



Potential environmental impacts of powders of agricultural origin, with particular regard to the effects of pesticide, Southern Hungary

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

University of Szeged, Faculty of Science and Informatics, Department of Physical Geography and Geoinformatics, Szeged, Hungary (csanyi@geo.u-szeged.hu)

Nowadays, intensive soil use, inadequate agricultural cultivation and agrotechnics lead to an increase in soil deflation sensitivity. Due to the increasing dust load, we have to consider their environmental and human health effects as well. The agricultural land surrounding urban environments can contribute to the accumulation of pesticides in urban areas due to the delicate soil particles transported by the wind, water, etc. For this reason, it is important to examine the spatial and temporal variations in the harmful and pollutant content of the topsoils. In addition to the amount of material discharged, the composition of the material, the content of organic matter and the pollutants must be examined. These effects can be tested by in-situ wind tunnel experiments. The aim of the research was to evaluate the potential risks of agricultural dusts with using portable wind tunnel.

The wind tunnel experiments were conducted on a Chernozem soil in summer of 2017 and 2018 near Szeged, Southern Hungary. Before the experiment, a portion of the sample area was treated with chlorpyrifos in 2017 and chlorpyrifos and pendimethalin were used in 2018. A control area was also selected. In the summer of 2017 and 2018, a total of 28 wind event experiments were conducted. Two types of traps were used to collect suspended soil particles during the in situ wind tunnel experiments: MWAC traps and WAST active wet traps. We used BWS-60 soil weighing scales situated below the wind tunnel in order to measure the amount of soil removed. Samples were taken from the topsoil before and after the wind event, then we performed different soil tests:

In the laboratory we examined the topsoil samples (pH (H₂O), CaCO₃, Arany yarn test, OM %, total salt content, humidity, heavy metal content (Cu, Zn, Mn, Co, Pb, Cr, Ni) pesticide content and the collected dust samples (chlorpyrifos, pendimethalin, heavy metals). An ICP-OES spectrometer was used to determine the heavy metal content. Pesticide measurements are made using LC-MS. The tests were carried out in accordance with the current Hungarian Standards.

The extent of soil loss due to different wind events was determined. If the amount of the transported soil material is known, we can quantify the amount of pollutants transported from the arable land per wind event.

The enrichment ratios (ER) as a quotient of the concentration measured in the topsoil with that in the sediment were calculated: $ER(\text{element}) = \frac{\text{Element concentration}(\text{sediment.})}{\text{Element concentration}(\text{soil})}$.

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