### Average Yields at Lahoma (2008-2011)

<table>
<thead>
<tr>
<th>Cropping System</th>
<th>Yield Bu/acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT Wheat</td>
<td>45</td>
</tr>
<tr>
<td>NT Wheat</td>
<td>44</td>
</tr>
<tr>
<td>NT Wheat After Canola</td>
<td>57</td>
</tr>
</tbody>
</table>

Improved yield can be attributed to decreased weed and disease pressures
Water Utilization

- Crop rotations can be developed to optimize water use efficiency
- Rainfall can leave a soil system through:
  - Transpiration
  - Runoff
  - Drainage
  - Evaporation

Biomass production: Provide various ecosystem functions
Useless loss of water
## Transpirational Water use in OK

<table>
<thead>
<tr>
<th>Crop</th>
<th>Average yield</th>
<th>Average yield</th>
<th>WUE</th>
<th>Transpiration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter wheat</td>
<td>33 bu</td>
<td>1980 lbs acre(^{-1})</td>
<td>317 lbs acre(^{-1}) inch(^{-1})</td>
<td>6.2 inches</td>
</tr>
<tr>
<td>Alfalfa</td>
<td>3.3 tons</td>
<td>6600 lbs acre(^{-1})</td>
<td>473 lbs acre(^{-1}) inch(^{-1})</td>
<td>14.0 inches</td>
</tr>
<tr>
<td>Corn</td>
<td>90 bu</td>
<td>5040 lbs acre(^{-1})</td>
<td>580 lbs acre(^{-1}) inch(^{-1})</td>
<td>8.7 inches</td>
</tr>
<tr>
<td>Sorghum</td>
<td>45 bu</td>
<td>2520 lbs acre(^{-1})</td>
<td>435 lbs acre(^{-1}) inch(^{-1})</td>
<td>5.8 inches</td>
</tr>
<tr>
<td>Soybean</td>
<td>23 bu</td>
<td>1380 lbs acre(^{-1})</td>
<td>240 lbs acre(^{-1}) inch(^{-1})</td>
<td>5.8 inches</td>
</tr>
<tr>
<td>Cotton</td>
<td>0.75 bale</td>
<td>360 lbs acre(^{-1})</td>
<td>100 lbs acre(^{-1}) inch(^{-1})</td>
<td>3.6 inches</td>
</tr>
<tr>
<td>Rye</td>
<td>20 bu</td>
<td>1120 lbs acre(^{-1})</td>
<td>310 lbs acre(^{-1}) inch(^{-1})</td>
<td>3.6 inches</td>
</tr>
</tbody>
</table>
Water budget for Continuous Wheat

- Runoff and Drainage: 6 Inches
- Transpiration: 6 Inches
- Evaporation: 21 Inches
Evapotranspiration during the Wheat growing Season (Mesonet at Lahoma)

Evapotranspiration (inches) during the Wheat growing season. There is a graph showing the evapotranspiration in inches over the months of the year, with a peak of 9 inches of water lost during the fallow period.
A Double Cropping Example

Evapotranspiration (inches)

Month of Year

Wheat

Soybeans
Double Crop example

• Replacing the fallow period will transfer evaporative water loss to productive transpiration water loss
Cumulative ET

- Evapotranspiration (inches)

- Month of Year

- Wheat
- Soybean
Importance of rainfall amount and Distribution

• The amount of rainfall is of course important
• The distribution is equally important
• Water holding capacity of the soil is also an important consideration
  – Provides resilience to short droughts.
Bimodal distributions of rain

Rainfall (in)

Month

30yr Avg.
2006
2007
Realizing the Benefits of Crop Rotation

• Benefits can be realized in most any form of rotation
  – The diversity of soils and climatic conditions results in a large variety in rotations found in Oklahoma.
  – Provides many opportunities and challenges for agronomic professionals and conservationist.
Realizing the Benefits of Crop Rotation

• Rotation intensity and length are dictated by
  – The amount of rainfall and its distribution.
  – Knowledge level of producer
    • Complex rotations require more planning that simply rotations
    • Each crop is different therefore with more crops comes the need for more information
  – Pest pressures
  – Must also consider temperature regime.
Factors to consider when developing a Rotation

- Commodity prices
- Soil Productivity
- Rainfall distribution and amount
- Insect and disease interactions among crops
- Herbicide interactions
- Residue management in no-till system
  - Can I establish the next crop in the current crops residue or lack of residue?