

Effects of foundry sand addition on trafficability, yield and CO₂ emission from an cultivated peat soil

BACKGROUND

The aim of this experiment is to investigate if the addition of foundry sand to the top soil of a peat soil will improve the trafficability without increasing the CO₂ emission rate or lowering the yield.

A field experiment was set up at a former cultivated, but now abandoned, fen peat. In the EU-funded CAOS (2015-2017) and PEATWISE (2017-2020) projects, we compare trafficability, yield and CO₂ emission from plots sown with *Phleum pratense* and treated with 0 cm, 2.5 cm or 5 cm foundry sand.

The sand was applied in the autumn of 2015 and mixed in the top 10 cm of the soil (Fig. 1). Penetration resistance was measured 10 times per plot down to a depth of 50 cm with a penetrometer from Eijkelkamp once a year. CO₂ emission from the soil was measured every second hour with automatic chambers from ADC Bioscientific during the snow free season 2015 – 2017.

CONCLUSIONS

The average CO₂ emission rates were lowest from the treatment where 5 cm of foundry sand was added and highest from the reference-plots. The yield was highest from the plots with 5 cm sand added. No consistent significant difference in penetration resistance in the horizon 10-20 cm could be shown.

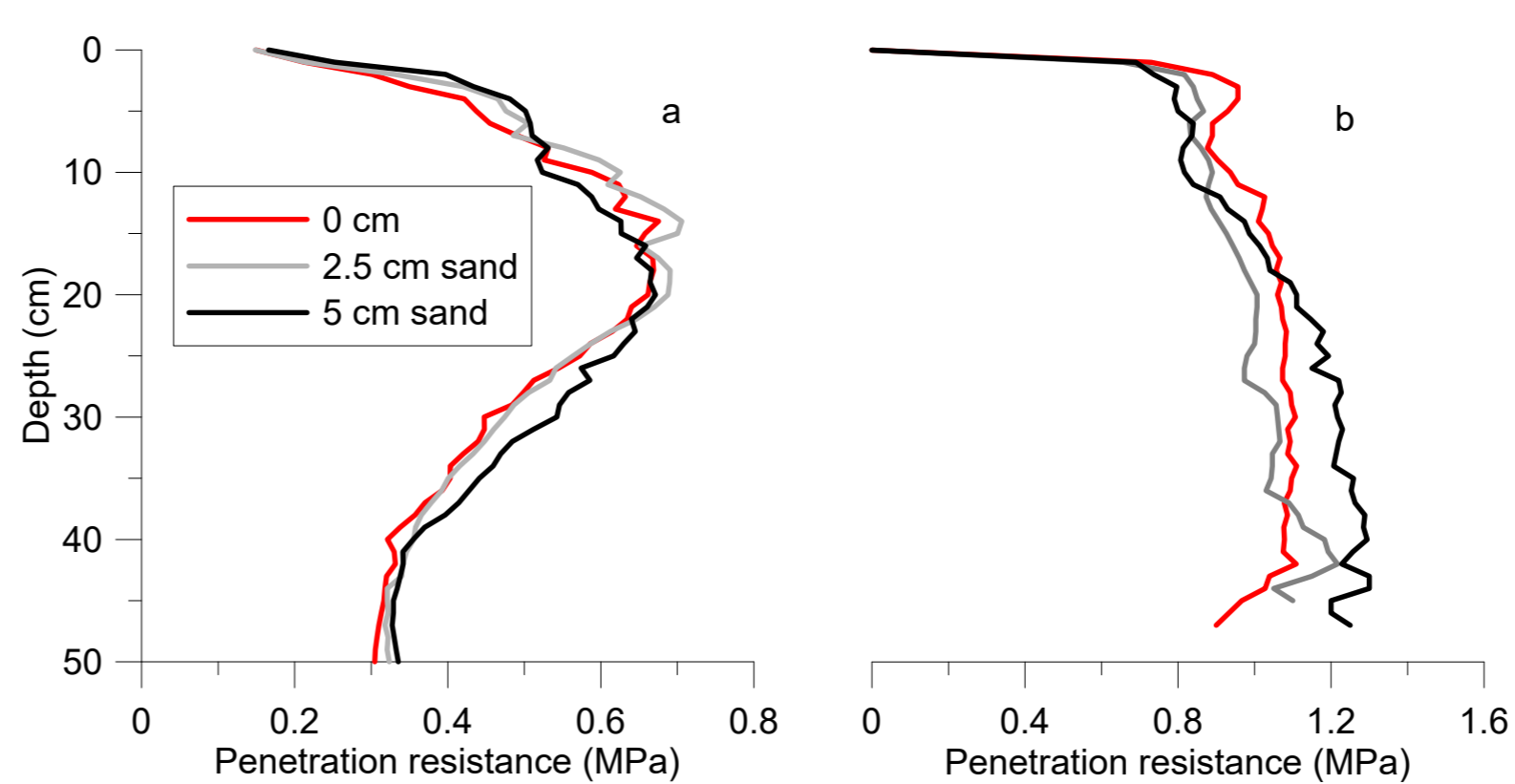


Figure 2. Penetration resistance 2016 (a) and 2017 (b). Average of 10 measurements per plots and 3 plots per treatment.

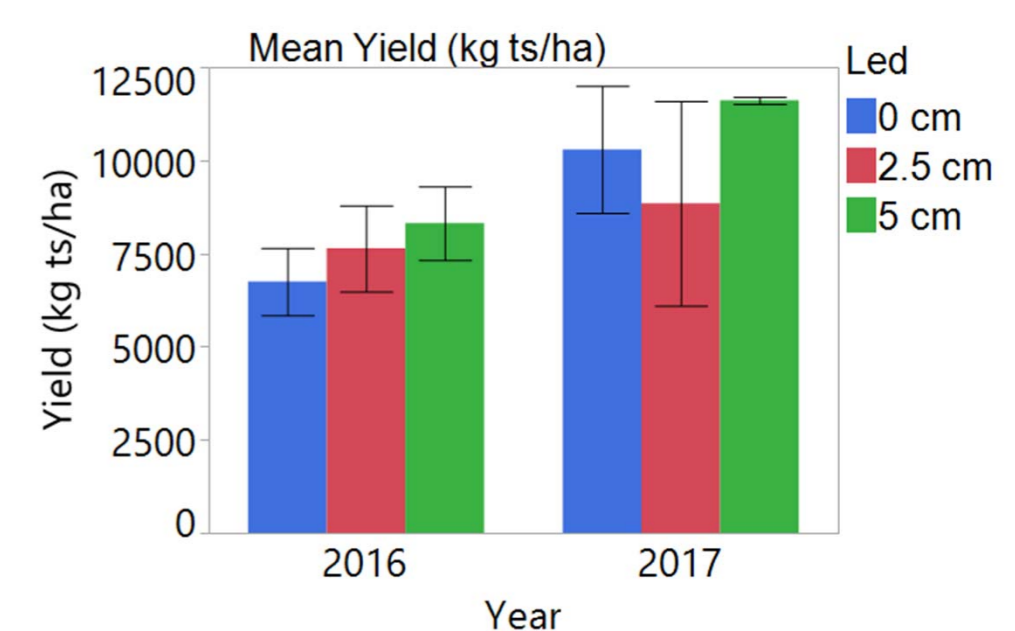


Figure 3. Yield 2016 and 2017 (kg ts/ha).



Figure 1. Foundry sand spread on Broddbo field trial.

RESULTS

The trafficability was slightly higher for the plots with sand addition 2016 but the opposite was found 2017 despite you really can feel that the stability has increased just by walking at the site. The average yield from the 5 cm treatment was 23% and 13% higher than from the plots with no sand addition for 2016 and 2017 respectively, but the differences were not significant (Fig. 3).

The average CO₂ emissions were lowest from the treatment with 5 cm foundry sand (Table 1, Fig. 4).

Table 1. CO₂ emission (μmol/m²/s)

Treatment	2015	2016	2017
0 cm	3.4	5.1	5.9
2.5 cm	1.8	6.1	4.9
5 cm	1.4	4.3	4.5

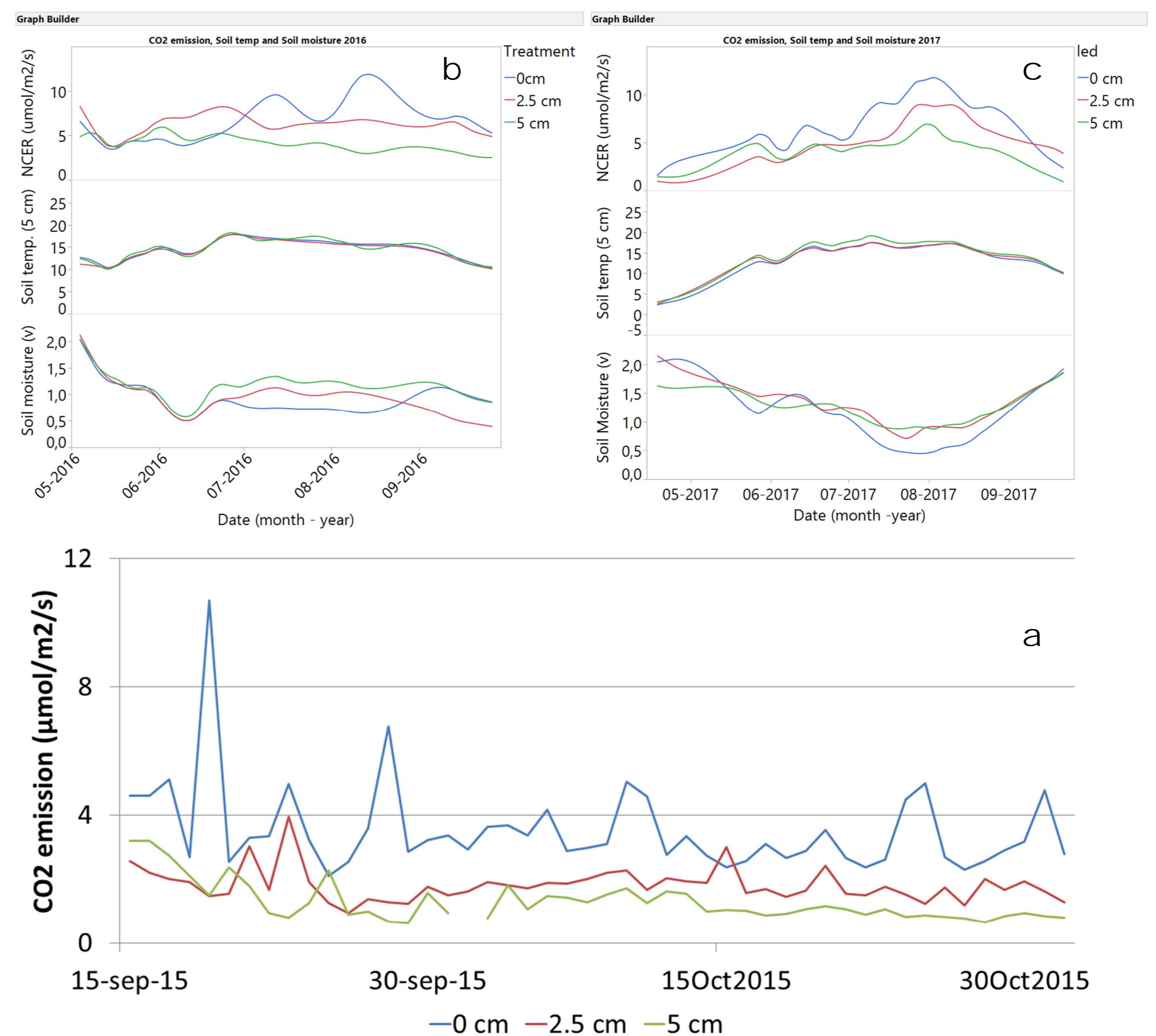


Figure 4. CO₂ emission 2015 (a) and CO₂ emission, soil moisture (higher V means wetter), soil temperature (5 cm depth) 2016 (b) and 2017 (c) in plots with 0, 2.5 and 5 cm of foundry sand added.