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Wind Erosion Contribution to Pesticide Transport

Katalin Csányi, Károly Barta, József Szatmári, and Andrea Farsang

Department of Physical Geography and Geoinformatics, University of Szeged, Szeged, Hungary (katus.csanyi@gmail.com)

Although 40% of Hungary's territory is very sensitive to deflation, few studies have been conducted on wind-eroded sediment as an environmental pathway for pesticide transport.

Three experiments were conducted on loam soil and another in sandy soil near Szeged (Hungarian Great Plain) in 2017, 2018, 2019, to examine wind-eroded sediment as a transport mechanism for two surface-applied pesticides [chlorpyrifos and pendimethalin].

For the experiments we used a portable 12 m long wind tunnel and a Wet Active Sediment Trap (WAST). WAST is a horizontal, isokinetic active wet trap that is patterned at different heights to collect the suspended soil fractions. Trap inlets are 5-10 cm, 20-25 cm, 50-55 cm high. Rolling soil samples (sediments) were also collected in a recessed tray at the end of the wind tunnel with a clean brush.

Before the experiment, a part of the sample area was treated with chlorpyrifos (2l/ha) and pendimethalin (5l/ha). A control area was also selected. Samples were taken before and after the wind event at 3 different places in the wind tunnel.

In the laboratory we analyzed the topsoil samples (pH (H₂O), CaCO₃ (%), Arany yarn test, OM %, total salt content (%), humidity (%), pesticide contents) and the collected sediments (chlorpyrifos, pendimethalin concentrations) according to Hungarian standard procedures.

We calculated the enrichment ratios (ER) of concentrations in the rolling and suspended samples.

Our measurements showed that the enrichment of chlorpyrifos and pendimethalin can be clearly indicated in the sediments. The mean value of chlorpyrifos ER in 2017 is 3.4. In 2018 the mean value of chlorpyrifos ER is 2.9 and of pendimethalin ER is 13.7. Pendimethalin ER is much higher in the rolled fraction than chlorpyrifos. Measurements of 2019 showed us that the analyzed pesticides were enriched in the rolling soil fraction. There were no pesticide enrichment in the suspended fraction.

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