Direct Seeding into Heavy Irrigated Residue as an Alternative to Burning

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Treatments

- Three-year rotation of winter wheat-spring barley-winter canola.

- Three residue management methods: Standing stubble, stubble mechanically removed, and stubble burned.

- Continuous annual winter wheat with burn and moldboard plow included as check.

- All treatments are replicated four times.
Irrigated Cropping Systems Plot Map, Lind, 2004 Crop Year

Rep 1
- Stubble Burned
- Stubble Burned & Plowed
- Mech. Stubble Removal
- Standing Stubble

Rep 2
- T 1: Spring Barley
- T 2: Spring Canola
- T 3: Winter Wheat
- T 4: Burn, Plow, Cont. WW

Rep 3
- Rep 4
- T 1: Spring Barley
- T 2: Spring Canola
- T 3: Winter Wheat
- T 4: Burn, Plow, Cont. WW
Irrigation

• Fall: six inches of water.
• Spring (after barley is emerged): three inches of water.
• Final: six inches of water applied mid-May to early-June.
• Total Water Applied: fifteen inches
Fertility

- Total fertilizer per acre: 170 lb. nitrogen, 30 lb phosphorous, and 30 lb sulfur.

- Fall seeded crops: 120 lb nitrogen, with 50 lb nitrogen “top dress” in the spring.

- Spring seeded barley: Total nutrients applied at time of seeding.

- All direct seedings use liquid fertilizer with a dry fertilizer “top dress” (exception – spring barley uses all liquid).

- The conventional burn-plow treatments used only dry fertilizer.
Seeding

• All no-till plots seeded with the Cross-Slot drill

• The burn-plow plots seeded with a conventional disk drill
Winter wheat
Organic Matter

Direct Seed/All Rotations

BPWW Burn Removed Left

2002 2003

Direct Seeding into Irrigated Stubble without Burning
Rat-tail fescue
Irrigated spring barley
# Grain yields of irrigated winter wheat

<table>
<thead>
<tr>
<th>Method</th>
<th>Winter Wheat (bu/a)</th>
<th>Winter Wheat (bu/a)</th>
<th>Winter Wheat (bu/a)</th>
<th>Winter Wheat (bu/a)</th>
<th>Average Yield (bu/a)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2001</td>
<td>2002</td>
<td>2003</td>
<td>2004</td>
<td></td>
</tr>
<tr>
<td>Stubble burned</td>
<td>85</td>
<td>106</td>
<td>113 (a)</td>
<td>102</td>
<td>100 (a)</td>
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<tr>
<td>Stubble mech. removed</td>
<td>67</td>
<td>110</td>
<td>96 (a)</td>
<td>96</td>
<td>92 (bc)</td>
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<tr>
<td>Standing stubble</td>
<td>69</td>
<td>107</td>
<td>101 (a)</td>
<td>92</td>
<td>94 (ab)</td>
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<tr>
<td>Burn and plow</td>
<td>75</td>
<td>97</td>
<td>74 (b)</td>
<td>99</td>
<td>86 (c)</td>
</tr>
<tr>
<td>LSD (0.05)</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
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</table>
### Grain yields of irrigated spring barley

<table>
<thead>
<tr>
<th></th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>Avg.</th>
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</thead>
<tbody>
<tr>
<td>Stubble burned</td>
<td>3.03</td>
<td>2.21</td>
<td>2.39</td>
<td>2.61</td>
<td>2.56</td>
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<tr>
<td>Stubble mech. removed</td>
<td>2.97</td>
<td>2.33</td>
<td>2.24</td>
<td>2.55</td>
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<td>Standing stubble</td>
<td>2.80</td>
<td>2.26</td>
<td>2.08</td>
<td>2.53</td>
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<tr>
<td>LSD (0.05)</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
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</table>
Grain yields of irrigated canola

<table>
<thead>
<tr>
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<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>Avg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stubble burned</td>
<td>2590</td>
<td>2500</td>
<td>1030</td>
<td>1120</td>
<td>1810</td>
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<tr>
<td>Stubble mech. removed</td>
<td>2500</td>
<td>2230</td>
<td>1140</td>
<td>1140</td>
<td>1750</td>
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<tr>
<td>Standing stubble</td>
<td>2290</td>
<td>2190</td>
<td>1330</td>
<td>1050</td>
<td>1710</td>
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<tr>
<td>LSD (0.05)</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
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</table>

Lind Field Day

Average attendance = 190
Other Measurements

- Soil water dynamics
- Root diseases
- Weed ecology
- Economics
Thank you!

• DOE for financial and technical support
• Special thank you to Karen Wood and those working with her
• Advisory committee
• Steve Schofstoll and Bruce Sauer
QUESTIONS?