Growing onions more cheaply

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California Garlic and Onion Symposium 2012
Agriculture Building Auditorium
UC Cooperative Extension Tulare County
February 13, 2012

Thank you for the opportunity to be with you this afternoon.
Partners

Tom Turini
Kurt Hembree
Anil Shrestha
Joe Coelho
Pete Dominguez
John Diener
Scott Schmidt
Armando Galvan
Dan Munk
No-till onion experimentation
Patos de Minos, BRAZIL
2006
High residue no-till established
onion seedlings
Patos de Minos, BRAZIL
2006
No-till tomato transplanting
Turkey
2009
CONSERVATION AGRICULTURE

• ... has developed to be a technically viable, sustainable, and economic alternative to current crop production practices,

• ... is gaining acceptance in many parts of the world as an alternative to both conventional agriculture and organic agriculture

• ... is the integration of ecological management with modern, scientific, agricultural production

Dumanski et al., 2006
CONSERVATION AGRICULTURE

• ... is not ‘business as usual,’ based primarily or solely on maximizing yields,

• ... rather, it is based on optimizing yields and profits to achieve a balance of agricultural, economic and environmental benefits,

• ...it advocates that the combined economic and social benefits gained from combining production and protecting the environment, including reduced input and labor costs, are greater than those from production alone.

Dumanski et al., 2006
CONSERVATION AGRICULTURE

• Minimal soil disturbance
• Preservation of residues that provide permanent soil cover
• Diverse crop rotations
• Use of cover crops
• Integrated pest management
• Reliance on precision, highly efficient irrigation
• Controlled or limited mechanical traffic over agricultural soils
"More with Less"

... agriculture in the future will have to sustainably produce more food, feed, fiber and energy on less land through more efficient use of natural resources and with minimal impact on the environment in order to meet growing population demands.

This will become a global imperative.
CONSERVATION AGRICULTURE

...links production with sustainability.
Conservation Agriculture worldwide 117 Million ha

- USA 26.5
- Canada 13.5
- Australia 17
- Europe 1
- Kazakhstan 1
- Africa 0.5
- Brazil 26
- Paraguay 2.5
- Argentina 26
- China 1
- Other LA 2
- Friedrich, 2012
Brazil

Planting

Harvest
CA Adoption in percent by region worldwide

- South America
- North America
- Asia
- Australia, New Zealand
- Europe
- Africa

Friedrich, 2012
It is estimated that in less than a decade > 85% of the cultivated area will be under No-till.

(Derpsch & Friedrich, 2008)
Brazil - Area under CA from 1972 to 2006

Argentina - CA from 1977 to 2006

Paraguay - CA area 1992-2001

No-Till Adoption in the U.S.

Estimated farmer adoption of no-till in WA

Starting of GTZ/MAG Soil Conservation Project

Friedrich, 2012
### Increases in CT 2004 - 2010

<table>
<thead>
<tr>
<th></th>
<th>No Till</th>
<th>RT/ST</th>
<th>Mulch Till</th>
<th>Subtotal</th>
<th>Minimum Tillage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2004</strong></td>
<td>5,265</td>
<td>690</td>
<td>51,150</td>
<td>57,105</td>
<td>64,613</td>
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<tr>
<td><strong>2006</strong></td>
<td>17,181</td>
<td>9,020</td>
<td>42,964</td>
<td>69,165</td>
<td>318,006</td>
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<tr>
<td><strong>2008</strong></td>
<td>27,308</td>
<td>121,055</td>
<td>79,434</td>
<td>227,797</td>
<td>416,035</td>
</tr>
<tr>
<td><strong>2010</strong></td>
<td>32,387</td>
<td>157,824</td>
<td>96,267</td>
<td>286,478</td>
<td>701,760</td>
</tr>
</tbody>
</table>
History and Adoption of CA

- Dustbowl: 1930
- First no-till in the US
- Faulkner (US) – Fukuoka (Japan)
- Dustbowl: Siberia/USSR
- Commercial no-till/US
- ITA no-till research
- Adoption Brazil: plantio direto na palha
- Oldrieve/Zimbabwe
- Argentina, Paraguay: experiments in China, Indogangetic Plains
- New boost: Canada, Australia, Kazakhstan...
- Africa, Russia, China, Finland...

Mill. ha
- 100
- 50

Friedrich, 2012
California farmers slow to adopt conservation tillage

Harry Cline
Feb. 10, 2012 4:51pm

California farmers have proven repeatedly they can be quick to adopt new technology.

GPS tractor guidance systems and the compatible variable rate technology along with drip irrigation are two cases in point.

Conservation tillage advocates contend CT offers much the same advancement as satellite directed tractors and micro irrigation systems.

CT consumes less energy and labor, thereby reduces costs, reduces environmental impacts, increases soil carbon content and improves soil tilth, fertility and overall organic matter,
Strip-till seeded onions in wheat cover crop
Moses Lake, WA
2010
Center-pivot mechanized irrigation is used. Moses Lake, WA 2010
Labor required for drip tape removal and reinstallation
Our experimental context and field set-up
Eight seed lines across a 60” bed
Establishment with overhead irrigation
Commercial state-of-the-art dehydrator onion field under center pivot irrigation
Five Points, CA
2011
Irrigation Amounts

- Overhead: 14.1 inches
- Drip: 13.6 inches

March – June 2011
Evidence of actual production
Commercial scale and equipment harvesting
Five Points, CA
August 2011
Strip-tilling ahead of following transplanted broccoli crop

Five Points, CA

2011
Onion Plant Populations

- OVERHEAD 49 / m²
- DRIP 33 / m²

The effect of irrigation on plant population was significant (P = 0.02).

There were no effects of tillage or interactions between irrigation and tillage.
There was no effect of irrigation or tillage on onion sizes.

- Small  < 5.7 cm
- Medium < 6.2 cm
- Large  < 7.2 cm
- X-Large < 8.4 cm
- XX-Large < 9.8 cm
Onion Yields 2010 - 2011

- Drip 29.3 tons/ac
- Overhead 37.3 tons/ac \( (P = 0.04) \)
- No effect of tillage
- No interactions between irrigation and tillage
Conclusions and next steps

• Figure in all costs

• Improve production practices

• Figure out seeding operations

• Is residue a problem in harvesting?

• The goal is increased competitiveness with sustainability.