Remote sensing of potassium treatments in pepper plants using high temporal, spatial and spectral resolutions

Shahar Weksler, The Department of Geography and Human Environment, Porter School of Environmental and Earth Sciences, TAU

Supervisors:

Eyal Ben-Dor, The Remote Sensing Laboratory, The Department of Geography and Human Environment, Porter School of Environmental and Earth Sciences, TAU

Offer Rosenstein, Institute of Soil, Water and Environmental Sciences, Agricultural Research Organization, Volcani Center

Abstract:

Imaging spectroscopy is a method of measuring an object's reflectance using hundreds of spectral channels in every pixel. It is the combination of spectroscopy and chemometrics with a spatial interface. The purpose of this research is to investigate the potential of the spectral information reflected from the plants to assess potassium deficiency throughout the growing season. To this end, a new apparatus was designed and deployed to carry a hyperspectral camera above plants that are monitored, irrigated, fertigated and measured for their weight by PlantArray® system. The experiment used pepper plants in various stress treatments and was analyzed for different effects of potassium levels on the spectral information. During the growing period of the experiment, the camera captured many images during daylight condition. The images were then used to develop specific models to predict transpiration rate as well as 3 different levels of potassium in the leaves. The hyperspectral system acquired a big data set of images that were then processed by an automatic system that has been particularly developed to mask out the background from real leaves and then correlate the reflectance values with the PlantArray® data. The findings of the database analysis so far are the ability to track potassium deficiency from the spectral information, as well as new insight into spectral changes through the daylight time.