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Effect of species composition on efficacy of vegetated buffer strips for herbicide runoff mitigation

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Vegetated buffer strips (VBS) may play an important role in creating and maintaining biodiversity, preventing soil erosion and contamination of superficial water bodies from plant protection products (PPPs) and nutrients, as well as in safeguarding the agroecosystem landscape. The aim of the study was to assess the efficacy of VBS with different species composition in reducing concentration of herbicides into the runoff water. Evolution in time of species composition of VBS was also monitored. Two types of VBS were tested: mix of *Festuca arundinacea* and *Trifolium pretense* (mix A) and mixture of leguminous species, including *Trifolium repens*, *T. pratense*, *Medicago sativa*, *Lotus corniculatus*, *Onobrychis viciifolia* and *Hedysarum coronarium* (mix B). Plots with bare soil without covering were included as control (check). Trials were conducted on maize, vineyard and peach orchard fields in four areas of North West Italy during 2015 - 2017. VBS were 5 m wide and were placed downhill of 55 to 200 m² plots. Plant growth was assessed periodically and VBS were mowed at 5-8 cm height at *T. repens* flowering. Runoff water were collected after each event and analysed through HPLC or LC-MS/MS analysis. Terbutylazine, S-metolachlor, mesotrione and desethyl-terbutylazine were searched in maize, while glyphosate and AMPA in vineyard/orchard. Very uniform coverage and stable composition was maintained in mix A, while dominance of one to two species (*M. sativa*, in particular) was observed in mix B. In maize, the highest terbutylazine concentration at 78 DAT was given by check plots (0.35µg/L), while lower concentrations were obtained in mix A (0.12µg/L) and mix B (0.21µg/L) plots. Similar trends were observed for desethyl-terbutylazine and S-metolachlor. In peach orchard, concentration of glyphosate at 97 DAT ranged from 0.75µg/L (mix B) to 0.13µg/L (mix A), while concentration of AMPA was always <0.1µg/L.