Geophysical Research Abstracts
Vol. 14, EGU2012-2783, 2012
EGU General Assembly 2012

Field effects of cadmium contamination in the radiation characteristics of maize

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Cadmium is one of the most common toxic heavy metals in our environment. Cadmium is a particularly dangerous element, because it dissolves readily, making it easily available to plants. It is thus able to accumulate in various links in the food chain, finally reaching humans, at the end of the chain. Adverse effects on human body was reported in 1858 at first. If it enters the body, damage to health, cause changes and can also cause cancer. Our study was designated to simulate the effects of cadmium on maize in field conditions, during the 2011 growing season. The impact of cadmium on maize was investigated at the Agro-meteorological Research Station in Keszthely. A Swiss-bred maize hybrid, Sperlona (FAO 340), with a short vegetation period, was sown in the experiments at the plant density (70,000 plants per hectare) widely used under Hungarian climatic conditions for growing grain maize. Effects of cadmium on corn life were studied under two water supplies. Evapotranspirometers of the Thornthwaite type were used for the “ad libitum” treatment and the the rainfed variant was sown in field plots. 0,5 M concentration of cadmium was used, which was sprayed weekly. The aim of the investigation was to simulate impact of atmospheric pollution of traffic origin (low and frequent doses in the field). Plant height was registered weekly similarly to leaf area index (LAI). Albedo was measured by pyranometers of the CMA-11 type (Kipp & Zonen, Vaisala). From this the most important radiative properties were calculated, so the net radiation balance, latent heat, sensible heat and the Bowen ratio.
The values of LAI for the cadmium contaminated maize were significantly lower compared to the control maize. The net radiation balance was about the same in both treatments. Cadmium causes the latent heat decreased, while the sensible heat increased compared to the control treatment. The Bowen ratio in the polluted crops was higher, than the cadmium-untreated area. The yield of maize declined as a result of cadmium pollution. The number of distorted cobs increased on a very high extent. It means that both the quantity and quality of yield deteriorated in cadmium polluted fields.

This article was made under the project TÁMOP-4.2.1/B-09/1/KONV-2010-0003 and TÁMOP-4.2.2/B-10/1-2010-0025.
These projects are supported by the European Union and co-financed by the European Social Fund.