



Remote sensing applications in evaluation of cadmium pollution effects

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According to the 21st century developments in information technology the remote sensing applications open new perspectives to the data collection of our environment. Using the images in different spectral bands we get more reliable and accurate information about the condition, process and phenomena of the earth surface compared to the traditional aircraft image technologies (RGB images). The effects of particulate pollution originated from road traffic were analysed by the research team of Department of Meteorology and Water Management (University of Pannonia, Georgikon Faculty) with the application of visible, near infrared and thermal infrared remote sensing aircraft images.

In the scope of our research was to detect and monitor the effects of heavy metal contamination in plant-atmosphere system under field experiments. The testing area was situated at Agro-meteorological Research Station in Keszthely (Hungary), where maize crops were polluted once a week (0,5 M concentration) by cadmium. In our study we simulated the effects of cadmium pollution because this element is one of the most common toxic heavy metals in our environment. During two growing seasons (2011, 2012) time-series analyses were carried out based on the remote sensing data and parallel collected variables of field measurement. In each phenological phases of plant we took aerial images, in order to follow the changes of the structure and intensity values of plots images. The spatial resolution of these images were under 10x10 cm, which allowed to use a plot-level evaluation. The structural and intensity based measurement evaluation methods were applied to examine cadmium polluted and control maize canopy after data pre-processing. Research activities also focused on the examination of the influence of the irrigation and the comparison of aerial and terrain parameters.

As conclusion, it could be determined the quantification of cadmium pollution effects is possible on maize plants by using remote sensing technologies. The adverse effects on maize appear not immediately. During the growing season, the cadmium accumulation in plants caused slow changes and disorders that caused changes in structure and intensity values of the images. Consequently, the cadmium polluted and control plants could be differentiated by the average values of the intensity. According to our expectation the average intensity values showed decreasing tendency effect of cadmium pollution and the irrigation influences the effect of cadmium contamination.

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