Herbicides Mode of Action

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Seedling Growth Inhibitors

PROWL, SURFLAN, CASORON

- Root meristem inhibitors
- Soil-applied herbicides
- Interfere with new growth and reduce the ability of seedlings to develop normally
- Plants take up herbicides after germinating until the seedling emerges from the soil
- Plants that have emerged from the soil uninjured are likely to remain unaffected

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Seedling Growth Inhibitors

DEVrinol, Kerb

- Shoot meristem inhibitor
- Taken up by developing roots and shoots
- Can move via the xylem to areas of new growth
- Only effective on seedling annual or perennial weeds
Amino Acid Synthesis Inhibitors

ROUNDUP, TOUCHDOWN

• Inhibit production of 3 essential aromatic amino acids by inhibiting a key enzyme
• Symptoms are slow to develop (1-2 weeks) and include stunting or slowing of plant growth and a slow plant death
• Nonselective and the site of uptake is the plant foliage
• Move via the phloem to all parts of the plant
• Excellent for annual and perennial weed control

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Other Amino Acid Synthesis Inhibitors

- Imidazolinones (IMI):
  - Scepter
  - Pursuit
  - Raptor

- Sulfonylureas (SU):
  - Accent
  - Beacon
  - Permit
  - Matrix

- Sulfonamides:
  - Broadstrike
  - FirstRate
Pigment Inhibitors

SOLICAM

- Prevents plants from forming photosynthetic pigments
- Plant becomes white to translucent and die
- Readily absorbed by roots
Cell Membrane Disruptors

GRAMOXONE

- Postemergence contact herbicide activated by exposure to sunlight to form oxygen compounds such as hydrogen peroxide.
- Destruction of cell membranes results in a rapid browning (necrosis) of plant tissue.
- On a bright and sunny day, herbicide injury symptoms can occur in 1 to 2 hours.
- No herbicide movement to underground root or shoot systems.
- No soil activity.

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Cell Membrane Disruptors

GOAL

• Absorption through leaves only
• Translocation is limited with root or shoot absorption
• Controls broadleaf weeds
• Suppresses annual grasses
• Controls top growth of nutsedge and johnsongrass
Growth Regulators

2,4-D

- Act at multiple sites to disrupt hormone balance and protein synthesis and cause a variety of plant growth abnormalities
- Selectively kill broadleaf weeds; however, they are capable of injuring grass crops
- Uptake primarily through the foliage but root uptake is possible
- Can move in both the xylem and the phloem to areas of new plant growth
- Injury symptoms are most obvious on newly developing leaves

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Other Growth Regulators

- **Benzoic Acids:**
  - Banvel, Clarity

- **Phenoxy Acids:**
  - 2,4-DB, MCPA

- **Pyridine Carboxylic Acids:**
  - Stinger
  - Tordon
  - Garlon
Photosynthesis Inhibitors

PRINCEP, KARMEX, SINBAR

- Shut down photosynthesis
- Rapid death due to the production of secondary toxic substances
- Injury symptoms include yellowing of leaf tissue followed by death
- Control annual or perennial grass or broadleaf weeds
Photosynthesis Inhibitors

- Triazines, phenylureas, and uracils are taken up into the plant via the roots or foliage and move in the xylem to plant leaves.
- Symptoms first appear on the older leaves, along the leaf margin.
- With foliar application, these herbicides are less mobile and do not move out of the leaf.
  - Triazines: Bladex, Sencor, Evik, Velpar
  - Phenylureas: Lorox, Spike
  - Uracils: Hyvar, Sinbar

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Photosynthesis Inhibitors

• Nitriles and benzothiadiazoles are not mobile in plants and are classified as postemergence contact herbicides.
• These herbicides have no soil activity.
  – Benzothiadiazoles: Basagran
  – Nitriles: Buctril, Tough
Lipid Synthesis Inhibitors

POAST

• Prevent the formation of fatty acids, essential for lipid production

• Broadleaf plants are tolerant to these herbicide families, however, almost all perennial and annual grasses are susceptible

• Taken up by the foliage and move in the phloem to areas of new growth

• Injury symptoms are slow to develop (7-14 days) and appear first on new leaves emerging from the whorl

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Other Lipid Synthesis Inhibitors

– Aryloxyphenoxypropionate (APPs or Fops):
  • Fusilade
  • Assure
  • Option

– Cyclohexanedione (CHDs or DIMs):
  • Select
For more information

North Central Regional Publication 377:

Herbicide Mode of Action and Injury Symptoms
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http://www.extension.umn.edu/distribution/cropsystems/DC3832.html