

MSc. Thesis: Modelling the potential to increase yield stability under extreme weather by managing soil physical properties

Background:

Climate change has already shown to increase the frequency and intensity of extreme weather events such as droughts and wet spells in Sweden. To ensure food security in the future, food production systems must be resilient towards such weather extremes. Soil physical properties play a key role in this respect. This is because they control the ability of soils to infiltrate, retain or drain water as well as regulate the growing medium for crops. Next to inherent soil properties such as soil texture, soil physical properties are strongly determined by soil management practices, for example, the choice of tillage, crop rotation, or the application of organic fertilizers. These management practises present a window of opportunity to achieve yield stability by managing soil physical properties and thereby ensuring food security under present and future climate.

Objective:

The objective of this MSc. Thesis is to investigate the potential to increase yield stability under extreme weather by modifying soil physical properties. This will be done using a modelling approach: first, a soil-plant model (e.g. STICS or COUP model) will be set up and calibrated for two sites near Uppsala representing different soil properties with respect to soil texture and organic matter contents. Subsequently, various soil physical properties, in particular the ones controlling soil water routing and plant water supply, will be adapted within ranges that can be achieved with common soil management practices.

In summary, this study will help answering the important question whether common soil management practices have the potential to increase yield stability under extreme weather, or whether other management strategies need to be explored.

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