USING REMOTELY SENSED (UAV) AND *IN SITU* FIELD MEASUREMENTS TO DESCRIBE GRAPEVINE CANOPY CHARACTERISTICS

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Abstract:

Context and purpose of the study - Row orientation and canopy management are essential for high quality grapevine production. Microclimatic conditions of the leaves and fruits can be influenced by the canopy geometry. Remote sensing is a very promising tool to describe vegetative growth and physiological behavior of vineyards. However, the correlation between remotely sensed data and *in situ* field measurements has been described scarcely in the scientific literature so far. The aim of the study was to correlate remotely sensed data obtained with Unmanned Aerial Vehicle (UAV) with *in situ* field measurements to describe canopy structure.

Material and methods - The experiment has been established in Borota (Hajós-Baja wine region, Hungary) in 3 repetitions with 'Cserszegi fűszeres' (*Vitis vinifera* L.) cultivar and with two row orientations (NE-SW and NW-SE) in 2016. Two canopy managements were applied: Sylvoz cordon (S; VSP) and Modified Sylvoz cordon (MS; shoots not positioned into the wires). The presented data have been collectedon 16 August 2017. Vegetative performance of the canopies has been investigated with remote sensing technique (UAV), mounted with a Parrot Sequoia multispectral (through 4 color channels: Green, Red, Red edge and NIR) and Sony RGB camera. The drone was flying at the altitude of 120 m, NDVI index map was created with the help of Pix4D, and the 3D NDVI figure was generated with MATLAB software. Canopy size and structure were evaluated by using a Smart phone application, i.e. VitiCanopy software (De Bei et al., 2016) and the Point Quadrat (PQ,) method (Smart and Robinson, 1991). PQ data were recorded as leaf layer number, percentage of interior leaves, average canopy thickness.

Results - The photosynthetically active canopy surface proved to be larger for Modified Sylvoz cordon, which was well reflected in*UAV NDVI* and *3D NDVI* data. Field measurements also support this observation. *VitiCanopy LAI* values clearlypresented this difference as well. *Point Quadrat* assessment drew attention to wider canopy and slightly higher interior leaves of MS cordon. Differences between row orientations need further refined studies. The MS system results in higher yield and needs less labour (only 2 mechanical trimming in the growing season) and in addition, seems to be more suitable for the desired wine style (fully aromatic fresh white wine) in the given terroir.

Keywords: Canopy structure, UAV, 3D NDVI, Smart phone application, Point Quadrat

1. Introduction.

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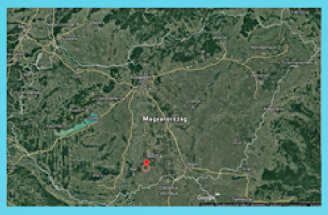
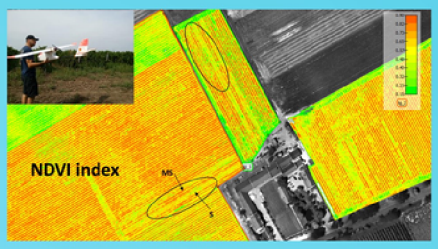


Sylvoz

Modified Sylvoz



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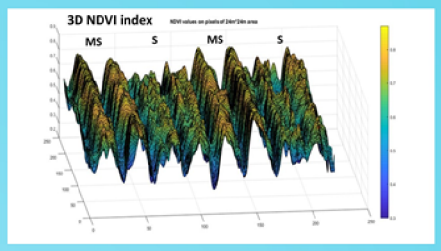

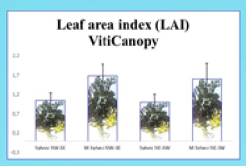

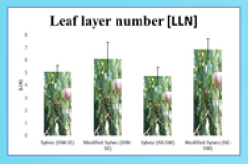

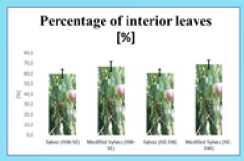

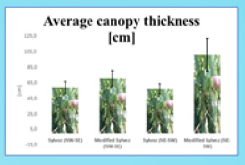

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