Irrigated Corn Management in Drought

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What Should A Policyholder Do When Crops Are Drought-Damaged?

The policyholder should contact the crop insurance company that sold the policy prior to putting their spring-planted crop acres to another use by harvesting for hayage, diverting irrigation from the crops or by abandoning the acres. A damage notice is to be given within 72 hours of the initial discovery of damage or loss of production, but not later than 15 days after the end of the insurance period, even if the crop has not been harvested. A notice may be made by telephone or in person to the company but must be confirmed in writing within 15 days. It is very important that the policyholder work closely with the company before making any changes to the care of the crop. The company must have a chance to appraise and release the acres before the crop is destroyed or abandoned. If the company cannot make an accurate appraisal, or the producer disagrees with the appraisal at the time the acreage is to be destroyed or no longer cared for, the company and producer can work out representative sample areas to be left intact for future appraisal purposes. For more information on duties in the event of damage, loss, abandonment, destruction, or alternative use of the crop or acreage consult Section 14 of the Common Crop Insurance Policy Basic Provisions (11th) Policy.

I Want To Discontinue Irrigating My Failing Crop. Must I Continue To Irrigate In Order To Maintain My Crop Insurance Coverage?

Producers must notify their crop insurance company and get approval before discontinuing to care for their crop. When notifying their company, producers should stress that they want to discontinue irrigating immediately. In situations of heavy workload, companies may authorize representative sample areas of the crop to be maintained for later appraisal. Under extreme high temperatures and wind conditions, evaporation along with the deteriorating crop condition may benefit to the crop. Producers should work with the local extension office to document crop condition and irrigation application. This information should be given to the insurance company to expedite damage assessment and allow producers to discontinue irrigation and conserve water.

Should I Continue To Care For Drought-Damaged Crops?

Crops that have been damaged and will be taken to harvest must be continued to be cared for and maintained. Many producers have asked about the degree of maintenance required in such cases. Producers are required to continue to care for the crop, following generally recognized practices. They may seek advice from agronomists in the area as to what, how much, and when to spray to maintain the production that is currently in the field and protect the crop.
Objective

• Equip viewers to evaluate irrigated corn fields to document support for management alternatives in drought:
  – Continue irrigating entire field
  – Divert irrigation water to a portion of the field and abandon the rest
  – Stop irrigating the entire field and abandon it or harvest it for forage
Outline

• Roozeboom
  – Corn Growth & Development and Effect of Heat and Drought
  – Estimating Yield Potential

• Rogers
  – Corn Water Use
  – Balancing Corn Water Use and Irrigation Capacity
# Stages of Corn Development

**Vegetative leaf formation**
- VE emergence, leaf and ear shoot initiation
- V1
- V2
- V3
- V4
- V5 leaf number set, all ear shoots formed

**Vegetative tassel and ear formation**
- V6 stalk elongation begins, tassel initiation
- V8
- V10
- V12 row number set
- V14
- V15 silks growing
- V16-17 kernels/row set
- V(n) pollen formation
- VT tassel emergence

**Reproductive pollination and grain fill**
- R1 silking, pollination
- R2 blister
- R3 milk, rapid starch deposition
- R4 dough
- R5 dent, kernel no. set
- R6 PM (black layer)
Leaf Area - Yield Loss Relationships

Growth Stage

Percent Yield Loss

Percent Leaf Area Loss
<table>
<thead>
<tr>
<th>Grain fill trait</th>
<th>77/68°F</th>
<th>93/77°F</th>
<th>Change %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate mg/kern/HU</td>
<td>0.55</td>
<td>0.42</td>
<td>-24</td>
</tr>
<tr>
<td>Duration, HU</td>
<td>333</td>
<td>403</td>
<td>21</td>
</tr>
<tr>
<td>Rate mg/kern/day</td>
<td>7.4</td>
<td>8.8</td>
<td>19</td>
</tr>
<tr>
<td>Duration, days</td>
<td>24.4</td>
<td>19.4</td>
<td>-22</td>
</tr>
</tbody>
</table>

Temperature and grain fill

• ~72°
  – ideal temperature for grain fill in corn

• 80° to 95°
  – rate of grain fill starts to slow down
  – even if roots are kept at normal soil temperatures from the shading of the canopy

• 105° to 110°
  – Grain fill rate ↑, but grain fill duration ↓
  – yield losses likely to occur
Loss of Leaf Area – “Firing”
Corn Grain Yield Components:

Plants per acre \times \text{Ears per acre} \times \text{Ears per plant} \times \text{Kernels per ear (row number, ear length)} \times \text{Kernel size (mass per kernel)} \rightarrow \text{Kernels per bushel}

Total Yield (mass per unit area)
Ears per Acre

- With 30-inch rows, 17.4 feet of row = 1,000 of an acre.
Every 5\textsuperscript{th} or 6\textsuperscript{th} plant in each ear count area
Kernels per Ear

• Count number of rows
Kernels per Ear

• Count number of kernels in each row
• Do not count aborted kernels or the kernels on the butt of the ear; count only kernels that are in complete rings around the ear
## Kernels per Bushel

<table>
<thead>
<tr>
<th>Grain Fill Conditions</th>
<th>Kernels per Bushel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>75,000 to 80,000</td>
</tr>
<tr>
<td>Average</td>
<td>85,000 to 90,000</td>
</tr>
<tr>
<td>Poor</td>
<td>95,000 to 105,000</td>
</tr>
</tbody>
</table>
Calculations

\[
\frac{\text{rows}}{\text{ear}} \times \frac{\text{kernels}}{\text{row}} = \frac{\text{kernels}}{\text{ear}}
\]

\[
\frac{\text{ears}}{\text{acre}} \times \frac{\text{kernels}}{\text{ear}} = \frac{\text{kernels}}{\text{acre}}
\]

\[
\frac{\text{kernels}}{\text{acre}} \div \frac{\text{kernels}}{\text{bushel}} = \frac{\text{bushels}}{\text{acre}}
\]
## Examples

<table>
<thead>
<tr>
<th></th>
<th>Field 1</th>
<th>Field 2</th>
<th>Field 3</th>
<th>Field 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ears/acre</td>
<td>29,000</td>
<td>29,000</td>
<td>29,000</td>
<td>29,000</td>
</tr>
<tr>
<td>Rows/ear</td>
<td>16.8</td>
<td>14.2</td>
<td>17.3</td>
<td>16</td>
</tr>
<tr>
<td>Kernels/row</td>
<td>22.8</td>
<td>22</td>
<td>12</td>
<td>19.7</td>
</tr>
<tr>
<td>Kernels/bu</td>
<td>90000</td>
<td>90000</td>
<td>105000</td>
<td>105000</td>
</tr>
<tr>
<td>Kernels/ear</td>
<td>383</td>
<td>312</td>
<td>208</td>
<td>315</td>
</tr>
<tr>
<td>Kernels/acre</td>
<td>11,108,160</td>
<td>9,038,333</td>
<td>6,032,000</td>
<td>9,125,333</td>
</tr>
<tr>
<td>Bushels/acre</td>
<td>123</td>
<td>100</td>
<td>57</td>
<td>87</td>
</tr>
</tbody>
</table>
## Breakeven Corn Yields

<table>
<thead>
<tr>
<th>Production Costs*</th>
<th>Price /Bushel</th>
<th>Breakeven Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>$600 - $1,000</td>
<td>$6 - $8</td>
<td>75 - 166 bu/a</td>
</tr>
</tbody>
</table>

* K-State Department of Agricultural Economics Cost-Return Budgets, MF-585 and MF-2601
Items to document

• Growth stage
  – Opportunity to recover?
• Green leaf area,
  – Still alive and functioning or not?
• Soil moisture status (probes, runoff)?
  – Soil too dry to support growth?
  – Soil water not being depleted, indicating little/no corn growth?
• Kernel set
  – How did it make it through pollination?
• Yield potential
  – At or below breakeven yields (75 to 120 bushels per acre)?