
Characterization and strategies for the control of eutrophication in the Furnas watershed (Azores – Portugal)

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Furnas watershed has a total area of 1,150 ha, 68% of which is used for pasture production for grazing of milking cows and beef production (average stocking rates vary between 1.5 and 1.7) and 32% is forest land (*Cryptomeria japonica*). Soils are originated from volcanic pyroclastic materials (fine ash and cinders) that are weakly weathered, and are generally classified at the Great Group level (Soil Taxonomy) as Typic Udivitrands. Average annual fertilization rates are: 62 kg N/ha and 68 kg of P₂O₅/ha. Fertilizer K is not usually applied because the soil parent material is, in general, very rich in this element.

The eutrophication process, identified in this watershed for the last twenty years, has been attributed to the high application rates of P fertilizers which, in conjunction with the low P retention capability of the soils, the slope pattern of the landscape and the high average annual rainfall (2,500 mm), tend to favour the P mobilization and transport to the water body, mostly in runoff. It is now well accepted that soil testing, when properly conducted, can be an essential and vital component of the risk assessment process for soil phosphorus movement from agricultural soils as a causative factor in the eutrophication of surface waters. Soil test data (Olsen method) from two different surveys, conducted in 2006 and 2008, consistently indicate high and very high P values, for most of the pasture soil samples, significantly higher than values from the forest soils in the Furnas watershed.

The degree of phosphorus saturation (DPS) approach, relating the P sorbed at a certain moment in the soil to its maximum P sorption capacity, has been used as an additional component of the risk assessment process and its correlation to P Olsen data was highly significant ($R^2 = 0.82$).

As part of a management plan being implemented, the regional government of the Azores has decided to initiate the negotiations with private owners for the acquisition of 200 ha of pasture lands of the upper part of the watershed to be forested with endemic species and thus leading, in the medium to long term, to a more favourable nutrient balance and better control of the eutrophication process in the Furnas watershed.