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NebGuide

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Cleaning Pesticide Application Equipment

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Important steps in completely and carefully cleaning and rinsing pesticide application equipment are covered in this NebGuide.

Mixing, loading, and application equipment should be cleaned and rinsed as soon as you finish a pesticide application.

Do not leave equipment containing pesticides at the mixing/loading or application site, or wash application equipment repeatedly in the same location, unless you use a containment pad or tray.

Anyone cleaning pesticide-contaminated equipment must have instruction on proper safety procedures. Equipment cleaning can present as great a risk of exposure to pesticides as do many other pesticide handling tasks. When cleaning pesticide-contaminated equipment, wear the same personal protective equipment (PPE) that the labeling requires for making applications, plus a chemical-resistant apron or other appropriate protective equipment. Also wear eye protection, even if not required by the label directions.

Cleaning Procedures

After the equipment is empty, clean both the inside and the outside thoroughly, including nozzles or hopper openings *(Figure 1)*. Certain pesticides use a carrier (e.g., petroleum-based products) that may require special cleaning agents or high water pressure to remove.

Select a location to clean the sprayer where any spilled rinsate will not contaminate water supplies, streams, crops or other plants and where puddles will not be accessible to children, pets, livestock, or wildlife.

The area may be the same as the mixing and loading location. It should be impervious to water and have a wash rack or cement apron with a sump to catch contaminated wash water and pesticides. If such a facility is not available, catch or contain the rinsate and spray the rinse water or the cleaning solution on a site and in a manner consistent with the label use of the pesticide product.

If concentrated spray material is spilled on the outside of the sprayer during loading or mixing, wash the outside of the sprayer immediately. Screens and strainers also should be cleaned or replaced frequently as they can be a major source of contamination. Self-cleaning strainers do a better job of straining and do not require cleaning. Residues also can accumulate in checked or cracked hoses. Inspect the inside of hoses and replace if necessary. Pay special attention to the following areas as they may be missed or difficult to clean:

- spray surfaces or components where buildup of dried pesticides might occur
- sprayer sumps and pumps
- inside the top of the spray tank and around baffles
- irregular surfaces inside tanks caused by baffles, plumbing fixtures, agitation units, etc.
- collection points where the hoses connect to the nozzle fittings in dry boom sprayers. Wet booms eliminate this problem

Figure 1. Cleaning a Sprayer (Photo credit: USDA).

When transitioning between crops, follow the specific cleanup procedures listed on the pesticide label.

Some cleanups require special cleaning agents. Sprayer-cleaning agents should be selected according to the pesticide and formulation to be removed (for herbicide-specific information see the Guide for Weed Management, EC130) . These agents penetrate and dissolve residues and then are removed in the rinsate. Commercial tank cleaning agents are generally preferred because they do a better job than household detergents and can deactivate some herbicides.

Rinsates

Rinsates from cleaned equipment contain pesticides and can be harmful to people and the environment. Do not allow rinsates to flow into water systems, including sink or floor drains, storm sewers, wells, streams, lakes, or rivers. Collect rinsates and apply them to labeled sites at or below labeled rates. If possible, consider rinsing your equipment at the application site and applying the rinsate to the labeled site.

Equipment rinsate may also be used as a diluent for future mixtures of pesticides if:

- The pesticide in the rinsate is labeled for use on the target site where the new mixture is to be applied.
- The amount of pesticide in the rinsate plus the amount of pesticide product in the new mixture does not exceed the label rate for the target site.
- The rinsate is used to dilute a mixture containing the same or a compatible pesticide.

The rinsate **cannot** be added to a pesticide mixture if:

- The rinsate contains strong cleaning agents, such as bleach or ammonia, that might harm the plant, animal, or surface to which the pesticide will be applied.
- The rinsate would alter the pesticide mixture and make it unusable; for example, if the pesticides are physically or chemically incompatible.

If rinsates cannot be subsequently applied to labeled sites, dispose of them as you would waste pesticides.

Equipment cleanup

Clean your equipment thoroughly after each use or when changing chemicals. Pesticide residues in a spray tank may corrode metal, plug hoses, or damage pumps and valves unless they are removed immediately after use. Some residues left in the spray tank and components can react with pesticides used later, reducing the effectiveness of the pesticides.

Special tank-cleaning nozzles are available for cleaning the interior walls of spray tanks.

Thoroughly rinse equipment with the recommended cleaning agent and carrier, allowing the cleaning solution to circulate through the system for several minutes. Remove the nozzles and screens, and flush the sprayer system twice with clean water.

Sloppy cleanup practices are a main cause of equipment failure or malfunction. Always clean application equipment immediately after each use. Pesticides allowed to dry in the application equipment are more difficult to remove.

Several commercial compounds are available to aid in tank cleaning. These can neutralize and remove pesticide residues, remove mineral deposits and rust, and leave a protective film on tank walls to help prevent corrosion.

As with any procedure involving exposure to pesticides, remove contaminated clothes and take a shower immediately after cleaning equipment. Waiting until the end of the day to clean up can allow additional absorption of the pesticide through the skin. Keep contaminated clothing separate from other laundry and tell whomever washes the clothes of the possible hazards. Encourage him/her to wear protective gloves while handling contaminated laundry and, if the same washer is used for family clothing, the washer should be run through one or more cycles with hot water and detergent but no clothing before doing normal laundry.

Equipment storage

When preparing to store your sprayer, add one to five gallons of lightweight oil like diesel fuel or kerosene (how much depends on the size of the tank) before the final flushing. As water is pumped from the sprayer, the oil leaves a protective coating on the inside of the tank, pump, and plumbing. To prevent corrosion, remove nozzle tips and screens and store them in a can of light oil. In addition, add a small amount of oil and rotate the sprayer pump four or five revolutions by hand to coat interior surfaces completely. Sprayer engines, whether air- or water-cooled, require additional servicing following a pesticide application. Follow the directions in the engine's owner's manual.

After thoroughly cleaning and draining the application equipment, store it in a dry, clean building, if possible. Replace worn-out, deteriorated, or broken parts. If you must store the sprayer outside, remove the hoses, wipe oil off exterior surfaces, and store them inside where they will not become damaged by ultraviolet light. When using trailer sprayers, you may want to put blocks under the frame or axle to prevent flat spots on the tires during storage.

Removing Herbicide Residues from the Sprayer

The following is the sprayer cleanout procedure listed in University of Missouri publication G4852, *Cleaning Field Sprayers to Avoid Crop Injury*, available on the Web site: *muextension.missouri.edu/xplor/agguides/crops/g04852.htm*.

This procedure is recommended for all herbicides unless the label specifies a different cleanout procedure. With sensitive crops, the best method to avoid herbicide injury from residual in the tank, is to use a separate sprayer for the crops. When some herbicides, such as glyphosate, are left in the tank for a period of time, they can absorb products such as dicamba (Banvel/Clarity/Sterling) from the spray tank, which can result in crop injury.

1. Add one-half tank of fresh water and flush tanks, lines, booms, and nozzles for at least five minutes using a combination of agitation and spraying. Rinsate sprayed through the booms is best sprayed onto cropland for which the pesticide is labeled to avoid accumulation of pesticide-contaminated rinsate. Thoroughly rinse the inside surfaces of the tank, paying particular attention to the surfaces around the tank-fill access, baffles, and tank plumbing fixtures. The use of a 360-degree nozzle, such as the TeeJet Model 27500E-TEF rinsing nozzle, permanently installed to the spray system, can automate the cleaning of tops and sides of the tanks. Several nozzles may need to be carefully positioned to clean tanks with baffles. Pressure sprayers are useful for removing caked-on internal and external residues. Hot water can increase penetration of dried residues, but adding a hot-water rinse may cause unacceptable health hazards due to the vapors produced. Carefully review labeled safety precautions for the agrichemicals and cleaning products used.
2. Fill the tank with fresh water and the recommended cleaning solutions or a commercially available tank cleaner and agitate the solution for 15 minutes. To make a cleaning solution, add one of the following to 50 gallons of water:
   - 2 quarts of household ammonia (let stand in sprayer overnight for growth regulator herbicides such as 2,4-D or Dicamba), or
   - 4 pounds of trisodium phosphate cleaner detergent.

   Operate the spray booms long enough to ensure that all nozzles and boom lines are filled with the cleaning solution. Let the solution stand in the system for several hours, preferably overnight. Agitate and spray the solution onto areas suitable for the rinsate solution.
3. Add more water and rinse the system again by using a combination of agitation and spraying. Remove nozzles, screens, and strainers and clean separately in a bucket of cleaning agent and water.
4. Rinse and flush the system once again with clean water.

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