Ingredients for soil fertility in vegetable production

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1. Organic matter management
2. Green manure strategy
3. Controlled traffic farming in vegetable production

Traffic in the field

Traditional

CTF

90% of soil surface is affected by traffic

What’s the soil challenge for vegetable production?

• High level of traffical operations in vegetable production
• High demand on uniform quality, nutrient uptake, and growth
• High need for accuracy for sowing, transplanting, weeding and other operations
• Demand for flexibility in days in the field
  • Climatic changes
• Mechanical sub soil tillage can not recreate original soil structure
• Crop specific machinery with different size
**CTF - benefits**

- Higher yields
- More uniform and better quality products
- Higher water infiltration and water holding capacity
- Better soil structure and biological activity
- Reduction in clod load in root crops
- Greater spatial accuracy
- Opportunities for more plants per hectare
- Tendency to a lower weed level
- Deeper and more abundant roots
- More working days in the field

**SOIL STRUCTURE AND RESISTANCE**

4-years project Wageningen University 2002-2005
Results in pea, spinach and onions on clay soil

<table>
<thead>
<tr>
<th>Vol% air at pF2</th>
<th>depth</th>
<th>traditional</th>
<th>CTF</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5-7.5</td>
<td>16 (10-21)</td>
<td>20 (14-26)</td>
<td></td>
</tr>
<tr>
<td>10-15</td>
<td>10 (6-14)</td>
<td>13 (10-17)</td>
<td></td>
</tr>
<tr>
<td>Cone index (Mpa)</td>
<td>3-8</td>
<td>1.3</td>
<td>1.1</td>
</tr>
<tr>
<td>10-15</td>
<td>1.5</td>
<td>1.2</td>
<td></td>
</tr>
</tbody>
</table>

**ROOT GROWTH**

4-years project Wageningen University 2002-2005
Results in pea, spinach and onions on clay soil

**CTF - challenges**

- Practically all machinery needs adjustment
- Same track width for all machines
- Harvesting celeriac, red beets, leeks, and many other crops are single row harvesters – SCTF (Seasonal Controlled Traffic Farming)
- Potato harvester needs one wheel in the bed for stability

- In full CTF soil tillage is restricted to work between the tracks
- Green manure incorporation
- Grass weed management
- Risk for falling off the tracks in wet soil
- Limitation for destoning
- Investment in GPS is still high – but getting lower
Do not consider second best choice
TWIN-steering

Different brands = different tracks?

TWIN-steering

AutoFarm
(AgLeader)
Internet

John Deere
(Radio)

CTF is measuring and fitting

Before CTF
With SBG

- Guidance Twin

Different track sizes
Row width
Potatoes: 1.85 m.
Redbeets, green beans, cabbage: 45 cm
Pumpkin: 1.0 m.
Onion: 45 cm

Track size
2.15 m.
Row width
Potatoes: 64.4 cm
Redbeets, green beans, cabbage: 46.6 cm
Pumpkin: 1.0 m.
Onion: 35 cm

Soil preparation
Grimme Bed plow
Lemken Plow
Grimme Destoner
Simon Bed former 180
Terrano and Tiger, Horsch Terra Dan, HE
Grimme bed plow customized
Grimme destoner customized

Sowing/planting
Stanhay
Hortus
Monosem pneumatic
CM Regero Transplanter
Struktural Potatoe planter

Weed control
Hatzenbichler Interrow Cultivator
Hatzenbichler Interrow Cultivator with disc
GPS steering, 3 beds, 4 rows
GPS steering, 3 beds, 5 rows
FP Robovator
Treffler

Fertilizing
Contractor with different widths
Customized 4 tons row injector, 3 beds
with flow-meter

Harvest
Grimme, customized 3 rows (1 wheel in bed)
ASA Lift, 1 row with wide tires
ASA Onion lift
Grimme onion harvester

Irrigation
Standard Bording pull-in machines
Contracted Bording pull-in machines

Transport
Keulmac
Transport