Symptoms of Various Classes of Herbicides on Crops

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Common Herbicide Classes

- ACCase inhibitors (1) – Poast, Fusilade, Select, etc.
- ALS inhibitors (2) – Sandea, Matrix, Raptor, etc.
- Photosynthetic inhibitors (7 or 5) – Karmex, Caparol, etc.
- PPO inhibitors (14) – Goal, Chateau, Shark, etc.
- Mitosis inhibitors (3) – Balan, Dacthal, Dual, Treflan, Prowl, Kerb, etc.
- Auxinic Acids (4) – 2,4-D, Garlon, Transline, etc.
- ESPS inhibitor (9) – Roundup
Photosynthetic Inhibitors

- Princep (5)
- Metribuzin (5)
- Caparol (5)
- Hyvar (5)

- Velpar (5)
- Karmex (7)
- Lorox (7)
Photosynthesis inhibitors

- At low rates the symptoms will be on mature leaves. Princep or Sencor cause interveinal chlorosis. Caparol or Karmex cause veinal chlorosis.
- At high rates, new leaves may burn without the chlorosis first appearing.
Almond leaves with Princep symptoms
Sencor @ 0.1 lb/a
Caparol injury to beans
Karmex injury on Fruitless Mulberry

Note veinal chlorosis
Diuron on Melon
Protoporphyrinogen Oxidase Inhibitors

- Goal
- Chateau
- Shark
- Ronstar
- Zeus/Spartan

- Gramoxone (22)-
  Not a PPO inhibitor
  but symptoms are similar
PPO Inhibitors

- Primarily spotting of leaves - new or old with new leaf growth being normal. Spotting may be necrosis or chlorosis.
- Will affect fruit by spotting or gumosis. If early enough in fruit development the fruit, or berries of grape will fall.
- Preemergence applications can result in stem girdling or leaf necrosis in emerging plants
Peppers with Goal injury
Goal symptoms on onion
Goal Aerial Drift on Spinach
Goal aerial drift
On Lettuce
Paraquat aerial drift
for comparison
Cucumbers – Goal          new growth OK
Shark symptoms on Photinia
Prune injured by Shark drift
Paraquat
@ .05 lb/a
No Damage
Increasing Damage
Severe Damage
Classic burning at soil line
Affected leaves often form a loop
Splash from the soil surface to the underside of the leaf
RoNeet Damage

- Sickle shaped and burned off at tips
- No burn at soil line

Goal Damage

- Can look similar to RoNeet but with burn at the soil line
Mitosis Inhibitors

- Prowl
- Treflan
- Balan
- Sonolan
- Surflan
- Dacthal
- Dual Magnum
- Devrinol
- Kerb
Mitosis Inhibitors

- Overall reduction in growth, no visual symptoms on leaves.
- Swelling of stems at the soil line with some herbicides; stems may be brittle
- Root suppression (roots enlarged at the tip), reduced lateral roots
- Interfere with cell division
- Mid-rib of leaves sometimes shorted
- Grass leaves fail to unfurl
Surflan injury to corn
Treflan injury to Tomato
control

Treflan 1 lb

Treflan 2 lb

Treflan 4 lb
Treflan on tomatoes
Treflan on Tomatoes
Poor root development with Kerb

Untreated
Metolachlor
Lipid Biosynthesis Inhibitors

- Fusilade
- Poast
- Select/Prism
Lipid Biosynthesis Inhibitors

- Symptoms on grasses only
- Cessation of top growth
- Yellow and then purple leaves
Poast
ALS inhibitors

- Glean
- Londax
- Accent
- Sandea
- Oust
- Osprey
- Matrix

- Pursuit
- Raptor
- Regiment
- Staple
ALS Inhibitors

- Symptoms on new foliage
- Shortened internode length
- Chlorosis and necrosis of meristems
- Symptoms from drift or soil residual
Matrix symptoms on Sunflower
Pursuit @
0.010 lb/A
+ 0.25% COC

Untreated

Roundup Ultra @
0.1 lb/A
Matrix on lettuce
Oust on Corn
Oust drift onto almonds
Sandea drift onto prunes
Sandea drift
Londax symptoms on squash
Cotton injured by Pursuit
Pumpkin injured by Raptor drift
Carotenoid Biosynthesis Inhibitors

- Pigment synthesis inhibition
- Veinal whitening → necrosis
- Symptoms appear shortly after emergence
Solicam symptoms on oats
Solicam injury on almond leaves
ESPS Inhibitor (Glyphosate)

• Blocks amino acid synthesis

• Spring / summer symptoms: reduced size of new growth, feathering of new growth, yellow new leaves, shortened internode length, bud breaks in the leaf axils, new leaf growth may be puckered with prominent veins, may have chlorotic spots

• Fall symptoms: old leaves may not show symptoms or they may have chlorotic spotting, if there is new growth it may be distorted.
Glyphosate applied in the fall to almond
Glyphosate applied in the fall to peach
Almond limb with chlorosis from glyphosate drift
Glyphosate drift on to almonds
Tomato leaf with Glyphosate symptom
Roundup on Broccoli
Roundup
## Auxinidic Acids

- 2,4-D
- MCPA
- MCPP
- 2,4-DB
- Clarity
- Garlon
- Transline
- Milestone
Auxinic Acids

- Petiole twisting, tendril twisting, malformed leaves
- Symptoms mostly on new growth, little effect on mature leaves
- Stem cracking and node enlargement, “root primordia“ or callus-like tissue may appear in cracks
Dandelion twisted by 2,4-D
Watermelon twisted by Garlon
Cotton leaves cupped by Garlon
Transline
2,4-D on Grapes
Cotton – “strap” leaves caused by 2,4-D
Cotton with “strap” leaves from MCPA drift
Garlon on grape
Garlon on tomatoes
Transline injury on sunflower
Cupping caused by Transline
Symptoms in plants may be caused by many factors

- **Abiotic factors**
  - Nutrient deficiency or excesses
  - Water excess or drought
  - Wind (sand or soil particles with wind)
  - High or low temperatures
  - Mechanical damage
  - Pesticides (herbicides, fungicides, insecticides)
Conclusions

• Many factors can cause abnormal crop growth
• Take pictures
• Compare symptoms to those observed on other plants