

Surface runoff and retention of transported pollutants in strips of riparian vegetation with and without trees

Gustavo Giaccio (1), Pedro Laterra (2), Virginia Aparicio (2), and Jose Luis Costa (2)

(1) INTA, Chacra Integrada Barrow, Tres Arroyos, Argentina, (2) INTA, Agronomy, Balcarce, Argentina
(aparicio.virginia@inta.gob.ar)

In this study, some aspects related to the effect of the crack willow (*Salix fragilis* L.) invasion on the reduction of runoff and sediment retention, glyphosate, nitrogen and phosphorus in riparian environments with herbaceous vegetation of the Austral Pampa of Argentina were analysed. In order to evaluate the influence of the willows on the filtering mechanisms, surface runoff simulation experiments were carried out in plots of 1.5 m x 2.5 m in environments characterized by the presence vs. the absence of willows. In spite of the small length of the experimental plots, glyphosate retention in the tree-less plots reached 73.6%, a higher value than that recorded in tree stands (43.8%). However, sediment, nitrogen and phosphorus retention did not vary significantly between treatments. On the other hand, the reduction of the volume of runoff in the sites with trees reached 63%, a superior value to the one registered in strips without trees (31%). The presence of trees only significantly modified the biophysical properties of hydraulic conductivity, surface roughness, aerial biomass and soil moisture, compared to areas with no trees. Partial correlation analysis for both tree and no-tree environments showed that the reduction in runoff volume increased significantly with hydraulic conductivity, soil sand content and depth at the water table, and decreased with apparent density, soil moisture and the slope of the riverbank. However, sediment retention increased significantly with aerial, mulch and root biomass and decreased with the slope of the riparian strip. Glyphosate retention increased significantly with sediment retention and decreased with the slope of the riparian strip and the mulch biomass. Nitrogen retention increased with the reduction of runoff flow, soil hydraulic conductivity and depth to the water table and decreased with slope and sediment retention. While, phosphorus retention increased with sediment retention and decreased with slope and soil content of soils. However, the mechanisms involved in the differential effect of the vegetation with or without trees could not be explained. This work emphasizes the importance of the ecosystem function of glyphosate filtration of riparian environments covered by herbaceous vegetation in front of the increasing intensification of agriculture. On the other hand, in the context of agro ecosystems and agricultural landscapes the presence of trees contributes to the reduction of the flow of runoff, although these sub compensate in relation to the sites without trees, considering the balance between flow and concentration.