Palmer amaranth in the South
(What they have and what we don’t want!)

Glyphosate-resistant Palmer amaranth in soybean

Single herbicide  Tank-mix  Herbicide MOA Rotation  Both

2010SMFD-SANDELL (1)

2010SMFD-SANDELL (2)

Time of Day Factors
- Effect of dew
- Leaf angle
- Relative humidity
- Air temperature

2010SMFD-SANDELL (3)

How long can weeds compete with corn after planting before yield is reduced?

0 lbs N  110 lbs N

2010SMFD-SANDELL (4)

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How long can weeds compete with soybeans after planting before yield is reduced?

Soybean yield loss (% of weed free)

- 7.5" rows
- 15" rows
- 30" rows

Weed removal (soybean growth stage)

Herbicide Resistance Development

Resistance = (selection pressure) x (resistant allele frequency)

Selection Pressure = (herbicide persistence) x (# individuals)

Resistant Allele Frequency
- Varies by species

Herbicide Persistence
- Varies for each herbicide
- Residual activity
- Frequency of application

Glyphosate Resistance Update

Nebraska
- Marestail
- ALS-resistance coming??

United States
- Marestail
- 18 states
- Waterhemp
- MO, IL, KS, MN, IA, MS
- Palmer amaranth
- GA, NC, AK, TN, NM, AL, MI, MO
- Common ragweed
- MO, AK, OH, KS
- Giant ragweed
- OH, AK, IN, KS, MN, TN, IA, MO
- Kochia
- KS (1 mile S of NE-KS border)

Herbicide rotation for resistance management

Influence of herbicide rotation on the evolution of resistance

Frequency of Resistant Plants

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## Herbicides that control volunteer corn

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Active ingredient</th>
<th>Corn size</th>
<th>Rate/Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assure II or Targa</td>
<td>quizalofop</td>
<td>0-12 in</td>
<td>4 oz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12-18 in</td>
<td>5 oz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18-30 in</td>
<td>8 oz</td>
</tr>
<tr>
<td>Fusilade DX</td>
<td>fluazifop</td>
<td>0-12 in</td>
<td>4 oz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12-24 in</td>
<td>6 oz</td>
</tr>
<tr>
<td>Fusion</td>
<td>fluazifop + fenoxaprop</td>
<td>0-12 in</td>
<td>4 oz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12-24 in</td>
<td>6 oz</td>
</tr>
<tr>
<td>Select or Arrow</td>
<td>clethodim</td>
<td>0-12 in</td>
<td>4 oz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12-24 in</td>
<td>6 oz</td>
</tr>
<tr>
<td>Select Max</td>
<td>clethodim</td>
<td>0-12 in</td>
<td>6 oz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12-24 in</td>
<td>9 oz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24-36 in</td>
<td>12 oz</td>
</tr>
</tbody>
</table>