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# Transfer of pesticides and copper in a stormwater wetland receiving contaminated runoff from a vineyard catchment

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Wetlands can collect contaminated runoff from urban and agricultural catchments, and have intrinsic physical, chemical and biological processes useful for mitigating pesticides. However, knowledge about the ability of wetlands to mitigate pesticide mixtures in runoff is currently very limited. Our results show that stormwater wetlands that primarily serve for flood protection can also be effective tools for reducing concentrations and loads of runoff-related pesticides. Concentrations and loads of 20 pesticides and degradation products, as well as copper were continuously recorded during the period of pesticide application (April to September 2009, 2010 and 2011) at the inlet, the outlet and in sediments of a stormwater wetland that collects runoff from a vineyard catchment. Removal rates of dissolved loads ranged from 39% (simazine) to 100% (cymoxanil, gluphosinate, kresoxim methyl and terbuthylazine). Dimethomorph, diuron, glyphosate and metalaxyl were more efficiently removed in spring than in summer. The calculation of sedimentation rates from discharge measurements and total suspended solids (TSS) values revealed that the wetland retained more than 77% of the input mass of suspended solids, underscoring the capability of the wetland to trap pesticide-laden particles. Only flufenoxuron was frequently detected in the wetland sediments. An inter-annual comparison showed that changes in the removal of aminomethylphosphonic acid (AMPA, a degradation product of glyphosate), isoxaben or simazine can be attributed mainly to the larger vegetation cover in 2010 compared to 2009. More than 80% of the copper load entering the wetland was retained in the sediments and the plants. Our results demonstrate that stormwater wetlands can efficiently remove pesticide mixtures and copper in agricultural runoff during critical periods of pesticide application. Nevertheless, fluctuations in the runoff regime, as well as the vegetation and hydrochemical characteristics affect the removal rate of individual pesticides and copper in stormwater wetlands. Therefore the use of stormwater wetlands as a management practice targeting pesticide and copper mitigation should not be conceived as a unique solution to treat pesticide runoff.