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Applicability of remote sensing in weed detection

Éva Lehoczky (1,2), Péter Riczu (3), Nikolett Mazsu (1), L. Viktória Dellaszéga (1), and János Tamás (3)

(1) Institute for Soil Science and Agricultural Chemistry, Centre for Agricultural Research, Hungarian Academy of Sciences, Budapest, Hungary, (2) Eszterházy Károly University, Institute of Agricultural Sciences and Environmental Management, Faculty of Agricultural Sciences and Rural Development, Gyöngyös, Hungary, (3) University of Debrecen, Institute of Water and Environmental Management, Debrecen, Hungary

Maize is one of the most important crop in the word, as food and forage point of view as well. Today, production area is more than 180 million hectare and production quantity exceeds 1 billion tons per year (FAOSTAT, 2018). Weeds compete with cultivated plants for water, nutrient and light, thus weeds strongly influence the profitability of crop production. Traditional and modern methods are available to detect weed patches on the field. Modern remote sensing techniques are ideal for fast, effective surveying of weeds on larger area. Nevertheless, the novel techniques and mathematical algorithms provide to discriminate weeds from cultivated plants.
The investigation was carried out near Nagyhörcsök, Hungary (N46°51'54", E18°36'28.8") in a long-term fertilization experiment, which was set up in 2003. Weed survey was proceeded on herbicide-free, weedy plots of five treatments (control, PK, NK, NP, NPK) in six replications, on 3th June 2014 five weeks after maize sowing (BBCH 12-14). In order to survey each investigated parcels, two digital cameras were applied. The vigour status of the parcels were measure by the Tetracam ADC multispectral camera, which calculated NDVI values from red and infrared channels. The lowest NDVI values were observed at the control plots (NDVI=0.40) and the highest vegetation activity was in NPK treatment (NDVI=0.52).
The other instrument was a simple, commercially used digital camera (Panasonic DMC-TZ40). Processing the high resolution digital images, canopy coverage of each parcel was calculated; furthermore, weeds and maize could be digitally separated from each other. Compared NDVI values (from Tetracam ADC) and canopy coverage (from the Panasonic DMC-TZ40 camera), a strong correlation (R2=0.71) was detected.
Using the regression equation of trend line (y= 12232x – 53.176, where x is the NDVI values), canopy coverage (y) can be estimated based on multi-, or hyperspectral terrestrial, airborne and commercial spaceborne images.

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