Herbicide Site of Action Key

for Crop Injury Symptoms

To help you determine which herbicide(s) may be responsible for suspected injury on crops, this key uses the herbicide's site of action (SoA) and respective Weed Science Society of America group number; herbicides within the same SoA can cause similar symptoms. After reaching a specific SoA, you can check if any of the herbicides from that group are the source of crop response. Herbicide control (selectivity) is specified for broadleaf and/or grass weed species and remember to also observe weeds for injury symptoms.

This key is based on two traits of injury symptoms that can be used to distinguish different herbicide SoA:

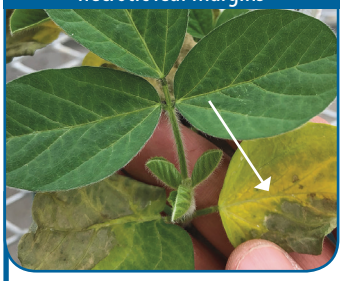
Injured at emergence. The plant absorbs the herbicide from the soil either as soil-applied herbicide or carryover. The roots are normal with damaged shoots or the roots are damaged resulting in stunted plants.

Injured after emergence. The herbicide has contact activity with the older leaves, resulting in injury, or the herbicide translocates (systemic activity) to the growing points (root tips or meristems) with new tissue showing injury.

INJURED AT EMERGENCE: SOIL-APPLIED HERBICIDE OR CARRYOVER

ROOTS NORMAL, DAMAGED SHOOTS

Chlorotic / necrotic leaf margins



Broadleaves most sensitive
Photosynthesis II Inhibitor (5&7)
Atrazine, Diuron, Metribuzin, etc.

OR

White, bleached leaves

Grasses and/or broadleaves affected
HPPD Inhibitor (27), Balance, Callisto, Laudis, etc.
Diterpene Synthesis Inhibitor (13), Command, etc.
Note that a low rate of glyphosate can also cause white, bleached leaves on seedling corn.

Burning / interveinal chlorosis

Burned cotyledon / hypocotyl

Broadleaves more sensitive than grasses
PPO Inhibitor (14)
Authority, Flexstar, Valor, etc.

Deformed leaves

Leafing out / buggy whipping

Drawstring

Grasses more sensitive than broadleaves
Long-chain Fatty Acid Inhibitor (15)
Dual, Outlook, Zidua, etc.

Malformed new leaves

Grasses and/or broadleaves affected
HPPD Inhibitor (27)
Balance, Callisto, Laudis, etc.

OR

Leaf cupping

Broadleaves more sensitive than grasses
Synthetic Auxin (4)
2,4-D, Dicamba, Status, Stinger, etc.

ROOTS DAMAGED, STUNTED PLANTS

Clubbed root tips

Grasses most sensitive
Microtubule Inhibitor (3)
Prowl H2O, Treflan, etc.

Root proliferation
Short, thickened roots

Broadleaves more sensitive than grasses
Synthetic Auxin (4)
2,4-D, Dicamba, Status, Stinger, etc.

Pruned roots
Short, slender lateral roots

Grasses and/or broadleaves affected
ALS Inhibitor (2)
Accent, Classic, FirstRate, Pursuit, Resolve, etc.

Note that the nematicide/fungicide Fluopyram (ILevo) can mimic PPO injury symptoms (halo effect) on soybean cotyledons.

INJURED AFTER EMERGENCE: POSTEMERGENCE APPLICATION, TANK CONTAMINATION, DRIFT

CONTACT ACTIVITY: Older leaves injured, new leaves not injured

Broadleaves more sensitive than grasses

Photosynthesis II Inhibitor (5,6 & 7)
Atrazine, Basagran, Buctril, etc.

PPO Inhibitor (14)
Aim, Cobra, Flexstar, etc.

Nonselective

Glutamine Synthesis Inhibitor (10)
Glufosinate, Liberty, etc.

Photosystem I Electron Diverter (22)
Diquat, Gramoxone, etc.

TRANSLOCATING HERBICIDE WITH SYSTEMIC ACTIVITY: New leaves (meristem) injured, older leaves not injured

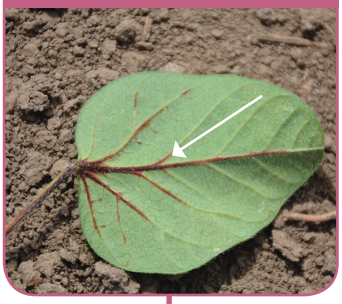
Leaf cupping, epinasty, leaning

Broadleaves more sensitive than grasses
Synthetic Auxin (4)
2,4-D, Dicamba, Status, Stinger, etc.

New leaves chlorotic/reddish, plants stunted

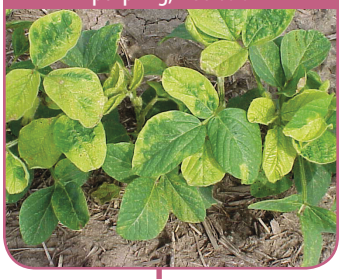
Chlorotic, crinkled leaves, shortened internodes

Chlorosis, reddened veins



Grasses and/or broadleaves affected
ALS Inhibitor (2)
Accent, Classic, Harmony, Resolve, Pursuit, etc.

Variable injury, chlorosis, purpling, necrosis



Nonselective
EPSP Synthase Inhibitor (9)
Glyphosate, Roundup, etc.

White, bleached leaves

Grasses and/or broadleaves affected
HPPD Inhibitor (27)
Callisto, Impact, Laudis, etc.

Grass meristems rot

Only grasses affected
ACCase Inhibitor (1)
Assure, Poast, Select, etc.

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