POSSIBILITY OF INCLUSION OF PARTICULATE P LOSS IN THE ESTIMATION OF P SOURCE FACTOR

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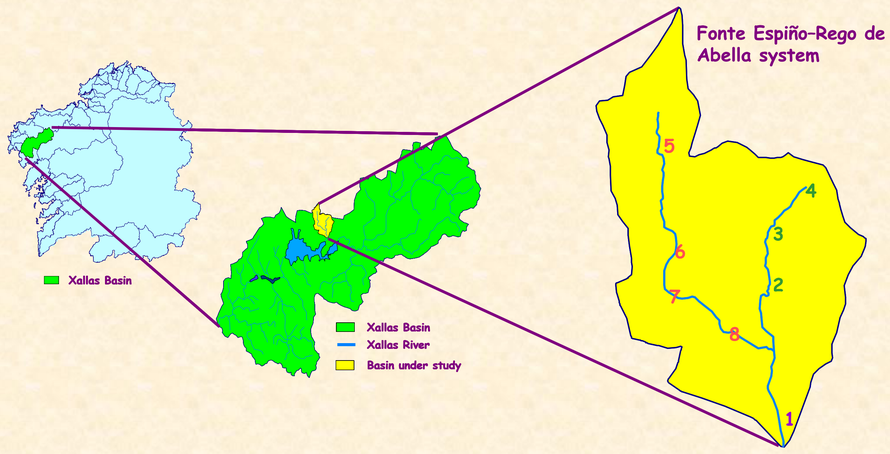
INTRODUCTION

Accurate estimation of the phosphorus (P) source factor for the elaboration of a P index requires knowledge of the forms of P that move from soil to water (McDowell et al., 2001). In most P indexes developed to date, only the inorganic P is taken into account, although erosion processes favor the movement of P associated with soil particles (PP) to water courses (Angle et al., 1984). During the elaboration of a P index for the Fonte Espiño – Rego de Abellas basin (Galicia, NW Spain), we found that inclusion of a parameter related to the risk of loss of PP from soils would improve estimation of the P source factor (Troitiño et al., 2013). However, at the time, we could not include this parameter in the index because it was not possible to assign categories to the levels of particulate PP as very little is known about PP, unlike other P-related parameters (available P, MRP).

The aim of this work was to know how the levels of desorbed PP in soils under different uses in the above indicated area.



MATERIALS AND METHODS

The desorption of PP from soil to water, within 30 min and at two different ratios of soil to water: 1:100 and 1:10 (w:v), were analyzed in 500 soil samples from Fonte Espiño – Rego de Abellas basin under different types of land use (forest, natural grassland and fertilized grasslands) and sampled at different times of year. Table 1 shows the range of values for the main general properties of the soils. PP was measured as the difference between total phosphorus (TP) desorbed and the MRP. TP (after mineralization of organic P by persulfate) and MRP were analyzed by the Murphy and Riley (1964) method.

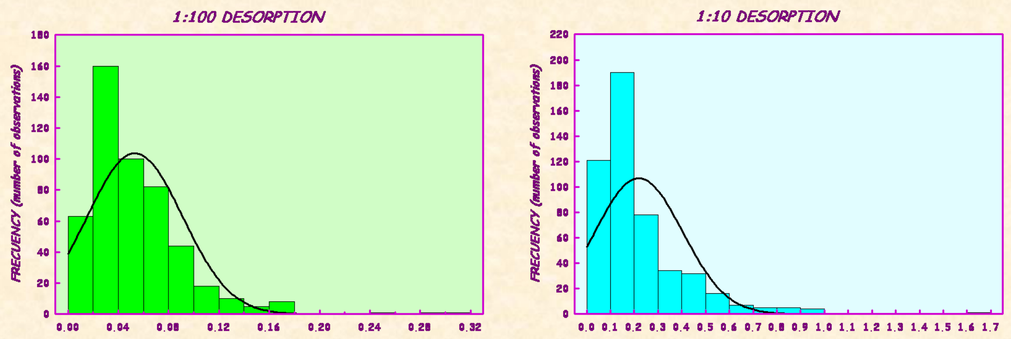
Table 1. Main characteristics of the soils investigated in the study.

	Forests	Natural grasslands	Fertilized grasslands
Water pH	4.71±0.34	5.29±0.28	5.27±0.30
KCl pH	3.92±0.26	4.41±0.20	4.42±0.25
Total C %	9.28±1.84	9.29±1.99	5.94±1.28
Total N %	0.74±0.14	0.83±0.14	0.58±0.12
C/N	12.8±1.2	11.1±1.1	10.3±0.5

RESULTS

The concentrations of PP desorbed varied widely (0.000-0.311 mg P L^{-1} for the 1:100 ratio, and 0.000-1.620 mg P L^{-1} for the 1:10 ratio). For both extraction ratios, the distribution of values (mg L^{-1}) fitted a Gaussian curve.

Fig. 1. Distribution of the values of PP desorbed obtained at 1:100 and 1:10 ratios.

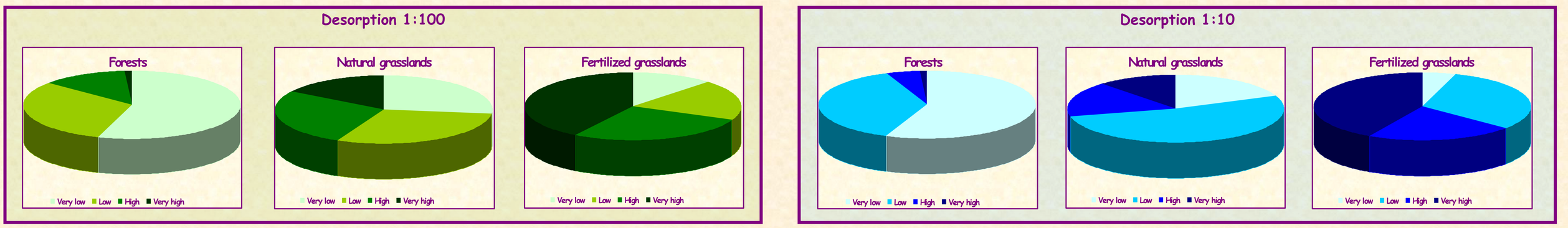


DISCUSSION

Different categories can be considered in relation to statistical parameters (20 % percentile, mean value, 80 % percentile) and we used these categories to classify the soils:

	Very low	Low	High	Very high
Ratio 1:100	< 0.030	0.030 - 0.050	0.050 - 0.070	> 0.070
Ratio 1:10	< 0.100	0.100 - 0.200	0.200 - 0.300	> 0.300

Fig. 2. Percentage distribution of the different categories for each of the soil uses investigated.



CONCLUSIONS

- ✓ The forest soils were mainly included in the low and very low categories, the natural grasslands in the low and high categories and the fertilized grasslands in the high and very high categories.
- ✓ All of the soils, independently of land use, displayed minimal risk of PP desorption during the summer and maximal risk during spring.
- ✓ The defined levels enable use of PP desorption to improve estimation of the P source factor, and they can also be used in regions that are similar to the Fonte Espiño-Rego de Abellas in terms of climate, soil type and land use.

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