History of the World Congresses on CA

The first World Congress on Conservation Agriculture was organized jointly by ECAF and FAO in 2001 in Madrid, Spain.

Since then:

- Iguassu-Brazil, 2003
- Nairobi-Kenya, 2005
- New Delhi-India, 2009
- Brisbane-Australia, 2011
- Winnipeg-Canada, 2014
- Rosario-Argentina, 2017
Why again in Europe?

• Bid presented at the last WCCA

• Opportunity to raise awareness about the deliverables of CA

• Diverse constraints for CA adoption

• 8WCCA being held in Central Europe to facilitate bringing important stakeholder together

• The international appeal of 8WCCA will attract media attention which should lead to a broader understanding and acceptance of CA.
Why in Switzerland?

- Swiss NT accepted the challenge
- Excellent conditions
- Switzerland a showcase of how Ag Policy can influence CA adoption
- Central location within Europe
- Possibility to provide a high CA diversity in post-Congress tours
The Organizing Committee

- **Official organizers:** ECAF and Swiss NT

- **In collaboration with:** FAO

- **Main partner:** Bern University of Applied Sciences
Other support and partnerships

- African Conservation Tillage Network
- School of Agricultural, Forest and Food Sciences HAFL
- Italian Ministry of Agricultural, Food and Forest Policy
- Canton Berne
- LIFE Programme
Conservation Agriculture is the only ecological and regenerative agricultural model able to bring together the profitability of farmers and the environmental protection while offering ecosystem services, climate change mitigation and adaptability and satisfying the demands of civil society.
Conventional vs. Conservation Agriculture

• Soil threats (degradation of farmland)
• Water efficiency (addressing water scarcity)
• Response to Climate Change (mitigation, adaptation)
• Productivity (sustain the demand of FFFF)
• Profitability (avoid abandonment of farming activity)
Soil threats: Erosion

- Global potential soil erosion rates of 43 (-7, +9.2) Gt yr\(^{-1}\)
- In Europe about 1 Gt yr\(^{-1}\)
- Water erosion causes over 50% of total P losses (4–19 kg ha\(^{-1}\) yr\(^{-1}\))

Source: EU-JRC, ESDAC
Soil threats: Erosion
Soil threats: Erosion - The only way to avoid
Soil threats: Decline in SOM (fertility)

Source: SmartSOIL project
Soil threats: Decline in SOM (fertility)

Belgium

Evolution of percentage of arable soils short in soil organic carbon, based on more than 60,000 samples taken every 3 years to a depth of 23 cm (Gobin, 2005)


% of samples

- Soil organic matter level > 7%
- Soil organic matter level 3.6% - 7%
- Soil organic matter level < 3.6%
**Soil threats:** Decline in SOM (fertility)

<table>
<thead>
<tr>
<th>Factor value type</th>
<th>Level</th>
<th>Temperature regime</th>
<th>Moisture regime</th>
<th>IPCC defaults</th>
<th>Error</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land use (F_L)</td>
<td>Long-term cultivated</td>
<td>Temperate/Boreal</td>
<td>Dry</td>
<td>0.80</td>
<td>±9%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Moist</td>
<td>0.69</td>
<td>±12%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tropical</td>
<td>Dry</td>
<td>Moist/Wet</td>
<td>0.48</td>
<td>±46%</td>
<td></td>
</tr>
<tr>
<td>Tropical montane</td>
<td>n/a</td>
<td></td>
<td></td>
<td>0.64</td>
<td>±50%</td>
<td></td>
</tr>
</tbody>
</table>

Represent area that has been continuously managed for >20 yrs, to predominantly annual crops. Input and tillage factors are also applied to estimate carbon stock changes.

Land-use factor was estimated relative to use of full tillage and nominal (“medium”) carbon input levels.
**Soil threats:** Decline in SOM (fertility)

<table>
<thead>
<tr>
<th>Factor value type</th>
<th>Level</th>
<th>Temperature regime</th>
<th>Moisture regime¹</th>
<th>IPCC defaults</th>
<th>Error²³</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tillage (F_{sl})</td>
<td>Full</td>
<td>All</td>
<td>Dry and Moist/Wet</td>
<td>1.00</td>
<td>NA</td>
<td>Substantial soil disturbance with full inversion and/or frequent (within year) tillage operations. At planting time, little (e.g., &lt;30%) of the surface is covered by residues.</td>
</tr>
<tr>
<td></td>
<td>Reduced</td>
<td>Temperate/Boreal</td>
<td>Dry</td>
<td>1.02</td>
<td>± 6%</td>
<td>Primary and/or secondary tillage but with reduced soil disturbance (usually shallow and without full soil inversion). Normally leaves surface with &gt;30% coverage by residues at planting.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Moist</td>
<td>Moist</td>
<td>1.08</td>
<td>± 5%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dry</td>
<td>Moist/Wet</td>
<td>1.09</td>
<td>± 9%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Moist/Wet</td>
<td>Moist/Wet</td>
<td>1.15</td>
<td>± 8%</td>
<td></td>
</tr>
<tr>
<td>Tropical montane²</td>
<td>n/a</td>
<td></td>
<td></td>
<td>1.09</td>
<td>± 50%</td>
<td></td>
</tr>
<tr>
<td>Tillage (F_{sl})</td>
<td>No-till</td>
<td>Temperate/Boreal</td>
<td>Dry</td>
<td>1.10</td>
<td>± 5%</td>
<td>Direct seeding without primary tillage, with only minimal soil disturbance in the seeding zone. Herbicides are typically used for weed control.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Moist</td>
<td>Moist</td>
<td>1.15</td>
<td>± 4%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dry</td>
<td>Moist/Wet</td>
<td>1.17</td>
<td>± 8%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Moist/Wet</td>
<td>Moist/Wet</td>
<td>1.22</td>
<td>± 7%</td>
<td></td>
</tr>
<tr>
<td>Tropical montane²</td>
<td>n/a</td>
<td></td>
<td></td>
<td>1.16</td>
<td>± 50%</td>
<td></td>
</tr>
</tbody>
</table>
Soil threats: Decline in biodiversity

- **Unsustainable farming practices**, the effects of climate change and soil pollution are just a few of the things that can adversely affect the health and biodiversity of our soils.

https://www.youtube.com/watch?v=hbdsHOnqd_gw&feature=youtu.be
Soil threats: Decline in biodiversity
Soil threats: Decline in biodiversity
Soil threats: Compaction

Credits: W. Sturny
Water efficiency: Infiltration

Source: Landers, 2007
Water efficiency: Storage

Source: Jemai et al. 2013

Source: Carvalho and Basch, 1995
Water efficiency: Evaporation losses

<table>
<thead>
<tr>
<th>Soil cover (%)</th>
<th>Evaporation acc. (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>102,8</td>
</tr>
<tr>
<td>53</td>
<td>97,4</td>
</tr>
<tr>
<td>75</td>
<td>81,2</td>
</tr>
<tr>
<td>100</td>
<td>60,6</td>
</tr>
</tbody>
</table>

Klocke et al., 2009
Water efficiency: Evaporation losses

Irrigated corn

Rainfed wheat

Source: Basch, unpublished data
Water efficiency: Evaporation losses
Response to Climate Change: Mitigation

• Creating a positive balance between gains and losses of carbon in the soil

• GHG emission reduction
  • CO₂
    • Less fuel use
    • Reduction of external, energy demanding inputs
  • N₂O
  • CH₄
Response to Climate Change: Mitigation

• Creating a positive balance between gains and losses of carbon in the soil
Response to Climate Change: Mitigation

Source: Tebrügge, 2001
Response to Climate Change: Mitigation

C-Sequestration potential of CA in annual crops

C-Sequestration potential of CA in perennial crops
Response to Climate Change: Mitigation

C-Sequestration potential of CA on African cropland
Response to Climate Change: Mitigation

- Creating a positive balance between gains and losses of carbon in the soil
- GHG emission reduction
  - CO₂
    - Less fuel use
    - Reduction of external, energy demanding inputs (e.g. fertilizers, pesticides and machinery manufacturing, water transport, etc.)
Response to Climate Change: Mitigation

- Creating a positive balance between gains and losses of carbon in the soil
- GHG emission reduction
  - $\text{CO}_2$
    - Less fuel use
    - Reduction of external, energy demanding inputs
  - $\text{N}_2\text{O}$ Reduced emissions over time through improved drainage and reduced N-inputs
  - $\text{CH}_4$
Response to Climate Change: Adaptation

- Improved resilience to extreme events of:
  - Excess rainfall (runoff, erosion, landslides)
  - Drought (more water intake and retention, less losses and higher WUE)
  - Heat (lower soil temperatures through mulch)
- Lowering losses in case of failure/disaster
- Faster recovery
Productivity: function of soil quality and health

- Regression analysis of wheat yields throughout various European countries

Source: Brisson et al. 2010
Productivity: function of soil quality and health

- Yield impact of Soil Organic Carbon (SmartSOIL model)
Productivity: At large scale

• Argentina – adoption of CA and evolution of yields

Source: Peiretti, 2002
**Profitability:** Improved input use efficiency

- Nitrogen use efficiency

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**Source:** Carvalho et al., 2012
Profitability: Cost reduction

- Less expenses with crop establishment
  - Variable annual expenses with tractors and drilling equipment (340 ha farm (rainfed) in South Portugal)

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintenance and repair of tractors*</td>
<td>10,450.47 €</td>
<td>1,507.15 €</td>
<td>85.6%</td>
</tr>
<tr>
<td>Maintenance and repair of tillage/drilling equipment</td>
<td>8,158.41 €</td>
<td>1,840.00 €</td>
<td>77.5%</td>
</tr>
<tr>
<td>Fuel</td>
<td>17,460.00 €</td>
<td>7,110.00 €</td>
<td>60%</td>
</tr>
<tr>
<td>Labour</td>
<td>25,000.00 €</td>
<td>15,000.00 €</td>
<td>40%</td>
</tr>
<tr>
<td>Total</td>
<td>61,068.88 €</td>
<td>25,457.15 €</td>
<td>58.3%</td>
</tr>
</tbody>
</table>

* 4 tractors with a total of 384 HP under CT and 2 tractors with 143 HP under NT
The way forward: Embracing the Future of Farming

- Reduction in soil disturbance %
- Increase in soil cover & biomass production %
- Intensive soil disturbance
- Sustainable Agriculture (CA - Systems)
- Crop diversity
- Soil mulch cover
- Min. soil disturbance
- Reduction in soil disturbance %
- Bare soil

The way forward:
Embracing the Future of Farming
There’s a lot to do...
Sub-themes of the 8WCCA Congress:

- “Successful experiences and learnings from Conservation Agriculture worldwide”. Prof. Amir Kassam (22 October 2020)
- “Farm and ecosystem level benefits of CA systems to farmers, society and environment”. Dr. Don Reicosky (5 November 2020)
- “Mainstreaming of CA with national policy and institutional support and for global governance to support national and international needs and commitments”. Dr. Tom Goddard (19 November 2020)
- “Promoting CA-based knowledge and innovation systems and information sharing and communication”. Dr. Rachid Mrabet (3 December 2020)
More Info at:

www.8wcca.org

For further information, contact us:

info@8wcca.org
Thank you for your attention!