Dry Beans

Weed Management

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Dry Beans

General Comments

1. Dry beans are more sensitive to herbicides than soybeans
2. Market classes respond differently to herbicides
3. Weed management programs need to be developed by market class

Treflan + Pursuit; Lorox
Dry Beans

General Comments

1. Three groups of dry beans in respect to weed management
   a. Small seeded beans
      i. White & black beans
   b. Large seeded beans
      i. Kidney & cranberry beans
   c. Adzuki beans

Treflan (500 mL/ac) + Pursuit (75 mL/ac)
Dry Beans

Question # 1

There are 4 soil applied grass herbicides (Dual, Eptam, Frontier and Treflan). Which one should I use?

Ragweed escapes with Treflan

Ragweed escapes with Frontier
# Dry Beans

## Annual Grass Control (Cost/Acre)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Low Rate $/Acre</th>
<th>High Rate $/Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treflan</td>
<td>8</td>
<td>15</td>
</tr>
<tr>
<td>Dual II Magnum</td>
<td>19</td>
<td>28</td>
</tr>
<tr>
<td>Frontier Max</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>Eptam</td>
<td>31</td>
<td>40</td>
</tr>
</tbody>
</table>

1. Treflan is the lowest cost
2. Dual & Frontier are intermediate in price
3. Eptam is the most expensive
Treflan, Rival and Bonanza

General Comments

1. Apply PPI
2. Excellent crop tolerance
   a. Only registered on black, kidney and white beans
3. Excellent full season annual grass control
   a. Good control of sandbur
4. Control/suppression of annual broadleaf weeds
   a. Lamb’s-quarters
   b. Pigweed
5. Pursuit tankmix for white beans
Injury

1. Injury rarely occurs in dry beans
2. Injury is more likely when the crop emerges slowly
3. Injury may occur on light textured soils that are low in organic matter (adjust herbicide rate)
4. Clubby swollen roots
5. Hypocotyl swelling and cracking
6. Stunted growth
General Comments

1. Apply PPI
2. Good crop tolerance
   a. Registered on black, brown, cranberry, kidney, pinto, yellow eye and white beans
   b. Not registered on otebo and SRM beans
   c. Not registered on adzuki beans
3. Good annual grass control
   a. Short residual activity
4. Suppression of …
   a. Small seeded broadleaf weeds
   b. Quack grass
   c. Nutsedge
5. Treflan tankmix for improved grass control and broadleaf weed suppression
   a. White & kidney only

Eptam + Treflan (PPI):
Basagran + Raptor (POST)

Sikkema, UG
Eptam

Injury

1. Injury rarely occurs in dry beans
   a. Do not use on adzuki beans
2. Injury is greater …
   a. When the crop emerges slowly
   b. Under dry conditions
      i. Delay planting 7-10 days
3. Injury symptoms include …
   a. Crinkled and malformed leaves
   b. Stunted and necrotic growing point
   c. Bud-seal
Dual and Frontier

General Comments

1. Apply PPI or PRE
2. Fair crop tolerance
   a. Registered on all market classes of dry beans
   b. Not registered on adzuki beans
3. Excellent control of specific annual grasses
   a. Weak on fall panicum, proso millet and sandbur
4. Some control/suppression of broadleaf weeds
   a. Eastern black nightshade and pigweed
   b. Frontier provides greater broadleaf weed suppression
5. Dual is more consistent on yellow nutsedge
6. Pursuit tankmix (PPI or PRE)
Dual and Frontier

Injury Symptoms

1. Marginal chlorosis of the unifoliates followed by necrosis
2. Unifoliates may be completely burnt off
3. Leaf distortion (crinkling) of the first trifoliate
4. Delay in plant development
Dual injury symptoms
Frontier injury symptoms in white beans
Dual and Frontier

**Increased potential for injury ...**

1. On small seeded market classes
   a. White & black beans
2. When applied PRE
   a. PPI is safer
3. With Frontier compared to Dual
4. Under cold, wet conditions and the beans emerge slowly
5. When heavy rainfall occurs at bean emergence following a PRE application
6. If the beans have started to emerge
7. Coarse-textured soils low in organic matter
   a. Use the lower rate on the label
Dry Beans

Dual (700 mL/ac) - PPI - Yield

- Black: 88%
- Cranberry: 98%
- Kidney: 100%
- White: 93%

Yield (% of Check)

Sikkema, UG
Dry Beans

Question # 1

There are 4 soil applied grass herbicides (Dual, Eptam, Frontier and Treflan). Which one should I use?
Soil Applied Annual Grass Herbicides

Recommendation

1. I think Treflan should be considered first
   a. Low cost
   b. Safe
   c. Excellent grass control
   d. Broadleaf weed suppression
Soil Applied Annual Grass Herbicides

Recommendation

1. The other three herbicides have a place
   a. Dual & Frontier
      i. PPI or PRE (PPI is safer)
      ii. Dual is safer than Frontier
      iii. Improved nightshade and nutsedge control
      iv. Can be used in reduced tillage systems – PRE
   b. Eptam
      i. Costly, must be applied PPI
      ii. More suppression of small seeded broadleaf weeds
Dry Beans

Question # 2

Do you recommend the same soil applied annual grass herbicide on adzuki beans?
Adzuki Beans

**Question # 2**

Do you recommend the same soil applied annual grass herbicide on adzuki beans?

No

Treflan is the safest (followed by Dual)

There is the potential for injury with Frontier and Eptam
Adzuki Beans

PPI Herbicides – 6 studies

- Pursuit (125 mL/acre)
- Treflan (960 mL/acre)
- Dual (700 mL/acre)
- Frontier Max (385 mL/acre)
- Eptam (2.2 L/ac)

Yield (% of Check)

Sikkema, UG
Adzuki Beans
Preplant
Incorporated

Control

Dual

Eptam
Dry Beans

**Question # 3**

Should I add Pursuit to my soil applied grass herbicide?

If yes, what rate should I use?

Pursuit (125 mL/ac)
Pursuit

General Comments

1. Apply PPI or PRE
2. Fair crop tolerance
   a. Registered on all market classes
   b. Registered on adzuki beans
3. Tankmixes
   a. Dual & Frontier
      i. PPI & PRE - all dry beans
   b. Treflan
      i. PPI - white beans

Pursuit (125 mL/ac)
Pursuit

General Comments

1. Excellent broadleaf weed control
   a. Inconsistent on common ragweed and lamb’s-quarters
2. Good annual grass control
   a. Poor control of tufted love and stink grass
3. No control of Group 2 resistant weeds
4. Excellent residual activity
   a. 100 days to plant winter wheat
   b. Severe re-cropping restrictions
5. Possibility for crop injury
Pursuit

Disadvantages

1. Narrow margin of crop safety
   a. Red to purple veins on lower side of leaf
   b. Yellow leaf margin
   c. Crinkled leaves
   d. Stunting
   e. Delay in maturity
   f. Reduced yield

Stunting of white beans due to Pursuit
Pursuit

Increased potential for injury …

1. Small seeded market classes of dry beans
   a. Black, otebo, pinto, white
      i. Adjust Pursuit rate depending on market class
2. Cold, wet conditions
3. Coarse textured soils that are low in organic matter
4. When the beans have begun to emerge

Pursuit injury in white beans applied at cracking
Pursuit

White Bean - Injury

<table>
<thead>
<tr>
<th>Application Rate (mL/ac)</th>
<th>Visual Crop Injury (% - 56 DAE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pursuit (42 mL/ac)</td>
<td>1</td>
</tr>
<tr>
<td>Pursuit (84 mL/ac)</td>
<td>2</td>
</tr>
<tr>
<td>Pursuit (126 mL/ac)</td>
<td>3</td>
</tr>
<tr>
<td>Pursuit (252 mL/ac)</td>
<td>6</td>
</tr>
</tbody>
</table>

Average of 12 Studies

Sikkema, UG
Gillard, UG
Swanton, UG
Pursuit Rate

13% decrease in white bean root dry weight

Sikkema, UG
Gillard, UG
Swanton, UG

Average of 12 studies
Pursuit Rate

7% decrease in white bean yield

<table>
<thead>
<tr>
<th>Treatment</th>
<th>White Bean Yield (cwt/ac)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check</td>
<td>25.1</td>
</tr>
<tr>
<td>Pursuit (42 mL/ac)</td>
<td>25.3</td>
</tr>
<tr>
<td>Pursuit (84 mL/ac)</td>
<td>24.9</td>
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<tr>
<td>Pursuit (126 mL/ac)</td>
<td>23.4</td>
</tr>
<tr>
<td>Pursuit (252 mL/ac)</td>
<td>22.1</td>
</tr>
</tbody>
</table>

Average of 12 experiments

Sikkema, UG
Gillard, UG
Swanton, UG
Dry Beans

**Dual (700 mL/ac) + Pursuit (126 mL/ac)**

- **Black**
- **Cranberry**
- **Kidney**
- **White**

Yield (% of Check)

<table>
<thead>
<tr>
<th>Yield (%) of Check</th>
<th>PPI</th>
<th>PRE</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td></td>
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</tr>
<tr>
<td>70</td>
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<tr>
<td>80</td>
<td></td>
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<tr>
<td>90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sikkema, UG
Question # 3

Should I add Pursuit to my soil applied grass herbicide?  

Yes

Pursuit (125 mL/ac)
Dry Beans

**Question # 3**

What rate should I apply?

Depends on the market class …

- Small seeded - 75 mL/ac
- Large seeded - 100 mL/ac
- Adzuki beans - 125 mL/ac

Pursuit (125 mL/ac)

Sikkema, UG
Dry Beans

Question # 4

My beans have emerged and I noticed that I have some grass weed escapes. What are my options?

Proso millet control with Poast
Dry Beans

Annual Grass Control (Cost/Acre)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Low Rate $/Acre</th>
<th>High Rate $/Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>Poast Ultra</td>
<td>11</td>
<td>34</td>
</tr>
<tr>
<td>Assure II</td>
<td>12</td>
<td>23</td>
</tr>
<tr>
<td>Excel Super</td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>
Assure, Excel, Poast and Select

Grass Control

1. Excellent control of emerged annual grasses
   a. No residual activity

2. Application timing
   a. 2-5 leaf stage and actively growing

3. Generally equivalent control of most grass species
   a. Assure is better on
      i. quack grass
      ii. volunteer cereals and volunteer corn
      iii. sandbur

Volunteer corn control with Assure
1. When the grasses …
   a. Are past the five leaf stage
   b. Have tillered
   c. Emerge after application

2. During periods of drought

3. If rainfall occurs within 1 hour of application

4. If you forget to add the correct adjuvant

Control is reduced …
## Adjuvants

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Adjuvant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assure</td>
<td>Sure-Mix</td>
</tr>
<tr>
<td>Poast</td>
<td>Merge</td>
</tr>
<tr>
<td>Select</td>
<td>Amigo</td>
</tr>
</tbody>
</table>

Assure, Poast and Select

Select

Select + Amigo

Hamill, AAFC
1. Injury is due to the adjuvant, not the herbicide
2. White to yellowish flecking of the leaves
3. Occurs with high temperature and humidity
4. Crop usually recovers with no impact on yield
Dry Beans

Question # 4

My beans have emerged and I noticed that I have some grass weed escapes. What are my options?

Assure, Excel, Poast or Select

Proso millet control with Poast
Dry Beans

Question # 5

My beans have emerged and I noticed that I have some broadleaf weed escapes.

Should I use Basagran or Reflex or tankmix the two?
Dry Beans

Question # 5
My beans have emerged and I noticed that I have some broadleaf weed escapes. Should I use Basagran, Reflex or tankmix the two?

Answer
It depends on …
1) Weed species present
2) Market class of beans
## Dry Beans

### Postemergence Broadleaf Weed Control (Cost/Acre)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Low Rate $/Acre</th>
<th>High Rate $/Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basagran Forte</td>
<td>20</td>
<td>26</td>
</tr>
<tr>
<td>Reflex</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>Basagran + Reflex</td>
<td>34</td>
<td>34</td>
</tr>
</tbody>
</table>
Basagran

Advantages

1. POST control of some broadleaf weeds
2. Good crop tolerance
   a. Rating of “G” in Guide
3. No recropping restrictions

Ragweed escapes with Basagran
## Basagran Forte

### Weed Control

<table>
<thead>
<tr>
<th><strong>Strengths</strong></th>
<th><strong>Weaknesses</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cocklebur?</td>
<td>Nightshade, Eastern black</td>
</tr>
<tr>
<td>Jimsonweed?</td>
<td>Pigweed species</td>
</tr>
<tr>
<td>Lamb’s-quarters</td>
<td>Ragweed, common</td>
</tr>
<tr>
<td>Lady’s thumb</td>
<td>Ragweed, giant</td>
</tr>
<tr>
<td>Mustard species</td>
<td></td>
</tr>
<tr>
<td>Velvetleaf</td>
<td></td>
</tr>
<tr>
<td>Yellow nutsedge</td>
<td></td>
</tr>
<tr>
<td>Canada thistle</td>
<td></td>
</tr>
<tr>
<td>Field bindweed</td>
<td></td>
</tr>
</tbody>
</table>
Basagran

Disadvantages

1. Limited spectrum
2. Timing is critical
   a. Large weeds may escape
3. Excellent coverage is essential
   a. Use higher water carrier volume
4. No residual activity
   a. Weeds emerging after application will not be controlled
5. Crop injury
Basagran

Crop Injury

1. Leaves show yellowing, bronzing, speckling or burn
2. Injury may occur if beans are under stress due to …
   a. Hot and humid conditions
   b. Previous herbicide injury
   c. Cold or dry weather
   d. Hail
3. Injury is usually transient with no effect on yield
4. Do not use on adzuki beans
NEVER apply Basagran to adzuki beans!
Reflex

Advantages

1. Good to excellent control of some broadleaf weeds
   a. Short residual activity
2. Fair crop tolerance
   a. Rating of “F” in Guide

ALS resistant pigweed control with Reflex

Deen, UG
<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buckwheat, wild</td>
<td>Cocklebur</td>
</tr>
<tr>
<td>Lady’s thumb</td>
<td>Fleabane, Canada</td>
</tr>
<tr>
<td>Nightshade, Eastern black?</td>
<td>Lamb’s-quarters</td>
</tr>
<tr>
<td>Pigweed species</td>
<td>Velvetleaf</td>
</tr>
<tr>
<td>Ragweed, common</td>
<td></td>
</tr>
<tr>
<td>Ragweed, giant?</td>
<td></td>
</tr>
<tr>
<td>Mustards</td>
<td></td>
</tr>
</tbody>
</table>
Relex

Disadvantages

1. Limited spectrum
2. Timing is critical
   a. Large weeds may escape
3. Limited residual activity
4. Excellent coverage is essential
5. Crop injury
Reflex

Crop Injury

1. Injury symptoms
   a. Speckling, bronzing, burn of the leaves
   b. Slight leaf crinkling may occur

2. Causes of injury
   a. Hot and humid conditions
      i. The leaf cuticle becomes thinner and the plant will absorb more than a normal amount of herbicide
   b. Addition of spray additives
   c. Above label rates
      i. Spray overlaps in the field

3. Injury is usually transient with no effect on yield
## Dry Beans

### Question # 5 – Basagran or Reflex?

<table>
<thead>
<tr>
<th>Basagran Forte</th>
<th>Reflex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beggarticks, nodding</td>
<td>Buckwheat, wild</td>
</tr>
<tr>
<td>Cocklebur</td>
<td>Lettuce, prickly</td>
</tr>
<tr>
<td>Fleabane, Canada</td>
<td>Mustard, wild</td>
</tr>
<tr>
<td>Flower-of-an-hour</td>
<td>Nightshade, Eastern black</td>
</tr>
<tr>
<td>Lady’s thumb</td>
<td>Pigweed species</td>
</tr>
<tr>
<td>Lamb’s-quarters</td>
<td>Ragweed, common</td>
</tr>
<tr>
<td>Mustard, wild</td>
<td>Ragweed, giant</td>
</tr>
<tr>
<td>Velvetleaf</td>
<td>Waterhemp</td>
</tr>
<tr>
<td>Bindweed, field</td>
<td>Horsetail, field</td>
</tr>
<tr>
<td>Nutsedge, yellow</td>
<td>Violet, field</td>
</tr>
<tr>
<td>Thistle, Canada</td>
<td></td>
</tr>
</tbody>
</table>


Question # 6

I have heard the statement “Once an adzuki bean grower – always an adzuki bean grower”. Is that true?
Volunteer Adzuki Beans

Corn - Soil Applied Herbicides

- Atrazine: 26%
- Banvel: 70%
- Marksman: 81%
- Converge: 60%
- Callisto + Atrazine: 61%

Visual Weed Control (%)

Summary of 8 experiments
Volunteer Adzuki Beans – Corn PRE

Weedy Check

Atrazine

Banvel

Marksman
Volunteer Adzuki Beans

Corn - Postemergence Herbicides

Visual Weed Control (%)

Sikkema, UG
Volunteer Adzuki Beans – Corn POST

Weedy Check

Atrazine

Callisto + Atrazine

Marksman
Volunteer Adzuki Beans

Soybeans - Soil Applied Herbicides

Summary of 7 experiments

FirstRate: 6
Lorox: 16
Sencor: 10
Python: 7
Pursuit: 1

Sikkema, UG
Volunteer Adzuki Beans

Soybeans - Postemergence Herbicides

- Blazer: 6
- Reflex: 6
- Basagran: 10
- Pinnacle: 21
- Classic: 73
- FirstRate: 6
- Pursuit: 5
- Clean Sweep: 6
- Roundup: 81

Visual Weed Control (%)

Summary of 8 experiments

Sikkema, UG
Volunteer Adzuki Beans

Classic

Sikkema, UG

Reflex

Sikkema, UG
I have heard the statement “Once an adzuki bean grower – always an adzuki bean grower”. Is that true?

Answer

Adzuki beans do volunteer.

Marksman PRE provides good control in corn.

Most POST herbicides in corn have good activity.

Classic (IP soybean) and Roundup (Roundup Ready soybean) POST provide good control.
Dry Beans

1. Weed management in dry beans must be divided into at least three groups
   a. adzuki beans
   b. black, otebo, pinto and white beans
   c. brown, cranberry, kidney and yellow eye beans
2. Start with a soil applied weed control program
3. Treflan (500mL/ac) + Pursuit (75, 100 or 125mL/ac) is a good foundation
   a. Adjust the rate of Pursuit depending on market class
Pursuit + Treflan

Sikkema, UG
Treflan (500 mL/ac) + Pursuit (75 mL/ac)

Weed Control

Lamb's-quarters
Pigweed
Ragweed
Foxtail

Visual Weed Control (%)

0  20  40  60  80  100

Sikkema, UG
Treflan (500 mL/ac) + Pursuit (75 mL/ac)

**Weed Control**

- **Lamb's-quarters**
- **Pigweed**
- **Ragweed**
- **Foxtail**

Visual Weed Control (%)

<table>
<thead>
<tr>
<th>Weed Type</th>
<th>Pursuit</th>
<th>Pursuit + Treflan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lamb's-quarters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pigweed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ragweed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foxtail</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sikkema, UG
Treflan (500 mL/ac) + Pursuit (PPI)

White Beans

<table>
<thead>
<tr>
<th>Pursuit Rate</th>
<th>Yield (cwt/ac)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 mL/ac</td>
<td>18.8</td>
</tr>
<tr>
<td>50 mL/ac</td>
<td>20.5</td>
</tr>
<tr>
<td>75 mL/ac</td>
<td>21.8</td>
</tr>
<tr>
<td>100 mL/ac</td>
<td>21</td>
</tr>
<tr>
<td>125 mL/ac</td>
<td>20.5</td>
</tr>
</tbody>
</table>

Sikkema, UG
Dry Beans

Summary

4. The other grass herbicides
   a. Dual is safer than Frontier
   b. Dual and Frontier are safer PPI than PRE
   c. Eptam, Dual and Frontier should be used to address specific weeds

5. Control grass escapes with Assure, Excel, Poast or Select

6. Control broadleaf escapes with Basagran or Reflex

7. You may need to consider using cultivation
## Dry Beans

### Adzuki Beans

<table>
<thead>
<tr>
<th>Timing</th>
<th>Control Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPI</td>
<td>Treflan (500 mL/ac) + Pursuit (125 mL/ac)</td>
</tr>
<tr>
<td>PRE</td>
<td>Pursuit (125 mL/ac)</td>
</tr>
</tbody>
</table>
| POST   | Assure (150 mL/ac) or Poast (130 mL/ac)  
         | Reflex (400 mL/ac) |
Thank You

Todd Cowan & Christy Shropshire
Herbicide Manufacturers
Ontario Coloured Bean Growers’ Association
Ontario White Bean Producers
Agriculture and Agri-Food Canada
Agricultural Adaptation Council

Peter H. Sikkema
University of Guelph
Ridgetown Campus