



## EVALUATION OF PHYTOTOXICITY AND ECOTOXICITY OF NANOENCAPSULATED OREGANO (*Origanum vulgare*) ESSENTIAL OIL FOR AGRICULTURAL USE

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### **INTRODUCTION**

Agriculture in Brazil consumes a significant volume of pesticides. The use of botanical products are considered ecologically safer and have less impact on human health and the environment. The use of essential oils associated with nanotechnology offers considerable potential for improving the quality and safety of products, and nanoencapsulation increases their efficiency. The objective of this work was to evaluate the phytotoxicity and ecotoxicity of nanoencapsulated essential oil of oregano (*Origanum vulgare*) intended for agricultural use, using *Solanum lycopersicum*, *Eisenia fetida* and *Daphnia magna* as test organisms.

### **MATERIAL AND METHODS**

The phytotoxicity of the essential oil was evaluated using the Rules for Seed Analysis (RAS) by calculating the Speed and Germination Power Index using tomato (*Solanum lycopersicum*) as a study model. The experiment was carried out with 8 concentrations of nanoencapsulated oregano essential oil (0.015625%, 0.03125%, 0.125%, 0.2%, 0.25%, 0.5%, 10%, 25%) and control (distilled water), with five replicates. The ecotoxicity assays in aquatic environment with *Daphnia magna* were based on NBR 12713 and for

the evaluation of ecotoxicity in soils, biomass of adult annelids of the species *Eisenia fetida* was used, according to NBR 15537.

### **RESULTS**

The nanoencapsulated essential oil based on oregano showed to have an influence on seed germination, and concentrations higher than 0.25% showed a phytotoxic effect on *Solanum lycopersicum* L., negatively influencing the germination process of this species. The concentrations to which aquatic organisms of the species *Daphnia magna* were exposed showed ecotoxicity, with the IC50 calculated at 0.04%. Regarding the analysis of ecotoxicity using the *Eisenia fetida* species, the presence of nanoencapsulated oregano essential oil did not affect the development of annelids at concentrations between 0.2% and 0.5%.

### **CONCLUSIONS**

The use of nanoencapsulated products of active substances is an efficient technological strategy for agricultural use. However, the study of its effects is necessary to understand about its possible negative consequences in the environment.

