When a pesticide doesn’t work

By Juanita Popenoe

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.

Pesticides are only one part of a comprehensive integrated pest management (IPM) plan and should be used strategically. What happens when you apply the most toxic option and get no results? Many applicators jump to the conclusion that the target pest has acquired resistance, but usually operator error is to blame. This article will cover several reasons why a pesticide application might not work.

IDENTIFY PESTS CORRECTLY

The first key to successful IPM is correctly identifying the target pest. If you don’t identify the pest, you might use the incorrect pesticide. If you confuse a mite with an insect and select an insecticide, it may not work, especially with the new chemistries of insecticides. Older broad-spectrum pesticides may have worked on any living thing and didn’t require exact identification, but new chemistries are designed to kill only the target pest and have less effect on beneficial insects.

Likewise, sedges misidentified as grass will not be killed by grass selective herbicides and vice versa. Selective herbicides have provided an efficient way to kill only certain types of weeds while keeping your crop plants safe, but they require the user to be skilled at weed identification. Correct pest identification, whether it be a weed, insect or mite, is always the first step.

CHECK LABELS AND CALIBRATION

Do you carefully read the label one more time to get the correct dosage when you’re getting ready to make a pesticide application? Even if you apply the chemical frequently, you should always read the label and make sure you’re putting the correct amount in the tank.

Or is the problem that your sprayer isn’t calibrated, so you’re not applying the correct dosage? Sprayers should be calibrated frequently to ensure you’re not wasting chemicals (and thus money). Applying the correct dose helps get the desired effect. University of Florida Institute of Food and Agricultural Sciences (UF/IFAS) provides step-by-step instructions at edis.ifas.ufl.edu/topic_calibration on how to calibrate a variety of sprayers. Even spray guns can be calibrated. Don’t let haste cause you to make the wrong dose and render your pesticide application ineffective.

GET THE TIMING RIGHT

Timing is critical. Correct timing of a pesticide application can be the difference between success and failure. New pesticide chemistries may target only a certain life stage of the pest, like eggs or larvae, so timing the application to the correct life stage is more critical than ever. Even with older chemistries, contact insecticides may only be effective on a certain life stage, like scale crawlers. It takes time to scout and determine exactly when the crawlers are exposed but applying too early or too late will be a waste of time, money and pesticide.

Some pesticides should only be applied a certain number of times or amount per year, so you must time the application to maximize its effectiveness. Sometimes the timing is based on the growth stage of the plant, such as
Timing psyllid sprays to growth flush. Timing your applications correctly can make the difference in efficacy.

**COVERAGE IS KEY**

Coverage is another critical aspect you may not be checking. If the pesticide does not reach the target pest, then it will be ineffective. This may not be critical with systemic pesticides, but it is important when using a contact pesticide.

Just as you calibrate your sprayer, you should be checking for deposition. You can check by putting water-sensitive paper in the tree and spraying the plant with water. Make sure you attach the paper under the leaves, on top of the leaves and at various depths and heights of the canopy. Come back after the spray and inspect the papers. Did you get anything on the paper? Is the deposition even across the various areas?

If the coverage was not what you want, there are several questions to ask: Are you driving too fast? Are the droplet sizes/nozzles right for the application? If using an airblast sprayer, are the nozzles correctly selected and adjusted for the various levels of tree height? Is the wind blowing too much at the time of application? Do you need to add an adjuvant to alter the droplet size or spread? There are many things an operator can do to adjust spray coverage. Ask your Extension agent or chemical sales rep for some water-sensitive paper and assistance if needed. We can all be lazy, but don’t let the importance of coverage escape your attention.

**CONSIDER ENVIRONMENTAL CONDITIONS**

The environment is something that all growers deal with. Environmental conditions not only affect crop growth but also a pesticide application’s efficiency. Temperature extremes may inactivate the pesticide or make it phytotoxic to the crop, like oil-based pesticides on a hot day. Check the label for any temperature requirements before making an application.

Wind is also an obvious component of application effectiveness. If it’s too windy, pesticide coverage is impacted; you may be spraying your neighbor’s field, or worse, the housing
development nearby. Rain soon after an application may wash the pesticide off before it has a chance to work. Be sure to check your weather forecast before planning a pesticide application.

**PROPER PESTICIDE STORAGE**

What is your pesticide storage shed like? Unsuitable storage conditions can impact the quality of the pesticide and harm application effectiveness. Some pesticides, especially biologicals or biorationals, have stringent storage requirements and can be inactivated above or below certain temperatures. Some pesticides were just not created to maintain effectiveness if stored for too long or under conditions above 100°F, which most storage sheds can reach in the Florida climate.

Some pesticides have a use-by date. Pesticides should be stored on a “first-in, first-out” basis. If you have pesticides that are so old you cannot read the label anymore, you should consider using Operation Clean Sweep. This program is run by the Florida Department of Agriculture and Consumer Services and picks up old pesticides for free disposal. You can avoid unnecessary pesticide disposal by storing formulations appropriately to maintain effectiveness.

**PESTICIDE RESISTANCE**

Finally, let’s look at the reason for pesticide failure that many jump to rather than admit they have been a little lazy, hasty or uninformed: pesticide resistance. Pesticide resistance is not a mutation in the pest caused by repeated exposure to a chemical. Resistant pests are not like superhero villains that mutated and have greater powers to destroy your crop. Pesticide resistance is the result of a long period in which the same chemical has been used over and over again. You might not be at fault; it may be many of the growers in your area using the same chemical repeatedly.

Pesticide resistance is like selection of the fittest. Pests naturally have a range of genetics like all living organisms. Some may have genes that allow them to survive a specific chemical or class of chemical with a specific mode of action, and they are the ones left behind to breed when the same
"If at first you don’t succeed, try again" does not apply to pesticide applications of the same chemical. If control with a pesticide fails, do not retreat with the same chemical or another with the same mode of action. Re-examine your checklist. Did you properly identify the pest? Did you use the correct dosage and timing? Is your equipment properly calibrated and do you have good deposition? Were environmental conditions correct for the application? Was your pesticide quality still good and not out of date? If you answer yes to all these, then try another pesticide with a different mode of action or a tank mix with two different modes of action. Pest resistance is something we all need to work together to avoid.

Source: Applying Pesticides Correctly (7th Edition) by F. Fishel, 2014, UF/IFAS
Juanita Popenoe is a retired UF/IFAS multi-county commercial fruit Extension agent.
‘When a pesticide doesn’t work’ test

To receive one Core continuing education unit (CEU), read “When a pesticide doesn’t work” in this issue of Citrus Industry magazine. Answer the 20 questions on the magazine’s website (www.CitrusIndustry.net) or mail the answers and application information to the address at the end of the article. You must answer 70 percent 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. A single pesticide class can usually provide all the control you need. True  False
2. Tank mixtures with chemicals with the same mode of action are more effective than spraying with a single pesticide.  T  F
3. Integrated pest control methods are not needed if you have a good chemical control program.  T  F
4. If a pesticide fails, do not retreat with a chemical that has the same mode of action.  T  F
5. If there are multiple generations of the pest in one season, you do not need to alternate pesticide modes of action.  T  F
6. If you are using the correct pesticide rate, coverage is not as critical.  T  F
7. Correct pest identification is key to pest control.  T  F
8. Timing the pesticide application to the susceptible life stage of the pest is critical to its control.  T  F
9. Checking the weather forecast is important before planning a pesticide application.  T  F
10. Pest resistance is caused by genetic mutations in the pest from repeated exposure to a chemical.  T  F
11. As long as you can read the label on the pesticide container, it should be good for use.  T  F
12. Correct pesticide dosage depends on:
   A) The level of pest pressure  C) How long it has been since your last spray
   B) Equipment calibration and following the label  D) How steady your hand is while measuring the pesticide
13. You can check your pesticide application coverage by:
   A) Having your assistant stand in the field to watch and see where the spray goes
   B) Seeing if the application worked  C) Using water-sensitive paper attached to leaves in the canopy
14. Effective tank mixes should:
   A) Include chemicals with different modes of action  C) Take more time to apply properly
   B) Be more expensive than applying chemicals separately  D) Only be applied with caterpillar track wheeled vehicles
15. IPM strategies other than chemicals include:
   A) Wishful thinking  B) Organic products  C) Laser beams  D) Cultural and biological controls
16. Pesticide classes are based on:
   A) Modes of action  B) Education level  C) Extension education  D) Social hierarchy
17. Using a higher rate of chemical than the label specifies is:
   A) More likely to kill the pests  C) Not a problem; allowances are made for poor measuring
   B) Illegal  D) Just a lot of government over-regulation
18. Pesticide failure is most likely caused by:
   A) Pest resistance  B) Chemical company hype  C) Operator error  D) Alien invaders posing as pests
19. Environmental conditions that might affect pesticide application success include:
   A) Proximity to a housing development  B) El Niño or La Niña  C) Barometric pressure  D) Wind, rain and temperature
20. Selection of pesticide and timing of pesticide application is important because:
   A) Newer chemistries may be very selective to the pest and pest life stage.
   B) Older chemistries were often broad-spectrum and would not kill much.
   C) You can only apply in the day.
   D) Spray schedules take out all the guesswork.

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Pesticide Applicator CEU Form

First Name: ____________________________________________  Last Name: ____________________________________________
E-mail: __________________________________________________  Phone: _______________________________________________
Pesticide License Number: ________________________________________________________________
Address: ________________________________________________________________________________
City: ___________________________  State: __________  Zip: ____________________________

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