Sorghum Growth and Development

CEA Training
August 10, 2005
Recognizing Key Plant Structures
Developmental Sequence of Sorghum

---------DAYS--------

Emergence: 6
Panicle Init.: 32 – 35
Flowering: 32 – 35
Phys. Mat.: 32 – 35

GS I
GS II
GS III

Total Leaf Area
60% Total Dry Wt.
Potential Seed Number Set

Key Period
Emergence time – 5 to 10 days

- Soil conditions
- Depth of planting
- Seed vigor

Other factors

- Cool, wet soils
  - Ideal temperature – 70 F
  - Recommend planting at 60 F
Planting to Emergence

Other factors

- Cool, wet soils
  - Ideal temperature – 70 F
  - Recommend planting at 60 F
  - Very little germination and growth will occur below 50 F
  - Promotes diseases
  - If planting in cool, wet soils plant as shallow as possible
Other Factors

- **Dry soils**
  - Try to plant into moisture. Place seed into soil with half inch of moisture above seed.
  - If not enough moisture you run the risk of seed imbibing enough water to rot, but not enough to germinate and grow.

- **Soil Crusting**
  - 0.25 inch or thicker will hinder plant’s ability to emerge.
    - Rotary hoe or use sprinkler irrigation
Planting to Emergence

Herbicide Injury

- Primarily from Chloroacetamide herbicides
  - Dual, Lasso, Frontier
  - Bullet, Lariat, Guardsman, Bicep
- Occurs more often when sorghum is slow to emerge, resulting in more herbicide being taken up by the plant
Chloroacetamide Injury
Vegetative Stage
• How fast the plant develops depends almost solely on heat units
  • \( H.U = \text{daily max. temp} + \text{Daily min. temp} - \frac{50}{2} \)

Number of Leaves
• Early Maturity – 15 leaves
• Late Maturity – 17 to 18 leaves
GS I
Vegetative Stage

- Can take a lot of abuse and still yield well
  - Hail, drought, freeze, wind
  - Insects can cause significant yield reduction
  - Apply most post herbicides during early Veg stage
GS I
Vegetative Stage

- Fertility
  - May see Fe or P def. symptoms
GS I
Vegetative Stage

➢ Tillering
  • Stems originating form basal nodes
  • Favored by sunny days with cooler temps
  • Plant densities of fewer than 3 plants per ft of row promote tillering
  • Varieties differ
## Variety Maturity

<table>
<thead>
<tr>
<th>Relative Maturity</th>
<th>Days to Mid-Bloom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early</td>
<td>55 - 61</td>
</tr>
<tr>
<td>Medium-Early</td>
<td>62-66</td>
</tr>
<tr>
<td>Medium</td>
<td>67-69</td>
</tr>
<tr>
<td>Medium-Full</td>
<td>70 +</td>
</tr>
</tbody>
</table>

To reach physiological maturity add 25 to 45 days Depending on hybrid and temperature.
GS II
Reproductive Phase
GS II
Panicle Initiation
GS II
Reproductive Phase

- Once the growing point is above the ground it is in the reproductive phase
- First internode that is visible is internode 4, making the node above it number 5. Fifth leaf is connected to node 5.
- Rapid Growth
- Panicle formed and maximum number of seed per plant are set
- 2,4-D or dicamba damage can occur
- The end of GS II is most critical from a water standpoint
GS II

Reproductive Phase -- Boot
GS II
Reproductive Phase -- Heading

Considered headed when panicles are visible on 50% of the plants in the field
GS III
Grain Filling

- Begins with flowering and continues until dry matter accumulation in the grain is complete.
GS III
Grain Filling - Flowering

- Begins at the top 5 to 7 days after heading
- Anthers (yellow) appear in florets
- Flowering may continue for 4 to 9 days
- Fully bloomed when 50% of plants in the field have 50% of the head in bloom
- Insects are a potential problem
GS III
Grain Development

- **Milk**
  - Seed is soft with white milk like liquid,
    - Last 10 days or so

- **Soft Dough**
  - 15 to 25 days after flowering
    - Can squeeze between fingers with little to no liquid present
    - Harvest for silage

- **Hard dough**
  - Cannot compress grain between fingers
    - 75 % of dry matter has accumulated in grain
GS III
Grain Development

- **Physiological Maturity**
  - Black layer appears near base of kernel
  - Kernel is 30 to 35% moisture
  - Waiting for plant dry down to harvest
Kernel at 35% moisture compared to 13%

Avg kernel size – 18,000 sd/lb
Range – 11,300 – 36,000 sd/lb
## Heat Units (GDUs) for to Reach Different Growth Stages

<table>
<thead>
<tr>
<th>Growth Stage</th>
<th>Cumulative GDUs (F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short Season Hybrid</td>
<td>Long Season Hybrid</td>
</tr>
<tr>
<td>Planting</td>
<td></td>
</tr>
<tr>
<td>Emergence</td>
<td>200</td>
</tr>
<tr>
<td>3-leaf</td>
<td>500</td>
</tr>
<tr>
<td>4-leaf</td>
<td>575</td>
</tr>
<tr>
<td>5-leaf</td>
<td>660</td>
</tr>
<tr>
<td>Panicle Initiation</td>
<td>924</td>
</tr>
<tr>
<td>Flag Leaf Visible</td>
<td>1287</td>
</tr>
<tr>
<td>Boot</td>
<td>1683</td>
</tr>
<tr>
<td>Heading</td>
<td>1749</td>
</tr>
<tr>
<td>Flowering</td>
<td>1848</td>
</tr>
<tr>
<td>Soft Dough</td>
<td>2211</td>
</tr>
<tr>
<td>Hard Dough</td>
<td>2508</td>
</tr>
<tr>
<td>Black Layer</td>
<td>2673</td>
</tr>
</tbody>
</table>