

50 Ways to Treat Your Pesticide

Whether herbicide, fungicide, or insecticide,
make sure you know the basics.

Always read and follow label directions before buying or using a pesticide. Follow all appropriate federal, state, and local regulations.



**AERIAL APPLICATOR
EDITION**

Aerial application in the United States has come a long way since the first crop duster applied a pesticide near Troy, Ohio. As an aerial applicator, you know that your role is essential for pest control in many crop and non-crop situations, accomplishing timely and accurate pesticide applications while overcoming a host of common agricultural challenges — heavy workloads, large acreages, narrow application windows, multiple pests and pest outbreaks, economics, and a variety of crops and product choices. And you are also the only reason pest control can still happen under wet soil conditions or when crops are too tall or hard to access with ground equipment.

Search the web for “pesticide stewardship and drift” and you get 26,000 documents. “Pesticide stewardship and storage” returns 166,000 documents, while “pesticide stewardship and runoff” produces 372,000. A smart aerial applicator will go straight to resources developed by their state pesticide safety education program coordinator, their national or state Agricultural Aviation Association, the EPA, USDA or state Department of Agriculture...all excellent starting points that can lead them to general or state-specific pesticide stewardship information on a host of topics from product storage, transportation and disposal to keeping pesticides on target.

Although pesticide stewardship is very often impacted by state and local regulations, there are basic principles and practices that must be understood whether you are spraying fungicides on corn in Illinois, or herbicides on cotton in Texas. Whether applying insecticides on forests in Oregon or peanuts in Georgia, pesticide stewardship is always important.

Here are 50 ways to be a good steward when using pesticides, from purchase to disposal.

COMPLY WITH WORKER PROTECTION AND RECORDKEEPING REQUIREMENTS

1) Understand your responsibilities as employer or rights as employee under the Worker Protection Standard, which contains the requirements for pesticide safety training, notification of pesticide applications, use of personal protective equipment, restricted entry intervals following pesticide application, decontamination supplies, and emergency medical assistance.

2) Record-keeping requirements are increasingly detailed and important for aerial applicators. It is better to have extra records than too few. Comply with all requirements — federal, state, and local. Accurate records concerning pesticide purchase, storage, equipment maintenance, calibration, application, and disposal are the first step to good stewardship. Decide in advance who will own electronic data and recognize that digital data logs can sometimes have errors that are the result of the limitations of the GPS equipment or storage media.

MAKE AN INFORMED PESTICIDE CHOICE

3) The purpose of a pesticide is to control specific pests, so read the label thoroughly before you make a purchase and before you apply a product, to ensure you've made the proper choice. You are legally obligated to read everything except the information about crops and sites that you are not planning to treat.



4) The label is the law. The directions for use and the rest of the information are equally important. Review

the signal word, precautionary statements, personal protective equipment requirements, reentry statements, emergency first aid measures, etc., until you fully understand them and can ensure that you are willing to follow the entire label.

5) The label will contain very important information specifically for aerial applicators. Look for any restrictions associated with aerial application. Pay close attention to instructions relating to buffer zones, maximum wind speeds, application height restrictions, droplet size specifications, and spray volumes.

6) Make sure that you understand what label information is mandatory versus advisory. If the label advises you to do something, and you don't, it is best to document why.

7) Remember that labels may change at any time, so read the label each time you purchase a product. Even products having the same active ingredient will usually contain different label information, whether formulated by the same or different manufacturers.

8) Look for product formulations, packaging, and application techniques that reduce the chance of spills and mixing errors. Consider purchasing a premix (prepack) if more than one pesticide is needed for the same application.

9) Use refillable, recyclable containers where possible. These containers provide “closed systems” and have eliminated millions of 2 1/2 gallon jugs, saved millions of cubic feet of landfill space, and greatly reduced handler exposure.



TRANSPORT AND STORE PESTICIDES PROPERLY

10) When transporting pesticide containers in a truck or car, do not place them in the same compartment with passengers, groceries or animal feed. Secure the containers to prevent spills due to sudden starts, turns, and stops. Transport all pesticides in their original, labeled containers. Department of Transportation (DOT) requirements are dependent on the product and how it is transported. Check the Material Safety Data Sheet (MSDS) to determine if, and what quantity of, the product is regulated as a US DOT hazardous material.

11) Store pesticides off the floor, on shelves or pallets in a secure area with limited access. Follow state requirements concerning signs. Storage areas should have proper containment, with no drains to the outside or to the sewer system. Read all labels to determine if ventilation and/or temperature controls are needed. Wherever possible, product inventories should be kept at levels that can be used in one year.



12) Understand the very specific requirements for bulk and mini-bulk pesticide storage tanks, concerning transport, maintenance, security, and pesticide containment.

13) Remember, security is your friend. Keep all pesticides, application and handling equipment secure to prevent theft and/or unauthorized use.

FOCUS ON THE APPLICATION

14) Know your target pest(s) before you treat. Improper pest identification may result in inadequate pest control, costing you time and money.

15) Good cooperation with the grower is critical. Have at least two ways to contact the grower, and communicate both before and after the application. The grower should verify the acceptability of the pesticide's restrictions (for example, reentry and rotational), the field boundaries, and the location of sensitive sites. Discuss the application time and any need to inform others in the area.

16) Always ensure that the personal protective equipment (PPE) indicated on the label is used by pilots, mixer/loaders, flaggers, and other handlers. If the label requires a respirator, use only respirators approved by the National Institute of Occupational Safety and Health.



Filters, canisters, or cartridges must be replaced according to all manufacturer and pesticide instructions, and whenever equipment damage, breathing resistance, odor, taste, or irritation occurs.

17) A little more is not better. Increasing the rate beyond the maximum allowed on the label for the specific use has absolutely no advantages and is illegal. The maximum residue level, or tolerance, is the legally enforceable maximum concentration of a pesticide residue that is allowed on an agricultural commodity at the point of market. Higher than labeled rates can also promote the development of resistance and will add cost.

18) Use USDA's Aerial Spray Nozzle Models to help select and carefully set up nozzles and other spray parameters — droplet size, pressure, etc. Controlling droplet size is a key ingredient to keeping pesticides on-target.

19) Nozzle calibration is important to get the pesticide on the specified target at a specified rate and droplet size. Nozzles should be checked at least once each year for wear and distortions which may cause a difference in spray patterns. And even though you may have a flow rate controller, monitor the pressure gauge to determine if you may have clogged nozzles, a leak in the system, or nozzles not properly shutting off.

20) Pesticide effectiveness often depends on a specific timing relative to the crop and/or pest(s). If workload or weather requires a delay in application beyond the proper timing, choose a different pesticide that is labeled for use at that time.



21) Adopt precision agriculture tools and techniques to better pinpoint pests so that pesticides can be applied exactly where they are needed in commercial fields. Grower data (soil testing, crop scouting, and yield monitoring) can be combined with GPS, satellite and aerial imagery, and variable rate technology to achieve pesticide applications that maximize crop yield, minimize pesticide costs and prevent unneeded pesticides in the environment. Boom lowering systems and electrostatic spray systems may also enhance precision application, but always ensure that you can still comply with all label requirements.

22) Attend Operation S.A.F.E. Fly-Ins where experts evaluate pilot/aircraft spray patterns and discuss realistic swath widths and proper use of GPS. Your aircraft should be checked at an Operation S.A.F.E. Fly-In whenever a part of your spray system or airframe changes (for example, a change in nozzles or boom, adding a rate controller, replacing the air scoop). Laser altimeters may also be helpful to prevent pattern variations due to application height changes.

23) Prepare only the amount of spray mixture that is needed. After the application is completed, do an initial rinse of the spray tank over the application site if possible, using an onboard rinse tank. For ground rinsing, have a collection system and dispose of rinsate according to the label.

24) If excess spray mixture exists, apply it to another labeled crop or site. If the spray mixture cannot be used in accordance with label directions, it must be evaluated by the applicator as to its waste classification so it can be properly disposed.

25) If use of a permanent loading pad is not always convenient, a portable loading pad will allow flexibility in where you mix and load pesticides, but make sure you meet EPA containment standards.

26) Protect pollinators.

Most pesticides are not toxic to bees and, in general, insecticides are more likely to be toxic than fungicides and herbicides.

When using a pollinator-toxic pesticide, ask the grower about the proximity of commercial hives and native pollinator habitat, local pollinator visitation habits, and blooming plants in the area. Follow all label directions and precautions to protect pollinators and beneficial predators and parasites.



27) Protect the crop or other desirable plants. The best pest control means nothing if desirable plants are injured by the pesticide. Observe all timing and placement directions relative to the desirable plants, do not exceed maximum rates, and consider weather and other stresses that may make them more susceptible to injury from the pesticide.

28) Make all applications when environmental conditions favor optimal performance of the pesticide and keeping it on-target. ALWAYS know the wind direction by use of onboard smoke generators or other observable indicators (dust from vehicles, smoke, windmills, ripples on ponds, etc.), and make the necessary adjustments to protect any sensitive areas downwind of the application site. Be especially aware and cautious of early morning and late evening applications when temperature inversions may exist. These inversions may cause pesticides to be carried farther downwind.

BE DILIGENT ABOUT CLEANUP AND DISPOSAL

29) Be vigilant regarding all potential sources of contamination — unused spray mixture, pesticide

containers, and the aircraft itself. Ensure that proper care and cleanup occurs at every step — whether mixing and loading, spraying and disposing, fueling, changing nozzle settings, or washing the aircraft.

30) Immediately remove clothing which has become contaminated during pesticide handling, wash it separately from other laundry before re-use, and properly discard items that have accidentally become heavily contaminated with pesticide.

31) If you no longer plan to use a registered pesticide, offer it to another qualified user. It can also be taken to an acceptable disposal site or appropriate waste collection event if necessary. Make sure you know how to dispose of the particular pesticide, following all federal, state, and local regulations, as well as the product label.

32) Triple- or pressure-rinse “empty” liquid product containers, and completely empty dry product containers, before disposing according to label, state, and local requirements. Recycle if possible. The Ag Container Recycling Council (877-952-2272, www.acrecycle.org) safely collects and recycles plastic pesticide containers.

33) Have a written spill management plan. Do everything possible to prevent spills, but always keep the necessary supplies (absorbent material, etc.) readily available at all locations where spills could occur. Clean up both liquid and dry spills immediately. A spill is still a pesticide, and must be disposed of as such if no longer usable.

34) Do not dispose of excess treated seed by air. Give it to the grower so that it can be returned to the seller or planted in fallow or other non-cropped areas of the farm. Treated seed may be hazardous to wildlife and must be planted according to the instructions on the seed bag. Whether or not the seed is being planted as potential wildlife habitat, growers should use a normal seeding rate and date, and plant treated seed at a depth greater than 1 inch.

KEEP PESTICIDES ON-TARGET

35) There is no one technique that can keep pesticides on-target — you must consider the weather conditions, application equipment, field conditions, sensitive areas downwind of the application, and buffers. Use as many drift reduction technologies as possible.



36) Extra precautions should be taken to minimize drift when sensitive areas are known to be in close proximity. Check to see if there is a sensitive crop and/or apiary registry for the area where you are applying pesticides.

37) Sensitive areas may also include sites occupied by humans (buildings, busy highways, parks, etc.), wildlife habitat, aquatic areas, or organic farms. If in doubt, consider it a sensitive area. Special laws apply to endangered species and their habitat.



38) Watch the wind speed and direction. No environmental condition has a greater potential impact on pesticides moving off-target than wind. If conditions favor off-target movement — variable, gusty, or sustained winds, completely calm conditions, or inversions — choose another time for the application.

39) When sensitivity of the downwind area is unknown, stay further away until the wind direction changes. Smoke generators are helpful to subjectively observe wind speed, direction and inversions, or consider the use of a more sophisticated technology that accurately determines and records wind speed and direction throughout the application.

40) Ensuring a proper application is the legal responsibility of the aerial applicator. There are many factors that influence the application, and many of these can be modified as necessary by the applicator. For example, there is more flexibility in the choice of nozzle, pesticide or acceptable weather conditions if the buffer size is increased.

UNDERSTAND THE IMPORTANCE OF BUFFERS

41) Permanent buffers are areas or strips of land maintained in permanent vegetation, which intercept spray droplets, flowing water, and/or eroding soil, all of which can carry pesticides off-target.



42) Circle the field before making the application. If a permanent buffer does not exist where needed, aerial applicators can establish a “flexible buffer” by swath displacement, creating a purposely untreated portion of the crop or landscape where needed. Make sure the grower understands when and why a portion of his crop must be left untreated.

43) Aerial applicators can sometimes avoid leaving part of the crop untreated by taking advantage of changes in wind direction — spray part of the field when the wind is

from one direction, then spray the remainder of the field after the wind switches, always with the goal of keeping the pesticide on-target.

44) The size and location of a flexible buffer is determined on an application-by-application basis, and may sometimes be needed in addition to any permanent buffer that exists.

PREVENT PEST RESISTANCE

45) Effective pest management depends upon pesticides that perform consistently on the target pests over time. Utilize proven resistance management techniques not only to prevent pest resistance, but also to manage it when it occurs.

46) If the grower requires multiple herbicide, fungicide, or insecticide applications to the same crop, he should be asking you to rotate the pesticide to one with a different target site/mode of action (MOA). Look for the Group Number on the label to indicate the MOA but, if absent, remember that all pesticides have an MOA and that many resources exist to tell you what it is. There are very few pesticides that have multiple MOA, but tank mixes or premixes that contain multiple MOA can make pesticide rotation unnecessary in a crop.

47) If the grower suspects a resistant pest, apply tank mixtures or premixes that contain multiple MOA. At least one of the pesticide active ingredients must be effective on the pest.



48) Adhere to label rates for the specific pest, crop, conditions, and location — each registered rate is carefully determined based on field trials. Combine as many resistance management strategies as possible, especially when applying maximum label rates of pesticides, because high rates enhance the selection pressure for resistance. Conversely, do not apply rates lower than those recommended for a particular pest species because this favors survival of the more vigorous individuals in the pest population.

49) The grower should be requesting preventative control where resistance is known to be occurring. Preventative control is the use of a pesticide(s) which prevents the pest from developing, as opposed to curative control which is not used until the pest or evidence of its presence (such as plant symptoms) has been observed.

50) Follow label directions for optimum timing relative to the growth stage of the target pest. Application to pest populations that are beyond the optimum timing (for example, large weeds, late instar insect larvae or disease in the epidemic phase) can speed the development of resistance.

FIRST AND FOREMOST, BE A GOOD STEWARD

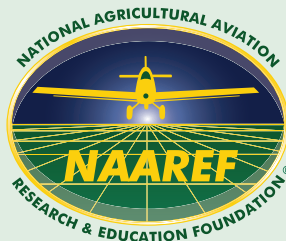
Many factors affect the impact of pesticides on man and the environment. Although the government, industry, and extension provide regulations, labels, and educational outreach to promote judicious use and good stewardship, success is ultimately contingent on the technical expertise and ethical behavior of everyone who handles a pesticide.

There are excellent pesticide stewardship resources available for aerial applicators. Join the National Agricultural Aviation Association for up-to-date information on changing technologies, laws, etc. that impact aerial application and stewardship and for access to NAAA's Professional Operating Standards, member directory, and resource archive. Members also support every aerial applicator's access to important stewardship programs and resources developed by the National Agricultural Aviation Research and Education Foundation, such as Operation S.A.F.E. Fly-Ins and the Professional Aerial Applicators' Support System (PAASS) program. Stay up-to-date on the newest innovations that enhance stewardship, from initiatives like the EPA Drift Reduction Technology Program and the USDA-ARS Aerial Application Research Program. Other excellent sources of pesticide stewardship information are state Pesticide Safety Education Programs, state Agricultural Aviation Associations, state Departments of Agriculture, the Extension Service, and the Pesticide Environmental Stewardship (PES) website.

As a professional pesticide applicator and pilot/operator, you are at the forefront of pesticide stewardship. Your actions have a significant impact, and you are also modeling the way for others who work with pesticides. Just as important, you demonstrate to the public the diligence of the aerial application industry in applying pesticides and its essential role in producing food. Remember, ***"Upon the performance of each rests the fate of all."*** Thank you for being a good steward.

A 2,000 FT VIEW OF PESTICIDE STEWARDSHIP

- Always read and follow label directions before buying or using a pesticide.
- Follow all appropriate federal, state, and local regulations.
- Understand your responsibilities as employer or rights as employee under the Worker Protection Standard.
- Keep accurate and detailed records.
- Look for product formulations, packaging, and application techniques that reduce the chance of spills and mixing errors.
- Use refillable, recyclable containers where possible.
- Transport pesticides securely and separately from passengers, food, and feed.
- Ensure limited access to pesticides and application and handling equipment at all times.
- Accurately identify your target pest(s) before you treat.
- Communicate with the grower before and after the application.
- Carefully select, set-up and monitor nozzles, pressure and other spray parameters.
- Attend Operation S.A.F.E. Fly-Ins whenever a part of your spray system or airframe changes.
- Adopt precision agriculture tools and techniques to better pinpoint pests.
- Use a permanent or portable loading pad to mix and load pesticides, and make sure you meet EPA containment standards.
- Make all applications when environmental conditions favor optimal performance of the pesticide and keeping it on-target.
- Ask the grower about the proximity of commercial hives and native pollinator habitat, local pollinator visitation habits, and blooming plants in the area.
- Ensure proper care, cleanup, and disposal of the pesticide, container, excess spray mixture, rinsate, contaminated clothing, treated seed, etc.
- Have a written spill management plan.
- Use as many drift reduction technologies as possible, taking extra precautions when sensitive areas are known to be in close proximity.
- Establish a "flexible buffer" by swath displacement if a permanent buffer does not exist.
- Combine proven techniques to prevent pesticide resistance, and to manage it when it occurs.
- Always remember that ensuring a proper application is your legal responsibility.



This publication can be downloaded from the following websites:

National Agricultural Aviation Association, National Agricultural Aviation Research and Education Foundation: www.agaviation.org

Syngenta Environmental Stewardship: syngentacropprotection.com/Env_Stewardship

Pesticide Environmental Stewardship (PES): pesticidestewardship.org