

EGU2020-9507

<https://doi.org/10.5194/egusphere-egu2020-9507>

EGU General Assembly 2020

© Author(s) 2020. This work is distributed under the Creative Commons Attribution 4.0 License.



## Pesticide concentrations in hydraulic shortcuts exceed environmental quality criteria

**Anne Dax**, Urs Schönenberger, Birgit Beck, Bernadette Vogler, Heinz Singer, and Christian Stamm  
eawag, Environmental Chemistry, Switzerland (anne.dax@eawag.ch)

Agricultural pesticides can enter surface waters through various pathways and impair the water quality. In the past, numerous studies have been conducted for certain entry paths such as surface runoff, direct drift into water bodies or preferential flow to drainage systems. Man-made hydraulic shortcuts (e.g. road storm drains or manholes of tile drainage systems) might potentially also play a major role for pesticide inputs into surface waters. However, they have been largely overlooked in the past. This study is the first one to measure pesticide concentrations in hydraulic shortcuts in agricultural catchments.

For our analysis, we selected a small catchment (2.8km<sup>2</sup>) with predominant arable land use in the Swiss Plateau. We installed a rain event-based sampling system at six locations in the catchment: water level proportional samplers at four road storm drainage inlets, one auto sampler in a manhole collecting water from the tile and road drainage system, and another auto sampler in the stream at the outlet of the catchment. In addition, we measured rainfall in the catchment as well as discharge or water level at each of the six sampling locations.

During spring and summer of 2019, samples were collected during 19 rain events. In a first step, the samples from the drainage inlets were analyzed. Liquid chromatography coupled to high-resolution mass spectrometry was used to quantify concentrations of 40 pesticides known to be applied in the catchment.

The obtained results support the hypothesis that hydraulic shortcuts can be relevant for pesticide transport. First, a wide variety of compounds was detected: 33 substances were found in the samples, 7 were not detected. Per rain event, 4 to 15 pesticides were measured on average. Second, some of the compounds were found in very high concentrations: some exceeded concentrations of 5 µg/L and reached up to 60 µg/L.

Ecological quality criteria are known for 15 of the analyzed substances. Based on the sum of the respective risk quotients, nearly a third of the samples posed an acute ecological risk. In most cases, the elevated risk could almost exclusively be attributed to the two herbicides Dimethenamide and Terbutylazine, as well as to the fungicide Epoxiconazole. Azoxystrobin, Cyproconazole, Mesulfuron-methyl, Metamitron and Metribuzin added to the overall risk to a lesser extent.

In a next step, samples taken by the auto sampler will be analyzed to obtain time series of the rain events and to link the findings from storm drain inlets to the concentration dynamics observed in the receiving drainage system and the river itself.