UNIVERSIDAD DE LA FRONTERA

Facultad de Ingeniería y Ciencias

Doctorado en Ciencias de Recursos Naturales

EFFECT OF COPPER OR SILVER ENGINEERED NANOPARTICLES ON PHOSPHORUS AVAILABILITY IN VOLCANIC SOILS

DOCTORAL THESIS IN FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE DOCTOR OF SCIENCES IN NATURAL RESOURCES

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“Effect of copper or silver engineered nanoparticles on phosphorus availability in volcanic soils”

Esta tesis fue realizada bajo la supervisión del director de tesis, Dra. Maria de la Luz Mora del Núcleo Científico y Tecnológico en Biorecursos de la Universidad de la Frontera y ha sido aprobada por los miembros de la comisión examinadora.

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Thesis summary

In recent years, the application of engineered nanoparticles (ENPs) of copper (Cu) and silver (Ag) in pigments, cosmetics, agrochemicals, among others, has shown great growth, causing their rapid and increasing incorporation into environmental matrices. This is a great risk for the environment, and especially for volcanic soils for agricultural use, since ENPs have a high reactivity, associated with their high surface area, and can modify the physicochemical properties of soils and the availability of important nutrients such as phosphorus (P). The objective of this study was to evaluate the effect of Cu or Ag ENPs on the physicochemical properties and the P adsorption/desorption process in a volcanic ash-derived soil. The results of the thesis showed that the incorporation of Cu or Ag ENPs suspensions in an Andisol soil generated a decrease in soil pH, increasing P adsorption, which led to a lower availability of P. A lower availability of P in agricultural soils can negatively affect the production of agricultural crops.