10. The first step in a proper integrated pest management strategy is to identify the target pest.                                                     | T           | F            |
| 11. When mixing and loading pesticides, you are required to wear _____ PPE as/than when spraying.                                                      |             |              |
| A) Less                      B) The same amount of                                                                                                     |             |              |
| C) More                    D) The answer cannot be determined without consulting the pesticide label.                                                  |             |              |
| 12. According to the Section 3 label for FireWall 50, the preharvest interval is:                                                                      |             |              |
| A) 30 days              B) 40 days              C) 50 days              D) 60 days                                                                     |             |              |
| 13. When preparing a pesticide solution, the first thing that should go into the spray tank is:                                                        |             |              |
| A) The pesticide              B) Water              C) The active ingredient              D) The pesticide label                                       |             |              |
| 14. The “A” in the W.A.L.E.S. sequence stands for:                                                                                                     |             |              |
| A) Acids              B) Agitate              C) Adjuvants              D) Both B and C                                                                |             |              |
| 15. When mixing water into chemicals, the first splashes of solution will be at their _____ concentration of chemicals.                                |             |              |
| A) Lowest              B) Average              C) Highest              D) Optimal                                                                      |             |              |
| 16. The “normal” kind of pesticide registration is:                                                                                                    |             |              |
| A) Section 3              B) Section 18              C) Section 24(c)              D) Section 25(b)                                                    |             |              |
| 17. After adding flowable liquids to a tank mix, what can be added next?                                                                               |             |              |
| A) Wettable powders              B) Emulsifiable concentrates              C) Adjuvants              D) Nothing                                        |             |              |
| 18. If two chemicals in a jar test produce an unexpected color, this may be a sign of                                                                  |             |              |
| A) Physical incompatibility              B) Phytotoxicity              C) Emulsification              D) Chemical incompatibility                      |             |              |
| 19. A _____ is a system in a pesticide sprayer that automatically keeps non-soluble chemicals evenly suspended.                                        |             |              |
| A) Tank agitator              B) Tank bully              C) Tank blender              D) Tank filter                                                   |             |              |
| 20. Should a pesticide application system develop a sludge due to physical incompatibility, the person or persons who clean the system should:         |             |              |
| A) Dispose of the mixture as hazardous waste.                                              B) Wear full PPE at all times.                              |             |              |
| C) Go to the Winchester, have a pint, and wait for this whole thing to blow over.              D) A and B                                              |             |              |

Please circle the number below to rate this article and test:

Not very useful	1	2	3	4	5	6	7	8	9	10	Very useful
-----------------	---	---	---	---	---	---	---	---	---	----	-------------

### Pesticide Applicator CEU Form

First Name: \_\_\_\_\_ Last Name: \_\_\_\_\_

E-mail: \_\_\_\_\_ Phone: \_\_\_\_\_

Pesticide License Number: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_