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Development of a natural antifungal agent obtained from an essential oil to increase the shelf-life of *in natura* food products

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Although the demand for food is on the rise, a high percentage of food is lost in different points of the agricultural chain. This loss reaches up to 40% of the food production and is partially due to foodstuff spoilage by microorganisms, including filamentous fungi. The use of pesticides and chemical compounds for controlling food spoilage represents hazards from human and environmental health and has been under strong discussion for years. On the other hand, Essential Oils (EO) are natural compounds produced by plants and which are characterized by antimicrobial, anti-inflammatory and antioxidant properties. In the current project we screened 25 different EOs for their antifungal properties against filamentous fungi. An specific EO inhibited the *in vitro* growth of the reference filamentous fungus *Aspergillus nidulans* and the food spoilage fungi *Trichoderma atroviride, Nectria haematococca, Penicillium paneum, Botrytis cinerea and Aspergillus niger* showing MIC (minimal inhibitory concentration) value of 0.03% v/v for all species. We developed a specific formulation containing EO which also inhibited *A. nidulans, A. niger* and *B. cinerea* growth at the concentration of 0.03% in MIC assays. In addition, this formulation inhibited spore germination of the assayed fungi species at 0.03% (observed by microscopy) and demonstrated antifungal activity. Moreover, using mini tomatoes fruits as infection model, the new formulation showed good activity on inhibiting the development of *A. niger* and *B. cinerea* artificially inoculated in these fruits and was able to extend the shelf life of naturally infected tomatoes fruits. Our results show that the development of a formulation containing a specific EO was able to combat the growth of foodborne plant pathogenic fungi suggesting its good innovation applicability in controlling the post-harvest spoilage of fresh tomatoes fruits.

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Recent Publications:

1. Thaila Fernanda dos Reis et al. (2017) The low affinity glucose transporter HxtB is also involved in glucose signalling and metabolism in *Aspergillus nidulans*. Scientific Reports. 7:45073.
2. Thaila Fernanda dos Reis et al. (2018) The influence of genetic stability on *Aspergillus fumigatus* virulence and azole resistance. G3-Genes Genomes Genetics. 8(1):265-278.
3. Marquele Oliveira F et al. (2017) Fundamentals of Brazilian Honey Analysis: An Overview. In Honey Analysis. 1ed. InTech Open. Pages:139-170.
4. Nogueira K M V et al. (2018) Characterization of a novel sugar transporter involved in sugarcane bagasse degradation in *Trichoderma reesei*. Biotechnology for Biofuels. 11:84.
5. Manfiolli A O et al. (2018) Mitogen activated protein kinases (MAPK) and protein phosphatases are involved in *Aspergillus fumigatus* adhesion and biofilm formation. The Cell Surface. 1:43-56.

Biography

Thaila Reis pursued her PhD in Cellular and Molecular Biology and Postdoc in Microbiology. She is currently the CEO at MicroControl Innovation, a startup organization focused on the development of natural compounds applied to the control of fungal development in food. She has her expertise in Fungal Genetics and Biotechnology. Using *Aspergillus* as model organism her research work emphasizes on molecular genetics of microorganisms, fungal food spoilage, sugar sensing and signaling, aspergillosis infection and antifungal drugs.

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