Herbicide Residue Concerns

Does your herbicide program limit your options for growing edibles, canola and other crops?

Darren Robinson

Herbicide dissipation over time

Maximum concentration allowable for safe recrop

Recropping interval

Factors that influence herbicide dissipation

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<th>Climatic factors</th>
<th>Soil factors</th>
<th>Herbicide properties</th>
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<td>Moisture (rainfall)*</td>
<td>Organic matter</td>
<td>Susceptibility to breakdown</td>
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<tr>
<td>Temperature</td>
<td>pH</td>
<td>Adsorption to soil particles</td>
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<td>Texture</td>
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There are several herbicides with residual activity

- **Imidazolinones (IMIs):** Pursuit, CleanSweep
- **Sulfonylureas (SUs):** Classic, Guardian
- **Triazolopyrimidines:** Broadstrike RC, FirstRate
- **Triazines:** Atrazine
- **Growth Regulators:** Lontrel
- **PPO Inhibitors:** Valtera, Integrity
- **HPPD inhibitors:** Converge, Callisto, Impact

Effect of soil and climate on persistence

**IMIDAZOLINONES**

- Pursuit, CleanSweep

- Persistence related primarily to climate
  - Drought, cool temperatures reduce microbial activity
- Secondary factors: soil texture, OM, pH
  - Adsorbed to clay particles and organic matter
  - Reduced microbial breakdown: pH <5.8
  - Increases adsorption to soil particles

Carryover injury symptoms

**IMIDAZOLINONES - Pursuit**

- Inhibits both shoot and root growth
- Uneven emergence
- Chlorosis and/or purpling of leaf tissue
Pursuit carryover injury in canola

Effect of soil and climate on persistence SULFONYLUREAS Classic, Guardian
- Persistence related primarily to soil pH
  - High pH (>7.4) reduces breakdown
- Secondary factors: OM
  - Adsorbed more tightly to OM than clay

Carryover injury symptoms SULFONYLUREAS
- Inhibits both shoot and root growth – “bottle-brush” effect
- Uneven emergence
- Chlorosis and/or purpling of leaf tissue

Classic carryover injury in peas

Classical carryover in vegetables
Recropping intervals
SULFONYLUREAS

*Field bioassay.

Effect of soil and climate on persistence
TRIAZOLOPYRIMIDINES
Broadstrike RC, FirstRate
- Persistence related primarily to climate
  - Drought, cold temperatures reduce microbial activity
- Secondary factors: pH, OM
  - Reduced microbial degradation at pH <6.5
  - More available to rotational crops at OM <2%

Carryover injury symptoms
TRIAZOLOPYRIMIDINES
- Inhibits both shoot and root growth
- Uneven emergence
- May cause leaf distortion

First Rate carryover in legumes

Recropping intervals
First Rate, Broadstrike RC

* Not recommended that vegetables be planted on ground where First Rate or Broadstrike Dual have been used in last 2 years.
Effect of soil and climate on persistence
TRIAZINES
Atrazine, Sencor/Lexone
- Persistence related primarily to climate
  - Drought, cold temperatures reduce microbial activity
- Secondary factor: pH
  - More persistent at pH> 7.5
  - Reduced acid hydrolysis

Carryover injury symptoms
TRIAZINES
- Uneven emergence
- Interverinal chlorosis
- Yellowing of leaf margins followed by necrosis
- Injury appears on oldest growth

Carryover injury symptoms
GROWTH REGULATORS
- Twisted stems and leaf cupping
- May reduce stand emergence

Recropping intervals
Atrazine

Atrazine carryover injury in cereal
Recropping intervals
GROWTH REGULATORS

Effect of soil and climate on persistence
PPO INHIBITORS
Valtera, Integrity
- Persistence related primarily to climate
  - Drought, cold temperatures reduce microbial activity
  - Breaks down more quickly in saturated soils under anaerobic conditions (no oxygen)
    - Especially if these conditions occur immediately after application
- Secondary factors: pH
  - More available to rotational crops at pH >6.5

Carryover injury symptoms
PPO INHIBITORS
- Veinal chlorosis
- Browning and collapse as corn leaves begin to arch
- Buggy-whipping

Integrity carryover in vegetables

Recropping intervals
PPO INHIBITORS
Effect of soil and climate on persistence

HPPD INHIBITORS

Converge, Callisto

- Persistence related primarily to climate
  - Drought, cold temperatures reduce microbial activity

- Secondary factors: OM, pH
  - Bound to organic matter – reduces rate of degradation
  - As pH increases, microbial degradation increases

Carryover injury symptoms

HPPD INHIBITORS – Converge, Callisto

- Uneven emergence
- Bleaching in new tissues
- Yellowing of leaf tissue followed by browning in edible beans

Carryover injury from

Converge

Yield losses – one year after application

HPPD INHIBITORS

Atrazine accentuated carryover injury from

Converge

Yield Loss (% of untreated check)

174 ml/ac Converge + 0.88 L/ac atrazine

Callisto (120 ml/ac) carryover injury in edible bean

Callisto (120 ml/ac) carryover injury on edible beans

Yield (of untreated check)

Caroline, Robinson, RC

Caroline, Robinson, RC

Caroline, Robinson, RC

Caroline, Robinson, RC
Impact (15 ml/ac) + Atrazine (420 ml/ac) did not carryover onto edible bean enough to reduce yield.

Climate and soil impact carryover

- Dry weather for first month after application increases chance of carryover
- High pH – SUs, Triazines
- Low pH – IMIs, Triazolopyrimidines, HPPD Inhibitors
- Clay and OM influence adsorption and concentration of herbicide available for microbial degradation

Thank You!

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