Assessing on-farm soil health indicators under Norwegian conditions

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ADS EJP 12-14 June 2023
Norwegian Centre for Organic Agriculture (NORSØK)

Core areas:

- Organic plant production
- Recycling org. materials
- Soil fertility and health
- Animal health and welfare
- Climate effects of agriculture
On-farm soil health indicators under **Norwegian** conditions

- Only 3% is agriculture land.
- Snow, freeze-thaw cycles.
- Midnight sun, dark winters.
- Soils with high content of SOM, but not always.

![Map of Norway with green areas indicating agricultural land.](image)

- SOM
  - 3% → 40%

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**June 2023**

- ADS EJP 12-14 June 2023
Soil health in different agricultural “habitats”

Organic milk farm
grass-clover (GC) ley in different ages and permanent pasture

Conventional potato field
residual effect of different organic materials
Indicators

- Carbon content
- Active carbon
- Soil respiration
- Earthworms
- Plant residues
- Cotton cloth
- Tea-bag
- Soil structure
- Aggregate size
- Aggregate stability
- Root depth
- Penetration depth
- Infiltration
- Pore Volume
- Bait lamina
- ........
On-farm soil biological indicators

• Soil respiration
• Feeding activity
• Soil microbiology
Soil respiration
Feeding activity
Soil microbiology
Soil respiration

Soil respiration (ppm CO₂ / day)

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<tr>
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<th>A</th>
<th>B</th>
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<tbody>
<tr>
<td>GC_2</td>
<td>Organic</td>
<td>Biochar+</td>
</tr>
<tr>
<td>GC_2</td>
<td>milk farm</td>
<td>Biorest</td>
</tr>
<tr>
<td>GC_4</td>
<td>Pasture</td>
<td>Farmyard</td>
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<td>Manure</td>
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<td>Control</td>
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<td>Conventional potato (residual effect)</td>
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</tbody>
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6/21/2023

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Feeding activity
Feeding activity

Organic milk farm

- GC_2
- GC_2
- GC_4
- Pasture

Conventional potato farm (residual effect)

- Biochar+
- Biorest
- Farmyard manure
- Control

Bait lamina (% eaten of the total)

Day 19
Day 7
Day 15
Day 6
Soil microbiology
Inform

Soil health indicator potential

\[ \text{Indicator value} = \text{Max. value for the indicator in farm} \]
Organic milk farm

Feed. Activity

Bacteria

Soil resp. (Solvita)

Fungi

Microbial C

GC_2

GC_2

GC_4

Pasture
Conventional potato farm (residual effect)
Conclusions

• Tests **significantly differentiate** between organically milk farm and conventional potato field, with the first showing better values for soil health.

• Tests **do not always differentiate** between areas/treatments within the production systems.

• In the organic milk farm, **permanent pasture showed a trend of better soil health** than cultivated areas.

• In the conventional potato field, selected soil health tests were not sensitive to capture the residual effects of the organic amendments, and untreated and treated soil showed very similar values.

• The visualization of the high potential level is a valuable approach to inform farmers and advisors about soil health.
Thank you!

More info:

https://www.norsok.no/
https://www.youtube.com/channel/UCyq6x7OFN83nPP9518OoDg/videos
https://orgprints.org/id/eprint/43527/

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