

AGRICULTURAL BEET

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CLS tank mixing technique
and sequence opportunities

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Appropriate tank mixing for fungicide effectiveness

Mixing the spray and spraying the mix...

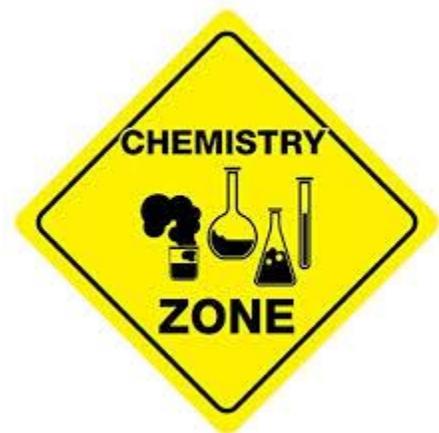
When it comes to fungicide control of Cercospora Leafspot (CLS) a variant of a humorous saying comes to mind. *If your fungicide products are not a part of a CLS "solution", then they are likely a precipitate.* Although this saying is designed to be humorous, if you are stopped in the field to clean plugged nozzles or obtaining less than adequate CLS control from your CLS fungicide program due to insufficient mixing or compatibility, the reality is that you may not consider this anecdote it all that amusing.

In a couple of the recent AgBEET editions, we've already discussed the importance of spray equipment, pressure, and volume to improve leaf coverage and increase the odds of obtaining acceptable leaf spot control. However, if you were to try to imagine yourself as one of thousands of fungicide molecules mixed in a spray tank, it may be easier to understand how inadequate solubility and/or uniformity of your active ingredient colleagues in the spray tank solution would impair the ability to expect that every droplet being released at the nozzle is properly loaded with an adequate concentration of fungicide molecules to do their job in your sugarbeet canopy. In other words, extraordinary droplet coverage on leaves alone cannot and will not matter if fungicide molecules are concentrated at the top or bottom of the tank and only a certain percentage of droplets actually possess the active ingredient due to poor mixing technique and fungicide dispersal.

Ultimately, what this means is that as much as many of us would like to leave their high school or college chemistry classes in the rear-view mirror, to be a crop farmer means looking straight out the front windshield at the signpost up ahead... "Your next stop, the Chemistry-Zone!" Failure to address the chemistry side of mixing pesticide products together first of all unsafe but could also result in plugged spray filters and nozzles or reduced disease control.

These concepts reinforce the importance of proper tank mixing procedures relating to effective combining of the products involved. Regarding mixing, there are a couple of acronyms that exist to assist with remembering the sequence to use when adding products that have vastly different formulations. The primary goals of using a proper mixing order include...

1. Providing the fungicide products the best chance to succeed as well as...
2. Prevent product incompatibilities that can plug the sprayer or decrease sprayer functionality.



One such acronym used for tank mixing is A-P-P-L-E-S. This North Dakota Weed Control Guide shortcut has been shared with you previously. However, a subtle modification of this shortcut might assist you to “grapple” with preparing your pesticide application options. A **GRAPPLES** sequence of mixing inputs stands for...

- **G**ear Up! Pesticides can be hazardous. Utilize labelled Personal Protective Equipment (PPE).
- **R**inse spray tank and booms prior to filling the tank and/or between jobs.
- **A**gitate: Add water to one half to ¾ full and begin agitation prior to adding the following products...
- **P**owders soluble (dry fertilizers, Soluble Granules, Soluble Powders).
- **P**owders dry (Dry Flowables, Water Dispersable Granules, Wettable Powders)
- **L**iquid flowables and suspension (ASC, F, ME, SC, SE)
- **E**mulsifiable Concentrates (EC, EW, OD)
- **S**olubles or Solutions (S, SL)

Alas, there are just too many products and options to create an acronym that fits all situations – every time. Therefore, a few additional rules to follow to assure an effective tankmix include...

- ✓ Do not leave leftover spray mixtures in a tank or sprayer lines for extended periods.
 - Several fungicides are dry products or are dry substances formulated as a liquid suspension.
 - Suspension by definition means that these products do not produce a consistent mixture with water that is capable of maintaining long term compatibility.
 - Some operations utilize a pre-slurry system to initiate mixing of tough to mix products.
 - When these suspension-type formulations separate from water they can settle out and...
 - Plug sprayers, filters, and nozzles.
 - Reduce uniform distribution of active ingredients that will reduce effectiveness.
- ✓ Generally speaking, spray additives/adjuvants are typically added last in a mixing sequence except for a few notable circumstances...
 - Water conditioners are applied prior to other inputs when hard water ions require attention.
 - pH buffers are applied early in the mixing sequence when certain pesticides are pH sensitive.
 - Certain additives such as stickers may require early sequence mixing if/when...
 - The additive itself is difficult to get into solution with water.
 - Other products such as fertilizers are being added that can increase incompatibility.



Wet conditions have already created a challenging beginning to the 2019 CLS season. Success will require diligence to all BMP's including use of two fungicide families with every application for effective control and fungicide resistance management. When tank mixing multiple product applications (including deposition aids or sticker/spreaders), certain products may not mix or react well with one another. Taking the time to give some thought to proper mixing order could save you time while increasing overall effectiveness of your CLS fungicide program. Also, please download Survey123 and input your CLS inputs into the APD to assist us with assessing grower inputs to combat this disease.

