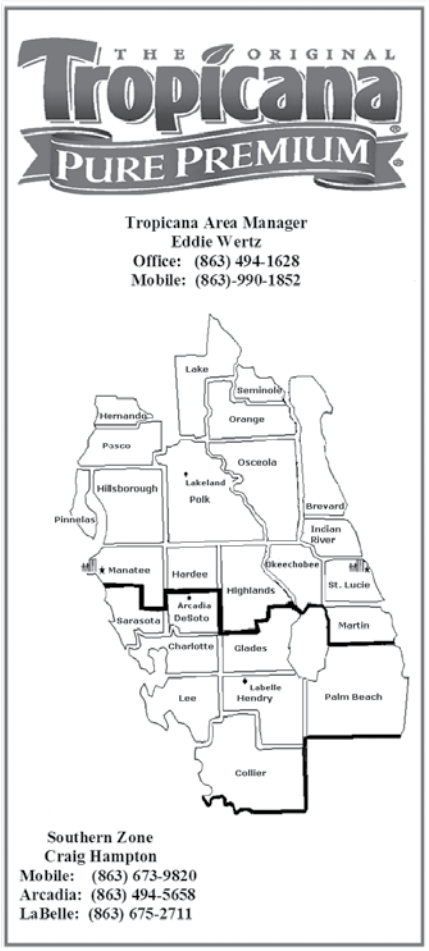
Product stewardship

By Stephen Futch and Tim Gaver

This is a CEU article that grants one General Standards (CORE) CEU when submitted and approved.

UF UNIVERSITY of FLORIDA IFAS Extension

Pesticide movement away from the target site can cause environmental contamination, damage to crops on other sites, and can create legal issues for the pesticide applicator. Pesticide drift can occur from air-blast spray applications or applications applied via boom systems whereby the pesticide is released into the air during the application process. Pesticide movement can occur in air or water, attached to soil particles or on objects that have come in contact with the pesticide. When off-site movement occurs, the applicator is legally and financially responsible for the actions that caused this off-site movement and damage to crops or other areas contaminated by the pesticide.



The applicator should ensure that his or her actions are conducted in a manner to minimize any potential for off-site movement of a pesticide or pesticides. Remember, the application sites are clearly listed on the product label along with rates, pests controlled and personal protective equipment (PPE) required. Pesticides can also be moved to additional sites on contaminated PPE that the applicator was wearing during a pesticide application. Items possibly contaminated by pesticides from PPE could include seats, furniture and clothing washed with the PPE.

The pesticide that remains in the environment or on items after the application or spill is the residue. Residues may be on the treated crop or area, equipment or any item or items that were contacted by the pesticide spray. The residue breakdown time may be as short as a few hours or may remain in the environment for months or years. Those pesticides that remain and are active in their original form in the environment for long periods of time are considered to be persistent pesticides. An example of a persistent pesticide is DDT, and its use has been restricted or eliminated in most areas of the world.

The breakdown time of a pesticide is largely determined by the chemical structure of the active ingredient that the pesticide contains. The acceptable residue is known as tolerance and is established by governmental agencies. The tolerance is the maximum amount of a given pesticide that remains on or in the raw agricultural commodity. These tolerances will vary with the crop, intended use or market where the product is sold.

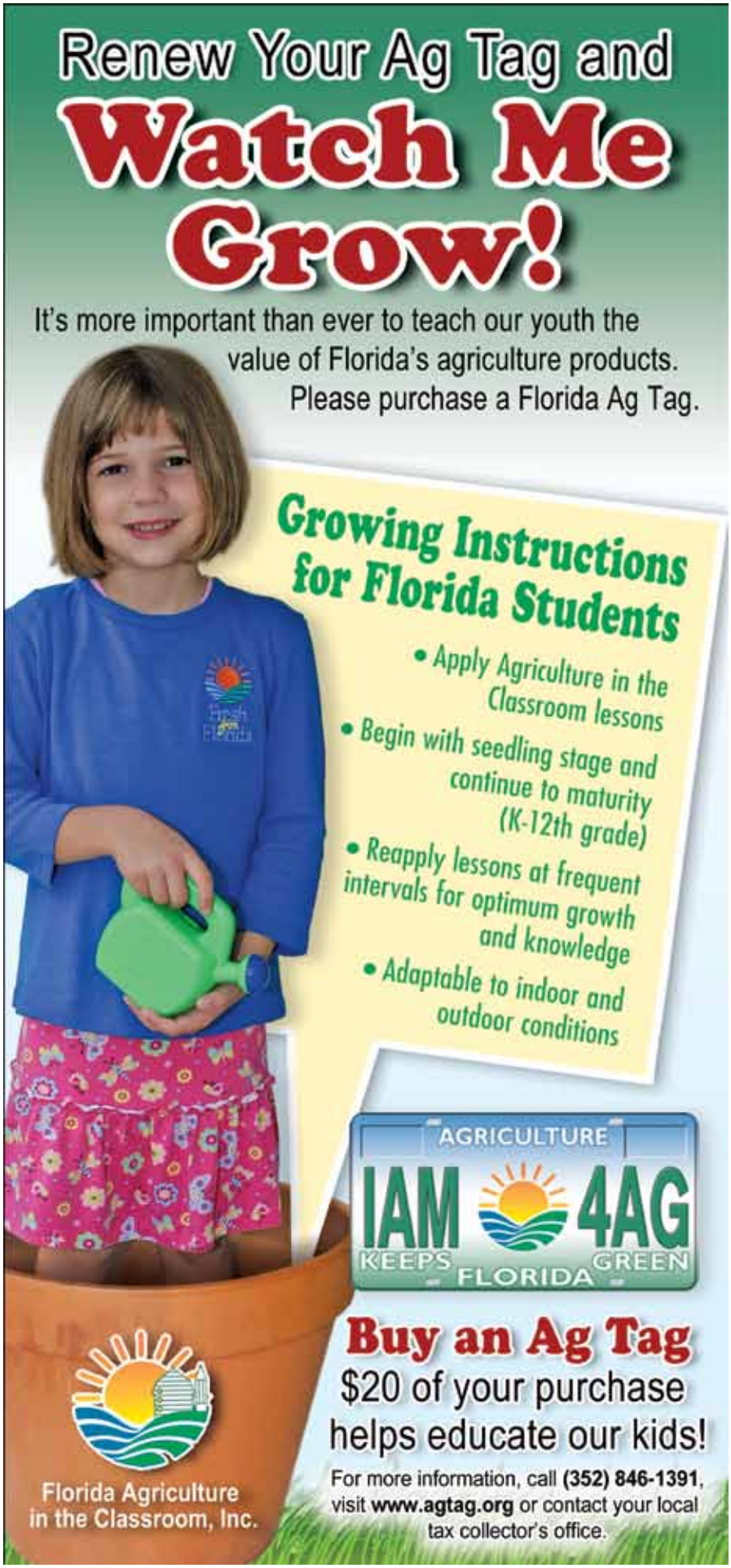
Off-site movement can damage or contaminate sensitive crops, poison bees, pose health risks to humans and animals, or contaminate soil and water in nearby areas.

Movement of pesticides in the air to non-target areas is defined as drift. This off-site or non-target movement can occur in the spray droplet, vapor or on particles when dust materials are applied. While it is difficult to eliminate all movement of a pesticide, actions should be implemented to reduce the off-site movement to a level that can be tolerated or is acceptable.

Off-site movement can damage or contaminate sensitive crops, poison bees, pose health risks to humans and animals, or contaminate soil and water in nearby areas. Remember that applicators are legally responsible for damages resulting from the off-target movement of pesticides.

Applicator error was the leading cause of drift and accounted for approximately 38 percent of drift incident issues. Other causes of drift were related to spray nozzles (26 percent), followed by physical (23 percent) or other factors (13 percent).

When looking at spray drift issues,



this off-site movement may occur during the liquid application of a pesticide, and is greatly impacted by droplet size, wind speed and direction. The smaller the spray droplet, the greater the chances for off-site movement of the pesticide via drift. Where possible, use nozzles that produce larger spray droplets as they are less likely to drift. Additionally, reducing the spray pressure will also increase droplet size. To aid the applicator in selecting nozzles that produce larger droplet sizes, consult the equipment or nozzle manufacturers' catalogs or charts. The charts will classify the droplet size for each nozzle type and at various pressures. The standard rates droplets as very fine, fine, medium, coarse, very coarse and extra coarse.

Each nozzle will produce a narrow range of droplet sizes. Manufacturers will provide data on the volume median diameter (VMD) and indicate the relative droplet size of a volume of spray produced by a given nozzle. The VMD size is stated in microns. A micron is one millionth of a meter. If the VMD is 100, half the volume of spray will be droplets that have a diameter of less than 100 microns, and the other half of the volume of spray will be droplets greater than 100 microns. However, since smaller droplets have less volume than larger ones, most of the droplets will be smaller than the VMD. Please note that some pesticide labels will require a VMD of 100 when applying pesticides using low-volume equipment.

Another factor that impacts droplet size is the viscosity or thickness of the liquid. Viscosity is a measurement of resistance to flow. When comparing mayonnaise to water, mayonnaise is more viscous than water. As the viscosity of the liquid increases, so does the droplet size, thereby reducing the potential for off-target movement via drift. Other products like an invert emulsion will have a thicker consistency, and will also aid in reducing drift.

When applying a pesticide, air movement is an important consideration influencing pesticide drift. Air movement can be influenced by a number of environmental factors such as temperature above and at the ground, sunlight that can heat the soil surface, and wind speed.

Temperature inversions result

when warmer air above traps cooler air near the ground. These inversions are more likely to occur at night or early in the morning when little or no movement of air is occurring. We have all seen these conditions on early-morning drives through patches of fog. Applications made under conditions of temperature inversions can sometimes result in more drift than those when wind is present.

Conditions of low humidity and high temperatures may also increase the potential for drift. These conditions favor evaporation of water from the spray droplet, thereby causing the spray droplet to decrease in size and become more prone to drift.

Applicators can minimize drift problems in outdoor areas by spraying when wind speed is low, leaving an untreated border or area that is downwind of the target crop, or only spraying downwind from sensitive areas like residential property, schools, crops or roadways. Spraying around these areas is best accomplished early in the morning when conditions are calm or when prevailing winds are blowing away from these areas.

Pesticides can also drift from the application site in the form of gaseous vapors. Drift occurs when the pesticides change from a solid or liquid to form a gas, and is usually associated with high air temperatures. Pesticides that are subject to volatilization will usually carry precautions against applying these products when conditions are favorable for volatilization, like high temperatures.

Drift can also occur when a solid particle of a pesticide moves from the target site by air during or just after application. The pesticide could be in the form of the formulated product or attached on soil particles to which the pesticides have become adsorbed.

Growers and pesticide applicators must understand the many potential forms of pesticide drift and take actions to minimize the off-site movement of pesticides.

Source: Applying Pesticides Correctly, SM 1. By Fred Fishel, University of Florida, Institute of Food and Agricultural Sciences, Gainesville, FL.

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'Product stewardship' test

To receive one Core continuing education unit (CEU), read "***Product stewardship"*** 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 bottom of the form. The article and test set will be valid for up to one year from the publication date. After one year, this test will no longer provide a CEU.

1.	*Pesticide movement can occur in air or water, attached to soil particles or on objects that have come in contact with the pesticide.*	T	F
2.	*When off-site movement occurs, the applicator is not legally and financially responsible for the actions that cause this off-site movement and damage to crops or other areas contaminated by the pesticide.*	T	F
3.	*Application sites are clearly listed on the product label along with rates, pests controlled and personal protective equipment (PPE) required.*	T	F
4.	*It is highly unlikely that pesticides can move to additional sites from PPE that the applicator was wearing during a pesticide application.*	T	F
5.	*The residue breakdown time may be as short as a few hours or may remain in the environment for no more than a few days.*	T	F
6.	*The breakdown time of a pesticide will be impacted by the chemical structure of the active ingredient that the pesticide contains.*	T	F
7.	*The acceptable residue is known as tolerance and is established by governmental agencies.*	T	F
8.	*When pesticides are moved in the air to non-target areas, it is defined as drift.*	T	F
9.	*Off-site movement of a pesticide can only occur in the spray droplet.*	T	F
10.	*Applicator error was the second leading cause of drift.*	T	F
11.	*Applications of a pesticide made under conditions of temperature inversions will not result in more drift than those when wind is present.*	T	F
12.	*In spray drift, this off-site movement occurs during the liquid application of a pesticide and is greatly impacted by droplet size, wind speed and direction.*	T	F
13.	*The larger the spray droplet, the greater the chances for off-site movement of the pesticide via drift.*	T	F
14.	*Volume median diameter (VMD) indicates the relative droplet size of a volume of spray produced by a given nozzle.*	T	F
15.	*Viscosity is a measurement of its resistance to flow.*	T	F
16.	*Air movement can be influenced by a number of environmental factors such as temperature above and at the ground, sunlight that can heat the soil surface, and wind speed.*	T	F
17.	*Conditions of high humidity and high temperatures may also increase the potential for drift.*	T	F
18.	*Applicators can minimize drift problems in outdoor areas by spraying when wind speed is low.*	T	F
19.	*Drift can occur when solid particles of a pesticide move from the target site by air during or just after application.*	T	F
20.	*Growers and pesticide applicators must understand the many forms of pesticide movement and take actions to minimize the drift potential of pesticides.*	T	F

Pesticide Applicator CEU Form

First Name: _____ Last Name: _____

Email: _____

Pesticide License Number: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone Number: _____

Please mail the answer sheet or a copy of the form to: Steve Futch, Citrus Research & Education Center, 700 Experiment Station Road, Lake Alfred, FL 33850

If you have questions regarding this form, test or CEUs, email Steve Futch at shf@ufl.edu or call (863) 956-8644.