PROJECT FACTSHEET

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PLANTSENS

Developing new methods of crop water stress detection through remote sensing and physiological measurements

Inspiration

As the demand for, and competition over, fresh water resources accelerates, scientists and policy makers around the world are seeking ways to reduce this significant environmental problem. There is intensive pressure on fresh water resources for agricultural use; in fact, the Food and Agriculture Organization (FAO) states that this sector uses more than 70 per cent of all fresh water. One of the major challenges facing the agricultural industry is water stress, when there is not enough water available to keep plant cell water concentrations at an acceptable and healthy level, resulting in plant dehydration. Water stress ultimately limits plant growth, crop yields and food quality and, as one of the most critical stressors on crops, is of paramount importance for food security worldwide.

Innovation

Past research has focused on improving knowledge of plant response to water stress, and different approaches have attempted to control water status and resist drought. The PLANTSENS project aims to develop methods for detecting crop water stress at an early stage, before it is visible to the human eye, and to assess crop water status over space and time. The project will develop and test a new method under laboratory and greenhouse conditions and then apply it to agricultural fields at an airborne or satellite level. The work will be carried out using a new Airborne Hyperspectral Thermal Imager, part of a dedicated spectral laboratory with advanced sensor systems, drones and field equipment, supported by software for image processing, geographic information systems and programming.

Impact

The new airborne imaging system will make it possible to fly over agricultural areas and acquire multiple images of high spatial resolution over different time periods. These images will not only show the fields from above in natural colours, but also measure the energy reflected and emitted by the plants in many spectral bands of the infrared region. The data in these bands can be used to assess the crop status in many different ways; for instance, the crop biomass, or their nutrient and water status. The imaging system will make it possible to see where plants are encountering favourable growing conditions and where, for instance, a shortage of water or nutrients is occuring or where plants are being affected by insects or disease. The new detection methods developed within PLANTSENS will enable agricultural actors to detect stress on crop water early on and take action to protect crops, preventing dehydration and having a positive effect on food secturity.

Partners

University of Natural Resources and Life Sciences Vienna (AT) , National Institute of Agrobiological Sciences (JP) , Trier University (DE) , University of Twente (NL)

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Contact

5, avenue des Hauts-Fourneaux
L-4362 Esch-sur-Alzette
phone: +352 275 888 - 1 | LIST.lu

Dr Martin SCHLERF (martin.schlerf@list.lu)

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