

Factors affecting the definition of critical source areas in Mediterranean areas

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There is little information available about P loss from agricultural watersheds in Mediterranean areas, particularly in Spain. During the last decade, some studies focus on the study of forms and quantities of P loss related to overland flow has been performed. Some studies were also focus on the evaluation of these losses in some tree crops without soil cover. The study and control of P losses in Mediterranean environments must be link to the study of the erosion. Erosion has been identified as one of the main factors constraining future agricultural productivity in soils and evidences reveal that significant amounts of P can be lost associated to this process. As an example, in a small catchment in SW Spain, more than 9 kg P ha⁻¹ were lost in only one storm event.

Some considerations can be made in the definition of areas with high risk of P loss in agricultural catchments based on the evidences obtained during the last years. The concentration in P and Fe is increased in sediments when compared with original soils. The P fractions related to Fe increase and those related to insoluble Ca phosphate decrease in sediments when compared with original soils. The ratio of Fe bound to poorly crystalline oxides to that bound to crystalline oxides is four times higher in sediments than in soils. All these evidences reveal that sediments are much more sensitive to reductant conditions than soils.

Under the same storm conditions, sediment loss and P forms and concentration in sediments is different depending on the soil. In general, Fe and P concentrations in sediments decrease at increased soil loss. Also the poorly crystalline to crystalline Fe oxides decrease at increased soil loss, with a clear potential effect on P release under reductant conditions. At a watershed scale, Alfisols tend to loss less soil and P than Vertisols. However, sediments of Alfisols are much more enriched in P when compared with original soil, meanwhile the P concentration in sediments is similar to that in original soils in Vertisols. Beside this, adsorbed and soluble precipitated P are the forms with the larger increase in concentration in sediments when compared with soil in the Alfisols.

Soil cover by crop decrease the risk of P loss. Observed P losses with winter wheat are much lower (about 4 times) than that observed with sunflower (spring sown) in the same soil.