Why herbicides fail

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• Herbicides are more potent and environmentally friendly than ever before
  – Much lower use rates (ounces vs. pounds/A)
  – Greater selectivity
Why do herbicides fail?

• Generally speaking, applicator error.

• Not going to discuss improper calculation, rain-off, equipment problems, or forgetting to add the herbicide to the sprayer.
Proper Weed ID
Johnsongrass

Guinea grass
Don’t assume your herbicide will kill every weed

- Milestone VM controls many weeds, but not all of them:

  - Tropical soda apple - yes
  - Blackberry - no
# Know your herbicides

## Table 3: Weeds Controlled

*Note: Numbers in parentheses (-) refer to specific use directions for a particular weeds species.*

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Rate Range (fl oz/acre)</th>
<th>Life Cycle</th>
<th>Plant Family</th>
</tr>
</thead>
<tbody>
<tr>
<td>amaranth, spiny</td>
<td><em>Amaranthus spinosus</em></td>
<td>4 to 7</td>
<td>annual</td>
<td>Amaranthaceae</td>
</tr>
<tr>
<td>bedstraw</td>
<td><em>Galium spp.</em></td>
<td>4 to 7</td>
<td>perennial</td>
<td>Rubiaceae</td>
</tr>
<tr>
<td>beggarticks</td>
<td><em>Bidens spp.</em></td>
<td>4 to 7</td>
<td>annual</td>
<td>Asteraceae</td>
</tr>
<tr>
<td>broomweed, annual</td>
<td><em>Amphiachrys dracunculoides</em></td>
<td>4 to 7</td>
<td>annual</td>
<td>Asteraceae</td>
</tr>
<tr>
<td>burdock, common*, **</td>
<td><em>Arctium minus</em></td>
<td>4 to 7</td>
<td>biennial</td>
<td>Asteraceae</td>
</tr>
<tr>
<td>buttercup, hairy*</td>
<td><em>Ranunculus sardous</em></td>
<td>4 to 7</td>
<td>annual</td>
<td>Ranunculaceae</td>
</tr>
<tr>
<td>buttercup, tall*, **</td>
<td><em>Ranunculus acris</em></td>
<td>4 to 7</td>
<td>perennial</td>
<td>Ranunculaceae</td>
</tr>
<tr>
<td>camethorn</td>
<td><em>Alhagi pseudalhagi</em></td>
<td>4 to 7</td>
<td>perennial</td>
<td>Fabaceae</td>
</tr>
<tr>
<td>chamomile, scentless</td>
<td><em>Matricaria inodora</em></td>
<td>4 to 7</td>
<td>annual</td>
<td>Asteraceae</td>
</tr>
<tr>
<td>chicory*</td>
<td><em>Cichorium intybus</em></td>
<td>4 to 7</td>
<td>perennial</td>
<td>Asteraceae</td>
</tr>
<tr>
<td>chickweed</td>
<td><em>Stellaria media</em></td>
<td>7</td>
<td>annual</td>
<td>Caryophyllaceae</td>
</tr>
<tr>
<td>cinquefoil, sulfur (1)*, **</td>
<td><em>Potentilla recta</em></td>
<td>4 to 7</td>
<td>perennial</td>
<td>Rosaceae</td>
</tr>
<tr>
<td>cocklebur</td>
<td><em>Xanthium strumarium</em></td>
<td>3 to 5</td>
<td>annual</td>
<td>Asteraceae</td>
</tr>
<tr>
<td>smartweed, Pennsylvania</td>
<td><em>Polygonum pensylvanicum</em></td>
<td>3 to 5</td>
<td>annual</td>
<td>Polygonaceae</td>
</tr>
<tr>
<td>spaege, arrow</td>
<td><em>Helenium amarum</em></td>
<td>4 to 7</td>
<td>annual</td>
<td>Asteraceae</td>
</tr>
<tr>
<td>soda apple, tropical (6)*, **</td>
<td><em>Solanum viarum</em></td>
<td>5 to 7</td>
<td>perennial</td>
<td>Solanaceae</td>
</tr>
<tr>
<td>Sonchus arvensis*</td>
<td><em>Sonchus arvensis</em></td>
<td>3 to 5</td>
<td>annual</td>
<td>Asteraceae</td>
</tr>
<tr>
<td>spanishnedles</td>
<td><em>Bidens bipinnata</em></td>
<td>4 to 7</td>
<td>annual</td>
<td>Asteraceae</td>
</tr>
<tr>
<td>star-thistle, Malta (7)*,**</td>
<td><em>Centaurea melitensis</em></td>
<td>3 to 5</td>
<td>annual</td>
<td>Asteraceae</td>
</tr>
<tr>
<td>starthistle, purple (7)*,**</td>
<td><em>Centaurea calcitrata</em></td>
<td>3 to 5</td>
<td>annual</td>
<td>Asteraceae</td>
</tr>
<tr>
<td>star thistle, yellow (7)*,**</td>
<td><em>Centaurea solstitialis</em></td>
<td>3 to 5</td>
<td>annual</td>
<td>Asteraceae</td>
</tr>
<tr>
<td>St. Johnswort, common</td>
<td><em>Hypericum perforatum</em></td>
<td>5 to 7</td>
<td>perennial</td>
<td>Clusiaceae</td>
</tr>
<tr>
<td>sunflower, common</td>
<td><em>Helianthus annuus</em></td>
<td>4 to 7</td>
<td>annual</td>
<td>Asteraceae</td>
</tr>
</tbody>
</table>
Plant Size
Application Timing
Application timing

- **Annuals** – germinate from seed, produce seed, die within 1 yr.
  - Spanish needles, ragweed, etc.
- **Perennials** – emerge from rootstock, produce seed, go dormant.
  - Blackberry, trees, etc.
Annual

Control of Annual Weeds

Weed Control

Perennials

Control of Perennial Weeds

Weed Control

Dorm. Veg. Bud Flower Fruiting Fall
Drought

- Slow plant growth.
- More time for the plant to break down the herbicide.
- Cuticle thickness.
Adjuvants

• Can greatly improve herbicide uptake
Reduction of Droplet Surface Tension

Leaf Surface

No adjuvant

adjuvant
Surfactants vs Oils

- Surfactants simply flatten out the droplet.

- Oils (methylated seed oils) will partially dissolve leaf waxes.
Surfactant

Methylated seed oil
Why not use MSO all the time?

- Surfactant - $5 per 100 gal water
- MSO - $10-20 per 100 gal water
Application technique

• More is not always better.
Spray retention – 1 squirt
Spray retention – 3 squirts
More is not better

100% spray retention

30% spray retention
Why do herbicides fail?

• Misidentified the weed
• Wrong herbicide for the wrong weed
• Weed size - too big = poor control
• Application timing – wrong time of year
• Drought – poor performance
• Adjuvant selection – follow the label
• Improper spray technique – maximize retention
Got more herbicide on you than in the tank!