



Early-Season Herbicide Injury in Corn

Corn Response to Herbicides in Adverse Environments:

- Fluctuating spring weather patterns can stress corn during emergence.
- Pre-emergence applied herbicides are typically activated well by rainfalls occurring during the spring.
- Cool temperatures, heavy precipitation and activated herbicides have the potential to cause injury to corn in some areas.
- Carry-over injury to corn can also occur when dry weather follows applications of some residual herbicides from the previous crop.
- Varying levels of pre-emergence injury as well as carry-over injury are observed each season across the Corn Belt.
- In many cases, the crop response is limited to areas of heavier ponding or rainfall, where the environment shortly after planting played a major role inducing injury.
- Different modes of action affect corn in various ways.



Group 15 Long-Chain Fatty Acid Inhibitors

Long-chain fatty acid inhibitors are seedling shoot growth inhibitors. They affect the roots or coleoptile as the plant grows through the herbicide zone often exhibiting “buggy whipping” in which leaves have trouble unfurling from the whorl. Shallow planting depth, in addition to the above mentioned issues will induce injury.

- Alachlor
- Acetochlor
- Dimethenamid-P
- Metolachlor, s-metolachlor
- Flufenacet



Group 27 HPPD Inhibitors

HPPD inhibitor herbicides “bleach” the tissue, reducing and stopping photosynthesis. The tissue will be bleached and then turn necrotic.

- Pyrasulfotole
- Topramezone
- Mesotrione
- Tembotrione



Group 4 T1R1 Auxin Receptors (Synthetic Auxins)

Synthetic auxin herbicides cause the tissue to “out-grow” the cells capacity to maintain function. Treated tissues can exhibit epinasty in which stalks twist, lean, and even fall over. Leaf rolling and trouble unfurling can also occur.

- Phenoxyacetic acids
- Benzoic acids
- Carboxylic acids

Group 2 ALS inhibitors

ALS inhibitor herbicides inhibit the enzyme acetolactate synthase (ALS). Leaves in the whorl may appear yellow or translucent, while older leaves can become purple. Root growth is inhibited causing a “bottle brush” appearance. This injury is slow to develop (usually >5 days).

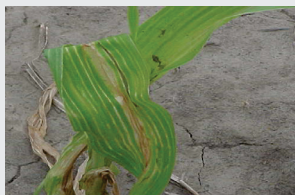
- Imidazolinones
- Sulfonylureas
- Triazolopyrimidine sulfonamides
- Sulfonylamino-carbonyltriazolinones



Group 14 PPO inhibitors

PPO inhibitors have the potential to carryover into corn. Carryover symptoms include veinal chlorosis or clearing of the midvein and veins. PPO inhibitors sprayed on corn will appear as speckling or bronzing of the leaves contacted by the spray droplets.

- Aryl triazolinones
- Diphenylethers
- N-phenylphthalimides
- Pyrimidinediones



Group 5, 7 Photosystem II Inhibitors

Photosystem II Inhibitors move throughout the plant and block the photosynthesis pathway. This causes loss of chlorophyll and carotenoids, as well as membrane leakage causing initial symptoms of chlorotic tissue, followed later by necrosis.

- Triazines
- Phenyl-carbamates
- Phenylureas
- Uracils



Group 6 Photosystem II Inhibitors

Group 6 photosystem II inhibitors “burn” the cells on the leaves stopping photosynthesis. Injury is typically confined to the foliage that has been contacted by herbicide droplets.

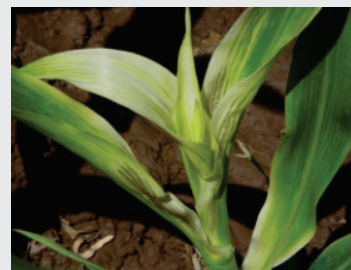
- Benzothiadiazoles
- Nitriles



Group 9 EPSPS Inhibitors

EPSPS inhibitors block an enzyme necessary for photosynthesis. This herbicide is mobile throughout the plant.

- Amino acid derivatives (glyphosate)



Group 10 Glutamine Synthetase Inhibitors

Glutamine synthetase inhibitors also block an enzyme necessary in photosynthesis. This injury is similar to that of glyphosate but may occur quicker due to the different enzyme.

- Organophosphorus (glufosinate)



Management Information

- Always read and follow the label information for the herbicides applied.
- University of Missouri extension manual IPM1007 provides information on herbicide sites of action, the herbicides in each chemical family, as well as their typical injury symptoms.
- Understand that environmental conditions can lead to unpredictable crop injury.
- The majority of crop injury scenarios have little to no impact on yield. However, rare cases of severe crop injury have shown the potential to impact yield.
- Review planting depth and soil characteristics to understand movement of the herbicides in the soil profile.