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Transport of cyazofamid and kresoxim methyl in runoff at the plot and catchment scales

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Surface runoff and erosion during the course of rainfall events represent major processes of pesticides transport from agricultural land to aquatic ecosystem. In general, field and catchment studies on pesticide transfer are carried out separately. A study at both scales may enable to improve the understanding of scale effects on processes involved in pesticides transport and to give clues on the source areas within an agricultural catchment. In this study, the transport in runoff of two widely used fungicides, i.e. kresoxim methyl (KM) and cyazofamid (CY) was assessed in a 43 ha vineyard catchment and the relative contribution of the total fungicides export from one representative plot was evaluated. During an entire period of fungicide application, from May to August 2011, the discharge and loads of dissolved and particle-laden KM and CY were monitored at the plot and catchment scales. The results showed larger export coefficient of KM and CY from catchment (0.064 and 0.041‰ for KM and CY respectively) than from the studied plot (0.009 and 0.023 ‰ for KM and CY respectively). It suggests that the plot margins especially the road network contributed as well to the fungicide loads. This result underlines the impact of fungicide drift on non-target areas. Furthermore, a larger rainfall threshold is necessary at the plot scale to trigger runoff and mobilise pesticides than on the road network. At the plot scale, a rapid dissipation of the both fungicides in the top soil was observed. It highlights that the risky period encompasses the first rainfall events triggering runoff after the applications. At both scales, KM and CY were not detected in suspended solids (i.e. > 0.7 μm). However their partitioning in runoff water differed. 64.1 and 91.8% of the KM load was detected in the dissolved phase (i.e. < 0.22 μm) at the plot and catchment scales respectively, whereas 98.7 and 100% of the CY load was detected in the particulate phase (i.e. between 0.22 and 0.7 μm) at the plot and catchment scales respectively. Although KM and CY have similar lab-defined properties, our results showed that their behaviour in field is different suggesting that these properties are insufficient to assess their transport and fate on site. This study highlights that assessing fungicides export at two different scales enable to improve the understanding of period and source areas of contamination within an agricultural catchment.