**Water-borne nitrogen and phosphorous in an intensively-cropped plain catchment in Italy**

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The Po Plain is a large area with slight slopes, but intensive agriculture which may contribute to non-point source pollution. Contrarily to Italian hilly areas, there is a lack of information regarding soil and P losses due to surface runoff in the plain. In fact, losses of P in drainage water from agricultural soils are generally small in the Po Plain as leaching is limited, and the subsurface horizons of many soils are relatively rich in clay, Fe oxides, and calcite that are effective P sorbents.

A 1113-ha-wide catchment in the western Po plain (Piemonte, Italy) was monitored for three years. The selected agricultural area lay in an alluvial plain, with an average slope of 0.6%. Water flow was recorded in three stations (an inlet and two outlets), and samples were analyzed for dry residue (suspended sediment SS), total P on unfiltered water (TPunf), total P on 0.45-µm filtered water (TP<0.45), molibdate-reactive P on 0.45-µm filtered water (MRP), $NO_3^-$ and $NH_4^+$.

No relation was found between N and P concentrations. TPunf, TP<0.45 and MRP concentrations increased with increasing water flow, while nitrate-N, after a threshold in flow volume, decreased with increasing flow, thus showing a dilution effect.

The total balance of transported nutrients (outlets-inlet) showed that, as an average of the three years, 2.4 kg $ha^{-1}$ $yr^{-1}$ of total P (0.6 kg $ha^{-1}$ of which as MRP), and 87 kg $ha^{-1}$ $yr^{-1}$ of N (almost entirely as nitrate) flowed out of the catchment. Part of the outflow drained the shallow groundwater, that contributed up to 20% of the P outflow. The average TP concentration in the groundwater was 0.06 mg $l^{-1}$. On the contrary, most of the water-borne N was originated by the baseflow that drained the groundwater, whose average N concentration was 8.2 mg $l^{-1}$.

These results indicate that intensive agriculture may contribute to surface water pollution of both N and P to a great extent even in plain areas, and that P is mobilized mainly in particulate forms and reaches water courses both through surface and sub-surface flow. Most sediment loss occurs during intense storms, but transfer of soil particles also occurs in shallow diffuse surface runoff. Thus, for identify critical source areas for P transfer, in particular in plain situation, it is necessary to take into account soil properties that regulate particle detachment such as texture, organic matter content and ionic strength and composition of soil solution.