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The effects of fire temperatures on water soluble heavy metals.

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Fire ash are majority composed by base cations, however the mineralized organic matter, led also available to transport a higher quantity of heavy metals that potentially could increase a toxicity in soil and water resources. The amount availability of these elements depend on the environment were the fire took place, burning temperature and combusted tree specie. The soil and water contamination from fire ash has been neglected, because the majority of studies are focused on base cations dynamic. Our research, beside contemplate major elements, is focused in to study the behavior of heavy metals released from ash slurries created at several temperatures under laboratory environment, prescribed fires and wildland fires. The results presented in these communication are preliminary and study the presence of Aluminium (Al3+), Manganese (Mn2+), Iron (Fe2+) and Zinc (Zn2+) of ash slurries generated in laboratory environment at several temperatures (150º, 200º, 250º, 300º, 350º, 400º,450º, 500º, 550ºC) from Quercus suber, Quercus robur, Pinus pinea and Pinus pinaster and from a low medium temperature prescribed fire in a forest dominated Quercus suber trees. We observed that ash produced at lower and medium temperatures (<300-400ºC) released in water higher contents of Al3+ than unburned sample, especially in Quercus species and Mn2+ in Pinus ashes. Fe2+ and Zn2+ showed a reduced concentration in test solution in relation to unburned sample at all temperatures of exposition. In the results obtained from prescribed fire, we identify a higher release of Al3+ and a decrease of the remain elements. The solubilization of these elements are related with pH levels and ash calcite content, because their ability to capture ions in solution. Moreover, the amount and the type of ions released in relation to unburned sample vary in each specie. In this study Al3+ release is related with Quercus species and Mn2+ with Pinus species. Fire ashes can be an environmental problem, because at long term can increase soil acidity. After all base cations have being leached, pH values decrease, and the heavy metals remaining in the ash are easily transported with unknown impacts on soil and water resources. Research is needed in the study at long term of the effects of fire in metals accumulation in soil resources, and all these aspects will be discussed.

Keywords: Fire ash, heavy metals, Quercus suber, Quercus robur, Pinus pinea, Pinus pinaster, prescribed fire, pH, Calcite