



Impact of agricultural practices on runoff and glyphosate peaks in a small vineyard catchment

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The Layon River, a tributary of the Loire River, does frequently not comply with water quality standards because of pesticides. Vineyard is generally denounced.

The aim of this project is to explain the transfer of pesticides during runoff events and its interaction with erosion. Pesticides and suspended particulate matter (SPM) concentrations are monitored at the outlet of the vineyards catchment each 2 minutes during floods to follow peaks. The results of three different hydrological years (2009, 2011, 2012) are exposed.

The 2.2ha catchment is composed of two main vineyards plots managed by two independent farmers. Mean slopes are of 8% and can reach 40% in terraces.

A gauging station has been installed at the end of the slope with a calibrated Venturi channel. The measurement station is composed of (a) an approach channel of 10 meters long for the establishment of a stable water surface, (b) a trapezoidal long-throated flume 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. 2009 was an average year, 2011 was particularly dry and 2012 particularly wet. Quantities of glyphosate applied were respectively 1087, 645 and 720g.

Maximum discharges in the gauging station were 5, 12 and 25L.s⁻¹. Minimum and maximum concentrations of glyphosate in runoff waters were 1-449.1 $\mu\text{g.L}^{-1}$ in 2009, 0.62-13.6 $\mu\text{g.L}^{-1}$ in 2011 and 0.1-3.7 $\mu\text{g.L}^{-1}$ in 2012. Minimum and maximum concentrations of SPM were 14-1261mg.L⁻¹ in 2009, 108- 6454 mg.L⁻¹ in 2011 and 9-1541 mg.L⁻¹ in 2012.

While flows, quantities of glyphosate applied and peaks of concentrations observed in 2011 are more important in 2009, SPM generated in the runoff waters are lower than 2011 and 2012, even though 2012 has particularly been a wet year. Also, maximum runoff coefficients are 7% in 2009 and 2011 and 57% in 2012. In fact, this latest explains differences between years better than other presented parameters. Moreover, those coefficients seem not governed by meteorological variability but directly linked with agricultural practices and in particular with tillage, not realised in 2009 as started in 2011 but increased in surface and number in 2012.

To conclude, results show that whereas glyphosate concentrations decrease while the percentage of weeded areas increases, erosion increases. In order to confirm those results, the project is now focusing on glyphosate's sorption on unstable soil's particles.

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