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Titel

Yield effects of soil compaction after different wheeling intensities on a silt soil in Norway

Abstract

Climate change with a higher amount of rain during harvesting increases the need for efficient harvesting and transport which leads to use of more effective and heavier machinery with an enhanced risk for compaction. Soil compaction is known to reduce the production capacity of a soil and can have severe negative ecological consequences and may reduce the production capacity of soils. Heavy loads can enhance subsoil compaction which is considered to be irreversible.

The effect of contrasting wheeling frequency (1x; 10x) and different wheel loads on the bearing capacity of a silt soil was studied in cooperation project between NIBIO (Norway), Christian-Albrecht-Universität Kiel (Germany) and Norwegian University of Life Sciences (Norway). Furthermore it is examining the influence of the use of typical (Norwegian) transport equipment (cereals, potatoes) with differing loads (12Mg; 16Mg total weight) and inflation pressure on soil physical parameters and yields under the climatic conditions of SE Norway.

Field measurements and sampling took place at Kongsvinger (60.25° N and 11.08° E) in SE Norway in June 2015. The soil is characterized as silt soil with 82% silt in the topsoil, overlying silt (84%).

Unloaded reference plots and loaded wheel tracks were sampled by taking undisturbed and disturbed soil samples (20, 40, 60 cm depth) to determine soil physical parameters. Soil bearing capacity was measured by determining precompression (PC). Stress propagation during wheeling was measured with a Stress-state and displacement stress transducer systems (SST, DTS). Yields of barley yields were monitored on unwheeled and wheeled plots two years after compaction.

We will present both the results from the soil physical analyses and use of the compaction verification tool (CVT) in addition to the results from the SST/ DTS measurements. The yield effect of compaction will be illustrated by showing the yield data (barley) for wheeled and unwheeled plots for the 2 years after the compaction. First results show that the compaction had significant effects on the yields, but may have a positive yield effect under certain condition.