

# Can hyperspectral measurements and machine learning track soybean leaf senescence?

## Master thesis call

In this master thesis you will explore the capabilities of spectral sensing in combination with machine learning to investigate the senescence dynamics of soybean under field conditions.

**Background:** The senescence behaviour of plants is important to understand the plant genome by environment interaction. Additionally, in many species it is correlated to yield, which also makes it an important trait for crop management and plant breeding. During senescence, the plant nitrogen is remobilized and chlorophyll is degenerated in leaves, which reveals the carotenoids – making the leaf colour changing from green to red, yellow and brown.

Spectral remote sensing allows measuring the intensity of light as a function of its wavelength – basically seeing the beautiful colours of nature well beyond the capabilities of our eyes. Thus, it allows to measure the pigment (chlorophyll, carotenoids) content in leaves.

**Research Approach:** In this master thesis you will explore the capabilities of spectral sensing in combination with basic machine learning to investigate senescence dynamics of soybean under field conditions. During the senescence phase of soybean you will take regular measurements of soybean leaves at the ETH research station in Eschikon. You will analyse the data with state-of-the-art tools and compare the results to classical approaches. As a result, the senescence process of leaves can be monitored.

**You will learn** skills in spectral remote sensing, machine learning analysis and field phenotyping.

**We are looking for** a motivated master student with interest in precision phenotyping willing to learn novel analysis procedures and their application in the field. Basic knowledge of data handling (e.g. in excel) is required and basic programming skills (e.g. R programming) are beneficial. However, the machine learning tools will be provided and can be controlled by a simple user interface. This project will start preferably in July or early August 2018.

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