Controlled traffic farming in Argentina: challenges and opportunities

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Argentina
Background agricultural sector

- **Significant changes since the mid-1980’s**
  - c.9% of world agricultural output,
  - 8\(^{th}\) largest producer and 12\(^{th}\) largest exporter of agricultural commodities.
  - Agriculture related activities represent c.20% of the country’s GDP

- **Rapid growth in production and productivity**
  - Increased global supplies of cereals and oilseeds,
  - More stable global food prices.

- **Key drivers**
  - Favourable conditions in the world markets,
  - Introduction of new technologies,
  - Research and extension effort.

[Source: FAO, 2007; AAPRESID, 2009; Trigo et al., 2009; INTA, 2010; Lance, 2010]
Adoption of zero-tillage 1978-2008

[Source: AAPRESID, 2009; Trigo et al., 2009]

*Conservation Agriculture Programme (INTA)
**Argentinean Assoc. of Growers in Zero-Tillage

C.75% of area with grain + oilseed crops

22,348
Adoption of zero-tillage 1978-2008

Zero-Till by crop:
- Corn: 76%
- Sorghum: 70%
- Soybeans: 95%
- Sunflower: 53%
- Wheat: 62%

[Source: AAPRESID, 2009; Trigo et al., 2009]

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[Source: Giancola et al., 2009]
Zero-tillage

Wheat zero-till after corn

Soybeans Post-harvest 2011
(c.30 mm h\(^{-1}\); 110 mm)

[Source: Antille et al., 2013] [Centre-east of Santa Fe, Argentina. Lat: -30.93; Lon: -60.65]
Effect of traffic on crop yield: a case study on soybeans

Treatment 1: 38.5 t km\(^{-1}\) ha\(^{-1}\) (Standard traffic)

Treatment 2: 20.1 t km\(^{-1}\) ha\(^{-1}\) (Confined traffic)

Treatment 3: 15.2 t km\(^{-1}\) ha\(^{-1}\) (Reduced traffic)

- 9 years under zero-till prior to the experiment with standard traffic regime
- Soil: Typical argiudol, moderately well drained, 20% (w w\(^{-1}\)),
- Machinery: Combine (15.3 t), tractor (8.5 t), grain cart (20 t).

[Source: Botta et al., 2007a-b.] [Site location: Lat 34.25 S; Lon 59.15 W]
## Effect of traffic on crop yield: a case study on soybeans

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<th>Crop</th>
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<td>Traffic density</td>
<td>38.5 t km⁻¹ ha⁻¹ (%)</td>
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Different letters indicate significance within years (P<0.01).

[Source: Botta et al., 2007a-b]
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<td><strong>Gross margin</strong></td>
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*US$ ha\(^{-1}\); based on direct costs and (internal) price of crop for 2012/2013 (322 US$ t\(^{-1}\)).

Different letters indicate significance within years (P<0.01).

[Source: Botta et al., 2007a-b; Ghida-Daza, 2012; Antille et al., 2013]
Challenges associated with CTF adoption

- CTF is still a novel concept

- Possible concerns
  - Realisation of benefits in practice and on a farm-scale,
  - Performance of permanent traffic lanes in wet conditions,
  - Harvesting operations involving contractors – supervision/discipline,
  - Consistency – design of simple easily-followed systems,

- Possible barriers
  - Incompatibility between crops,
  - Reliance on different contractors for different operations,
  - Cost of conversion and recent investments in machinery,
  - Cultural issues,
  - More management,
  - Economic context – domestic agricultural policies.

[Based on Chamen, 2006]
Responses required for CTF adoption

- **Emphasis on knowledge/technology transfer**
  - Increase awareness of CTF and its benefits,
  - Effective use of technology networks available.

- **Strategic planning**
  - Determine the appropriate engineering approach to CTF,
    - Application of whole-farm economic modelling.

- **Applied research and development**
  - Effort must be on identifying efficient and cost-effective methods,
  - Promote on-farm action-learning activities,
  - Review existing soil management practices and alternative methods to mitigate soil compaction,
  - Use scientific evidence to influence policy makers and land managers.
Opportunities for CTF development

- Favourable conditions in global markets for key commodities,
- Agricultural sector extremely responsive to economic incentives,
- Demonstrated improvement in profitability
- Synergism between CTF and zero-tillage,
  - Supported by (rapid) adoption of PA-related technologies.
- Wide range of technology networks available,
  - Independent and private organisations,
  - Government-funded research and extension institutions.
- Planting pools,
  - Agreement between producers and other agents,
  - Major source of financing,
  - Tend to incorporate more advanced technology.

[Chamen, 2006; World Bank, 2006; Botta et al., 2007a-b; Tullberg et al., 2007; Bragachini et al., 2011]
CTF development

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CTF development

AgroPrecision (AGP)

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- AGP Centre
- AGP North West
- AGP South East
- AGP West
- AGP Entre Rios
- AGP Uruguay
- AGP Patagonia
- CTF Argentina
Summary

- **Role of controlled traffic farming**
  - Sustainable intensification of agriculture,
  - Increased productivity and environmental performance,
  - Critical for an agriculture-dependent economy.

- **Need for integrated R & D + adoption programme**
  - Key to help address the challenges and deliver sustainable intensification,
  - Effective bridge between knowledge and practice.
THANK YOU

ISTRO
CTF Working Group

CTF Europe Ltd.