WEED CONTROL IN SOUTH CAROLINA VEGETABLES

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Background in Weed Control

- Turf, ornamentals, and tree fruit (Grad School).
  - Herbicide resistance and IPM projects

- Herbicide Discovery

- Herbicide Development (Early Stage for corn, soybean, and wheat). Late stage development for vegetables and tree crops.
Economic Impact of Weeds

In the US $32 billion in crop production loss annually due to weeds – 12 % yield loss.
Economic Impact of Weeds

• Palmer amaranth can easily exceed sweetpotato height within 10 days after transplanting and ultimately reach heights greater than 6 feet. Decrease marketable yield by 85%.

• One to 13 yellow nutsedge shoots per square foot of planted sweetpotato row at two weeks after transplanting resulted in 6 to 80% marketable sweetpotato yield loss.
Economically Important Weeds

1. Nutsedge (*Cyperus* spp.)

- Yellow nutsedge produced 1911 new plants and 6864 tubers from one tuber in one year.

2. *Amaranthus* spp.

- An individual female Palmer amaranth has the potential to produce up to 600,000 seeds.
Components of a Weed Management Program

1. Preventative
2. Non Chemical
3. Mechanical
4. Biological
5. Chemical

Whitwell
Preventive Measures

1. Planting crop seed that contain no weed seed

2. Using weed free mulch and equipment.

3. Prevent weeds from reproducing by seed or vegetative

4. Weed scouting to identify new weeds.

5. Stale seed bed technique
Guidelines for weed scouting

✓ Scout 7 to 14 days after each herbicide application and near harvest.

✓ Identify and record the weed species present.

✓ Determine the distribution pattern of plants in the field.
  • Correlate with application pattern or identify as random

✓ Determine if plants present survived a previously applied herbicide or emerged after the last herbicide application.

✓ Observe individual plant responses, especially if plants survived a herbicide application.

✓ Look at previous field history to understand what changes may be occurring.
Cereal Rye Management (Experimental Treatments)

- **Plow down**: rye is incorporated at jointing
- **Ryelage**: rye is harvested at boot stage
- **Roll down**: rye is roller-crimped immediately prior to planting at 50% anthesis

**No cover**: No rye cover crop seeded.
Soil Respiration

Respiration (mg CO₂ / g dry weight)

No cover  | Plow down  | Ryelage  | Roll down

*Measured in August both years

b  | ab  | ab  | a
Sweetpotato: bunched type versus creeping growth habits

(A) Carolina Bunch
(B) Beauregard

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<thead>
<tr>
<th>Weed free interval (days)</th>
<th>Sweetpotato shoot biomass (% of weed free)</th>
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<tbody>
<tr>
<td>0</td>
<td>20</td>
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<tr>
<td>5</td>
<td>40</td>
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<tr>
<td>10</td>
<td>60</td>
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<td>15</td>
<td>80</td>
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<td>20</td>
<td>100</td>
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<td>25</td>
<td>120</td>
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- **Beauregard**
- **Carolina Bunch**

Graph shows the growth comparison between Beauregard and Carolina Bunch in terms of sweetpotato shoot biomass over time with weed-free intervals.
Mechanical/Physical Measures

1. Hand pulling
2. Mulch
3. Tillage and cultivation
4. Fire
5. Liquid N
6. Soil solarization
7. Flooding

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History of Herbicides

1. Romans salted the land to stop food production in Carthage in 167 BCE.
2. Inorganic Salts – high rates and non selective were the first herbicides
3. Selective organic herbicides were developed during WWII but not deployed
4. 2,4-D first herbicide
5. 1ST war use of herbicides was Vietnam War
6. Major US herbicide use started about 1960
7. Herbicide resistant crops adopted in 1995
8. Resistant weeds major problem about 2005
Classification of Herbicides

- Selectivity - selective and nonselective

- Application timing – Burndown, PPI, PRE, POST, POST Directed

- Movement - Systemic (phloem/xylem) or Contact

- Mechanism of action – Photosystem 2 Inhibitor, Microtubule inhibitors, etc.

- Families - dinitroanalines, phenoxies, etc.

- Regulatory – General or restricted use
Soil Fumigation
Example of Weed Control Program in Watermelon (Plastic Mulch)

1. Scout for weeds and prepare stale seed bed.
2. Soil Fumigant: Vapam at 50 GPA for small seeded weeds, use 75 GPA for nutsedge.
3. After plastic is laid, broadcast Reflex* and Curbit (Include a non-selective herbicide if weeds are emerged). *Can treat under mulch.
4. Wash off herbicides prior to transplanting (0.5 inch rain)
5. Dual Magnum and Sandea and can be applied to row middles.
6. Broadcast Select Max for grass control.
Dicamba Injury

Growth Regulator

University of Illinois;-Google image
VaporGrip Technology

Dicamba Volatility

- DMA Dicamba
- DGA Dicamba + VaporGrip

Time in Water Solution

Dicamba Free Acid
Spray Droplets