

Not the 2,4-D you think you know

What makes 2,4-D choline in Enlist® herbicides different from other forms of 2,4-D?

With the growing popularity of the Enlist® weed control system, you may have some customers asking why they can't use more traditional forms of 2,4-D (amine or ester) on their Enlist E3® soybeans. After all, aren't Enlist E3 soybeans tolerant to 2,4-D?

There are important reasons why only Enlist One® and Enlist Duo® herbicides—which contain 2,4-D choline and Colex-D® technology—are the only 2,4-D herbicides approved for use on Enlist® crops. Enlist herbicides are about much more than a logo on a label.

2,4-D amine, ester and choline: What's the difference?

2,4-D ester

2,4-D herbicide was originally introduced in the 1940s in an ester form. It was a game-changer in broadleaf weed control. 2,4-D itself is an acid. In an ester, the 2,4-D is combined chemically with alcohol. 2,4-D esters readily absorb into plants, making them very effective at killing weeds.¹ This also increases the potential for injury to non-targets in cases of off-target movement or application error.¹ Ester formulations also have higher vapor pressures than amine or choline forms. The higher the vapor pressure, the more likely the 2,4-D will volatilize.

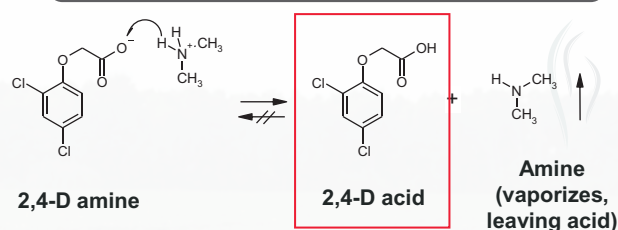
2,4-D amine

In amine forms, the 2,4-D acid reacts with an amine base to form a salt. Amines are water soluble and don't absorb into plants as efficiently as esters. While their chemical composition makes amines less volatile than esters, they are still prone to instability, especially when mixed with other products.

2,4-D choline

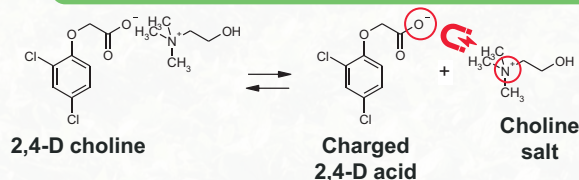
2,4-D choline is a completely new molecule that combines the negatively charged 2,4-D acid with a positively charged choline salt. Because of these opposite charges, the 2,4-D choline molecule is extremely stable. When combined with Colex-D technology, 2,4-D choline is the least volatile form of 2,4-D with near zero volatility and reduced potential for drift, and has the weed control properties of 2,4-D, making it very effective against weeds.

2,4-D amine (DMA) breaks apart, leaving behind volatile 2,4-D acid



Once separated, the 2,4-D acid can volatilize and move off target.

2,4-D choline is more stable—stays associated

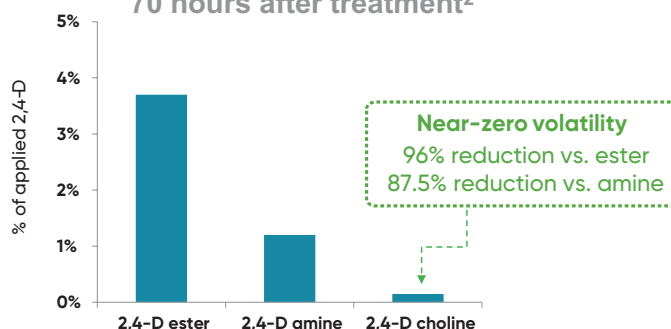


The negatively charged acid and positively charged salt stick together like a magnet. This inherent stability results in near-zero volatility.

 **Enlist One®**
COLEX-D® technology
HERBICIDE

 **Enlist Duo®**
COLEX-D® technology
HERBICIDE

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



2,4-D choline is inherently less volatile than traditional forms of 2,4-D

2,4-D choline in Enlist herbicides



Broadleaf weed control

- Near-zero volatility
- PLUS Colex-D technology reduces physical drift potential



Tank-mix flexibility

- Compatible with hundreds of tank-mixes
- Acidic products or AMS do not "break" low-volatility characteristics

See: [EnlistTankMix.com](https://www.enlisttankmix.com)



Application timing

- Apply through R1
- No plant-back restriction with Enlist E3 soybeans

¹ Glenn Nice, Bill Johnson, and Tom Bauman, "Amine or Ester, Which Is Better?," Purdue Weed Science (Purdue University Extension, May 25, 2004).

² Summary of eight field trials from 2010–2011 in Indiana, Georgia and Arkansas. Corteva Agriscience data on file.

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