Synthesis of Natural Herbicide and Study of Its Effects on Grain Seeds Germination and Microorganisms Growth

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Agriculture in the 21st century faces several challenges: increase food production, adopt efficient and sustainable production methods, adapt to climate change. In order to fight agricultural losses caused by weeds´ infestation, products that have phytotoxic action have been researched. Reports in literature indicate that terpenes such as limonene and carvone have phytotoxic action against weeds. After obtaining carvone through a synthetic route from limonene, we synthesized the Carvacrol, essential oil component of oregano, a terpene known as a fungicide and bactericide. Then, we conducted biological experiments with and without temperature and humidity control, in different concentrations of the synthesized product, in order to discover if the compound had any negative action on the germination of B idens pilosa. Also, tests were performed with P haseolus vulgaris , Z ea mays and L ens esculenta seeds, while we studied parameters as percentage of germination, mitotic index, probability of germination and speed index. The synthesized molecule structure was confirmed with spectroscopic and analytical techniques such as infrared, nuclear magnetic resonance, and carbon, gas chromatography and mass spectrometry, resulting in Carvacrol. Biological tests showed that all tested concentrations inhibited the germination of B idens pilosa, accelerated and increased the germination in P haseolus vulgaris , Z ea mays and L ens esculenta on tests with and without temperature and humidity control. Speed rates and mitotic index corroborate this result. In conclusion, we observed that Carvacrol inhibits the growth of Bidens pilosa and acts on the germination of economically important seeds. We intend to continue the project performing biochemical tests.

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