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## Section 16

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# Cleaning Application Equipment

### Why Is Cleaning Important?

#### Pesticide Residues In Your Equipment Can Cause Yield Losses

It is always important to clean your sprayer out thoroughly to keep the equipment working properly. Pesticide residues that remain in the equipment may clog lines and nozzles and may cause injury to crops you spray at a later time. Clean out has become increasingly important due to changes in pesticide chemistry and changes in crop production practices.

Some farmers in Ontario have suffered significant yield losses due to inadequate sprayer clean out procedures. For example, this can happen if you use a sprayer to apply a Group 2 herbicide to corn and you don't clean it out properly before you use the same sprayer to apply a fungicide to wheat. The wheat may be seriously damaged by residues of the herbicide you used for the corn. Similarly, you may see damage on soybeans if you make a post-emergence application with a sprayer that wasn't effectively cleaned out after it was used for a growth regulator herbicide such as 2,4-D or dicamba.

## What you can't see, can hurt your crop

Your spray tank may look empty, but depending on the size of your sprayer, there could be several litres of spray mix remaining in the plumbing, pump and boom of your sprayer. The operators' manual for your sprayer should tell you the plumbing capacity of your equipment. The plumbing capacity is the amount of liquid that has to be pumped through the system to completely replace what's already there. In order to rinse your hoses, pump and boom thoroughly, you will need to use an amount of water greater than the plumbing capacity of your equipment.

Your spray tank may also look clean, but your equipment could still contain pesticide residues that you can't see. Invisible residues of some pesticides may be trapped on the walls of the spray tank or in the plumbing or filters. For example, this may occur with some Group 2 herbicides.

These residues may be bound to the equipment by a layer of oil that was part of the pesticide formulation or adjuvant. In most cases, you can't remove these residues just by rinsing with water. When you add other pesticides or adjuvants to the tank later, some of these products may break down this oily layer and then the pesticide residues could be released. These residues can damage your crop or they may bind with the next pesticide and change its activity.

## Safety Reminders for Sprayer Cleaning

### Protect Yourself

- ▶ Put on chemical resistant gloves, boots, hat, apron and goggles to reduce your exposure to pesticides when you clean your spray equipment and your measuring containers.
- ▶ Always wear gloves when you handle any part of the spray equipment, **even after you have cleaned it**. Some pesticide residue may still remain on the outside of the sprayer after it has been cleaned.
- ▶ **Never blow out nozzle tips with your mouth.**

## **Protect your family, the public and the environment**

- ▶ Clean the sprayer in an area that is away from water sources such as wells, creeks, ponds and ditches.
- ▶ Clean the sprayer in an area that is not used by people or animals.
- ▶ Make sure that you do not leave puddles of wash water where children or animals may find them.

## **When Should You Clean Your Sprayer?**

### **When you buy a new sprayer**

- ▶ New sprayers may contain metal or plastic chips and dirt from the manufacturing process. Remove the screens, filters and nozzles and rinse and flush the sprayer with clean water. Inspect the screens, filters and nozzles and clean them if necessary.

### **When you buy a used sprayer or you borrow a sprayer**

- ▶ You don't know what residues may still remain in the spray equipment. Plan to do a complete clean out procedure with a cleaning agent (see further information later in this chapter). Be sure to remove, inspect and clean all of the screens, filters and nozzle tips.

### **When you finish an application**

- ▶ Always rinse the tank and circulate clean rinse water through the entire sprayer, even if you will use the same pesticide on the same crop the next day. Next, remove and inspect the screens, filters and nozzles. Clean them if necessary.
- ▶ If you plan to change pesticides or change crops, do a complete clean out procedure with a cleaning agent (see further information later in this chapter).

### **Before you store the sprayer for the off-season**

- ▶ Do a complete clean out using a cleaning agent (see further information later in this chapter).

## What Should You Clean?

### Clean the entire sprayer system, not just the tank.

- ▶ Operate the pump and flush all the hoses and boom sections. Remove the boom ends if possible.
- ▶ Remove the screens, filters and nozzles. Place them in a bucket and clean them with small brushes, using the same cleaning solution that you use for the rest of the sprayer. Label the bucket and brushes clearly and use them only for this purpose. Rinse all the items thoroughly with clean water before you re-install them.

### Clean your measuring containers

- ▶ Triple rinse the containers and add the rinsate to the spray tank.
- ▶ Clean the containers with the same cleaning solution that you use to clean the sprayer. If you don't thoroughly clean your measuring containers, you could contaminate the next spray tank with residues from those containers.

## How Should You Clean Your Equipment?

**Many pesticide labels give specific clean out directions.** Don't assume that the directions given for any one pesticide will also work for another pesticide.

**Read each label for each pesticide you use.** The clean out procedures and cleaning agents that are recommended will depend on the type of pesticide and how the pesticide is formulated.

### Read the label carefully to check for the following information:

**How long should you leave the cleaning solution in the sprayer?** Some directions may advise you to leave the cleaning solution in the sprayer for as long as 8 hours, or overnight.

**How much water will you need to complete the clean out procedure?** Some clean out procedures given on pesticide labels may require large quantities of water. If you have to haul water for your sprayer, plan for this before you begin the clean out procedure.



## Tank Mixes

If you prepare a tank mix of more than one pesticide, some pesticide labels will give specific directions for cleaning out the sprayer after you have sprayed the tank mix. If no specific clean out directions are given for the tank mix, refer to the labels of all of the pesticides you mixed in the tank. If the clean out procedures given on the pesticide labels are different, choose the clean out procedure that is the most thorough.

## Pesticides Without Clean Out Instructions

If the pesticide label does not give specific clean out instructions, consider using a cleaner that is especially formulated for cleaning pesticide application equipment. Follow the directions given on the label of the cleaning agent.

## Get Technical Advice If You Need it

If you aren't sure about the plumbing capacity of your equipment, or the best clean out procedure for your particular type of sprayer, check with your equipment dealer or equipment manufacturer.

If you need more information about a clean out procedure for a particular pesticide, call the pesticide manufacturer. Each pesticide label will provide a toll free number that you can call for technical advice.

## Cleaning Agents



Read the label of the cleaning agent, before you add it to the tank.

Check the cleaning product label for mixing instructions and safety precautions. Many of these products can be irritating to your skin and eyes. Keep all cleaning products out of the reach of children.

Some pesticide labels may name a specific cleaning agent and tell you how to dilute it in the tank. Other labels may be less specific and may use more general terms such as “strong detergent”.

## Ammonia

If the pesticide label tells you to use ammonia, take note of the strength of the ammonia solution the label tells you to use. This will be given as a percentage. For example a label may state “Add 1 L of household ammonia, **containing at least 3% ammonia**, for every 100 L of water.

## Detergents

If the pesticide label tells you to use a “household detergent” or “strong detergent”, choose one that is **low-foaming**. Dishwashing detergents and laundry detergents may cause a lot of foam in the tank and therefore may not be good choices. Before you add any detergent to the spray tank, try a bucket test or jar test first. Dilute the detergent according to the directions on the detergent container label. Stir the detergent mixture vigorously in a bucket or shake vigorously in a jar. If a lot of foam develops, don’t use it to clean your sprayer.

**Note:** High phosphate detergents such as Trisodium Phosphate (TSP) can be very damaging to the environment and shouldn’t be used to clean sprayers.

## Commercial Cleaners for Spray Equipment

These products are marketed specifically to clean pesticide sprayers. Some labels name the pesticides that the cleaner will remove effectively. Note: some of these cleaners for spray equipment may be more concentrated than household cleaners. Check the label of the cleaner for safety information.

## Chlorine Bleach

Chlorine bleach is rarely recommended for sprayer clean out.

### **WARNING**

**Chlorine bleach can react with other chemicals to produce dangerous gases.**

**NEVER add chlorine bleach to a spray tank that has contained 28% UAN (Urea Ammonium Nitrate).**

**NEVER mix chlorine bleach with any other cleaning products.**

## Rinsing Is An Essential Step

**Rinse the sprayer thoroughly, inside and out, when you finish every application.** Pesticide deposits can begin to build up in your equipment with each application that you make.

- ▶ circulate clean water and flush through the lines and booms **for at least 10 minutes**
- ▶ remove boom ends, if possible
- ▶ flush the boom one section at a time, to give high turbulent flow
- ▶ if you can still see any residues remaining, repeat this clean water rinse cycle
- ▶ remove and inspect all screens, strainers and nozzle tips after you complete the first rinse

### **Rinse the sprayer thoroughly before you start a full clean out procedure**

Pre-rinse the sprayer before you add any cleaning products to the tank.

**When possible, leave the first rinsate from your spray equipment in the field, on the crop you have just sprayed.** If you can, carry clean water in a clean water tank on the sprayer or on a support vehicle. Rinse the sprayer thoroughly, **inside and out**, before you leave the field. Spray the rinse water from the tank onto the crop. This safely disposes of the pesticide residue onto a crop for which the pesticide is labelled.

### **Rinse thoroughly after you clean**

After you use a cleaning agent, it is essential to rinse the entire system again thoroughly. Many cleaning agents can cause damage to crops. All traces of the cleaner must be rinsed out before you mix another tank of pesticide.

**Studies have shown that for some pesticides, several rinses using 10% of the spray tank capacity are more effective than filling the entire tank once with clean water. However, if the directions on the pesticide label tell you to fill the entire tank, then you should follow those instructions.**

## **In-Tank Rinsing Systems**

Low volume flush and rinse systems are common on new sprayers and can be retrofitted to older sprayers. These systems use water from a clean water tank. The tank rinsing nozzles are mounted inside the tank and spun by the clean water pumped through them. This produces a ball of rinse water that repeatedly scours the inside of the tank.

The benefits of in-tank rinsing systems include:

- ▶ thorough rinsing of the tank with less water
- ▶ more efficient rinsing than with a hose end nozzle, and
- ▶ reduced risk of operator exposure to pesticide residue.

Operate tank rinsing nozzles **for at least 10 minutes** per cleaning cycle.

**If you have an in-tank rinsing system, use it regularly or these nozzles may get plugged and may not spin freely.**

## **No Cleaning is 100% Effective**

Some pesticide spray mixtures will penetrate into hoses, seals and gaskets.

If you spray sensitive crops that may be injured by trace amounts of herbicides, **use two sprayers** - one for herbicides and one for all other pesticides.

## **At the End of the Spray Season**

- ▶ After the final rinse, add an antifreeze mixture to the tank. With the agitation on, circulate the antifreeze mixture thoroughly through all sprayer circuits for at least five minutes. Pump the liquid out through the boom and nozzles until the tank is empty.
- ▶ Close all the openings into the sprayer to prevent debris, insects or animals from getting inside.
- ▶ Protect plastic tanks from direct sunlight when you store them. They will last longer.

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## Review Questions

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1. List two (2) reasons why it is important to clean out your sprayer.
  - 1.
  - 2.
2. What should you read first to look for sprayer clean out information?
3. If you prepare a tank mix of more than one pesticide, how will you decide what procedure to use to clean out the sprayer?
4. Why is it important to rinse the sprayer thoroughly after each application - even if you will use the same pesticide again for the next application?
5. List three (3) advantages of in-tank rinsing systems:
  - 1.
  - 2.
  - 3.
6. What areas should you avoid when you choose the location to do your sprayer clean out?
7. Where should you dispose of the rinsate from the first clean water rinse of the sprayer?