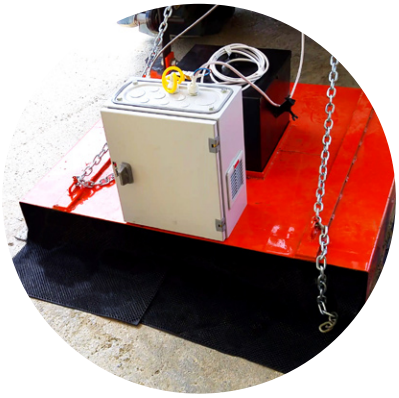
MOBILE SOIL SENSOR SYSTEM

A system based on a mobile soil sensor measuring visible and near-infrared spectra developed to estimate spatio-temporal distribution of specific soil quality indicators



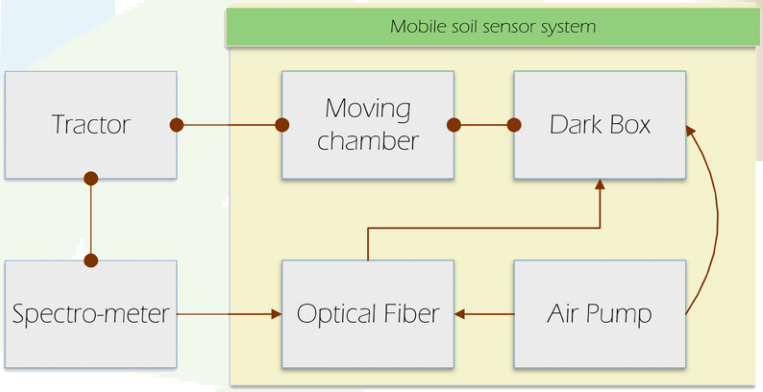
CROPS

Pilot crops will be selected to validate the system. The selection of the crops will be mainly based on the ability of the product to reach a **higher value** by improving its quality features. Wheat for example is a crop that can produce a higher quality seed (% protein) by accurate and appropriate application of fertilizers.

SOIL QUALITY INDICATORS

The selection of soil indicators to be determined will be based on an algorithm that estimates the N-fertilization demand of crop based on soil measurements. Such indicators can be soil texture, organic matter and nitrogen.

The scope is to investigate the ability of soil to provide nitrogen to the crop, thus determining the amount of N-fertilization that needs to be added.



OPERATION OF THE SYSTEM

Measurements will be conducted at bare soil, before the crop emerges. The core of this system is a sensor placed in a dark box, i.e. shielded from the sunlight, and is lit inside using lamps, enabling it to operate under variant ambient light conditions. The measured vis-NIR spectra are correlated with soil indicators, highlighting the status of the soil. This **dark box is driven by a tractor** and within it a spectrometer operates which acquires the soil spectra (350 – 2500 nm). To ensure optimal results, the illumination conditions and the driving speed were optimized to enhance the SNR (signal to noise ratio).

ADVANTAGES

Soil spectroscopy is utilized, providing some advantages over lab analyses such as the low cost of the measurements, the high density of sampling points and the **value determination in real time**. In the future, the system can be combined with a fertilization spreader in order to apply the fertilizers simultaneously with the measurement.

EXPECTED BENEFITS

Expected benefits of the system are:

- Application of **accurate fertilization**, avoiding leaching and ensuring yield
- **Accurate spatial distribution** of the fertilization which can benefit farmers that may use less fertilizer than the crop demands (to minimize cost). In such a case the famer can optimize the use of the fertilizers
- **Securing** the homogenous and satisfactory **development of the crop**, thus improving the application efficiency of a further fertilization system when the crop is grown (i.e. a system based on N-sensor). If the first fertilization fails to meet the demand of the crop, then the fertilization when the crop is grown may not be able to meet the productivity goal

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