Progress in SoilCare

SoilCare
SOILCARE FOR PROFITABLE AND SUSTAINABLE CROP PRODUCTION IN EUROPE

WP 3: Stakeholder involvement

Multi-Stakeholder Advisory Panel (MSAP):

- A meeting was held with two representatives from the Norwegian Agricultural Extension Service and a farmer with cover crop fields in 2017.
- A meeting with the Norwegian Agricultural Extension Service was held in April 2018. It was decided that the Extension Service should locate and establish a new study site. The experimental design was planned and discussed.

WP 4/5: Assessment methodology

- In January 2018 a meeting was held with study site representatives discussing the preliminary monitoring plan. Additionally, how to best report to SoilCare from the robotization experiment.

WP 5: Monitoring

- In March 2018 a project group meeting was held discussing status and progress at each study site with study site representatives. Budget was presented.
- In April 2018 the monitoring plan was discussed between study site representatives from Solør-Odal (biological soil loosening) and Øsaker (cover crops). Prioritized indicators were selected and method and possible challenges discussed.

WP 7: Policy analysis

- In WP7 an in depth analysis was carried out for the Regional Environmental Program (RMP), a policy instrument with a pronounced impact on management in Norway.
- Interviews were conducted; two representatives from the Norwegian Agricultural Agency, one representative from the County Governor in Oslo and Akershus and one from the Norwegian Agricultural Extension service.

WP 8: Dissemination

Dissemination activities in SoilCare
Partner: NIBIO

Name/description	Type of dissemination	Type of audience	Number of persons reached (approx.)
General information on SoilCare, with focus on the Norwegian setting	Newspaper article (NATIONEN)	Rural area inhabitants	50 000 (figures from 2014, according to the website of NATIONEN)
SoilCare information released on world soil day 5 December 2016	Media release	Communication network from NIBIO	unknown
Annual meeting of the Deutschen Bodenkundlichen Gesellschaft, Goettingen, 27.9.2017	Presentation	(Soil) Scientists	250
AGROPRO project, final meeting (21-22 june 2017)	Poster	Local, regional and nationalpolicy makers, farmers, scientists	120

Demonstration day in Akershus County 18th of October 2017

Photos: Jannes Stolte

TEMA

forskning.no

Forskning & utdanning

Undersøker mystisk leir

– CO2-utslippene økte i fjor

Slik skal forskerne redde europeisk jord

Nå blir det et slit å være meldugg

Newspaper article (NATIONEN)

The **SOILCARE** project is a 5 year project aimed at identifying and evaluating promising soil improving cropping systems and agronomic techniques increasing profitability and sustainability across scales in Europe.

The SOILCARE project consortium consist of 28 partner institutes from 10 European countries
The SOILCARE project is coordinated by ALTERRA, Wageningen UR, The Netherlands.

• Starting date: March 1st 2016. • Ending date: February 28th 2020. • EU contract number: 677407

EU project officer for SOILCARE: **Aneta Ryniak** – aneta.ryniak@ec.europa.eu
Project coordinator: **Dr. Rudi Hessel** – rudi.hessel@wur.nl – tel. +31 317 468530

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Biological loosening in Kongsvinger

Introduction

The use of larger and heavier machinery increases the risk of soil compaction. This results in reduced air volume, increased soil density and poorer infiltration. Subsoil compaction as a result of e.g. harvest under moist conditions is often difficult to reverse. Furthermore, mechanical soil loosening is costly (diesel + labour), and might result in increased soil compaction.

Biological loosening in Kongsvinger

The study site in Solør-Odal (Roverud, Kongsvinger) was established in spring 2017 in a field previously used to study soil compaction. In the compaction study in 2015, subsoil compaction was measured to 60 cm depth. The aim of the SoilCare experiment is to investigate the effect on soil structure through soil loosening by plant roots (biological soil loosening, biodrilling) in compacted silt soil. Alfalfa (*Medicago sativa*) and "rybs"(*Brassica rapa* ssp. *Oleifera)* are grown in crop rotation with barley.

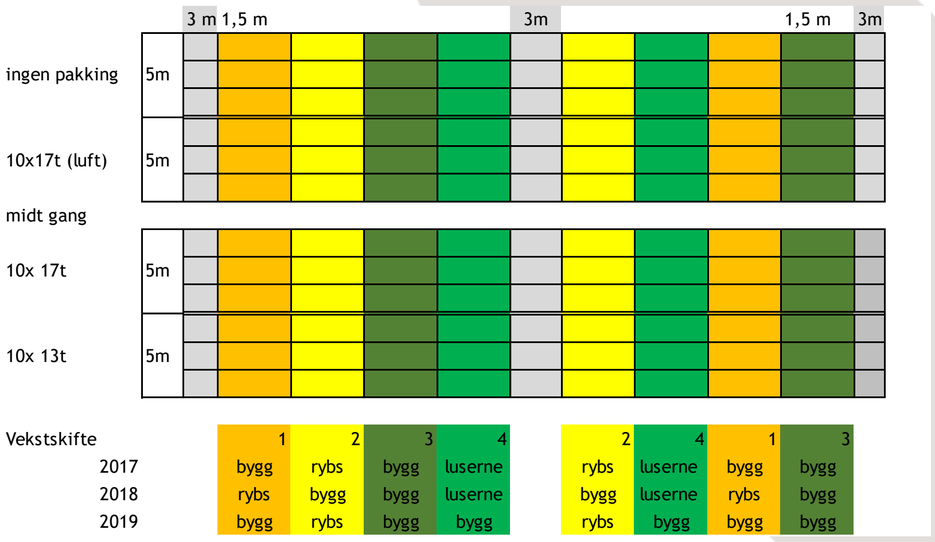

Figure 1: Plan 2017-2019

Photo: Till Seehusen

Plan and progress

Soil sampling are planned to be carried out in 2018 and 2019. Soil samples will be analysed for air permeability, density and pore size distribution. Furthermore, pre-compression samples for soil stability and yield analysis will be carried out.

Photo: T. Seehusen

Consequences of soil compaction

Soil compaction occurs when pressure applied to the soil exceeds the capacity of the soil to withstand the load resulting in permanent damages. Thus, soil particles are pushed together and the number of large and medium pores decreases. Increasing compaction pressure causes damages to the aggregates and the soil structure. Damages to the soil structure causes decreased root growth and reduced water infiltration, which might increase denitrification, reduce efficiency of fertilizers and increase greenhouse gas emissions. In moist conditions, standing water might increase erosion. In dry conditions, layers of dense soil might reduce water transport through soil profile resulting in water deficiency. Use of heavy machinery during non—ideal conditions might cause soil compaction below the plow layer. As neither climate processes, soil management measures or plant roots affects the soil in deeper layers, damages below 50 cm are considered permanent.

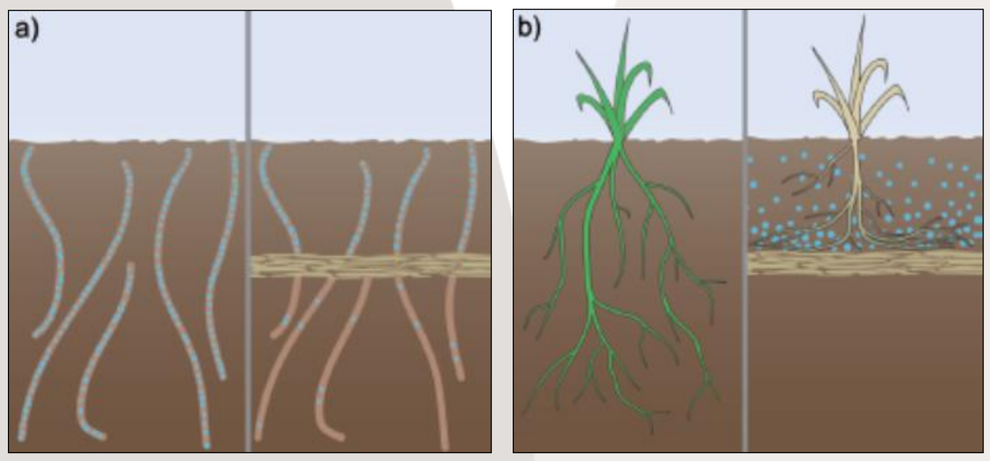

Figure 2. Soil compaction results in reduced water transport (a) and reduced root growth and infiltration (b). Source: www.umwelt.nrw.de

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Cover crops in Øsaker and Precision Agriculture (PA)

Introduction

Traditionally, cover crops are implemented to prevent losses of nitrogen and protect the soil from erosion during autumn and winter. Further, cover crops might be beneficial to soil carbon stocks, crop yields, physical properties and hydraulic properties etc.

Cover crops in Øsaker

The study site in Øsaker (Østfold county) is located in southeast Norway. In collaboration with the Norwegian Agricultural Extension Service, a field with 5 plots and 3 replicates was established in spring 2018 to investigate cover crops sown in spring cereal at two different timings (spring and autumn). Different mixtures of cover crop seeds were chosen. Cover crops mixture sown includes two mixtures, one more nitrogen fixating than the other.

Selection of cover crops

In spring the following cover crops are sown: Chicory (*Cichorium intybus)*, perennial ryegrass (*Lolium perenne*) and alfalfa (*Medicago sativa).* Furthermore white clover *(Trifolium repens),* "Birdsfoot trefoil" (*Lotus corniculatus*) and crimson clover *(Trifolium incarnatum).* Autumn mixtures are planned to be sown in autumn.

Status and plan

The cover crop seeds will be sown as soon as they arrive. Soil profile samples exists from 2016. Soil sampling are planned to be carried out to investigate the effect of cover crops on soil organic matter (SOC), mineral nitrogen and the physical parameters bulk density and soil aggregate stability. Further, infiltration tests and crop yield analysis will be carried out.

Challenges

The original plan was to conduct experiments in a cover crop field in Akershus County. The experiment was limited to the study of cover crops sown in late summer/early autumn. The second year cover crops were not to be sown in the defined plots, restricting the possibility to monitor the effect of cover crops throughout the project period. Thus, the relocation of the study site resulted in a delayed start in spring 2018.

Photo: Else Villadsen

Precision Agriculture in Apelsvoll

NIBIOs Center of Precision Agriculture (CPA) develops control systems for autonomous electrical vehicles. In the SoilCare project the method is tested in relation to reduce soil compaction.

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