

SPRAYER TANK CLEAN-OUT PROCEDURES

Always read and follow label directions. If these guidelines ever conflict with label directions, use the label directions only.

Sprayer tank clean-out is necessary when changing between crops or between products to avoid crop injury due to contamination. A simple rinse or flush with water works for only a handful of herbicides, the primary one being – glyphosate. The development of herbicide-resistant weeds now requires the use of tank-mix partners to attain proper weed control. As such, the addition of a tank-cleaning agent is necessary to accomplish a thorough clean-out.

When cleaning a sprayer, the primary concern is to attain three objectives. These include diluting the active ingredient below damaging concentrations, deactivating the herbicide, or removing the herbicide from the sprayer system.

Household ammonia, chlorine bleach, commercial tank cleaners, and household detergents are examples of several types of tank-cleaning agents. Each has a specific purpose or use. Commercial tank cleaners and detergents help remove water and oil-soluble herbicides. Commercial tank cleaners usually perform better than household detergents; the tank cleaners generally raise the pH and can deactivate some herbicides in addition to dissolving them. Chlorine bleach lowers the pH of the solution which enhances the degradation of some herbicides. Ammonia increases the pH of the solution which increases the solubility of others.

One note of **CAUTION!** Never mix chlorine bleach and ammonia, or chlorine bleach with fertilizers containing ammonia, as it will produce a dangerous chlorine gas! The gas will irritate eyes, nose, throat and lungs.

Most herbicide labels contain information on sprayer clean-out following application. The label should have a recommended cleaning agent and cleaning procedure.

Taking time at the completion of the spray day to clean the sprayer can help prevent drying and hardening of product residues. This will also reduce the risk of

corrosion and damage to sprayer equipment. A sprayer should never be left to sit overnight without cleaning. If the same product mixture is to be used the next day, flushing the sprayer system with water should be sufficient. However, if switching products or crops, a more thorough cleaning is needed. At a very minimum, filling the sprayer with water will prevent dried deposits from forming.

Generally, poly tanks tend to require additional attention when cleaning compared to stainless steel tanks. Pay particular attention to sprayer sumps and pumps, and clean or replace screens and strainers. Inspect the inside of hoses. Checked or cracked hoses can accumulate residues. Make sure to clean irregular surfaces, such as baffles, plumbing fixtures and agitation units. Don't forget the inside top of the spray tank, as well as, the tank cover.

Plant growth regulator herbicides (2,4-D, Banvel, Stinger, etc.) and ALS-inhibiting herbicides (Pursuit, Maverick, FirstRate, etc.) are the most likely types to adhere to plastic tanks. Their chemical residues can subsequently be removed by herbicides and adjuvants used in future sprayer loads. One situation to avoid is a plant growth regulator mixture left in a sprayer overnight or for several days. If the next spray mixture has herbicides and adjuvants that act as tank cleaners, and are left in the tank for an extended period of time, the residues may be removed and mix with the current spray mixture. This may be a sufficient amount to cause crop damage or crop loss to a sensitive crop.

When performing sprayer tank clean-out, care should be taken to avoid contamination of crops, water supplies and streams. Clean in an area inaccessible to children, pets and livestock. The best disposal of rinsate is done by spraying back in the field according to labeled product rates.

The following sprayer clean-out procedure is recommended for all herbicides, in general. Read and follow the label directions if it specifies a different clean-out procedure.

1. Drain the tank and thoroughly rinse the inside surface with clean water. Spray rinse water through the spray boom for at least five minutes.
2. Fill the sprayer tank with clean water and add a cleaning solution (most labels provide recommended cleaning solutions). Fill the boom, hoses and nozzles and allow the agitator to operate for 15 minutes.
3. Allow the sprayer to sit for eight hours while full of cleaning solution so the herbicide can be fully removed from the residues inside the sprayer.
4. Spray the cleaning solution through the booms.
5. Clean nozzles, screens, and filters. Rinse the sprayer to remove cleaning solution and spray rinsate through the booms.
6. Rinse the entire system with clean water.

Company recommendations for sprayer tank clean-out are listed below. This is an abbreviated list which addresses a few specific herbicides of interest.

1. **Monsanto**

<u>Herbicide</u>	<u>Recommended Cleaning Solution</u>
Maverick	Ammonia + water
PowerMax	Water
WeatherMax	Water

A. Maverick Tank Clean-out.

Thoroughly clean application equipment with a 1% solution of ammonia (1 Qt of ammonia for every 25 gallons of rinse water) promptly after using this product. Use a sufficient volume of cleaning solution to thoroughly rinse all surfaces and to flush all hoses. Rinse with water and repeat the cleaning procedure with the ammonia solution. Complete the cleaning procedure by rinsing thoroughly with clean water. If visible residue is present in the spray tank, use a 1% solution of ammonia plus 0.25% nonionic surfactant (8 fluid ounces for every 25 gallons of rinse water) as the cleaning solution.

2. **AmVac**

<u>Herbicide</u>	<u>Recommended Cleaning Solution</u>
Impact	Commercial tank cleaner + water

Drain and clean application equipment thoroughly using a strong detergent or commercial tank cleaner according to the manufacturer's directions. Then triple rinse the equipment before and after applying this product.

3. **BASF**

<u>Herbicide</u>	<u>Recommended Cleaning Solution</u>
Armazon	Commercial tank cleaner + water
Beyond	Commercial tank cleaner + water
Clarity	Commercial tank cleaner + water
Status	Commercial tank cleaner + water
*Engenia	*Not yet labeled. Possible label in 2014.

- 1) All products should be completely sprayed or drained out of the spray tank.
- 2) As soon as possible after use, rinse down the inside walls of the tank.
- 3) Fill tank half full of water and add cleaner (strong detergent, ammonia, or commercial tank cleaner).
- 4) Circulate for a few minutes and then spray through the boom.
- 5) Remove and clean all filters and tips.
- 6) Allow solution to stand overnight, then spray out.
- 7) Flush out tank, all lines and nozzles one more time with water. Remove and clean all filters, nozzles and screens one more time.

4. Bayer

<u>Herbicide</u>	<u>Recommended Cleaning Solution</u>
Balance Flexx	Commercial tank cleaner + water
Capreno	Household bleach + water *
Huskie	Ammonia + water *
Laudis	Household bleach + water *
Liberty	Commercial tank cleaner + water

*Note: 1 gallon bleach per 25 gallons of water
 1 gallon ammonia per 100 gallons water

A. Laudis Tank Clean-out

- 1) Remove, dump and clean main sump and boom strainers in tank cleaner solution.
- 2) Disassemble nozzle bodies including screens, gaskets, and diaphragm caps and clean in tank cleaner solution.
- 3) Rinse walls of tank and all surfaces of tank to remove any visible residue.
- 4) Reassemble nozzles and strainers.
- 5) Flush the system with clean water.
- 6) Add 35 to 50 gallons of water to the tank and mix with 1-2 gallons of household bleach (1 gallon bleach for each 25 gallons of water). Start agitation in the sprayer and re-circulate the cleaning solution for 5 minutes. Prime the boom and nozzles; allow cleaning solution to remain in the sprayer for a minimum of 1 hour.
- 7) Spray cleaning solution until empty.
- 8) Rinse machine with clean water.
- 9) Dispose of all rinsate in an appropriate manner.

5. Cheminova

<u>Herbicide</u>	<u>Recommended Cleaning Solution</u>
Sulfonylureas	Ammonia + water
Edition Broadspec	
Harass	
Report, etc.	

- 1) Empty the tank and drain the sump completely. Remove any contamination on the outside of the spraying equipment by washing with clean water.
- 2) Spray the tank walls (including the lid) with clean water using a minimum volume of 10% of the tank volume. Add household ammonia at a solution rate of 1 gal/100 gallon water or other similarly approved cleaner to the tank. Circulate the water through the lines, including all by-pass lines, for at least 2 minutes. Flush the boom well and empty the sprayer. Completely drain the sump.
- 3) Repeat step 2. For this rinse, the addition of household ammonia or other cleaner is not required.
- 4) Remove the strainers, nozzles, tips and screens and clean separately in a bucket containing water and ammonia solution.

If only ammonia is used as a cleaner, the rinsate solution may be sprayed to the crop(s) listed on the label. Do not exceed the minimum labeled use rate. If other cleaners are used, consult the cleaner label for rinsate disposal instructions. If no instructions are given, dispose of the rinsate on site or at an approved waste disposal facility.

6. Dow

<u>Herbicide</u>	<u>Recommended Cleaning Solution</u>
Chaparral	Ammonia + water *
FirstRate	Ammonia + water *
Grazon	Ammonia or commercial tank cleaner + water *
Milestone	Ammonia or commercial tank cleaner + water *
PowerFlex	Ammonia + water *
SureStart	Ammonia or commercial tank cleaner + water *
Tordon	Ammonia + water *
Widematch	Ammonia + water *
*Enlist Duo	*Not yet registered. Clean-out resembles 2,4-D For row crops.

*NOTE: 1 gallon of ammonia per 100 gallons water.

A. SureStart Tank Clean-out.

- 1) Drain any remaining SureStart from the spray tank and dispose of according to label disposal instructions.
- 2) Hose down the interior surfaces of the tank. Flush tank, hoses, boom, and nozzles with clean water for 10 minutes. Fill the tank with water and recirculate for 15 minutes. Spray part of the mixture through the hoses, boom, and nozzles and drain the tank. All rinse water must be disposed of in compliance with local, state, and federal guidelines.
- 3) Fill the tank with water and recirculate for 15 minutes. For optimum cleaning, a tank cleaner such as liquid ammonia (1 gallon per 100 gallons of water) or other commercial tank cleaner is recommended in the second rinse if the spray equipment will be used on crops other than field corn. Spray part of the mixture through the hoses, boom, and nozzles and drain the tank. All rinse water must be disposed of in compliance with local, state, and federal guidelines.
- 4) Remove the nozzles and screens and clean separately.
- 5) If the spray equipment will be use on crops other than field corn, repeat steps 1 and 2 again and thoroughly wash the spray mixture from the outside of spray tank and the boom.

7. Syngenta

<u>Herbicide</u>	<u>Recommended Cleaning Solution</u>
Atrazine	Commercial tank cleaner + water
Callisto	Ammonia and/or Simple Green + water
Callisto Xtra	Ammonia and/or Simple Green + water
Lumax	Ammonia and/or Simple Green + water

A. Lumax Tank Clean-out.

- 1) Flush tank, hoses, boom, and nozzles with clean water.
- 2) Prepare a cleaning solution of 1 gallon of household ammonia plus 1 gallon of Simple Green in 20 gallons of water. Many commercial tank cleaners may be used.
- 3) Use a pressure washer to clean the inside of the spray tank with this solution. Take care to wash all parts of the tank, including the inside top surface. If a pressure washer is not available, completely fill the sprayer with the cleaning solution to ensure contact of the cleaning solution with all internal surfaces of the tank and plumbing. Start agitation in the sprayer and thoroughly recirculate the cleaning solution for at least 15 minutes. All visible deposits must be removed from the spraying system.
- 4) Flush hoses, spray lines, and nozzles for at least 1 minute with the cleaning solution.
- 5) Dispose of rinsate from steps 1-3 in an appropriate manner.
- 6) Repeat steps 2-5.
- 7) Remove nozzles, screens, and strainers and clean separately in the ammonia solution after completing the above procedures.
- 8) Rinse the complete spraying system with clean water.

8. Valent

<u>Herbicide</u>	<u>Recommended Cleaning Solution</u>
Gangster	Valent Tank Cleaner or ammonia + water
Valor	Valent Tank Cleaner or ammonia + water

- 1) Completely drain the spray tank, rinse the sprayer thoroughly, including the inside and outside of the tank and all in-line screens.
- 2) Fill the spray tank with clean water and flush all hoses, booms, screens and nozzles.
- 3) Top off the tank, add 1 gallon of 3% household ammonia for every 100 gallons of water, circulate through the sprayer for 5 minutes, and then flush all hoses, booms, screens and nozzles for a minimum of 15 minutes. If diaphragms are being used on the spray boom, loosen diaphragms before flushing the spray system, allowing cleaning solution to spray through the open diaphragm. If spray lines have end caps, they must be loosened before flushing the system, allowing cleaning solution to spray through the loosened caps. To enhance removal of Valor SX herbicide from the spray system, add a tank cleaner such as Valent Tank Cleaner, in place of ammonia and allow the cleaning solution to remain in the pressurized spray system (spray tank, hoses and boom) overnight before flushing the system for a minimum of 15 minutes.
- 4) Drain tank completely.
- 5) Add enough clean water to the sprayer to allow all hoses, booms, screens and nozzles to be flushed for 2 minutes.
- 6) Remove all nozzles and screens and rinse them in clean water.

In summary, when it comes to sprayer tank clean-out remember that the best information source is the product label. Check labels for products previously applied, and for products that will next be used in the sprayer tank. Sprayer clean-out and maintenance are important for crop safety, and should not be neglected.

Sources: B. Johnson et.al. 1999. Cleaning Field Sprayers to Avoid Crop Injury. Univ. of Missouri Extension. G4852.

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