High Residue Farming in Irrigated Cropping Systems
High residue farming demonstration
- Wheat-Corn-Corn
- Custom harvest
- No residue removed
High residue farming under irrigation
Direct seed or 4-8 tillage passes?
High residue farming saves water

<table>
<thead>
<tr>
<th>Source of water savings</th>
<th>Water savings, inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elimination of tillage</td>
<td>0.3-0.7 per pass</td>
</tr>
<tr>
<td>Reduced evaporation</td>
<td>2-3.8</td>
</tr>
<tr>
<td>Increased storage</td>
<td>1-2 (?)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3.3-6.5</strong></td>
</tr>
</tbody>
</table>

Klocke, 1991
Residue covered soil
Low humidity slows decomposition.

Average min. and max. relative humidities, %
For Yakima WA and Waterloo IA

Relative humidity, %

Yakima, Washington

Waterloo, Iowa
Specialty crops require tillage, attract research funding.
Diverse cropping sequences.
HRF in the Columbia Basin

Challenges

- Coarse soils
- Low SOM
- Slow decomposition
- Complex cropping systems
- High value crops
  - Tillage
- HRF equipment
- Northern latitude
- Low research priority

Advantages

- Irrigation
- High yield crops
- High residue crops
- Diversity of crops
- High profit potential
Planter retrofit, Drill purchase.
High Residue Farming under Irrigation

WASHINGTON STATE UNIVERSITY EXTENSION

- What and Why EM071E
- Crop Rotation EM072E
- Residue management through Planting EM073E
- Pest Management Considerations EM074E
- Strip-till EM036E
Direct seeding dry edible beans
Planting into very high residue can be done successfully.

<table>
<thead>
<tr>
<th>Year</th>
<th>Plant spacing</th>
<th>Std. deviation</th>
<th>Plant pop.</th>
<th>Gaps per 30 plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>5.4”</td>
<td>2.3”</td>
<td>38,880</td>
<td>0.5</td>
</tr>
<tr>
<td>2009</td>
<td>6.1”</td>
<td>3.3”</td>
<td>34,556</td>
<td>2.2</td>
</tr>
</tbody>
</table>

Target 36,000
Yields show potential, if adjustments are made.

<table>
<thead>
<tr>
<th>Year</th>
<th>Variety</th>
<th>Yield, tons/ac</th>
<th>Pioneer trials, tons/ac (tilled)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>37Y11 (97)</td>
<td>6.22</td>
<td>4.73 – 6.86</td>
</tr>
<tr>
<td>2009</td>
<td>37K11 (99)</td>
<td>6.06</td>
<td>6.44- 7.16</td>
</tr>
</tbody>
</table>
If this is the worst case scenario, what is possible?

Challenges overcome:

• Warm season crop
• Corn after corn
• High residue levels
• Poor residue management
• Cooler than average temperatures
• Inexperienced farmers
• Soil not yet structured (2nd year of no-till)
What is the potential of our soils?
Cumulative effect of high residue farming?

- Productivity
- Water & Air Quality
- Water & Nutrient Holding Capacity
- Aggregation & Infiltration
- Near-surface soil C

Begin improved soil management

Transition Period

Improvement
Cool springs in 2008, 2009