



Macro- and micro element enrichment in the runoff transported sediment on Hungarian agricultural watersheds

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The social and economic changes of the past twenty years have greatly affected the rural areas of Hungary, therefore the element transport, element balance of the agricultural areas has altered to a great extent. The changes of land use, changing some arable lands into monocultural vineyards, the privatisation of arable lands, the size changes of plots and their cultivation parallel to slope, all result in the increase of erosive and nutrient wash-off processes.

The studied areas are situated in the catchment area of Lake Velence in North-West Hungary and in the Szekszárd Hills in South-West Hungary. The climate of these areas is moderately cool and dry. The annual average temperature is 9.5-9.8 °C; the volume of rainfall is 550-600 mm, with 50-55 % in form of severe summer rainstorms. The land use of the studied plots is vineyard and arable land. The soil type in the catchment area of Lake-Velence is calcic Chernozem, and in the Szekszárd area is calcic Luvisol. The soil texture is a combination of loam and sandy loam. The average angle of slope is 4°, ranging from 1° to 6°.

Measurements with sediment collectors were between 2004-2008 on two slopes in each area. The collectors were spaced at a distance of 25 m over a total length of 150-350 m. On the slopes (vineyard and arable land), we measured element redistribution due to rainfall with sediment collectors. The enrichment ratios (ER) (Duttmann, 1999; Boy & Ramos, 2002; Zhang et al., 2004) as a quotient of the concentration measured in the topsoil with that in the sediment were calculated. The sediment build-up in the collectors and the topsoil around the collectors was gathered after rainfall events. We calculated enrichment ratios as follows:

$ER(\text{element}) = \frac{\text{Element concentration}(\text{sedim.})}{\text{Element concentration}(\text{soil})}$

The soil properties and elements taken into consideration included: pH (H₂O), particle size distribution (%), organic matter content (OM, %), AL-P₂O₅ content and microelement (Zn, Cu, Ni, Pb, Cd) content. The tests were carried out in accordance with the current Hungarian Standards. In the case of microelements, measurements are made using aqua regia digestion with a Perkin Elmer AAS (Atomic Absorption Spectrometer) 3110.

The presentation shows the enrichment ratios of OM, clay fraction, AL- P₂O₅, Zn, Cu, Ni, Pb and Cd in the runoff transported sediment. Statistical analysis were made between the enrichment ratios and the different soil properties, land use and rainfall conditions.

Our results demonstrate the connections between the factors affected to the element transport processes on agricultural lands.