

MITIGATION OF A MIXTURE OF PESTICIDES FREQUENTLY DETECTED IN AGRICULTURAL DRAINAGE WATERS BY A SUPERFICIAL FLOW CONSTRUCTED WETLAND



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The treatment of agricultural drainage water is an important challenge to reduce environmental pollution. In this study, the ability to mitigate pesticide concentrations of a superficial flow constructed wetland (SFCW) was evaluated.

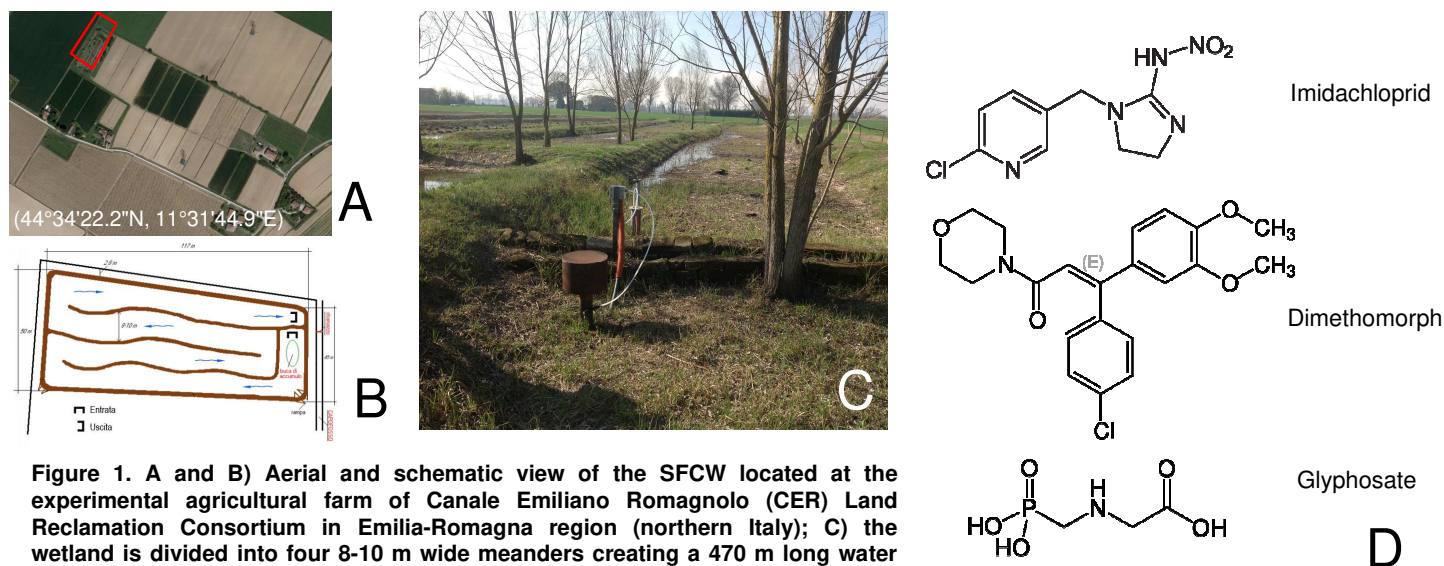


Figure 1. A and B) Aerial and schematic view of the SFCW located at the experimental agricultural farm of Canale Emiliano Romagnolo (CER) Land Reclamation Consortium in Emilia-Romagna region (northern Italy); C) the wetland is divided into four 8-10 m wide meanders creating a 470 m long water course with a maximal water capacity of 1500 m³. The SFCW is monitored in the framework of the Italian national project Green4Water²); D) Pesticides under investigation chosen among those frequently found in Italian superficial and ground waters³.

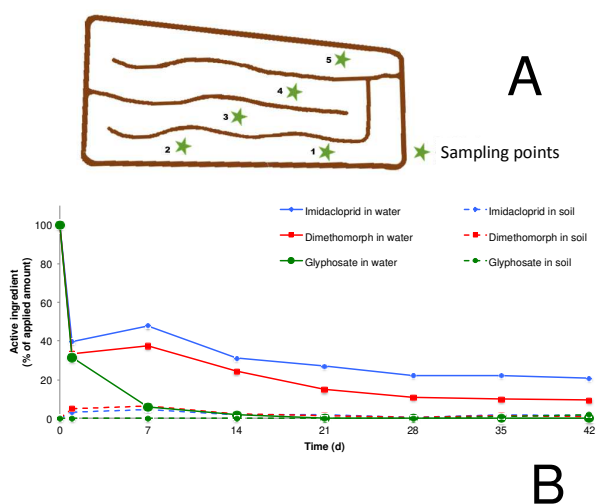


Figure 2. A) Sampling positions of water and sediment along the wetland before and after the pesticide treatment are showed. Water and sediment samplings were done 1 day and weekly for 6 weeks after treatment. Samples were analyzed by an HPLC-MS/MS multiresidual analysis; B) Trend of agrochemical residual concentrations after 6 weeks from the treatment.

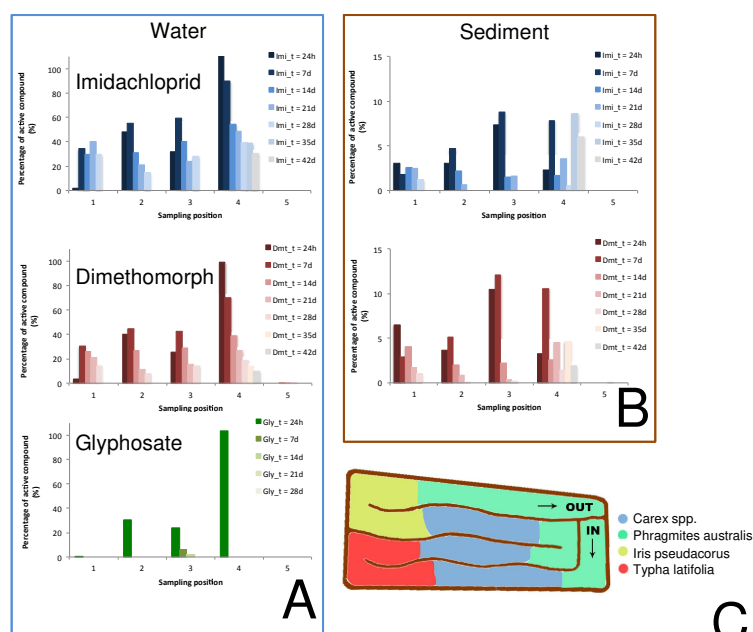


Figure 3. The residual concentrations of agrochemicals in each sampling point at different times are reported for water (A) and soil (B) compartments; C) The distribution of vegetation along the wetland is depicted.

The SFCW was able to abate the level of pesticides in the soil-water system within a relatively short time. Despite the fact that the amounts of agrochemicals - applied as a mixture - were several orders of magnitude higher than the maximal concentrations detected in Italian superficial and ground waters, the SFCW operated as a valuable biofilter against the diffusion of pesticides to surrounding superficial waters.

(1) Lavrnić S., Braschi I., Anconelli S., Blasioli S., Solimando D., Mannini P., Toscano A. (2018) Long-term monitoring of a Surface Flow Constructed Wetland treating agricultural drainage water in northern Italy. *Water* 10(5): 644-659

(2) green4water: Le infrastrutture verdi per la gestione e la tutela delle risorse idriche (Project code: PRIN2015AKR4HX)

(3) http://www.isprambiente.gov.it/files2018/pubblicazioni/rapporti/Rapporto_282_2018.pdf