



# EXTENSION

## Herbicide Mixing Order for Effective Pesticide Application

July 2024

Liberty Galvin

Extension Weed Science, Department of Plant and Soil Science

Oklahoma Cooperative Extension Fact Sheets  
are also available on our website at:  
[extension.okstate.edu](http://extension.okstate.edu)

Many applicators will elect to mix multiple products in a single pesticide application. This is referred to as “tank mixing” and is often utilized to:

- Improve control of specific pests.
- Apply multiple products simultaneously, e.g., insecticide and herbicides.
- Decrease the time and associated costs of operating spraying equipment.
- Reduce soil compaction by reducing the number of tractor passes.

The order in which a herbicide and other ingredients are added into a spray tank can have a serious effect on the performance of a herbicide application. Proper mixing order ensures products do not gel or form precipitates that can clog/destroy spray equipment and/or antagonize one another, resulting in a decrease in weed control. The best way to determine the proper mixing order for spray products is to consult the product labels. In lieu of label specifications, an updated list of mixing order recommendations is described in this fact sheet.

Spray tanks must first be cleaned in order to prevent issues such as nozzle clogging and contamination from previous herbicide use. Fill the spray tank between 10%-50% full with clean water and add a cleaning agent of your choosing, e.g., ammonia. Ensure the correct dilution rate is being used according to the cleaning agent label. Mix this solution with the agitator and circulate the fluid through the system, including boom and nozzles. Once this mixture has depleted to about 5% of the tank, refill the tank completely and repeat the process, agitate and circulate. Replace small sprayer parts often, e.g., screens, to increase application uniformity.

To begin, fill clean tank 50%-75% full with clean water or other carrier. If an inductor is used, rinse it thoroughly after each component is added. Add compatibility agent and/or defoamer at this time.

**1. Ammonium sulfate (AMS)** is an inorganic salt used as a fertilizer and typically contains ~12%-21% nitrogen and 24% sulfur. A product that includes AMS + a surfactant premixed will typically be added last. Otherwise, AMS is added first and requires constant agitation. This product should be completely dissolved before the addition of other chemicals. AMS that is not properly agitated can clog spray equipment and cause compatibility issues with various water sources.

**2. Water dispersible products** [(wetable powders (WP), dry flowables (DF), granular (G), etc.)]. WPs are often listed with a number, e.g., 40WP. This indicates what percent of the product weight is the active ingredient (a.i.). Wetable powders should first be made into a slurry by mixing with water, then slowly added to the spray tank. Again, constant agitation is needed to ensure this chemical stays in solution.

**3. Microcapsule suspension (ME)** and other suspensions [(suspension concentrate (SC), aqueous suspension (AS), capsule suspension (CS), etc.)] Ensure the proper surfactants are utilized with suspension-formulated herbicides per label directions. Encapsulated formulations must remain in solution, i.e., water, carrier liquid, to have effect.

**4. Liquids that are soluble (SL)** Liquid herbicides or additives that are water-based.

**5. Emulsifiable concentrates (EC)** EC formulations are oil-based liquid herbicides. Adding oil-based liquids before soluble liquids can cause improper mixing of other additives and reduce efficacy.

**6. Surfactants** [nonionic surfactant (NIS), crop oil concentrate (COC), methylated seed oil (MSO)] should be added last after everything has been properly mixed into solution, e.g., there are no floating particles except for those in the “suspension” category.

Add remaining water if tank size allows, and continue agitation throughout application.

Oklahoma State University, as an equal opportunity employer, complies with all applicable federal and state laws regarding non-discrimination and affirmative action. Oklahoma State University is committed to a policy of equal opportunity for all individuals and does not discriminate based on race, religion, age, sex, color, national origin, marital status, sexual orientation, gender identity/expression, disability, or veteran status with regard to employment, educational programs and activities, and/or admissions. For more information, visit <https://eeo.okstate.edu>.

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Director of Oklahoma Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Vice President for Agricultural Programs and has been prepared and distributed at a cost of 20 cents per copy.07/2024 MR