



Field spectral sampling of grapevine under different cultivation methods

Imre Potyó, Györgyi Gelybó, Szandra Baklanov, Márton Dencső, Eszter Tóth, and Ágota Horel

Department of Soil Physics and Water Management, Institute for Soil Sciences and Agricultural Chemistry, Centre for Agricultural Research

This study examines the potential in using simple dual-channel spectral reflectance sensors in monitoring grapevine vegetation. The experiment spans vineyards with different management practices located at the Balaton Uplands, Hungary (46.85037 N; 17.45955 E center coordinates, 146.9 m asl). There is no agreement in the region on the management options to be applied. Farmers frequently use combinations of different treatments and cultivation practices even within individual vineyards, sometimes even changing the applied treatments row by row. This common feature limits the possibility in assessing of the effect of management using regular large scale remote sensing approaches let that be proximal or space based. In order to represent the main categories in the region, we selected both tilled and no-till vineyards in the present study, also involving biochar as potential soil amendment and organic manure as fertilizer. In this study low cost Decagon Spectral Reflectance Sensors were installed above the vegetation in grapevine rows. Observations of Normalized Difference Vegetation Index (NDVI) and Photochemical Reflectance Index (PRI) were used to detect vegetation state and responses to treatments and environmental circumstances. At the study site and Photosynthetically Active Radiation (PAR) and global radiation (R_g) were also monitored in the course of the study during 2017 and 2018. Data retrieved from the PAR sensors suggest that the highest biomass production occurred in the case of biochar and organic manure treated plots (two year daily average of below canopy PAR = $449 \mu \text{mol m}^{-2} \text{s}^{-1}$), however biochar addition without fertilizer also showed much lower PAR values compared to the non-amended treatments ($p = 0.749$ between the two biochar amended treatments), which can signify denser vegetation compared to control. Preliminary PRI data showed that both fertilizer added and fertilizer + biochar amended treatments had low PRI values (often negative) indicating that there was no or minimal nitrogen and/or drought induced stress to the plants. NDVI values increased in biochar amended treatment compared to control; however, the organic manure and biochar amended sites had lower NDVI values compared to fertilized only plots. Similar to the PAR data, these NDVI data indicate healthier and denser (i.e. more biomass present) vegetation in fertilized plots.