



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.



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 pesticide user will go straight to their county agent, the pesticide safety education program coordinator for their state, their land grant university, the EPA website... all excellent starting points that can lead them to general or state-specific pesticide stewardship information on a host of topics from product storage, transport, and disposal to avoiding drift, runoff, and leaching during and after the application.

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 commercial potato fields in Maine, or insecticides on your home-grown vegetables in California. There are also things that should never be done, whether applying herbicides on wheat in Washington or golf courses in Florida.

Here are 50 important ways to treat your pesticide, from purchase to disposal.

DON'T HELP THE PEST

1) Make an unhappy home for pests. Of course, different pests like different conditions, but some practices just ask for trouble, so avoid them.



Use field sanitation techniques that reduce pest habitat. Turn under infected/infested plant material that can be a source of new pests, and plant disease- and insect-resistant crop varieties. Mow uncontrolled annual weeds before they go to seed. Uncontrolled perennial weeds pose a greater challenge than annuals and may require spot treatment with herbicides at very specific timings. Seal food containers and entryways into buildings to keep insects out, and avoid over-watering or over-fertilizing crops – many diseases thrive in wet, succulent conditions.

2) Know your pest(s) before you treat. Your pesticide won't work on the wrong pest, costing you money and doing nothing to solve your problem. Also, some insects and diseases cause little damage to certain plants, and some weeds are not competitive.

3) Determine whether the pest(s) is likely to cause you trouble this year. Scout the field or garden to determine the presence and extent of the pest. Do the past/current weather conditions favor a major infestation, is the crop already close to harvest, can you accept superficial damage or absolutely no damage at all? The answers are critical to deciding whether



to treat or not treat; and for highly valued crops, professional pest and weather monitoring may be done in your area to assist you in making the decision.

MAKE AN INFORMED PURCHASE

4) The purpose of a pesticide is to kill specific pests, so read the label before you even purchase the product. The label is the law, and there is nothing funny about the oft-spoken opinion that “nobody reads the label”. You wouldn't take a prescription without reading the directions carefully, and it is just as important to read the pesticide label thoroughly – you are legally obligated to read everything except the information about crops that you are not planning to treat.

5) 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., as many times as necessary to fully understand them and ensure you are willing to follow them.

6) Do not deny it's a pesticide. “I don't use pesticides, I use....” Ant or rodent baits? Fertilizers that also control pests? Treated seed? Aerosols that control pests? Flea collars? Natural chemicals like sulfur and copper? If it contains a chemical that controls pests, use all appropriate stewardship practices and don't be complacent.



7) 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 at the same time.

8) For large acreages, consider bulk packages. These refillable, recyclable containers provide “closed systems” and have eliminated millions of 2 1/2 gallon jugs, saved

millions of cubic feet of landfill space, and reduced handler exposure greatly.

TRANSPORT AND STORE PROPERLY

9) Always transport pesticides in the car trunk or in the back of the truck. Do not transport in the same compartment with passengers, groceries or animal feed. Secure the containers to prevent spills due to sudden starts, turns, and stops.

10) Store your pesticides in a locked and labeled cabinet or area. Read all labels to determine if ventilation and/or temperature controls are needed for your situation.



FOCUS ON THE APPLICATION

11) Use the required personal protective equipment (PPE) when handling the pesticide. If the label requires a respirator, use only respirators approved by the National Institute of Occupational Safety and Health (NIOSH). 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.

12) A little more is not better. Increasing the rate beyond the maximum allowed on the label for the specific use has absolutely no advantages. 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.

13) Determine the equipment calibration schedule based on the types of nozzles and formulations that are used. It is better to calibrate more often than needed, than not enough, because worn nozzles can change the pesticide rate or pattern.

14) Where pest control will not be compromised, replace broadcast applications with in-furrow or directed applications, seed or spot treatments, and barrier or band treatments, to better target pest populations or the zone where pest control is needed.



15) Adopt precision agriculture techniques to better pinpoint pests so that pesticides can be applied exactly where they are needed in commercial fields. Soil testing, crop scouting, and yield monitoring, along with global

positioning systems, satellite and aerial imagery, and data analysis, allow variable rate pesticide applications that maximize yield, minimize pesticide costs and prevent unneeded pesticides in the environment.

16) Don't wait until you are desperate to treat. Of course, pest identification and monitoring are critical aids in deciding whether or not to treat, but don't gamble and delay treatment when you know a pesticide will be needed. Pesticide effectiveness often depends on a specific timing and placement relative to the crop and/or pest, and waiting too long can leave you with no effective way to control the pest.

17) Don't prepare more spray solution than is needed, and dispose of any excess by applying it to a registered crop or site, if possible.

18) Don't treat when winds are moderate (greater than 8 mph), or rainfall is imminent. These conditions may decrease performance of the pesticide and/or move it off-target.

19) 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.

20) Protect our 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, make sure you know the proximity of commercial hives and native pollinator habitat, local pollinator visitation habits, and the blooming period of plants in the area, and follow all label directions and precautions.



STAY ATTENTIVE AFTER THE APPLICATION

21) Watch out for regrowth or reinfestation. Second flushes of weeds may or may not be competitive, and reinfestations of insects or diseases may or may not cause unacceptable plant damage. In any case, know what you can tolerate and continue monitoring or scouting **after** the initial and any subsequent applications.

22) Even if it is too late to prevent yield and quality loss, use rescue treatments where appropriate to prevent weed seed production, harvest problems, and pest contamination of the crop.

BE DILIGENT ABOUT CLEANUP AND DISPOSAL



23) Evaluate the results of the application. Granule pesticides intended for lawns but landing on driveways, etc. need to be swept up or back onto the lawn. If you are not going to sweep it up, don't apply it, because pesticides move easily off paved surfaces into drains and ditches.

24) Do everything possible to prevent spills, but always keep an absorbent material such as cat litter or sawdust readily available. 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.

25) Wash clothing worn during pesticide application before re-use, wash it separately from other laundry, and discard items that have accidentally become heavily contaminated with pesticide.

26) 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 day 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.

27) Triple- or pressure-rinse "empty" liquid product containers, and completely empty dry product containers, before disposing properly. Recycle if possible. The Ag Container Recycling Council (877-952-2272, www.acrecycle.org) safely collects and recycles plastic pesticide containers. For homeowners, your state's household waste agency can provide recycling options or instructions on where to dispose of unwanted pesticides.

28) The best way to dispose of a small quantity of leftover seed that has been treated with a pesticide is to plant it 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, use a normal seeding rate and normal practices for that crop (for example, local planting dates and soil temperatures), and plant treated seed at a depth greater than 1 inch. If the seed is broadcast on the soil surface, incorporate it immediately.

AVOID DRIFT

29) Keep spray droplets on target. There is no one technique that can minimize spray drift – you must consider the



weather conditions, the application equipment, the sensitive areas downwind of the application, and buffers. Sensitive areas include anything that should not be sprayed with the pesticide in question – even registered crops if they have already received the maximum rate as a planned application.

30) Extra precautions should be taken to minimize drift when sensitive areas are known to be in close proximity. Highly sensitive areas include sites occupied by humans, sensitive crops, wildlife or pollinator habitat, aquatic areas, and organic farms. Special laws apply to endangered species and their habitat.

31) Watch that wind. No environmental condition has a greater impact on drift. Don't spray when winds are variable, gusty, or sustained at greater than 8 mph, **or** when conditions are completely calm, **or** when droplets may enter and move within an inversion (a layer of trapped air moving horizontally).

32) Anything that causes very fine droplets (wrong nozzle, clogged nozzle, high pressure, etc.) will increase the chance for drift. For the same reason, high temperatures and low relative humidity during application will also increase the chance for drift.

33) Drift management at the time of application is the legal responsibility of the applicator, who must combine a personal knowledge of the site conditions and application variables to minimize drift. Flexibility is a key component in minimizing drift, since there are so many factors that influence drift and can be modified by the applicator, depending on the particular circumstances. For example, there is more flexibility in the choice of nozzles or acceptable weather conditions if the buffer size is increased or a shield is used on the sprayer.

34) Growers and homeowners can have a significant impact on the applicator's flexibility in minimizing drift, through plant and pesticide choices, and a careful short and long-term consideration of buffer type, size, and location.



UNDERSTAND THE IMPORTANCE OF BUFFERS

35) Buffers, which are natural or man-made physical barriers, can reduce spray drift as well as water runoff and soil erosion, all of which can carry pesticides off-target.

36) Permanent buffers are areas or strips of land maintained in permanent vegetation, designed to intercept spray droplets, flowing water, and/or eroding soil. Permanent buffers provide the most benefits – reducing off-target pesticide movement while improving water quality, preventing soil erosion, and providing wildlife habitat.

37) A permanent buffer is not required. Instead, a buffer may be flexible – a purposely untreated portion of the crop or landscape large enough to minimize the chance of spray drift, water runoff, and/or soil erosion taking pesticides off-target.

38) For successful drift management, flexible buffers are critical when permanent buffers are not available. The size and location of flexible buffers are determined on an application-by-application basis, and consider all the factors influencing drift. Flexible buffers can minimize drift whether winds are blowing from the expected direction (prevailing winds) or not.

39) Applicators have the responsibility to properly define flexible buffers for drift management. The flexible buffer may be very small when other drift reduction techniques are sufficient.

PREVENT PEST RESISTANCE

40) 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.

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



42) If you suspect 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.

43) 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.

44) Use 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.

45) 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.

USE INTEGRATED PEST MANAGEMENT (IPM)

46) Evaluate all your pest control options – biological, chemical, cultural, genetic, mechanical, etc. – and combine effective techniques into an integrated pest management (IPM) approach that achieves the desired pest control at a reasonable cost *and* with constant attention to protecting the environment through good stewardship. The IPM plan may target insects, diseases, or weeds but, in the best case, there will be an IPM plan for all types of pests.

47) Promote biological control by protecting beneficial predators and parasites that help control the pest. Follow all pesticide label precautions and directions to avoid or minimize exposure.



48) Use cultural control practices that help prevent and control pests.

- Maintain optimum crop growth through proper fertilization, irrigation, etc. – a healthy crop is more competitive with weeds and often less susceptible to disease and insect attack.
- Scout fields regularly to respond quickly to changes in pest populations and, particularly in the case of insects, to monitor for the presence of natural enemies.
- Clean cultivation and harvest equipment before moving from field to field.
- Rotate crops, particularly those with different pest problems, to prevent the buildup of certain pests.
- Use sanitation techniques that reduce pests, their habitat, and their alternate hosts – before, during, and after the growing season.

49) Take advantage of the crop's own genetic abilities. Plant pest-resistant crop varieties, where available, or pesticide-resistant crop varieties where use of the pesticide has significant advantages for the crop.

50) Consider mechanical control (cultivation) to assist with weed control (where erosion and limited soil moisture are not concerns).

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 personal knowledge and diligence of everyone who handles a pesticide.

There are excellent resources available through your Extension Service and the Pesticide Safety Education Program in your state.

In addition, a new web-based resource is available to assist you with general pesticide stewardship. The Center for Integrated Pest Management's (CIPM) Pesticide Environmental Stewardship website (PES) covers a wide variety of pesticide stewardship topics for **everyone** who applies, sells, stores, or disposes of pesticides, provides advice or training concerning pesticide use, or regulates, stewards, or has questions about pesticides. Upcoming additions to PES include educational modules to test your stewardship knowledge and self-assessment tools to evaluate your personal stewardship efforts.

Don't leave stewardship to your neighbors. Your actions do make a difference, and you can (and should) model the way for others, including your children as they reach adulthood and begin handling pesticides.

Sooner or later, many of us will choose to use pesticides. Please use them wisely.



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This publication can be downloaded from the following websites:

National Association of County Agricultural Agents
nacaa.com

Syngenta Environmental Stewardship
syngentacropprotection.com/Env_Stewardship

Pesticide Environmental Stewardship (PES)
pesticidestewardship.org