# **COTTON FUNDAMENTALS**

# Growth and Fruiting Habits

# **PLANTING TO EMERGENCE**

4 to 15 days

Taproot may be 10" deep when cotyledons unfold

Appearance of first true leaf - 7 to 9 days after emergence

Roots may be over 36" deep when plant is 12 to 14" tall

# **EMERGENCE TO FIRST SQUARE**

27 to 40 days

# **SQUARE TO WHITE BLOOM**

20 to 25 days

### WHITE BLOOM TO FULL SIZE BOLL (volume)

20 to 25 days (Figure 1)

# WHITE BLOOM TO OPEN BOLL

45 to 65 days

# **PLANTING TO BLOOM**

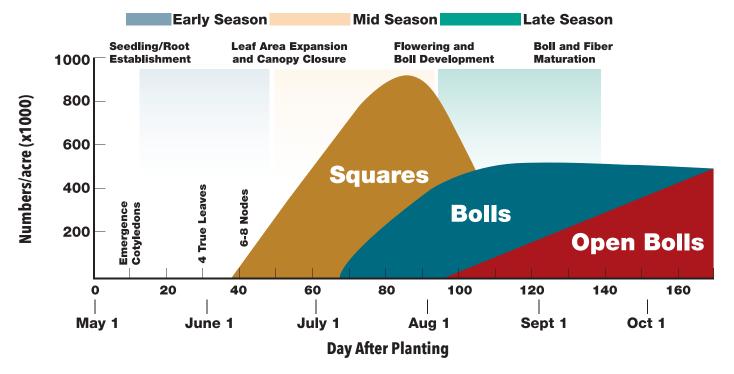
55 to 65 days

Figure 1. Boll Age in Days ("How a cotton plant grows." Progressive Farmer. 1982)



#### Figure 2. Cotton Growth Timeline

(Image credit to Derrick Oosterhuis, Ph.D., University of Arkansas)



## **VEGETATIVE GROWTH**

- Leaf reaches maximum photosynthetic capacity at 20 days old, and decreases over time with little photosynthetic capacity by 60 days of age
- New node appears every 3 to 4 days, depending on temperature
- Internode growth is complete in about 12 to 15 days
- Largest volume of roots will be in the upper 3' of soil profile, but can reach deeper depths
- Maximum root volume attained 75 days after planting, then starts to decline during boll filling

# **REPRODUCTIVE GROWTH**

- The Node to First Fruiting Branch (NFFB) is typically between nodes 5 to 7
- New fruiting branches appear every 3 days at successive nodes (vertical fruiting interval); the first position square at node 5 is 3 days older than the first position square at node 6, etc. (*Figure 3*)
- Squares are produced on the fruiting branch every 6 days (horizontal fruiting interval); the first position fruit is 6 days older than the second position fruit, etc. (*Figure 3*)
- Full canopy closure (if it is attained) occurs about 75 days after planting

## **BOLL DEVELOPMENT**

- The bloom period is 4 to 6 weeks, depending on the region/ environment
- The plant typically sheds 60% of its fruit (squares and young bolls 3 to 8 days old)
- Under normal plant populations:
  - first position bolls contribute about 60 70% of total yield
  - second position bolls 20 30% of total yield
  - third position bolls 5 10% of total yield
  - vegetative branch bolls 5 10% of total yield
- Seeds attain full size 21 days after bloom, but do not reach full maturity until the boll opens. Physiological maturity of the seed can be determined by cross section. Seed with tan or brown seed coats are physiologically mature.

## **FIBER DEVELOPMENT**

- Fiber attains full length about 21 days after bloom, with maximum growth occurring at 10 to 15 days. Each fiber is an extension of the cell wall of an individual cell on the seed coat. The number of fibers per seed ranges from 12,000 to 20,000.
- Micronaire (fiber thickening cellulose deposition) begins about 16 days after bloom and continues until the boll opens

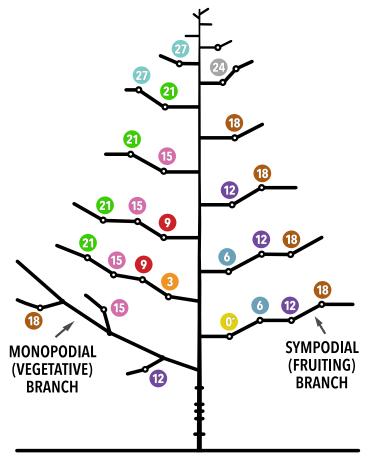
#### **STAPLE LENGTH**

80% genetic / 20% environment

#### **MICRONAIRE** 40% genetic / 60% environment

**STRENGTH** 90% genetic / 10% environment

**Figure 3.** A diagram representing the flowering time sequence in days from first flower (0).



#### Selected References:

- 1. The Cotton Foundation. 2007. p. 9-10. In: The First 40 Days The Most Critical Period.
- 2. Glen L. Ritchie, Craig W. Bednarz, Philip H. Jost and Steve M. Brown. 2007. No. 1252. Cotton Growth and Development Bulletin. University of Georgia Cooperative Extension.
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