Weeds

Weed control is a form of procrastination...

What you fail to deal with today will haunt you tomorrow!!!

That is why a truly integrated approach to weed management is essential!
Weed Management in Sweet Corn

- Know your weeds
- Use integrated approaches
- Multiple tools – don’t rely on 1 method
- Manage for the long-term
  - Need plan with clear goals and objectives
  - Understand ecology of system
  - Anticipate and prevent future weed problems
Sweet Corn Herbicides
This is the weed control we would like to achieve
Want to Avoid Herbicide Damage to the Corn Crop

So what are some herbicides for sweet corn?
Preemergent Herbicides Registered for Sweet Corn

- Aatrex
- Micro-Tech
- Dual Magnum
- Harness/Surpass) or encapsulated/ME Degree/TopNotch
- Prowl H2O
- Zidua
- Anthem
- Define
- Outlook
- Lexar
- Callisto
Postemergent Herbicides Registered for Sweet Corn

- Weedar 64 (2,4-D)
- Basagran (bentazon)
- Stinger (clopyralid)
- Permit, Sandea (halosulfuron)
- Aim (carfentrazone)
- Starane (fluroxypyr)
- Accent Q (nicosulfuron)
- Callisto (mesotrione)
- Option (foramsulfuron)
- Roundup (glyphosate)
- Atrazine
- Anthem (pyroxasulfone + fluthiacet)
- Cadet (fluthiacet)
- Sandea (halosulfuron)
- Gramoxone
- Laudis (tembotrione)
- Impact (topramezone)
Choosing a Sweet Corn Weed Control Program

1. Soil type
2. Rotation
3. Sweet corn hybrid
4. Weed spectrum
5. Season
Soil Type

1. On light (sandy) soil, pre grass herbicides can stunt SWCO, especially early in season (Dual, Lasso, Outlook, Prowl)
2. In areas with sandy soil and high water table, atrazine use may be restricted
3. Sandy soil is more likely to have carryover problems for following crops
Growers planting SWCO in rotation with other vegetable crops should avoid herbicides with long residual problems. Atrazine is of primary concern. A general rule is: Maximum of 1 lb ai atrazine before July 1, if the soil has at least 3% OM or 20% clay. Less OM, use less atrazine or use it pre only.
Hybrid

• SWCO hybrids vary in their tolerance of herbicides. This is especially true of super sweet (sh2) types and sulfonylurea herbicides e.g. Sandea and Accent. Some labels list sensitive hybrids, but it is difficult to remain current.

• New herbicides may be more problematic, so growers will have to accept some responsibility for crop injury.
Weed Spectrum

1. Know your weeds
2. Check labels for weeds controlled
3. Choose a weed control program before you plant
4. Cultivate plus sidedress at 6-8 in corn
Season

1. Early in year, SWCO germinates slowly in cold soil. Sh2 is especially sensitive. Some hybrids also are more sensitive to pre grass herbicides at this time. Use lower rate, or only atrazine if you have trouble with Dual, Lasso, or Outlook. Use Prowl only after corn is up to avoid injury.

2. In warm weather, increase herbicide rate if needed.
Things to Consider

- **Stale Bed Applications**
- The following herbicides are nonselective and control weeds present in a field prior to planting sweet corn or before emergence. If using "no-till" or "minimum tillage," these herbicides will kill the cover crop.
  - Glyphosate (Roundup 4S) @ 1 to 5 qt/A. Apply to emerged annual or perennial weeds prior to crop emergence.
  - Paraquat (Gramoxone Inteon 2S RUP) @ 2 to 4 pt/A + NIS. Apply in 20 to 60 gallons spray mix to emerged annual weeds before crop emergence as a broadcast or band treatment.
Most Common Approaches

- Apply a good preemergent herbicide, usually more than 1 herbicide at planting
- Follow with a postemergent herbicide or combination after weeds emerge
- A common practice is a preemergent with atrazine as a component – but must be aware of restrictions
Grass

• The following herbicides control most annual grasses as well as certain smaller-seeded broadleaf weeds. Some growers may find that the weed control spectrum of these herbicides may be sufficient to allow use of only one of these herbicides without the addition of a broadleaf-weed herbicide.
Soil-applied Herbicides (Acetanilide Family)

- These herbicides are usually applied to the soil surface immediately after seeding or can be applied after crop emergence as part of a reduced rate program.
- Acetachlor products (Many) – rates vary depending on product. 1.5 – 3.75 qts/A. (RUP). Only apply before planting or before crop emergence.
- Alachlor (Lasso, Micro-Tech 4EC) - 2 to 3 qt/A (RUP). Weak on lambsquarters and ragweed. May also be applied after crop emergence to weed-free soil before crop is 5" tall.
- Metolachlor (Dual Magnum) - 1 to 2 pt/A. Apply to the soil surface after seeding. Poor control of lambsquarters. May also be applied after crop emerges to weed-free soil before crop is 5" tall.
Soil Applied

- **Pendimethalin (Prowl H₂O) @ 2 to 4 pt/A** – broader registration for 2014
- Apply preemergent only after seeding and **Do not incorporate**
- If Prowl moves into the seed zone there is potential for injury
- Minimize potential crop injury by planting in a firm seedbed and seed at least 1.5" deep
- Plant into moist rather than dry soil
- Do not mix Prowl with liquid fertilizers and avoid sandy soils
- Specific weeds include triazine-resistant lambsquarters, and velvetleaf
- Consider a lower rate of Prowl plus a broadleaf herbicide and another grass herbicide such as Dual Magnum (metolachlor), Lasso (alachlor), Frontier (dimethenamid). etc.
Soil-applied Broadleaf Herbicide (Newer Chemistry)

- Mesotrione (Callisto 4EC) @ 6 to 7.7 oz/A after seeding to the soil surface
- Use 5 to 6 oz/A if tank mixing with atrazine. In a tank mix, the atrazine rate can be reduced to 0.5 to 1 pt/A
- A grass herbicide must also be used.
- Callisto provides excellent control of many problem broadleaf species such as velvetleaf and triazine-resistant lambsquarters
Soil-applied Broadleaf Herbicides (Triazine Family)

- Atrazine provides excellent control of most broadleaf weeds and is commonly used as a supplement to one of the grass herbicides discussed. Although atrazine is usually applied to the soil surface immediately after seeding, it can also be soil incorporated if tank mixed with a preplant incorporated grass herbicide.
- Atrazine (Aatrex 4L) @ 1 qt/A either preplant incorporated or to the soil surface immediately after planting. Use alone only if annual grasses are not a problem. Shallow cultivation may help to control annual broadleaf weeds. May be tank mixed with many herbicides and is also available in many pre-mixes.
Special Atrazine Precautions

The Environmental Protection Agency and Syngenta have revised label uses of all atrazine products to reflect potential surface and groundwater contamination concerns. Be sure to read and follow all directions and restrictions listed on the label. All of the rates listed in ID-56 for atrazine are within the guidelines of the label and include both single applications (applied before crop emergence or early postemergence) and sequential applications (applied both at planting and postemergence).

Please read the label carefully.
Other Preemergent Herbicides for Sweet Corn

- Define - 12-21 oz/A
- Outlook- 10-21 oz/A
- Zidua – 1- 4 oz/A, grass and broadleaves, 18 month replant

Also has post activity -
- Lexar - 3 or 3.5 qts/A or Lumax - 2.5 - 3 qts/A can be used with COC to control emerged broadleaf weeds
Anthem (pyroxasulfone + fluthiacet)

- Apply at 7-10 oz/A
- Has both pre and post label
- Pre control grasses and broadleaves
- Post control of some broadleaves
- Controls jimsonweed, lambsquarters, morningglory, pigweeds, smartweed, nightshade, velvetleaf, barnyardgrass, crabgrass, fall panicum
Anthem ATZ

- Contains Anthem + atrazine
- Pre and post (up to 4” weeds) applications
- Rates vary depending on soil type and OM – 1.75 – 4 pts/A for pre and 2-3 pts/A for post
- Broad weed spectrum of grasses and broadleaves
- 18 month replant for all other vegetables
Formulated Mixes (Prepackaged Tank Mixes)

- Several herbicide products on the market are sold as formulated combinations. Below is a list of some formulated mixes registered for use on sweet corn:
  - Bicep Lite contains 2/3 as much atrazine as Bicep and allows growers a better opportunity to obtain good grass control without using more atrazine than is needed.
  - Dual II, Bicep II, and Bicep Lite II are newer formulations containing a softener to improve tolerance of corn to metolachlor in cold soils. For supersets and se sweet corn, it is still recommended to plant after soil temperatures reach 60°F. Also combinations with atrazine and dimethenamide.

- Three questions to ask before using a mix or the individual herbicide are:
  - Which is less expensive on a per acre basis?
  - Which formulation is easier to apply?
  - Is the ratio of the two herbicides in the formulated mix appropriate?
Postemergent Sweet Corn Herbicides

- **Grasses and/or Broadleaves**
  - Accent Q – grasses @ 0.45-.9 oz/A + COC or NIS broadcast or with drop nozzles on corn 12” tall (5 leaf collars) or 12-18” corn use drop nozzles
  - Option* – 1.5 oz (MSO only), 1-6 collar, annual grasses and quack, not crabgrass
  - Laudis – grasses and broadleaves @ 3 oz + MSO
  - Roundup – broadleaves and grasses in Roundup Ready or with shielded sprayer in conventional @ 1qt/A after corn reaches 12” between rows
  - Gramoxone (RUP) – broadleaves and grasses - shielded @ 1-2 pts or directed to 10” corn with spray that does not reach higher than 3’ on stalk
Postemergent Grass Herbicide

- Nicosulfuron (Accent Q 55WDG) @ 0.45 to 0.9 oz/A
- Apply as a broadcast application when grasses are young and actively growing to corn that is less than 12" high or up to and including 5 leaf collars
- If corn is 12" to 18" high, applications must be made with drop nozzles
- Make only one application per year. Also see the label for optimum sizes of grasses
- Applications must include either NIS or COC + an ammonium nitrate nitrogen fertilizer
- Do not apply if corn is greater than 18" of 6 leaf collars
- Not all sweet corn varieties are tolerant to Accent so check with a DuPont representative or Extension
Postemergent Broadleaf Herbicides for Sweet Corn

• Broadleaves
  - 2,4-D - 0.5-1.5 pt
  - Anthem & Anthem ATZ
  - Bentazon - 0.75-1 qt*
  - Callisto – 3 oz*
  - Impact - 0.75 oz*
  - Starane - 0.66 pt
  - Aim - 0.5 oz*
  - Option* – 1.5 oz (MSO only)
  - Cadet - 0.6- 0.9 oz*
  - Callisto Xtra – 20 – 24 oz*
  - Sandea – 2/3 – 1 oz*
  - Stinger - 0.33-.66 pts

  * Requires surfactant – COC, NIS, MSO – check labels for type and restrictions and cv sensitivity especially size restrictions most require drop nozzles if corn is greater than V6 stage
Mesotrionone (Callisto 4EC):

- Apply 3 oz/A postemergent to corn (up to 30" tall) when weeds are no more than 3" tall
- Do not make more than 2 applications per season to corn and do not exceed a total of 7.7 oz/A of Callisto
- Callisto provides excellent control of many problem broadleaf species such as velvetleaf and triazine-resistant lambsquarters.
- Callisto provides only partial control of yellow nutsedge and no control of ragweed when applied postemergent
- See the label for precautions and more information on tank mixes, rates, and weeds controlled
Laudis (tembotrione)

- Field, seed, sweet (processing and fresh mkt) and popcorn
- Postemergent
  - up to V7 sweet corn (V8 field corn)
  - primarily broadleaf weed control
  - partial grass control
    - Synergized by atrazine - Improves consistency; moves certain grasses and broadleaves from suppression to control
- Includes a safener
- 3 oz/A +1% MSO + 8.5 lbs AMS/100 gal
  - Efficacy with COC < MSO but COC can be used if:
    - broadleaf weeds are the main target
    - good growing (killing) conditions
Impact (topramezone)

Postemergent in field corn, sweet corn (processing and fresh mkt), and pop corn

- primarily broadleaf weed control
- partial grass control
  - Synergized by atrazine - 0.25 to 1.0 lb/A recommended

Rate: 0.75 oz/A

Adjuvant: methylated seed oil or crop oil concentrate plus nitrogen additive

PHI: 45 days
HPPD Herbicides - which to use POST?

Callisto  Impact  Laudis

• Efficacy
  – Broadleaves  POST similar with atrazine
  – Grasses  Laudis ≥ Impact >> Callisto

Crop Tolerance
  – Impact ≥ Laudis > Callisto

• Crop Rotation Options
  – Laudis ≥ Impact > Callisto

• Insecticide interactions
  – Only Callisto
HPPD Herbicides - Bleachers

So, which should I use?

All three best used with 0.5 - 0.75 lb ai atrazine to round out broadleaf efficacy
atrazine (Aatrex 4L): Post

- Apply at 1 qt/A and add either 1 qt/A of crop oil concentrate or 1 gal/A of spray oil
- Apply when weeds are 1 to 1 1/2" high and before corn is 12" high
- This treatment can be used as the primary broadleaf herbicide treatment instead of an application at planting or it can be used as an emergency treatment if the soil-applied broadleaf herbicide treatment failed
- If applied correctly, this application will control the emerged weeds and will continue to provide residual control for later-emerging broadleaf weeds
- Check label for additional precautions regarding the use of crop oil and petroleum oils
2,4-D amine (Amine 4): 0.5 to 1 pt/A. Use 0.5 pt/A when weeds are small and corn is 4" to 5" tall

- Increase rate to 1 pt/A as corn reaches 8" tall
- Use drop nozzles to direct spray toward base if corn is over 8" tall
- Do not cultivate for about 10 days after spraying, as corn may be brittle
- Reduce rate of 2,4-D if temperature is hot and soil is wet
- Use only the amine formulation of 2,4-D and do not use any ester or low-volatile ester formulation
- Use all precautions to avoid spray drift to desirable broadleaf crops
Bentazon for Postemergence Broadleaf Weed Control

• Bentazon (Basagran 4E) @ 1.5 pt/A
• Apply early post-emergence overtop when weeds are small and corn has one to five leaves. See label for ideal weed size
• Basagran will not control redroot pigweed and will provide only partial control of common lambsquarters, giant ragweed and morning glory
• Basagran should be primarily used as an emergency treatment when a soil-applied broadleaf herbicide has failed. There is less chance of adjacent crop injury from spray drift than with 2,4-D
Aim for Post Broadleaf Weed Control

• Carfentrazone (Aim 40 WG) @ 0.33 to 0.67 oz/A + NIS
• Apply before corn reaches 8” to control seedling broadleaf weeds including pigweed, common lambsquarters, eastern black nightshade, and velvetleaf. Use drop nozzles if corn is > 8” tall
• Tank mix with atrazine at reduced rates or another broadleaf herbicide to increase weed spectrum controlled
• Expect to see speckling of the crop foliage after application. Initially, the injury appears to be substantial, but it is not systemic and the corn outgrows the injury rapidly. Cultivar sensitivity may vary with Aim. Use caution when treating new cultivars.
• Weather conditions can affect the degree of injury observed and it may be more severe during periods of warm, cloudy weather with high humidity and plentiful soil moisture when corn growth is rapid and soft
Sandea for Post Broadleaf Weed Control

- Halosulfuron (Sandea) @0.67 to 1.33 oz/A + NIS
- Provides control of many weed species which are not under drought stress
- Species controlled include redroot pigweed, pokeweed, common ragweed, Pennsylvania smartweed, common sunflower, velvetleaf, wild mustard, yellow nutsedge, and wild radish
- Do not cultivate for 7 days after application
HPPD-inhibitor

growth regulator

Distinct
dicamba + diflufenzopyr

ALS-inhibitor

PSII-inhibitor

PPO-inhibitor

Callisto
desmotrione

Accent
nicosulfuron

Basagran
bentazon

Aim
carfentrazone

Aim
carfentrazone

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Perennial Weed Control

• Apply Glyphosate (Roundup 4S) @ 1.33 oz/gal as a spot treatment BEFORE silking of corn. Do not treat more than 10% of the total field area to be harvested. Any crop plants receiving spray in the treated area will be killed.

• Glyphosate (Roundup 4S) @ 2 qt/A AFTER corn harvest to actively growing quackgrass 6" to 8" high. Wait at least 5 days and then plow. Do not plant subsequent crops other than those on the label for 30 days following application. Most effective on most perennials if applied at or after bloom.
New Dual Magnum 24C Label

- Dual Magnum kills emerging weeds but has no postemergent activity
- In some crops can be applied post to the crop, 1-2 leaves
- Controls: many annual grasses and small seeded broadleaf weeds
- Especially effective on galinsoga, purslane, crabgrass, foxtails, fall panicum
- Good on: barnyardgrass, chickweed, pigweed, yellow nutsedge, nightshade, carpetweed
New Dual Magnum 24C Label

Crops:
Chive (Fresh Leaves), Chinese Chive (Fresh Leaves),
Garlic (Bulb), Great-Headed Garlic (Bulb),
Wild Leek, Beltsville Bunching Onion
Dry Bulb Onion, Green Onion (Fresh),
Pearl Onion, Potato Onion (Bulb), Welch Onion (Tops),
Shallot (Bulb), Shallot (Fresh Leaves)
New Dual Magnum 24C Label

Crops:
Carrot, Garden Beet, Radish, Turnip, Turnip Greens

Collards, Kale, Spinach, Mizuna, Mustard Greens, Mustard, Spinach, Cilantro; Rape Greens
New Dual Magnum 24C Label

Crops:
Broccoli (Raab), Transplanted Cabbage Including Chinese Cabbage, Chinese Cabbage (Bok Choy)

Citron Melon, Muskmelon, Watermelon, Cucumber, Winter Squash

Transplanted Bell and Non-Bell Pepper Okra
General Recommendations – Check 24C label for your crop

- Dual Magnum rate varies depending on crop but generally is between 0.67 to 1.3 pts/A
- Label allows a preemergent application or a postemergent application in many crops, BUT only 1 application per year
- Dual Magnum will not control emerged weeds
- Precautions: risk to crop is greater on light soils and any tank mixing increases injury potential
- Restrictions: PHI days exist, varies from ~60 days for pre and 30 days or less for post
Other Crops for Dual Magnum

- Tomatoes
- Beans – dry, lima, pole and snap
- Sweet corn
- Potatoes
- Pumpkin
Prowl New Broader Registration in 2014

- Pendimethalin (Prowl H₂₀) @ 2 to 4 pt/A pre
- Preemergent herbicides
- Most annual grasses
- Many small seeded broadleaf weeds
  - Pigweeds, carpetweed, chickweed, henbit, smartweeds, lambsquarters, purslane, velvetleaf, spurge, nightshade
- Crops
  - Fruiting vegetables, sweet corn, carrots, edible beans, garlic, leek, lentils
Questions?

Thank You