

10 Go-To Tips for Summer 2024

As the growing season kicks into high gear, now's a good time to brush up on herbicide concepts that can help your team add value for customers growing Enlist E3[®] soybeans. Here's a quick review as you, your customers and applicators head to the field:



1

Start clean, stay clean

Getting ahead early sets the stage for staying ahead of weeds all the way to harvest. Corteva Agriscience recommends use of overlapping residual herbicides with Enlist E3 soybeans. Farmers who started clean this year with tillage or burndown and follow with soil residual herbicides can apply Enlist[®] herbicides over the top. This program approach effectively controls weeds and proactively reduces potential for weed resistance issues over the long run.

2

Adjuvant use with Enlist[®] herbicides and tank-mixes

Corteva recommends use of crop oil concentrates (COC) or methylated seed oils (MSO) to help penetrate the leaf surface and also maintain the longevity of herbicide droplets. Staying intact allows droplets time to burn through and improve uptake by the plant, a key to good control. A non-ionic surfactant (NIS) should be used for glyphosate products which require a surfactant. NIS products can reduce surface tension in droplets and allow a bigger "splatter" and more leaf surface coverage. Be aware that COC and MSO are not recommended for use with glyphosate.¹

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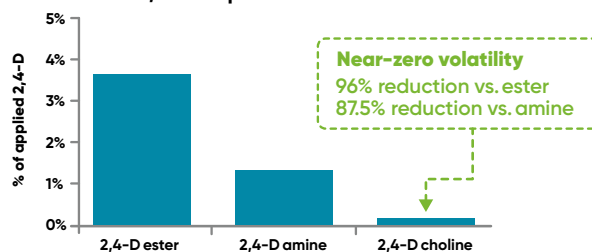
Over-the-top applications? If it's 2,4-D, only use Enlist herbicides.

If it's 2,4-D, the only herbicides labeled for spray use on Enlist E3 soybeans are Enlist One[®] (2,4-D choline) and Enlist Duo[®] (2,4-D choline + glyphosate) herbicides. Use of any other 2,4-D formulation over the top is a violation of law, and a violation of the grower's Corteva Agriscience[™] Technology Use Agreement. But there are many more reasons than that to use only Enlist herbicides.

- Generic amine and ester forms of 2,4-D, are not the same products as Enlist herbicides.
- Ester and amine 2,4-D herbicides are highly volatile.
- Enlist herbicides, are made with 2,4-D choline which provides the many benefits of near-zero volatility.
- Enlist herbicides are 87.5% and 96% less volatile than ester and amine formulations (see graphic).

Help your customers understand the difference and avoid off-target crop and non-crop damage, violations and potential fines by using only Enlist herbicides on Enlist E3 soybeans.

Cumulative 2,4-D vapor loss at 70 hours after treatment²



¹ Oklahoma State University Extension, "Herbicide How-To: Maximizing Glyphosate Activity" Accessed May 9, 2024, <https://extension.okstate.edu/fact-sheets/herbicide-how-to-maximizing-glyphosate-activity.html>.

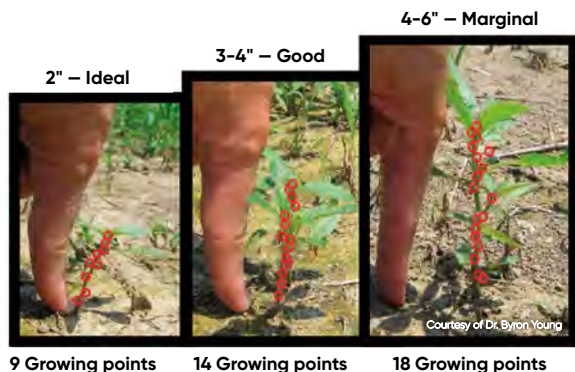
² Summary of 8 field trials for Indiana, Georgia and Arkansas, USA.

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Small weeds = easier to control

A key herbicide use principle is to spray weeds when they're small. The reason is simple: Smaller weeds have fewer growing points. A 2" weed, for instance, has nine growing points; a 4-6" has 18 (see photo).

Weed height & growing points



That's twice as much work needed from the same volume of herbicide. Some vigorous weed species can grow as much as 2" in a single day. Killing a 6" Palmer amaranth or waterhemp plant can sometimes be like fighting a much larger plant. Waiting several days to get a sprayer into a field can make the weed control that much harder. This chart shows what a big difference just a few inches of weed height can make in reducing field results.

Enlist One® herbicide weed control height evaluation

	2-4 IN	5-6 IN	10-12 IN
Common ragweed	98%	96%	99%
Common waterhemp	93%	84%	80%
Common lambsquarters	96%	89%	76%

Control Rates: ■ 85-100% ■ 84-75% ■ < 74%

* Enlist One, 2,4-D choline formulations and 2,4-D amine data were combined across trials.

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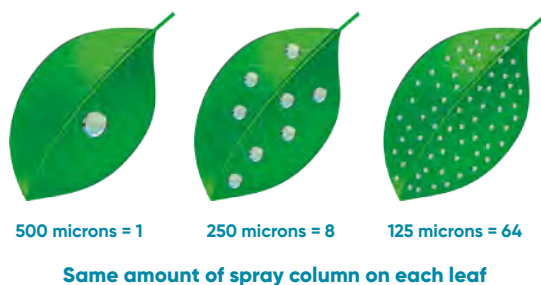
Importance of droplet size, leaf coverage and drift

Droplet size and leaf coverage comes down to simple, but sometimes surprising math. Take a look at the illustration below. Reducing the size of one 500 micron droplet by half produces eight 250 micron-sized droplets. Cutting those 250 micron droplets in half creates 64 droplets of 125 microns. (Seem confusing? Remember: droplets are three dimensional objects.)

Now look at the increase in leaf coverage as droplet size gets smaller. Smaller droplets produce better coverage. But there's a downside. Smaller droplets are more prone to physical drift. Drift occurs when air movement has more control over a droplet than gravity. This means even small amounts of wind speed can cause movement in a direction other than straight down. Be aware that the 125 micron size used in our example is considered a "driftable fine" (a droplet size of 150 microns or less).

Always follow label directions for spraying conditions and use recommended nozzles. A list of nozzles qualified for use with Enlist® herbicides can be found at www.EnlistTankMix.com.

Droplet size and coverage



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Check EnlistTankMix.com for qualified tank-mix partners

The U.S. Environmental Protection Agency (EPA) administers tank-mix protocols and defines what it means to be "qualified." It's important for you and your growers to know what qualified tank-mix partners ARE and ARE NOT:

Qualified tank-mix partners ARE:

- Products that passed the EPA-mandated drift testing protocol.
- One reason for the testing protocol for drift is protecting sensitive areas where endangered species may have habitat.*

Qualified tank-mix partners ARE NOT:

- Tested for crop response
- Tested for physical tank-mix compatibility
- An agronomic recommendation from Corteva Agriscience
- An endorsement of any kind from Corteva
- An indicator of performance

Enlist Duo® and Enlist One® herbicides may only be tank-mixed with products that have been tested and found not to adversely affect the spray drift properties of Enlist herbicides. You and your customers have one stop for information about products qualified for tank-mix use with Enlist herbicides: www.EnlistTankMix.com.

Products listed on EnlistTankMix.com have not been tested for crop response, e.g., leaf burn. The addition of tank-mix products may cause increased crop response. Applications of products containing crop oils or vegetable-based oils are more likely to result in crop response. Listing does not imply endorsement of use.

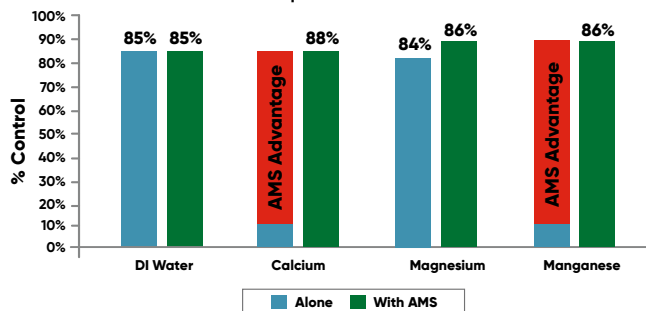
7

Use water conditioner (AMS)

Use of a water conditioner such as ammonium sulfate (AMS) in every tank-mix is recommended to counteract positively charged metals (calcium, magnesium and others) found in hard water. These cations can bind to negatively charged herbicides and prevent them from working. AMS also increases herbicidal uptake on some weed species – glyphosate uptake in velvetleaf surface, for example. Typical use rates for AMS are 8 ½ to 17 lbs. AMS per 100 gallons of spray solution. The red bar in the chart below shows improvement in weed control 21 days after treatment from addition of AMS to 2,4-D amine in hard water.

2,4-D amine & effect of hard water cations³

Common lambsquarter control – 21 DAT



8

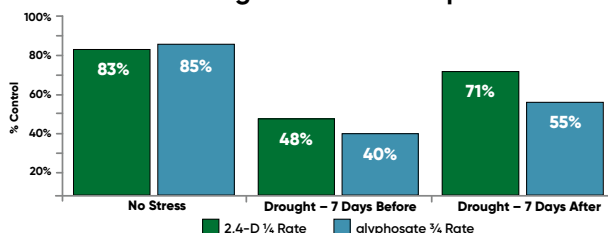
Effect of drought on weed control

Moisture stress, of course, affects plant and weed growth. It can also affect herbicide efficacy. This experiment shows waterhemp control with 2,4-D and glyphosate in normal and drought conditions before and after treatment. Herbicide application rates were adjusted downward to make the results easier to observe (2,4-D at ¼ rate, and glyphosate at ¾ rate).

As shown, drought before a spray has a more negative effect on herbicide activity than drought after a spray. Why? Under drought stress, soybeans and weeds stop growing and defense mechanisms of the plants can kick in to preserve moisture. The cuticle can harden and leaves can develop a thick waxy layer, which makes it harder for herbicides to do their job. To protect against water loss, grassy weeds will curl leaves and broadleaf weeds will droop during the hottest part of the day. Both actions make it harder to get good application coverage.

When drought occurs after a spray, even a heavy morning dew can sometimes be enough moisture to get plants growing again, making it easier for herbicides to do their job.

Effects of drought on waterhemp control⁴



Drought Before: Timing of drought occurred 7 days prior to herbicide application

Drought After: Timing of drought occurred 7 days after herbicide application

No-Stress: Plants were watered to saturation

Herbicide treatment by drought timing interaction from the second greenhouse assay designed to determine the effect drought stress on herbicide efficacy.

9

Improving results from one pass, postemergence

It's always the goal to achieve good results with a first spray. In a first spray, Enlist One® + Liberty® herbicides provides best control. A look at the data on waterhemp:

Post pass #1	Control rating
glyphosate herbicide alone	46
Liberty herbicide alone	82
Liberty alone	82
Liberty alone	82
glyphosate + Liberty	86
Enlist One herbicide + Liberty	91
Enlist One + Liberty	91
Enlist One + Liberty	91
Enlist One + glyphosate	86

Enlist One + Liberty *increases weed control by:*

- 10% vs. Liberty alone
- 5% vs. Enlist One + glyphosate
- 5% vs. Liberty + glyphosate

Enlist One + glyphosate *has the same control rating* on waterhemp as Liberty + glyphosate.

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Improving results from a second-pass, postemergence

Last year, drought conditions in some areas slowed soybean canopy establishment, giving weeds a more favorable growing environment. Faced with this, many farmers chose a second postemergence spray – an option they have with the Enlist® weed control system. And what does the data say regarding the approach for a second pass?

Post pass #2 (15 days later)	Control rating
glyphosate herbicide alone	65
Enlist One® + Liberty®	92
Enlist One + glyphosate	98
Enlist One + Liberty	95
glyphosate + Liberty	99
Liberty alone	98
Enlist One + Liberty	99
Enlist One + glyphosate	98
Enlist One + Liberty	99

Enlist One + a tank-mix partner herbicide improved control vs. glyphosate alone.

In addition to the information presented here, always refer to label directions for all products mentioned in this article.

³ Roskamp et al. 2013, Weed Technol 27:72-77

⁴ Skelton, J.J.(2015). UPTAKE, TRANSLOCATION, AND METABOLISM 2,4-D IN ENLIST® CROPS AND CONTROL OF DROUGHTSTRESSED WATERHEMP (AMARANTHUS TUBERCULATUS) WITH 2,4-D AND GLYPHOSATE. Doctoral dissertation, University of Illinois at Urbana-Champaign, <http://hdl.handle.net/2142/88156>.

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