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Monitoring peaks of pesticides during runoff events in a small vineyards catchment to prevent transfers (Loire river, France).

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The Layon river, a tributary of the Loire river, does frequently not comply with water quality standards because of some high mean day pesticides concentrations. The land use of the Layon catchment, a 1054 km2 catchment, is represented both by vines and yearly crops. Vineyards are located on the hillsides while crops are planted in flat areas. The under way project which first results are presented here aims at identifying the contribution of a small vineyards catchment of 2.2 hectares to the transfer of pesticides during runoff events. In this project, we make three assumptions (1) peaks of pesticides have the highest concentrations, (2) peaks of pesticides have a major impact on both water quality concentrations and environment in general, (3) in this particular catchment with high slopes and a sub-soil oriented as the main slope, runoff plays the main role of the transfer of pesticides. Thus, this project aims (i) to identify peaks of pesticides, (ii) to explain the main causes (hydrology, input quantities, soil conditions, topography), (iii) to predict peaks in function of rainfall forecasting.

To answer this problematic, after the delineation of the catchment (Digital Terrain Model obtained with one elevation point each 36 m2), a gauging station has been installed at the outlet of the catchment. This station has been designed not only to monitor the quantities of pesticides transferred during runoff events but also to follow the flow peaks. This station is composed of (a) an approach channel of 12 meters long for the development of uniform and symmetric flow conditions and the establishment of a stable water surface, (b) a trapezoïdal long-throated flume designed with winflume software (www.usbr.gov/wrrl/winflume/) to assess the flow rate with the water level (measured with (c) a bubbler sensor), (d) an automatic rain gauge, (e) an automatic sampler, (f) a modem and (g) a logosens (OTT®) data logger.

The rainfall runoffs following pesticides applications in 2009 have been sampled and analysed. Depending on molecules, peaks concentrations are varying between 0.2 μg/L and 386 μg/L for flows lower than 5 L/s. All the peaks of concentrations are located at the flow peak except for two molecules. Those molecules have been applied to the top of the catchment. Thus, we assume the interval between the peak of water and the peak of concentrations represent the time for a pesticide to reach the outlet during a runoff event. Discussions of results will be improved by starting researches on adsorption/desorption capacity of few specific molecules to soils components.