

Avoid a tank tri-mix on soybeans

Avoid 3-Way Fungicide, Insecticide and Herbicide Tank Mixtures on Soybeans

Roundup Ready soybeans, soybean aphids and the potential for soybean rust in Wisconsin have increased growers' interest in combining all pesticide products into a single spray application. While convenient, these tank mixtures are not recommended.

Optimal application times for fungicides, herbicides and insecticides are not the same

Insect, disease and weed pests do not all appear at the same time; so a single tank mixed application will not provide satisfactory control of all three pest types.

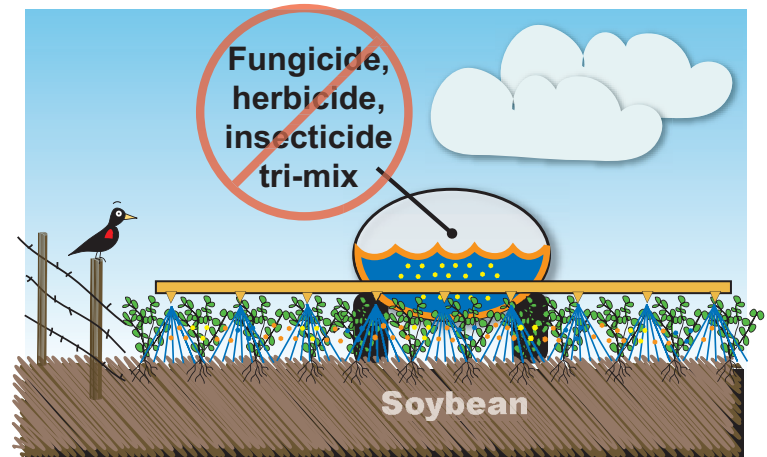
For example, to avoid yield loss from weed competition, applications of glyphosate to Roundup Ready soybeans should be made around the V3 growth stage. The recommendation for soybean aphid control is to wait until late vegetative through early reproductive stages (R1 to R4) and only treat if soybean aphids have reached an average of 250 aphids/plant throughout the field and are actively increasing. Glyphosate applications at the late vegetative to reproductive soybean growth stages would result in substantial yield loss from early season weed competition.

Alternatively, an insecticide application at the V3-V4 stage would provide little to no economic benefit because soybean aphid populations typically build to threshold levels by mid to late season, during the vulnerable bloom (R1-R2) to pod set (R3-R4) soybean growth stages. Insecticides applied below the soybean aphid threshold will kill beneficial insects important for natural control.

The proper timing for the control of soybean rust will depend on if and when it reaches Wisconsin. Predicting the arrival of soybean rust, and when subsequent fungicide applications should be made, is not simple. The arrival of soybean rust and severity of the disease will depend on wind currents from the south as well as the stage of soybean development. Fungicide applications are not likely to be recommended before the R1 stage. Consequently, combining a fungicide with an insecticide or herbicide may miss the correct timing to control soybean rust.

Application equipment and coverage differences

Fungicides: There are two types of fungicides, preventative/protective and curative. Preventative fungicides are



not absorbed into a plant and only protect plant surfaces where they have been deposited. Curative fungicides are locally systemic. Locally systemic fungicides are absorbed into leaves, but only move a small distance within the plant. Regardless of fungicide type, fungicide applications must achieve complete plant coverage and thorough penetration of the crop canopy. Leaves that are not covered by a fungicide will not be protected from soybean rust. Adequate coverage will require spray nozzles that deliver smaller droplets than what is typically used in herbicide applications.

As a general guideline, use nozzles producing medium to fine droplets for fungicides and insecticides, medium sized droplets for postemergence herbicides and coarse droplets for preemergence applications (see Table 1, on page two). In addition, increasing spray volume will aid in obtaining better surface coverage. It is recommended that ground applied fungicides be sprayed in a carrier volume of at least 15 gallons per acre.

Insecticides: Insecticides kill insects through contact activity or by acting as a stomach poison after the target insect has fed on treated plant material. As with fungicides, both contact activity and locally systemic foliar insecticide applications require thorough penetration of the crop canopy and good coverage of the plant. Nozzles used for insecticide applications are similar to those used for applying fungicides. Insecticide carrier volumes are typically recommended between 10 and 20 gallons per acre, with higher volumes (15 to 20 gpa) providing better coverage for soybean aphid, which feeds on the underside of leaves and moves to inner and lower canopy locations mid- to late season.

(continued on page 2)



Table 1. Spray droplet classification system*

Category	Symbol	Color Code	VMD (0.5)**
Very Fine	VF	Red	<150
Fine	F	Orange	150-250
Medium	M	Yellow	250-350
Coarse	C	Blue	350-450
Very coarse	VC	Green	450-550
Extremely coarse	XC	White	>550

*Source: ASAE Standard S-572

**Volume median diameter (VMD) is a measure of droplet size where half of the spray volume is contained in droplets larger than the VMD, and half of the volume is in spray droplets smaller than the VMD.

Table 2. Movement (including lateral drift) of spray particles*

Droplet diameter (microns)	Size classification (ASAE)	Time required to fall 10 feet	Lateral movement in 3 mph wind
20	Very Fine	4.2 minutes	1,100 feet
100	Very Fine	10 seconds	44 feet
240	Fine	6 seconds	28 feet
400	Coarse	2 seconds	8.5 feet
1,000	Extremely coarse	1 second	4.7 feet

*Source: Adapted from, Akesson and Yates, Ann. Rev. of Entomology, 1964.

Herbicides: *Postemergence herbicides do not require complete coverage.* Several postemergence herbicides like glyphosate do not rely on complete leaf coverage for weed control because they translocate through the entire plant.

Drift is a major concern with postemergence herbicides. Spray nozzles for the application of postemergence herbicides provide larger spray droplets that are less prone to drift (see Table 2). Systemic herbicides are often effectively applied at spray volumes of 10 to 15 gallons per acres, which is lower than recommended for fungicides or soybean aphid insecticides.

Additional Considerations for Applying Fungicides and Insecticides

- Droplet size for fungicide and insecticide applications should be in the fine to medium category (200 to 350 microns). Higher spray pressure creates smaller droplets providing better coverage, but you must balance smaller droplet size with the potential to increase drift. Follow nozzle manufacturer's recommendations for nozzle selection and pressure.
- Consider twin spray nozzles or other nozzles designed to improve canopy penetration.
- Increase spray volumes to at least 15 gallons or more to improve plant coverage and canopy penetration.

General guidelines for improving pesticide applications.

- Nozzle selection is the most important factor for making proper pesticide applications. Nozzle type

regulates spray uniformity, application rate, spray coverage and drift potential. Carefully select the appropriate nozzle for the pesticide type that you are applying and intended droplet size.

- Adjust the spray boom height to provide uniform coverage at the top of the crop canopy for insecticides and fungicides or to the height of the weeds for herbicides.
- Overlap nozzles to obtain proper coverage. The amount of overlap will depend on the nozzle type. Flat fans usually require a 50% overlap, whereas flood nozzles require 100% overlap. Check to make sure you have the correct overlap. Remember to place spray tips that make a fan pattern at a slight angle to the boom.
- Always Read and Follow the label for:
 - recommended carrier
 - recommended spray volume (gallons per acre)
 - proper pesticide rate
 - necessary adjuvant
 - pre-harvest interval
 - correct application timing
- Remember that applications resulting in pesticide spray drift (movement of spray particles or vapor off target) may be a violation. Factors that increase the potential for spray drift include small droplet size, increased spray pressure, wind, temperature inversions, and low relative humidity.

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