2003 Solution Days
SEED TREATMENTS

REFUGE ACRES AND RESISTANCE MANAGEMENT

- Insecticides
- Fungicides
- Resistance management
- Soybean rust

Tom Hunt, UNL Entomology Department,
Loren Giesler, UNL Department of Plant Pathology

SeASONAL ET in NebrasKA (in./yr)

<table>
<thead>
<tr>
<th>Crop</th>
<th>Western</th>
<th>Central</th>
<th>Eastern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
<td>23-26</td>
<td>24-27</td>
<td>25-28</td>
</tr>
<tr>
<td>Soybeans</td>
<td>20-22</td>
<td>21-23</td>
<td>22-25</td>
</tr>
<tr>
<td>Sorghum</td>
<td>18-20</td>
<td>19-22</td>
<td>20-23</td>
</tr>
<tr>
<td>Winter Wheat</td>
<td>16-18</td>
<td>16-18</td>
<td>16-18</td>
</tr>
<tr>
<td>Alfalfa</td>
<td>31-33</td>
<td>32-35</td>
<td>34-36</td>
</tr>
</tbody>
</table>

Crop Water Use = Evapotranspiration (ET)

Soils Differ for Available Water

<table>
<thead>
<tr>
<th>Soil Texture</th>
<th>Available Water (in/ft)</th>
<th>Range</th>
<th>Typical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fine sand</td>
<td>0.7 - 1.1</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Sandy loam</td>
<td>0.9 - 1.5</td>
<td>1.4</td>
<td></td>
</tr>
<tr>
<td>Loam</td>
<td>1.2 - 2.3</td>
<td>1.8</td>
<td></td>
</tr>
<tr>
<td>Silt loam</td>
<td>1.4 - 2.6</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td>Silty clay loam</td>
<td>1.5 - 2.6</td>
<td>2.2</td>
<td></td>
</tr>
<tr>
<td>Clay</td>
<td>1.6 - 2.2</td>
<td>1.8</td>
<td></td>
</tr>
</tbody>
</table>
- Can dry to tillage depth
- Warm up quickly
- Tend to crust or seal
- Are prone to erosion

- Buries residue cover
- Destroys soil structure
- Compacts the soil
- Adds to production costs
Managing Resistance in Pest Populations

- Host Resistance
  - Natural
  - Engineered
- Chemical Controls
  - Broad Spectrum
  - Specific
- Cultural Controls
  - Crop Rotation

Host Resistance

- Natural
- Engineered

Chemical Controls

- Broad Spectrum
- Specific

Cultural Controls

- Crop Rotation

Water Use (ml)

- Excess or gravitational water
- Available water, no plant stress
- Available water, plant stress possible
- Unsuitable water

Soil Types:
- Sand
- Loam
- Silty Clay Loam
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Summary

- Use no-till, crop residues, and cover crops
- Select crops and rotations to use available soil water and rainfall
- Make sure the crop has adequate water during reproduction through maturity
- Don’t shut off early on beans—fill the pods

WEED RESISTANCE MANAGEMENT – REALITY VS REACTIONARY

- History
- Current status
- Importance
- Identify mode of action

Bob Kacwinski, Syngenta

Herbicide Resistance Definition

The inherited ability of a weed to survive a rate of herbicide that would normally give effective control

“Every Pesticide Selects For Its Own Failure”

- 1975: 12 Biotypes = 2003: 250 + Biotypes
- All 12 herbicide modes of action
- More than 70 countries confirmed resistance

Regional Resistance NE/CO/KS/IA/MO

- Triazine: pigweeds, lambquarters, kochia, ragweed...
- Dikamba: kochia
- 2,4-D: kochia, pigweeds, triazine, ...
- ALS/AHAs: pigweed, kochia, sunflowers, cocklebur, shattercane, waterhemp, Palmer, ...
- Glyphosate: mare tail/morse weed, waterhemp, (FT) lambquarters

Proto: waterhemp

Bottom Line: If You Overuse & Abuse, You Will Lose
Natural Selection of Resistance

Factors Affecting Resistance Development

- Number of acres being established
- Frequency of usage
- Rotation of mode of actions
- Combination with other managements

Weed Tolerance Development

Variable weed tolerance levels
2001 Waterhemp Glyphosate Tolerance

- Acreage management method
- Rootworm resistant corn (Transgenic)
- Mode of action rotation

2002 Waterhemp Glyphosate Tolerance

- Maximize Management
  - Use Full Label Rates
  - Treat Earliest Timing
  - Prevent Weeds from Flowering/Seed
  - Repeat Applications
  - Tank Mix As Needed
  - Reach 100% Control
  - Common Initial Response

- Multiple Management
  - Full Label Rates
  - Treat Earliest Timing
  - Prevent Weed's from Flowering/Seed
  - Tank Mixing MOA
  - Sequential Treatments
  - Cultural Controls
  - Rotate Crops/Timing
  - Rotate Herbicide MOA

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**Resistance Management**
- Use Multiple Herbicide Mode of Actions
- Use Multiple Herbicide Timings
- Prevent Weeds from Flowering/Seeds
- Use Cultural Controls – Tillage, Cultivation, Crop Rotations, ...
- Break Up Patterns – Prevention vs. Curative

*“Every Pesticide Seeks for Its Own Failure”*

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**Components of Corn & Soybean Yield**
- Solar radiation
- Field demonstrations
- Diseases
- Prevention
- Weed Resistance

Jim Erwin, Syngenta
Jim Stack, Kansas State University Extension

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**What is Stress?**
- Lack of photosynthesis

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**Effects of Radiation Upon Corn During Grain Fill**
- How do cloudy days affect yield?
  - Decrease photosynthesis (food manufacture)
  - Take sugars away from stalk to promote grain fill
- Even hazy days can diffuse solar radiation by more than 50%
  - 8530 – Sunny – 4466 Hazy – 2304 Cloudy

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**Soybean Rust:**

- Pustule Types

**Bacterial Pustule**

**Wrap-Up**

- Diversity of seed treatments available
  - Match the need for your field
  - Use in resistance management
- Resistance management strategies
  - Mode of action rotation
  - Acreage management
  - Combinations

**WATER MANAGEMENT and Utilization**

- Maximizing rainfall and soil water
- Matching crops and available water
- Using no-till & residue cover to conserve water
- Scheduling irrigations

Paul Jasa, NU Extension Engineer

**Crops Require Water Different Times in the Season**