



HERBICIDE INJURY IN CORN

What You'll Learn...

- Herbicides used in corn have been developed to provide excellent crop safety when used according to label directions.
- Cool, wet soil conditions can result in corn injury from preemergence residual herbicides.
- Warm, humid conditions that promote rapid corn growth can increase the potential for injury with postemergence herbicides.
- Corn injury symptoms that can result from environmental conditions and/or the misapplication of herbicides are described in this publication.

Soil-Applied Herbicide Injury

Corn injury from soil-applied or preemergence (PRE) residual herbicides is generally the result of cool and wet soil conditions. Plant metabolism is reduced under these conditions, resulting in slow corn growth and herbicide detoxification. Planting too deep can result in prolonged contact of the herbicide with the emerging corn shoot. Planting too shallow can result in the corn seed sprouting in the herbicide-treated soil. Stress from insects, diseases, and poor soil conditions can reduce the vigor of the crop, increasing the effect of herbicide injury. Weather conditions favorable for rapid corn emergence and growth can minimize the risk of herbicide injury.

Seedling Root Growth Inhibitors

Dinitroanilines - Prowl® (pendimethalin)

- Inhibits main and lateral root growth through inhibition of cell division.
- Seedling roots are pruned and "clubbed" with swollen root tips.
- Stunting and purplish discoloration can occur above ground (Figure 1).
- Injury is common when corn seed has been planted too shallow and/or comes into direct contact with the herbicide solution.



Figure 1. Corn stunted and purple in color from dinitroaniline injury.

ALS Inhibitors

Triazolopyrimidine - Python® (flumetsulam)

- Preemergence injury to corn begins with stunted growth and yellowing in the youngest leaves, and leaf veins turning purple or red.
- Root malformation occurs with short and slender lateral roots, referred to as "bottle-brush" roots.
- Injury can be increased by over application, shallow planting depth, or OP insecticide use.
- Various ALS inhibitors can persist and carryover to injure corn. This can depend on the herbicide rate, soil pH, dry conditions, or late applications.

Seedling Shoot Growth Inhibitors

Chloroacetamides - Dual II Magnum® (s-metolachlor), Harness® (acetochlor)

- Main activity seen on the shoots of corn seedling.
- Stunting of shoots that result in abnormal seedlings that do not emerge from the soil.
- Corn plants can leaf out underground and leaves may not unfurl properly.
- Stunted, malformed shoot that may be twisted and onion-leaved (Figure 2).



Figure 2. Corn injury called buggy-whipping.

Growth Regulators - 2,4-D, dicamba, clopyralid

- Corn plants can leaf out underground or show symptoms very similar to chloroacetamides.
- Usually due to planting slot not being properly closed and/or corn being planted too shallow, causing the herbicide to come into direct contact with the germinating corn seed.
- Can be caused by not following the proper corn planting rotational interval for the herbicide.

Pigment Inhibitors - Balance® Flexx (isoxaflutole)

- Leaves appear chlorotic to bleached-white (Figure 3).
- Injury usually appears on older leaves while new leaves can appear normal.
- Plants could eventually turn brown (necrotic) and die.
- Injury is generally short-lived and often confined to low areas or wet spots within a field.



Figure 3. Bleaching injury on corn as result of PRE application of isoxaflutole.



HERBICIDE INJURY IN CORN (CONTINUED)

Foliar-Applied Herbicide Injury

Corn injury from herbicides applied postemergence (POST) can vary with herbicide product, rate, timing of application, and environmental conditions. Corn growth and development can be affected by POST herbicides, so it is important to follow the instructions on herbicide product labels. Environmental conditions influence the absorption of POST-applied herbicides and potential crop tolerance. Corn under stress may not metabolize some herbicides quickly enough to avoid crop injury. Cool temperatures and wet soils can slow corn growth and alter development. Warm, humid conditions promote rapid absorption, while cool and dry conditions may slow the crops development. Corn can become more responsive to herbicides due to changes in the leaf cuticle that may allow greater absorption. Spray additives can increase the rate of herbicide uptake by the crop. Injury symptoms from spray additives include chlorotic mottling or necrosis of leaves, and may only be temporary as the crop recovers. Herbicide product labels should be followed regarding recommended spray additives and other precautions.

Growth Regulators - Phenoxys, Benzoics, and Pyridines: 2,4-D, Banvel®/Clarity® (dicamba), Distinct®, Status®, Stinger®/Hornet® (clopyralid)

- Distorted and malformed growth and development, bending of stalks, fused or tightly rolled leaves (Figure 4).
- Stem bending and leaning is typically temporary, with corn usually becoming erect within a week in good growing conditions.
- Can increase stalk brittleness and vulnerability to snapping.
- Can cause brace root malformation (Figure 5).
- Potential for corn injury increases after applications to rapidly growing corn, late in the growing season, or when the crop is under stress.



Figure 4. Corn that is bent or "goose-necked."



Figure 5. Fused brace roots on corn.

ALS Inhibitors - Sulfonylureas: Accent® (nicosulfuron), Resolve® (rimsulfuron), etc.

- Stunted plants with shortened internodes, chlorotic leaves, improper leaf unfurling from whorl (Figure 6).
- Can cause restriction of corn kernel rows resulting in pinched ear.



Figure 6. Sulfonylurea herbicide POST injury to corn.

Photosynthesis Inhibitors - atrazine, simazine, metribuzin, bentazon, bromoxynil

- Chlorosis and necrosis at leaf tips and margins on older leaves (Figure 7).
- Spray droplets may cause leaf spotting or speckling.
- Crop oil concentrates (COC), other additives, or warm weather can increase injury.



Figure 7. Corn injury from atrazine POST.

PPO Inhibitors - Aim® (carfentrazone), Cadet® (fluthiacet), Resource® (flumiclorac), Sharpen® (saflufenacil), etc.

- Symptoms range from leaf speckling to browning and death of entire leaves (Figure 8).
- COC and other additives, as well as extremely cool or warm temperatures can increase injury symptoms.



Figure 8. PPO herbicide POST injury to corn.

Pigment Inhibitors - Callisto® (mesotrione), IMPACT® (topramezone), and Laudis® (tembotrione)

- Main symptom of injury is bleached-white foliage (Figure 9).
- Bleaching appearance ranges from a yellow thumb print to some whitening of new leaves, with corn growth not distorted.



Figure 9. Bleaching of leaves on corn.

Source: Bradley, K., Johnson, B., Smeda, R. and Boerboom, C. 2009. Herbicide injury - practical weed science for field scouts. University of Missouri. IPM 1007. <http://www.ncga.com>. (Web site verified 5/15/15)

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