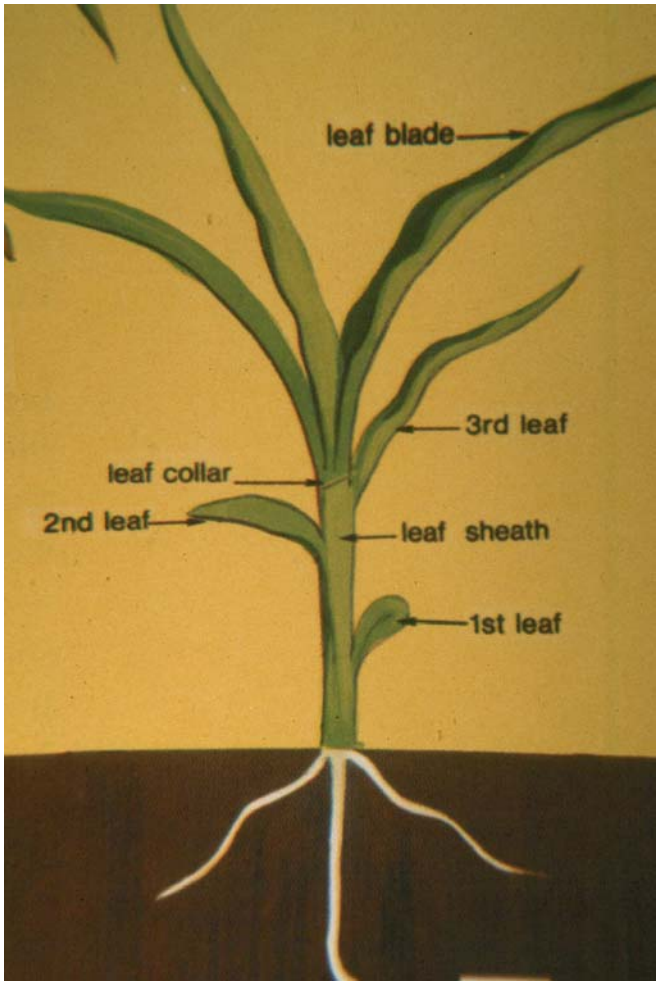
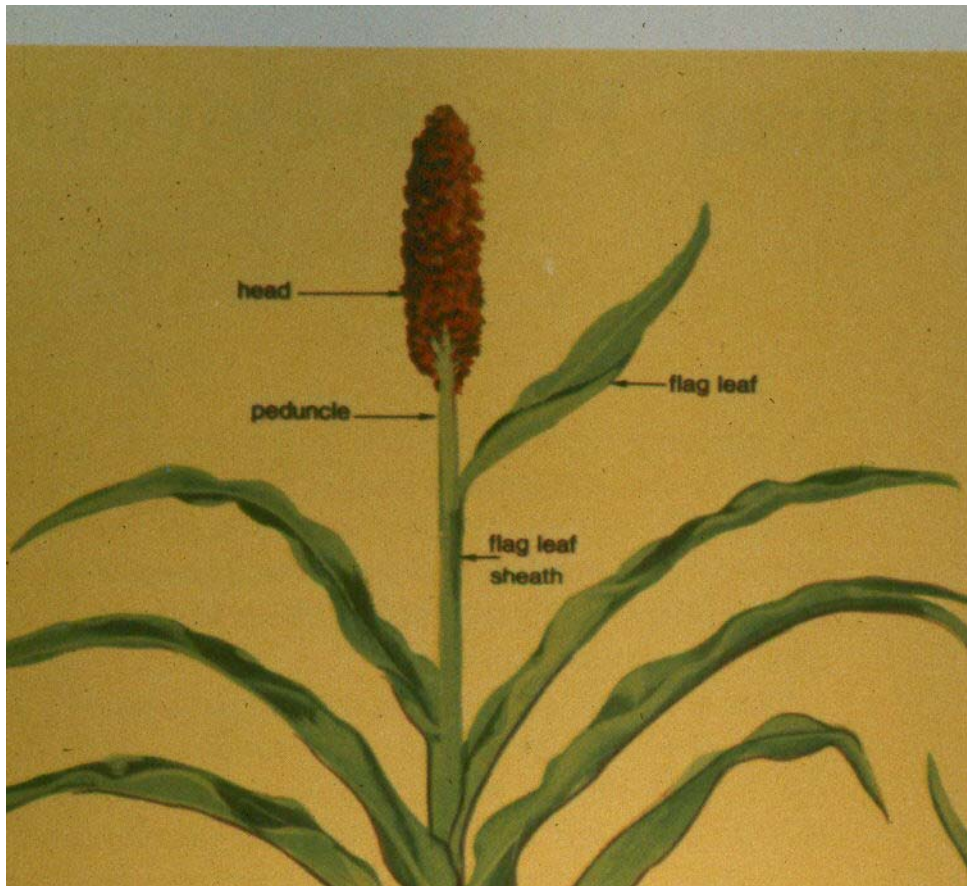
Sorghum Growth and Development

CEA Training

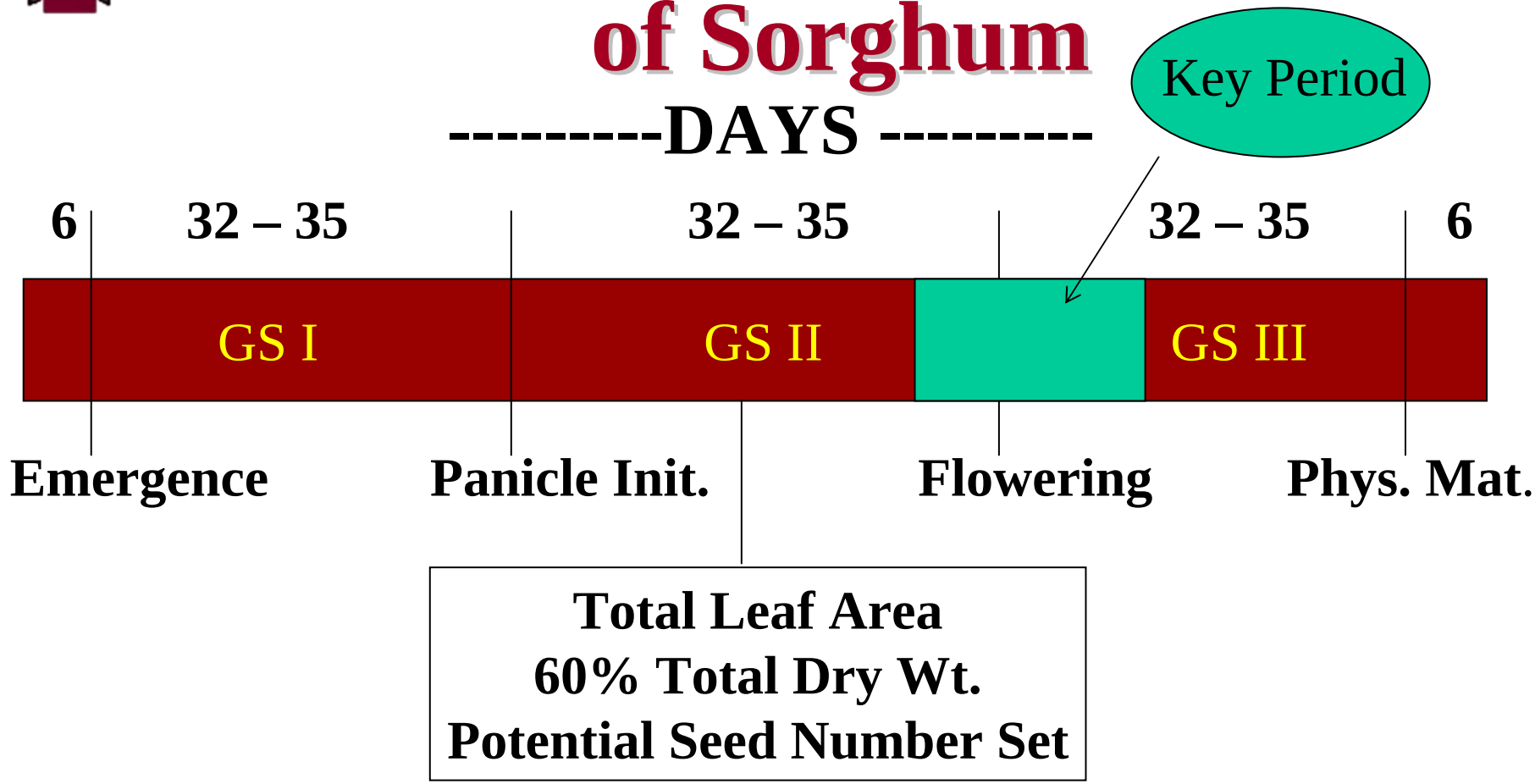
August 10, 2005

Recognizing Key Plant Structures





Developmental Sequence of Sorghum



Planting to Emergence

- 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**

Planting to Emergence

- 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

GS I

- Vegetative Stage
  - **How fast the plant develops depends almost solely on heat units**
  - **H.U = $\frac{\text{daily max. temp + Daily min. temp}}{2}$ - 50**
- 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

Relative Maturity	Days to Mid-Bloom
Early	55 - 61
Medium-Early	62-66
Medium	67-69
Medium-Full	70 +

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**

Kernels

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

Growth Stage	Cumulative GDUs (F)	
	Short Season Hybrid	Long Season Hybrid
Planting		
Emergence	200	200
3-leaf	500	500
4-leaf	575	575
5-leaf	660	660
Panicle Initiation	924	1365
Flag Leaf Visible	1287	1470
Boot	1683	1750
Heading	1749	1890
Flowering	1848	1995
Soft Dough	2211	2310
Hard Dough	2508	2765
Black Layer	2673	3360