EVALUATION OF OVERHEAD LOW-PRESSURE IRRIGATION AND NO-TILL PRODUCTION SYSTEMS IN CALIFORNIA’S CENTRAL VALLEY

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Department of Plant Sciences
University of California, Davis

Southern Conservation Agricultural Systems Conference
North Florida Research and Education Center
Quincy, FL June 25 – 27, 2007
Collaborators

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Steve Wright  Andy Zylstra  Johnnie Silizinoff
Steve Temple  Ryan Camara  Mike McElhiney
Randy Southard  Scott Schmidt  Brooks Englehardt
Nick Madden  Brett Miller  Malia Hilldebrandt
Kurt Hembree  Alan Sano  Ron Harben
Mick Canevari  Jesse Sanchez  Allen Wilcox
Karen Klonsky  Tom Barcellos  Ralph Cesena, Sr.
Julie Baker  Darrell Cordova  Monte Bottens
Gene Miyao  Emilio Cervantes  John Bliss
Howard Ferris  Henry Villalobos  Larry Beckstead
Tom Lanini  Andy Rollin  Allen DuSault
Lee Jackson  Bill McCloskey  Kristen Hughes
Wes Wallender  Steve Husman  Ladi Asgill
Willi Horwath  Mike Buser  Sustainable Conservation
Jaime Solorio  Lyle Carter
Ed Scott
OVERVIEW OF PRESENTATION

- recent advances in CT systems in California
- merging no-till and overhead irrigation technologies
Possible benefits of conservation tillage

- saves fuel
- saves soil
- saves time
- saves labor
- saves machinery
- permits timely planting
- reduces run-off
- increases soil moisture
- increases soil organic matter
- sequesters carbon
- improves habitat for beneficial organisms

Dr. Sharad Phatak, University of Georgia, 1999

- dust (PM10 and PM2.5) emissions mitigation
- surface water (sediment, nutrient and pesticide) runoff reduction (?)
- reducing GHG emission (?)
Conservation / Standard Tillage Comparison Study (1999 – ongoing)

**Standard Tillage**
- With cover crop
- Without cover crop

**Conservation Tillage**
- With cover crop
- Without cover crop

An example of developing alternative tillage systems
EXPERIMENTAL METHODS

1) tomato / cotton rotation with and without winter triticale/rye/common vetch cover crops

2) 10 X 90 m plots, replicated 4 times in RCBD

3) “reduce tillage to greatest extent possible” in CT systems

4) monitor all inputs and operations for economic analysis

5) machine harvest yield determinations
Standard Tillage Tomato System
(Coming Out of Cotton)

**Year 1 (going into tomatoes)**
- shred cotton stalks
- undercut cotton plants
- disk 2X
- chisel
- list
- cultimulch
- winter weed control
- apply preplant herbicide
- recultimulch beds
- transplant tomatoes
- irrigate
- cultivate
- fertilize
- cultivate
- harvest

**Year 2 (going into cotton)**
- flail chop tomato residue
- disk 2X
- chisel
- disk
- list
- winter weed control
- apply preplant herbicide
- plant cotton
- irrigate
- cultivate
- fertilize
- cultivate
- harvest
Conservation Tillage Tomato System (Coming Out of Cotton)

**Year 1 (going into tomatoes)**
- shred and undercut cotton
- sweep furrows
- spring herbicide application
- transplant tomatoes
- irrigate
- cultivate
- harvest

**Year 2 (going into cotton)**
- spring herbicide application
- plant cotton
- irrigate
- cultivate
- fertilize
- cultivate
- harvest
Conservation tillage system following tomato harvest and before cotton planting

Five Points, CA 2000
Rye / triticale / vetch cover crop in CTCC system
Five Points, CA 2000

Surface residue in CTCC system
Five Points, CA 2003
Standard tillage with cover crop: 10% ± 4

Standard tillage no cover crop: 7% ± 3

Conservation tillage with cover crop: 90% ± 4

Conservation tillage no cover crop: 55% ± 10

Following 2005 Tomatoes November 2, 2005
No-till transplanting processing tomatoes into cotton residues
Five Points, CA
April 2007
No-till cotton planting into tomato residue
April 2007
Five Points, CA
### Comparison of Standard and Conservation Tillage
Costs and Resource Use - Cotton 2001

<table>
<thead>
<tr>
<th>Operation</th>
<th>Standard Tillage*</th>
<th>Conservation Tillage**</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>No cover</td>
<td>Cover</td>
</tr>
<tr>
<td>Disc</td>
<td>XX</td>
<td>XXX</td>
</tr>
<tr>
<td>Chisel</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>List Beds</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Clean Furrows</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Compact Furrows</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Spray Treflan</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Lilliston</td>
<td>XX</td>
<td></td>
</tr>
<tr>
<td>Chain Beds</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Plant Cover Crop</td>
<td></td>
<td>X</td>
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<tr>
<td>Mow Cover Crop</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spray Roundup</td>
<td>XX</td>
<td>X</td>
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<tr>
<td>Plant Cotton</td>
<td>X</td>
<td></td>
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<tr>
<td>Fertilize***</td>
<td></td>
<td>XX</td>
</tr>
<tr>
<td>Cultivate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spray Grnd-Insectcds/GrwthReg</td>
<td>XXX</td>
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</tr>
<tr>
<td>Spray Grnd-Custom: Defoliants</td>
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<tr>
<td>Spray Air-Custom:Insecticides</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Harvest</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Times over field</td>
<td>20</td>
<td>20</td>
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</table>

*30” rows  **60” rows  ***Applied with irrigation water
## Tomato yields 2000 – 2004 (tons/acre)

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
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<tbody>
<tr>
<td>STNO</td>
<td>58 + 1</td>
<td>58 + 1</td>
<td>46 + 3</td>
<td>42 + 2</td>
<td>46 + 4</td>
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<tr>
<td>STCC</td>
<td>53 + 1</td>
<td>63 + 2</td>
<td>45 + 3</td>
<td>45 + 3</td>
<td>42 + 5</td>
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<tr>
<td>CTNO</td>
<td>56 + 1</td>
<td>62 + 2</td>
<td>56 + 1</td>
<td>54 + 4</td>
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<tr>
<td>CTCC</td>
<td>51 + 1</td>
<td>61 + _1</td>
<td>43 + 2</td>
<td>52 + 3</td>
<td>48 + 3</td>
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<tr>
<td></td>
<td>2000</td>
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<td>2002</td>
<td>2003</td>
<td>2004</td>
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<tr>
<td>----------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>STNO</td>
<td>360 a</td>
<td>1783</td>
<td>1930 a</td>
<td>1228 ab</td>
<td>2217 a</td>
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<tr>
<td>STCC</td>
<td>360 a</td>
<td>1405</td>
<td>1921 a</td>
<td>1336 a</td>
<td>1990 ab</td>
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<tr>
<td>CTNO</td>
<td>200 a</td>
<td>1579</td>
<td>1736 b</td>
<td>1058 b</td>
<td>1816 bc</td>
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<td>CTCC</td>
<td>372 a</td>
<td>1454</td>
<td>1252 c</td>
<td>1157 ab</td>
<td>1486 c</td>
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</tbody>
</table>

**Cotton yields 2000 – 2006**
(lbs lint/acre)
## Dust Production by Treatment and Operation (μg/L)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>STNO</th>
<th>STCC</th>
<th>CTNO</th>
<th>CTCC</th>
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<tr>
<td><strong>Size Fraction</strong></td>
<td>Total</td>
<td>Resp.</td>
<td>Total</td>
<td>Total</td>
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<tr>
<td>Land Preparation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disc</td>
<td>98</td>
<td>14</td>
<td>81</td>
<td>10</td>
</tr>
<tr>
<td>Chisel</td>
<td>20</td>
<td>1</td>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>List Beds</td>
<td>12</td>
<td>3</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>Ringroll Beds</td>
<td>44</td>
<td>7</td>
<td>39</td>
<td>24</td>
</tr>
<tr>
<td>Power Incorporate</td>
<td>127</td>
<td>20</td>
<td>93</td>
<td>7</td>
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<tr>
<td>Plant Cover Crop</td>
<td>4</td>
<td>trace*</td>
<td>21</td>
<td>4</td>
</tr>
<tr>
<td>Mow/Chop CvrCrop</td>
<td>22</td>
<td>9</td>
<td>61</td>
<td>6</td>
</tr>
<tr>
<td>Compact Furrow</td>
<td>9</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>300</td>
<td>44</td>
<td>270</td>
<td>58</td>
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<tr>
<td><strong>In Season Operations</strong></td>
<td></td>
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</tr>
<tr>
<td>Spray</td>
<td>12</td>
<td>3</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Lilliston</td>
<td>92</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cultivate Tomato</td>
<td>34</td>
<td>2</td>
<td>28</td>
<td>2</td>
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<tr>
<td>Cultivate Cotton</td>
<td>316</td>
<td>8</td>
<td>222</td>
<td>10</td>
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<td><strong>Subtotal</strong></td>
<td>455</td>
<td>17</td>
<td>250</td>
<td>12</td>
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*There were detectable dust measurements for these operations, but they rounded to 0 with this number of significant figures.*
**Dust Production by Treatment and Operation (µg/L)**

*(continued)*

<table>
<thead>
<tr>
<th>Planting / Harvest</th>
<th>STNO</th>
<th>STCC</th>
<th>CTNO</th>
<th>CTCC</th>
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<tr>
<td>Plant Cotton</td>
<td>1</td>
<td>trace*</td>
<td>5</td>
<td>1</td>
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<tr>
<td>Transplant Tomato</td>
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<td>trace*</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>Clean Furrow</td>
<td></td>
<td></td>
<td></td>
<td>37</td>
</tr>
<tr>
<td>Shred-Bed</td>
<td></td>
<td></td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>Mow</td>
<td>38</td>
<td>6</td>
<td>51</td>
<td>6</td>
</tr>
<tr>
<td>Undercut</td>
<td>29</td>
<td>3</td>
<td>27</td>
<td>2</td>
</tr>
<tr>
<td>Harvest Cotton</td>
<td>11</td>
<td>2</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>81</strong></td>
<td><strong>11</strong></td>
<td><strong>103</strong></td>
<td><strong>12</strong></td>
</tr>
</tbody>
</table>

**Cumulative Dust Production**

<table>
<thead>
<tr>
<th></th>
<th>STNO</th>
<th>STCC</th>
<th>CTNO</th>
<th>CTCC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>837</strong></td>
<td><strong>72</strong></td>
<td><strong>623</strong></td>
<td><strong>82</strong></td>
</tr>
</tbody>
</table>

*There were detectable dust measurements for these operations, but they rounded to 0 with this number of significant figures.*

---

Baker, Southard and Mitchell
JEQ, 2004
May 25, 2007 • Friday
10 am - Noon

University of California
West Side Research and Extension Center
Oakland and Lassen Avenues
Five Points, CA
(559) 884-2411

Burrito lunch available.

Although there is currently no commercial no-till cotton production in the
San Joaquin Valley (SJ), over the past several years University of California researchers have
been evaluating a number of no-till cotton production options in an effort to develop
cheaper, yet economically profitable
alternatives. This field day will present
information that has resulted from these studies
and will provide opportunities for SJV producers
to learn about no-till management options,
equipment and economics.

10:00 Welcome to the West Side Research and Extension Center
Bob Hutmacher
Director, WSREC and UCCE Cotton Specialist

10:15 Overview and History of No-Till Cotton Research at the
West Side Research and Extension Center
Jeff Mitchell
UCCE Cropping Systems Specialist

10:45 No-Till, Strip-Till, Twin-Row and Ultra-Narrow Row
Cotton Planting Equipment
Jeff Mitchell
UCCE Cropping Systems Specialist

11:15 The “Next Generation” of Tillage and Water Management
Research: Coupling No-Till with Overhead Irrigation
Dan Munk
UCCE Cotton, Soils and Water Advisor

11:30 Discussion - Participant Feedback - Lunch
Steve Wright
UCCE Cotton and Field Crops Advisor
Short-season triticale cover crop preceding processing tomatoes
Firebaugh, CA 2005
Strip-till planted processing tomatoes
Firebaugh, CA 2006
PROCESSING TOMATOES
STRIP-TILL PLANTED INTO
TRITICALE COVER CROP
FIREBAUGH, CA 2005
“This is the first worm I’ve seen in these fields in 30 years.”

Alan Sano
Sano Farms
Firebaugh, CA
May 4, 2006
Steve Groff
Pennsylvania no-till
tomato producer visiting
Sano Farms
Firebaugh, CA
May 2006
Rolling stalk chopper knocking down bell bean cover crop ahead of strip-tilling and transplanting processing tomatoes
Davis, CA
April 2006
Modified Orthman 1-tRIPr strip-tiller preceding tomato transplanting
Davis, CA May 2006
Standard tillage land preparation following alfalfa or winter forage consisting of disking cross checks prior to broadcast disking entire field

Rollin Dairy, Burrell, CA 2004
Tom Barcellos
2006 CT Farmer Innovator Award Recipient
Tipton, CA 2004
Sampling agricultural dust emissions
Dairy corn production field,
Tipton, CA 2004
### Fields and Operations

#### Sweet Haven
- **Soil:** Sandy Loam
- **Location:** Burrel, CA
- **Crop:** Oats => Corn

<table>
<thead>
<tr>
<th>ST Corn</th>
<th>CT Corn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disk (Off-Set)</td>
<td>Strip-Till</td>
</tr>
<tr>
<td>2nd Disk (Off-Set w/ Roller) 2X</td>
<td>CT Drill</td>
</tr>
<tr>
<td>Corn Planter</td>
<td></td>
</tr>
</tbody>
</table>

#### Barcellos Farm
- **Soil:** ST Sandy Loam, CT Loam,
- **Location:** Tipton, CA
- **Crop:** Wheat => Corn

<table>
<thead>
<tr>
<th>ST Corn</th>
<th>CT Corn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disk (Off-Set) 2X</td>
<td>CT Drill</td>
</tr>
<tr>
<td>Listing</td>
<td></td>
</tr>
<tr>
<td>Disk-Bedder (Go-Devil)</td>
<td></td>
</tr>
<tr>
<td>Bed Mulcher</td>
<td></td>
</tr>
<tr>
<td>Ring Roller</td>
<td></td>
</tr>
<tr>
<td>Planter</td>
<td></td>
</tr>
<tr>
<td>Ring Roller</td>
<td></td>
</tr>
</tbody>
</table>
Barcellos Farms, Tipton, CA

**SPRING 2004**

<table>
<thead>
<tr>
<th>Operations</th>
<th>AVG. EF (mg/m²)</th>
<th>CARB EF (mg/m²)</th>
<th>Test Grades</th>
<th>Avg GWC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disk (Off-Set)</td>
<td>252</td>
<td>135</td>
<td>A,C,B</td>
<td>0.06</td>
</tr>
<tr>
<td>2nd Disk (Off-Set)</td>
<td>917</td>
<td>135</td>
<td>A,A,A</td>
<td>0.06</td>
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<tr>
<td>Listing</td>
<td>615</td>
<td>90</td>
<td>B,A,A</td>
<td>0.07</td>
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<tr>
<td>Disk-Bedder (Go-Devil)</td>
<td>25</td>
<td>135</td>
<td>B,B</td>
<td>0.15</td>
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<tr>
<td>Bed Mulcher</td>
<td>89</td>
<td>135</td>
<td>A,A</td>
<td>0.11</td>
</tr>
<tr>
<td>Ring Roller</td>
<td>566</td>
<td>90</td>
<td>A,A</td>
<td>0.10</td>
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<tr>
<td>Planter</td>
<td>96</td>
<td>90</td>
<td>A,G</td>
<td>0.14</td>
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<tr>
<td>Ring Roller</td>
<td>186</td>
<td>90</td>
<td>C,B</td>
<td>0.08</td>
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**CT Corn**

<table>
<thead>
<tr>
<th>Operations</th>
<th>AVG. EF (mg/m²)</th>
<th>CARB EF (mg/m²)</th>
<th>Test Grades</th>
<th>Avg GWC</th>
</tr>
</thead>
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<tr>
<td>Disk (Off-Set)</td>
<td>198</td>
<td>90</td>
<td>B,E</td>
<td>0.26</td>
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- CT emissions reduced 93%

**SPRING 2005**

<table>
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<tr>
<th>Operations</th>
<th>AVG. EF (mg/m²)</th>
<th>CARB EF (mg/m²)</th>
<th>Test Grades</th>
<th>Avg GWC</th>
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<tr>
<td>Disk (Off-Set)</td>
<td>51</td>
<td>135</td>
<td>A,A,A</td>
<td>0.21</td>
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<td>2nd Disk (Off-Set)</td>
<td>123</td>
<td>135</td>
<td>A,A,A</td>
<td>0.19</td>
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<td>Circle Harrow w/ Roller</td>
<td>264</td>
<td>1403</td>
<td>B,C,D</td>
<td>0.18</td>
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<tr>
<td>Listing</td>
<td>466</td>
<td>90</td>
<td>B,B,B</td>
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<td>Disk-Bedder (Go-Devil)</td>
<td>109</td>
<td>135</td>
<td>A,B,B</td>
<td>0.17</td>
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<tr>
<td>Bed Mulcher</td>
<td>384</td>
<td>135</td>
<td>B,A,A</td>
<td>0.15</td>
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<tr>
<td>Planter</td>
<td>481</td>
<td>90</td>
<td>B,A,A</td>
<td>0.17</td>
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**CT Corn**

<table>
<thead>
<tr>
<th>Operations</th>
<th>AVG. EF (mg/m²)</th>
<th>CARB EF (mg/m²)</th>
<th>Test Grades</th>
<th>Avg GWC</th>
</tr>
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<tr>
<td>Disk (Off-Set)</td>
<td>224</td>
<td>90</td>
<td>C,B</td>
<td>0.19</td>
</tr>
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</table>

- CT emissions reduced 88%
Sweet Haven Dairy, Burrell, CA

**SPRING 2004**

<table>
<thead>
<tr>
<th>ST Corn</th>
<th>Operations</th>
<th>AVG. EF (mg/m²)</th>
<th>CARB EF (mg/m²)</th>
<th>Test Grades</th>
<th>Avg GWC</th>
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<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Disk (Off-Set)</td>
<td>316</td>
<td>135</td>
<td>C,B,B</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td>2nd Disk (Off-Set w/Roller)</td>
<td>1035</td>
<td>135</td>
<td>A,A,A</td>
<td>0.05</td>
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<tr>
<td></td>
<td>3rd Disk (Off-Set w/Roller)</td>
<td>135</td>
<td>135</td>
<td>E,B,A</td>
<td>0.15</td>
</tr>
<tr>
<td></td>
<td>Planter</td>
<td>96</td>
<td>90</td>
<td>C,A,B</td>
<td>0.08</td>
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<tr>
<td></td>
<td><strong>CT Corn</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strip-Till</td>
<td>181</td>
<td>135</td>
<td>A,F,E</td>
<td>0.11</td>
</tr>
<tr>
<td></td>
<td>CT Drill</td>
<td>115</td>
<td>90</td>
<td>C,B,C</td>
<td>0.10</td>
</tr>
</tbody>
</table>

- **CT emissions reduced 81%**

**SPRING 2005**

<table>
<thead>
<tr>
<th>ST Corn</th>
<th>Operations</th>
<th>AVG. EF (mg/m²)</th>
<th>CARB EF (mg/m²)</th>
<th>Test Grades</th>
<th>Avg GWC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Disk (Off-Set)</td>
<td>145</td>
<td>135</td>
<td>B,C,B</td>
<td>0.14</td>
</tr>
<tr>
<td></td>
<td>2nd Disk (Off-Set w/Roller)</td>
<td>375</td>
<td>135</td>
<td>B,B,B</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td>3rd Disk (Off-Set w/Roller)</td>
<td>404</td>
<td>135</td>
<td>A,A,B</td>
<td>0.16</td>
</tr>
<tr>
<td></td>
<td>Planter</td>
<td>263</td>
<td>90</td>
<td>A,A,A</td>
<td>0.16</td>
</tr>
<tr>
<td></td>
<td><strong>CT Corn</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strip-Till</td>
<td>180</td>
<td>135</td>
<td>A,A,A</td>
<td>0.17</td>
</tr>
<tr>
<td></td>
<td>CT Drill</td>
<td>385</td>
<td>90</td>
<td>A,A</td>
<td>0.16</td>
</tr>
</tbody>
</table>

- **CT emissions reduced 52%**
California Waste Discharge Permit Requirement
General Order 55-2007-0035 for Milk Cow Dairies
Dairy forage triple-cropping as a means to increase forage production and nutrient uptake
Side-by-side comparison of traditional tillage (left) and strip-till corn production (right)

Gwerder Dairy • May 31, 2007
Harvesting winter forage wheat, strip-tilling and planting corn, Tipton, CA, May 2005
Corn planting following strip-tilling wheat residue
Barcellos Farms, Tipton, CA 2005
Triple-crop no-till planting of sorghum sudan following wheat and corn
Barcellos Farms, Tipton, CA 2005
## No-till vs. Conventional

### Double Cropped Corn following Wheat

<table>
<thead>
<tr>
<th>Item</th>
<th>No-till</th>
<th>Conventional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seed</td>
<td>$50</td>
<td>$36</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>$60</td>
<td>$60</td>
</tr>
<tr>
<td>Pesticide</td>
<td>$12</td>
<td>$12</td>
</tr>
<tr>
<td>Herbicide</td>
<td>$41</td>
<td>$18</td>
</tr>
<tr>
<td>Disc 2X</td>
<td>$0</td>
<td>$28</td>
</tr>
<tr>
<td>Landplane</td>
<td>$0</td>
<td>$14</td>
</tr>
<tr>
<td>Rip</td>
<td>$0</td>
<td>$20</td>
</tr>
<tr>
<td>List</td>
<td>$0</td>
<td>$12</td>
</tr>
<tr>
<td>Disc Bedder</td>
<td>$12</td>
<td>$12</td>
</tr>
<tr>
<td>Mulcher</td>
<td>$0</td>
<td>$15</td>
</tr>
<tr>
<td>Roller</td>
<td>$0</td>
<td>$5</td>
</tr>
<tr>
<td>Plant</td>
<td>$28</td>
<td>$16</td>
</tr>
<tr>
<td>Cultivate</td>
<td>$0</td>
<td>$10</td>
</tr>
<tr>
<td>Fertilizer App.</td>
<td>$7</td>
<td>$10</td>
</tr>
<tr>
<td>Layby</td>
<td>$0</td>
<td>$10</td>
</tr>
<tr>
<td>Herbicide App.</td>
<td>$20</td>
<td>$10</td>
</tr>
<tr>
<td>Irrigation 2.5 a/f</td>
<td>$150</td>
<td>$150</td>
</tr>
</tbody>
</table>

### Total Cost
- **No-till**: $368
- **Conventional**: $438

### Total Savings
- **$70 per acre**

---

Data compiled by Tom Barcellos, Dairyman, Tipton, CA, 2006
At this Strip-Tillage Field Day, you’ll have an opportunity to learn about new information that is being developed for strip-till forage corn production at Giacomazzi Dairy. You’ll see how strip-till is done, what different strip-tillers are available, and learn about ongoing field studies that are trying to answer the following questions:

- Is it better to strip-till before or after a pre-irrigation?
- Does twin-row corn planting out perform single-row planting in strip-till?
- Which corn varieties yield best in strip-till?
- How do different strip-tillers perform?
- What is the best weed management in strip-till corn?

Strip-Tillage Field Day
Wednesday
August 30, 2006
9am - noon

For more information, call
Jeff Mitchell at (559) 303-9689
2007 Conservation Tillage 
FARMER TOUR
JUNE 12 - 16, 2007

California’s Conservation Tillage Workgroup is pleased to announce its 2007 Farmer tour that will take place from the afternoon of Tuesday, June 12 through Saturday morning, June 16. The objective of this tour will be to provide intense learning opportunities for California producers on a wide variety of successful conservation practices that have been developed for a number of row and field crops in the region of western Nebraska, southern South Dakota and western Colorado and Wyoming where irrigation systems are common.

This year’s tour will highlight a wide range of no-till and strip-till cropping systems and will feature farmer, researcher and private sector hosts who have considerable, state-of-the-art experience with successful CT systems. Participants in the tour will view a range of no-till and strip-till farms and research sites and learn about the mechanics of systems in terms of planting, crop rotations, pest management, irrigation, labor and resource conservation.

Well-known and world-renowned researchers, including Dr. Dwayne Beck of South Dakota State University and Dr. Paul Jasa of the University of Nebraska, leading no-till and strip-till farmers, and No-till on the Plains Director, Brian Lindley, will be featured on the tour which will depart from and return to Fresno Yosemite Airport.

Applications must be received by April 25 to guarantee a spot on the tour.

TENTATIVE ITINERARY

TUESDAY
JUNE 12, 2007
• Depart Fresno Yosemite Airport 2pm.
• Arrive Denver International Airport.
• Board bus for overnight stay near Greeley, CO.

WEDNESDAY
JUNE 13, 2007
• Visit Strip-Till Farms and research sites with Mike Petersen, former USDA NRCS Conservationist and current Precision Tillage Coordinator for Dohrmann Mfg.
• Depart for Pierre, SD in afternoon.

THURSDAY
JUNE 14, 2007
• Meet with Dwayne Beck at SDSU Dakota Lakes Research Farm, Pierre, SD.
• No-till intensive, diverse crop rotations.
• No-till farm visits.
• Depart for Alliance, NE.

FRIDAY
JUNE 15, 2007
• Whitwind Expo No-till Field Day, Alliance, NE hosted by “No-till on the Plains” (Brian Lindley, Coordinator) and the University of Nebraska (Paul Jasa) at the farm of long-time no-till, Mark Watson.
• Depart for Torrington, WY.

SATURDAY
JUNE 16, 2007
• Visit strip-till production region with Dave Zimmer, Schlappi Mfg.
• Depart to Denver.
• Return flight to Fresno.
No-till soybeans in corn residue
Center pivot irrigated
Dakota Lakes Research Farm
Pierre, SD
July 2005
CENTER PIVOT, OVERHEAD IRRIGATED NO-TILL COTTON
BUSHLAND, TX 2006
Coupling overhead irrigation systems with conservation tillage: A means for optimizing cheap, efficient and resource-conserving production systems?

Twenty 160-acre center pivot systems installed in Western Fresno County in last 6 months
Developing new crop production systems that couple overhead irrigation with no-till practices
Five Points, CA

Wes Wallender
Karen Klonsky
Dan Munk
Bob Hutmacher
Anil Shrestha
John Diener
Scott Schmidt
Monte Bottens
Steve Wright
Kurt Hembree
Pat Murray
Darrell Cordova
John Beyer
Rita Bickel
Anita Brown
Tom Gohlke
Ron Harben
Johnnie Siliznoff
Brook Gale
Overhead, low-pressure irrigation coupled with continuous no-till

- cotton
- tomatoes
- wheat
- corn
- 4 crops / 4 years

- wheat
- cotton
- cover crop
- tomatoes
- sorghum sudan
- wheat
- cotton
- wheat/green chop
- corn
- sorghum sudan
- 10 crops / 4 years
Conservation tillage / overhead irrigation and industrial / bioenergy crop production: An ideal match?

No-till planting of sorghum into wheat residue

Five Points, CA 2003
Making Conservation Tillage Conventional:
Building a Future on 25 Years of Research

Proceedings of the 25th Annual Southern Conservation Tillage
Conference for Sustainable Agriculture

Auburn, AL, USA 24-26 June 2002
CONCLUSIONS

- considerable innovation underway with CT systems for forage production and to some extent for tomato production systems

- rather recent and emerging interest in merging overhead irrigation with CT technologies, but cost / benefit evaluations are needed
there are tremendous opportunities and needs for far greater connections between CT research, extension and impact making in terms of

- resource quality
- economics
- ag engineering and cropping systems design

future goals
- biofuel production systems design
- integrated animal / crop systems, and
- sustaining CT production through more diverse rotations including vegetables and root crops
Thank you very much.