Late Season Management Decisions – Final Irrigation and Harvest Prep

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Late – Season Decisions

❖ Goals
   ❖ Manage crop for optimum lint yield and fiber quality
   ❖ Maximize economic returns
      ❖ Efficient crop termination – point of diminishing returns
         ❖ Constraints related to weather (HU accumulations)
      ❖ Efficient harvest prep through defoliation and boll opening
         ❖ Earlier harvest prep typically more efficient
Concept of Irrigation Termination

- What is the goal of efficient irrigation termination?
  - Maximize yield
  - Optimize water efficiency
  - Mature bolls
  - Point of diminishing returns
    - Point at which additional input does not result in positive net returns

Crop Monitoring - Irrigation Termination

- Identify last fruit intended for harvest
- point of diminishing returns
- occurrence of cut-out
  - consider variety type
- Consider insect populations / pressure
  - SPWF, PBW, lygus, stink bugs, etc.
Irrigation Termination Decision

- Identify last flower to be taken to harvest
- Determine the amount of time for that flower to mature into a harvestable boll
- Must provide sufficient soil water through fiber elongation phase (~600 HU ~21 days / Aug. and Sep.)

Boll Maturity

- All harvestable bolls are mature (cut bolls with a knife)
  - seed coats are brown
  - small leaves are visible in the seeds
  - no green jelly in the seeds
Boll Development and Maturation

Boll Maturity

Boll slicing of first position bolls beginning with a mature cracked boll on the far right to the least mature boll in this image on the far left (NCC, 2007).
Boll Maturation Data

Expected Date of Boll Maturity vs. Date of Fresh Bloom

Norton 2012
Irrigation Termination

- Scenario
  - Crop planted on 4/10/12
  - Last flower identified for harvest on 8 SEP
  - On average should mature on 5 OCT

Boll Maturation Data

- Expected Date of Boll Maturity

Date of Fresh Bloom

8/9 8/19 8/29 9/8 9/18 9/28

Scenario – cont.

- Irrigation occurred on day of final flower identification – 8 SEP
- Water use for that period
  - 8 SEP – 5 OCT...
    - Approximately 6.05" water
  - Average soil will hold 2" plant available water (PAW) per foot
  - \( x \) 3 foot effective rooting depth
  - \( = \) 6 inches of water holding capacity

Scenario - Continued

- Irrigate @ 50% PAW or 3” depleted
- Average water use would deplete 3” in approximately 12 days
  - Final Irrigation on 8 SEP plus 12 days = 20 SEP
Defoliation Goal

- Single defoliant application
- Satisfactory defoliation (>75%)
  - with good top-growth control
- Manage for picking high quality lint

- Good progress in the past 10 years
  - Dropp, DEF/Folex, Accelerate, Ginstar, Na Chlorate, etc.

Defoliation

- Management to enhance a natural physiological process
  - senescence (aging)
  - abscission layer development
  - leaf drop

- Yield
- Quality
Defoliation – 4 Main Goals

- Defoliation of mature leaves
- Control of regrowth
- Mature boll opening
- Juvenile growth control

Steps to Successful Defoliation

- Final irrigation
- Crop Evaluation - complete maturity
- Selection of defoliant material
- Timing of defoliant application
- Allowing appropriate time following defoliant application
  - 14 days
Defoliation - Related Factors

- Plant-water relations
- N fertility status
- Honeydew deposits on leaves
- Weather conditions
- Chemical defoliants

Water Stress / Defoliation

- Adequate
  - abscission layer formation
  - sustained physiological activity / defoliant
  - sufficient green leaf weight
    - break through abscission layer
    - accomplish leaf drop (shear)
Defoliation Scheduling Techniques

- Late-season irrigation interval
- Percent open bolls
- Nodes above cracked boll (NACB)

Late Season Irrigation Interval

- General rule of thumb
- Apply defoliants at approximately 2X the normal late season irrigation interval
  - allow for current weather conditions and soil water holding capacity
Rule of Thumb - Example

- 14 day irrigation interval (late season)

- 28 day (4wk) interval
  - Last irrigation to defoliant application
  - May be earlier with
    - Hot, dry weather conditions
    - Good boll load (fast senescence)
    - Coarse textured soil (low water holding capacity)

Percent Open Boll

- Most defoliants may be applied at 60% open boll without negatively impacting boll opening or fiber quality
- Care must be taken with Na-Chlorate
  - Need to be approximately <85% prior to application
  - Some bolls may be burned by application and not open properly
Percent Open Boll

- Perform evaluations in several field areas
- Select field areas where crop stage is representative (make several counts across a field)
- Select a row length (i.e. 2m) and count the total number harvestable bolls
- Count the total number of open or cracked bolls
- Divide the open or cracked number by the total number and multiply by 100 to get percent open boll

Harvest Prep Guidelines
Percent Open Boll

Total Bolls (mature) = 33
Total Bolls (open + cracked) = 25
Percent Open Bolls = 25/33*100 = 75.8%
Nodes Above Top Cracked Boll

- Nodes Above (Top) Cracked Boll (NACB)
  - When NACB $\leq 4$
  - Well correlated to percent open boll (>60%)
  - Caveat with desiccants (<85%)
- Top node = top node with a harvestable boll (boll intended for harvest)
- Count the total number of nodes above top, first position cracked or open boll (0) to uppermost harvestable boll

Harvest Prep Guidelines

NACB

Upper-most first position Cracked boll
Harvest Prep Guidelines
NACB

Upper-most first position
Cracked boll

Harvest Prep Guidelines
NACB

Upper-most first position
Cracked boll
Harvest Prep Guidelines
NACB

Upper-most first position
Cracked boll

Norton 2012
Defoliant Application Rates - Temperatures
(Based on Recommended Label Rates)

<table>
<thead>
<tr>
<th>Type</th>
<th>Trade Name</th>
<th>Common Name</th>
<th>Manufacturer</th>
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<tr>
<td>Defoliant</td>
<td>Aim</td>
<td>Carfentrazone-ethyl</td>
<td>FMC</td>
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<tr>
<td></td>
<td>Ginstar EC</td>
<td>Diuron Thidiazuron</td>
<td>Bayer CropScience</td>
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<tr>
<td></td>
<td>Redi-Pik 1.5 EC</td>
<td>Diuron Thidiazuron</td>
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<td>Dropp</td>
<td>Thidiazuron</td>
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<td>Def 6</td>
<td>Tribufos</td>
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<td></td>
<td>Freefall</td>
<td>Thidiazuron</td>
<td>Griffin</td>
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<td></td>
<td>Resource</td>
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<td>Valent</td>
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<td>ET</td>
<td>Pyraflucon ethyl</td>
<td>Nichino America</td>
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<td>Boll Opener/Conditioner</td>
<td>Prep</td>
<td>Ethephon</td>
<td>Bayer CropScience</td>
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<td>Ethephon Cyclanilide</td>
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<td>Ethephon AMADS</td>
<td>NuFarm</td>
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<td>Paraquat Dichloride</td>
<td>Syngenta</td>
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<tr>
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<td>Paraquat Dichloride</td>
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<td>Firestorm</td>
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### Expected Activity of Harvest Aid Materials

<table>
<thead>
<tr>
<th>Harvest Aid Material</th>
<th>Defoliation of Mature Leaves</th>
<th>Control of Regrowth</th>
<th>Boll Opening</th>
<th>Effect on Juvenile Growth</th>
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<td>Aim</td>
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<td>×</td>
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<td>●</td>
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<td>Tribufos</td>
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<td>Ethephon + AMADS</td>
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<td>Paraquat</td>
<td>×</td>
<td>○</td>
<td>○</td>
<td>●</td>
</tr>
</tbody>
</table>

- ●: Excellent activity
- ○: Excellent to fair activity
- (): Fair to poor activity
- (): Poor activity
- ×: No activity

*Source: Norton 2012*