Weed Control in Illinois Pumpkins

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Weeds Life Cycles

• When planning a good weed management program, growers must be able to correctly identify weeds and their lifecycles.
Annual Weeds

• Live for a single season

• There are two types of annuals and both reproduce by seeds
  
  – Winter Annuals - germinate late in the summer or early fall, are dormant during the winter, flower in early spring or early summer, and then die.

  – Summer Annuals - germinate during spring or summer, flower, and die at the end of the growing season.
Biennial Weeds

- Live for two seasons
- During the first growing season, these weeds remain in a vegetative stage. Following a cold treatment (vernalization), biennial weeds bolt, flower, set seed and die during the second growing season.
Perennial Weeds

- Live for multiple seasons and flower more than once
- Perennial structures (rhizomes, stolons, crowns, entire plants, nutlets, or roots) survive from year to year.
Table 21. Relative Effectiveness of Herbicides for Vegetable Crops

<table>
<thead>
<tr>
<th>Ratings Key</th>
<th>Grasses</th>
<th>Weeds</th>
<th>Tomatoes</th>
<th>Pepper</th>
<th>Capsicum</th>
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Notes: * For pre-packaged mixtures, see ratings for individual components. **Endorses against quackgrass. ***Post-directed spray.
Weed Management Options

• Reduce weeds prior to planting
• Weed control using cultivation
• Plasticulture
• No-till systems
• Weed control using herbicides
Reduce Weeds Prior to Planting

• Repeated cultivations (10 day intervals) throughout the year prior to planting
  – Good option for certified organic production
  – Caution with perennial weeds that spread via rhizomes

• Smother crops/cover crops

• Translocated herbicides applied late summer the year prior to planting
No-till considerations

• Example—planting in wheat stubble
  — Shift in weed community
  — Reliance on herbicides
  — An uneven covering of residue can interfere with the effectiveness of herbicide applications. Residue can shield weeds from herbicides
  — higher level of seed predation
    • Use transplants
Cultivation After Planting

- Cultivation should be done when weeds are still in the cotyledon stage
  - no larger than the two true-leaf stage
- Cultivation should be shallow to reduce the number of weed seeds brought to the surface
- Time to last cultivation to just prior to vining
Weed Control Using Herbicides

• Bare-ground, direct-seeded
  – Preemergent herbicide (pre or post plant)
  – Postemergent herbicide
  – Supplement with cultivation/or hand weeding
Herbicide Challenges

- Fewer herbicides labeled for pumpkins
- Pre-plant, preemergent broadleaf herbicides very limited
- Tillage limited to early season growth
- Resistant weeds—particularly waterhemp
Prefar • bensulide (N)
Pre-plant Preemergent

• Advantages
  – Good on grasses
  – “Some” activity on lambsquarters, pigweed, velvetleaf and purslane
  – Non-ALS
  – Can be put down preplant

• Disadvantages
  – poor and short-lived control
  – Crops injury potential—cold, wet soils
  – Carryover potential for future crops
  – Requires incorporation (tillage or irrigation)
  – Poor on most broadleaves except those listed above
Prefar • bensulide (N)

- **Unit cost:**
  - $190.00 (2.5 gal)

- **Use rate:**
  - 5-6 qt/A PRE

- **Cost/acre:**
  - $95.00 – 114.00
Post-direct seeded Preemergence

• **Dual Magnum** • s-metolachlor (K3)
  • Use on pumpkins requires supplemental label
• **Strategy** • ethalfluralin (K1) + clomazone (F3)
• **Curbit** • ethalfluralin (K1)
• **Sandea** • halosulfuron-methyl (B)
• **Treflan** • trifluralin (K1)
• **Command** • clomazone (F3)
  • Not labeled for use on Jack-o-lantern pumpkins or other sensitive *C. maxima* cultivars
Dual Magnum • s-metolachlor (K3)

- **Weeds controlled:**
  - annual grasses, nightshade, pigweed, and nutsedge
- **Weak on:**
  - lambsquarters, mustards
- **Limitations:**
  - Supplemental label must be in hand
    • Brawl includes pumpkins on national label
  - Rate on low side for season-long weed control
- **Length of control:**
  - 4 weeks
Dual Magnum • s-metolachlor (K3)

• **Unit cost:**
  – $350.00 (2.5 gal)

• **Use rate:**
  – 1-1.33 pt/A PRE

• **Cost/acre:**
  – $17.00-$24.00
Strategy • ethalfluralin (K1) + clomazone (F3)

- Weeds controlled:
  - annual grasses, several broadleaves

- Weak on:
  - pigweed, waterhemp, nightshade

- Limitation:
  - needs more clomazone

- Length of control:
  - 4-5 weeks

Strategy contains 1.6 lbs (18.2%) ethalfluralin + 0.5 lbs (5.6%) clomazone per gallon. Curbit EC contains 3 lbs (31.5%) ethalfluralin per gallon. Command ME contains 3 lbs (31.1%) clomazone per gallon.
Strategy • ethalfluralin (K1) + clomazone (F3)

• **Unit cost:**
  – $334.00 (2.5 gal)

• **Use rate:**
  – 2-6 pt PRE on seeded crops; directed spray on transplanted crops
    • 0.4 – 1.2 lbs a.i. ethalfluralin applied/A
      – *Curbit alone = 1.125 – 1.5 lbs a.i. applied/A*
    • 0.125 – 0.375 a.i. clomazone applied
      – *Command alone = 0.25 – 0.75 lbs a.i. applied/A*
      *(not labeled alone on Jack-o-lantern pumpkins)*

• **Cost/acre:**
  – $34.00-$101.00

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Strategy contains 1.6 lbs (18.2%) ethalfluralin + 0.5 lbs (5.6%) clomazone per gallon. Curbit EC contains 3 lbs (31.5%) ethalfluralin per gallon. Command ME contains 3 lbs (31.1%) clomazone per gallon.
Curbit 3EC • ethalfluralin (K1)

• **Weeds controlled:**
  – annual grasses, lambsquarters, nightshade, pigweed, purslane

• **Weak on:**
  – ragweed & mustards

• **Length of control:**
  – 4 weeks

• **Limitation:**
  – Dry weather will reduce control
  – Cold/ wet weather increases damage
Curbit 3EC • ethalfluralin (K1)

• Unit cost:
  – $157.00 (2.5 gal)

• Use rate:
  – 3-4 pt/acre PRE after seeding or as directed spray between rows after TP.
  – Do not apply under plastic
  – Can tank mix with Sandea or Dual Magnum
  – Needs water activation

• Cost/acre:
  – $24.00-$32.00
*Command 3ME • clomazone (F3)

• Weeds controlled:
  – annual grasses, lambsquarters, purslane, velvetleaf

• Weak on:
  – Marestail, nightshades, redroot pigweed, yellow nutsedge

• Limitation: bleaching injury
  – *Not labeled on Jack-o-lanterns
    • Or bright orange or pink c. maxima cultivars
Command 3ME • clomazone (F3)

- **Unit cost:**
  - $386.00 (2.5 gal)

- **Use rate:**
  - 0.67 - 2 pt/acre PRE before or after seeding (before soil cracking) or as directed spray between rows before TP.
    - Do not apply under plastic

- **Cost/acre:**
  - $13.00-$39.00
Sandea • halosulfuron-methyl (B)  
PRE

• Weeds controlled:
  – broadleaves

• Weak on:
  – Nightshades; no grass control
  – Doesn’t work on ALS-resistant weeds (waterhemp)

• Length of control:
  – 6-8 weeks
Sandea • halosulfuron-methyl (B) PRE

• **Unit price:**
  – $433.00 (10oz)

• **Use rate preemergent (Jack-o-lanterns):**
  – 0.5-0.75 oz after seeding, before cracking
    • Cost/acre:
      – $22.00-$33.00

• **Use rate preemergent (Processing):**
  – 0.5-1.0 oz after seeding, before cracking
    • Cost/acre:
      – $22.00-$44.00

• **Use rate under plastic (transplants):**
  – 0.5 – 0.75 oz
    • Cost/acre:
      – $22.00 - $33.00
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<td>Velvetleaf</td>
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C=controlled     N=Not Controlled     S=Suppressed
Resistance

Problems in IL

• B - ALS inhibitors
  – Waterhemp, Kochia, Common Ragweed, Giant Ragweed, Eastern Black Nightshade

• C1 - Photosystem II inhibitors
  – Lambsquarters, Kochia, Smooth Pigweed, Waterhemp

• E - PPO inhibitors
  – Waterhemp

• F2 - 4-HPPD inhibitors
  – Waterhemp

• G – Glycines
  – Horseweed, Waterhemp
    • Maybe Giant Ragweed and Palmer Amaranth

Pumpkin Herbicides

• A – ACCase inhibitors
  – Sethoxydim (Poast), Clethodim (Select)

• B – ALS inhibitors
  – Halosulfuron-methyl (Sandea)

• D - PS1
  – Paraquat (Gramoxone)

• E - PPO inhibitors
  – Carfentrazone-ethyl (Aim)

• F3 - carotenoid biosynthesis inhibition
  – Clomazone (Command)

• G-Glycines
  – Glyphosate (Roundup)

• K1 – MAI inhibitors
  – Ethalfluralin (Curbit), Trifluralin (Treflan)

• K3 – Chloroacetamides
  – Metolachlor (Dual)

• N – lipid biosynthesis inhibitors
  – Bensulide (Prefar)
Managing Weed Resistance to Sandea

- Sandea inhibits the enzyme acetolactate synthetase (ALS) in susceptible plants
- It is very common for weed biotypes to develop resistance to ALS-Inhibiting herbicides
Managing Weed Resistance

• Scout for weeds no longer controlled by the herbicide
• Rotate herbicides with different sites of action
  – Avoid multiple applications of Sandea to the same crop
  – Avoid using Sandea or other ALS-inhibiting herbicides on the same field two years in a row
    • Example: Sandea on pumpkins; Pursuit and Raptor on snap beans; Accent on sweet corn
• Rotate with grain crops and pasture
• Use cultivation and hand-weeding
Treflan • trifluralin (K1)

• Advantages:
  – Good on annual grasses, pigweed, lambsquarters, and purslane

• Disadvantages:
  – Row middles only, no crop contact (pumpkins at 3-4 leaf stage)
  – Needs incorporation (2-3 inches, tillage)
Treflan • trifluralin (K1)

• Unit Cost:
  – $95.00 (2.5 gal)

• Use rate:
  – 4EC formulations at 1-2 pts/ac

• Cost/acre:
  – $5.00-$10.00
Postplant Postemergent

Sandea • halosulfuron-methyl (B)
Poast • sethoxydim (A)
Select • clethodim (A)
Aim • carfentrazone-ethyl (E)
Gramoxone • paraquat (D)
Sandea • halosulfuron-methyl (B)

Postemergent

• **Weeds controlled:**
  – most broadleaves, nutsedge

• **Weak on:**
  – nightshade, lambsquarters, ALS-resistant weeds

• **Limitations:**
  – Apply before female flowers
  – May cause stunting, chlorosis, and lower yield
Sandea • halosulfuron-methyl (B)
Postemergent

- **Unit cost:**
  - $434.00 (10 oz)

- **Use rate postemergent (crop contact):**
  - 0.5 – 0.67 oz (between 2 and 5 leaf stage, best 4-5 leaves)
  - **Cost/acre:**
    - $22.00 – $30.00

- **Use rate row middles (no crop contact)**
  - 0.5 - 1.0 oz
  - **Cost/acre:**
    - $22.00 – 44.00
Postemergence Grass Herbicides

Poast • sethoxydim (A), Select Max • clethodim (A)

• Weeds controlled:
  – annual grasses, suppresses perennial grasses

• Unit cost:
  – Poast $238.00 (2.5 gal)
  – Shadow $94.00 (1 gal)

• Use rate:
  – Poast 1-1.5 pt/ac
  – Shadow 6-8 fl oz

• Cost/acre:
  – Poast $12.00-$18.00
  – Shadow $5.00-$6.00
Aim • carfentrazone-ethyl (E)

- **Weeds controlled:**
  - most broadleaf weeds
- **Improving control:**
  - Weeds less than 3 inches
  - Good coverage
  - NIS or COC
- **Unit cost:**
  - $287.00 (1qt)
- **Use rate:**
  - 0.5-2.0 fl oz
- **Cost/acre:**
  - $5-$18
Crop Groupings

• The Aim label is a good example of where labeled crops are listed by Crop Group
• Pumpkins are not listed specifically, but are included in Crop Group 9 (Vegetable, cucurbit)
• For a complete list, go to the EPA website:

http://www.epa.gov/fedrgstr/EPA-PEST/1995/May/Day-17/pr-266.html
Gramoxone Inteon • paraquat (D)

- **Weeds:**
  - foliar burndown of most weeds

- **Unit costs:**
  - $101.00 (2.5 gal)

- **Use rate:**
  - 2-4 pt/ac with shielded sprayer between rows to kill emerged weeds
    - Drift can injure crops

- **Cost/acre:**
  - $26.00 - $51.00
Which should you choose?

• Rotate herbicide mechanisms of action
• Unless velvetleaf a problem extra costs of Strategy may not be justified
• If nutsedge, galinsoga, nightshade or pigweed is a problem choose Dual Magnum
• If common lambsquarters is a problem choose Curbit
Pumpkin Weed Control Recommendations

• **Curbit or Dual Magnum PRE + Sandea PRE**

• **If needed: Sandea 0.5 oz POST - between rows, + Poast or Select; no NIS**

• **Cultivate aisles before vines run; apply Aim between rows**
Some things to remember about weed control

• Weed control is essential for effective disease control and for high yields
• Pumpkins are sensitive to many of the herbicides registered
• Command is not registered on jack-o-lantern pumpkins
• ALS-inhibitors (e.g., Sandea) can cause weed resistance (waterhemp, pigweed, lambsquarters, kochia, ragweed)
Things to remember

• Plant crops so that you can cultivate or disk between rows
• Leave spray aisles for driving in the field
• Use drop nozzles to keep Sandea off crop leaves
• Use shielded sprayers for applying Aim or Gramoxone between rows
Available References

Midwest Vegetable Production Guide for Commercial Growers - 2011
http://www.btny.purdue.edu/Pubs/ID/ID-56/

Identifying and Managing Cucurbit Pests
https://pubsplus.uiuc.edu/C1392.html (to order)

Pumpkin Production Guide, NRAES-123
http://www.nraes.org/nra_index.taf (to order)

Illinois Fruit & Vegetable Newsletter (20 issues)
http://ipm.illinois.edu/ifvn/
Questions?

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