



A complete and continuous pesticide screening during one growing season in five small Swiss rivers with agricultural watersheds

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Agricultural pesticides are regularly found in surface waters at concentration levels that raise ecotoxicological concerns. Due to large fluctuations in concentration over time and the potentially high number of pesticides in agricultural watersheds, it is difficult to obtain a comprehensive overview of the actual pollution level. This collaborative project between research and Swiss federal and cantonal authorities aimed for a comprehensive analysis of pesticide pollution in five small agricultural streams to address this knowledge gap. The five rivers are located in catchments (1.5 to 9 km²) with intensive agriculture covering a wide range of crops, such as grains, vegetables, vineyards and orchards. Urban activities and influences are low. Twelve-hour composite samples were collected continuously from March until the end of August with automatic sampling devices, resulting in 360 samples per site. Using precipitation and water level data, we differentiated between discharge events and low-flow periods. Samples taken during dry weather were pooled for the analysis. This procedure resulted in a complete concentration profile over the entire monitoring period covered by 60 samples per site. The analysis, using liquid chromatography coupled to high resolution mass spectrometry (Orbitrap technology), involved a target screening of 248 pesticides including fungicides, herbicides, insecticides, as well as important transformation products. Data on the total number and distribution of pesticides, their detection frequency, crop specific applications and concentration time profiles will be presented. Preliminary results indicate substantial pesticide exposure since at least 20 different compounds were detected in all samples. One sample even contained a mixture of 80 pesticides. The majority of concentrations were in the low ng/L range but concentrations of a few compounds were very high (several micrograms/L) during discharge events as well as during low flow conditions and exceeded environmental quality standards (EQS).