Sveriges lantbruksuniversitet
Swedish University of Agricultural Sciences

Department of Soil Science
Agricultural Water Management

1 December 2025

MSc thesis /intern project
Soil Science and Environment; Agricultural Water Management

Exploring water-related yield gap for Swedish cereals

Analysis for yield gaps due to water shortage/stress (so-called "Water yield gap analysis") is not well developed for Swedish growing conditions. This work aims to investigate yield development in Swedish rainfed systems, and using harvest data from the last 10-20 years to investigate yield gaps related to water shortage and excess, so-called * Water yield gap * (see e.g. FAO 2015). The aim is to understand how large the yield gap is, related to water such as varying rainfall patterns and thus lack of water and/or too much water. The study will also explore whether there are so-called stagnant yield levels in certain crops and/or regions (or not) which may be important to understand when intensifying cropping systems in a more variable climate.

There is quite a lot of (water-related) yield gaps internationally (https://www.yieldgap.org/ mainly for drought, but considerably less information on yield response for too much water (water saturation). An example of an analysis of Swedish yields based on regions and climate can be found here Sjulgård et al 2022, as well as by De Toro et al 2015. However, these do not account for management or e.g., practises of agricultural water management such as irrigation or drainage.

One aspect of the study will be to relate yield levels to existing area of drainage, which may explain whether different yield outcomes are found depending on drainage/cover ditching or not in a given region. Examples of research questions (depending on data availability):

- How much yield variation for main crops can be related to too much water/lack of water at the national/regional level
- How does actual yield change in relation to potential yield based on too much water/lack of water? Can local needs for irrigation be estimated based on this?
- (Assuming that data on drainage-cover ditching is available). Can drainage-tile drain increase yield (close the yield gap) during wet/dry seasons vs. undrained soil?

Contact: Jennie BARRON (jennie.barron@slu.se) Professor Agricultural Water Management