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

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

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

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

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

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

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