



4th International Workshop on Bioactive Compounds:
Functional Foods as the Cornerstone of Healthy Nutrition:
Linking Academia and Industry
December 10th to 11th, 2024, UNICAMP

ESSENTIAL OILS AS NATURAL FUNGICIDES IN CONTROLLING *LASIODIPLODIA THEOBROMAE*

Ygor G. P. Osti¹, Larissa G. R. Duarte², Conny W. T. Fukuyama¹, Isadora C. Pedrino¹,
Higor V. Santos³, Josemar G. de Oliveira Filho², Maria Eduarda A. Astolfo³, Maria
Eduarda M. Martins², Stanislaw Bogusz Junior³, Marcos David Ferreira²

¹Department of Biotechnology, Federal University of São Carlos, São Carlos, SP,
Brazil, E-mail: ygor.osti@estudante.ufscar.br, conny@estudante.ufscar.br,
isadorapedrino@gmail.com

²Brazilian Agricultural Research Corporation, Embrapa Instrumentation, São Carlos,
SP, Brazil, E-mail: larissagraziele@gmail.com, josemargooliver@gmail.com,
maria.m.martins@unesp.br, marcos.david@embrapa.br

³Institute of Chemistry (IQSC), University of São Paulo (USP), São Carlos, SP, Brazil,
E-mail: higosantos8@usp.br, dudastolfo020@usp.br, stanislau@iqsc.usp.br

Keywords: Essential Oils, *Lasiodiplodia theobromae*, Antifungal Activity

Summary: The fungus *Lasiodiplodia theobromae* poses a significant threat to tropical fruit production, leading to substantial economic losses. This study examines the antifungal properties of essential oils (EOs) derived from *Syzygium aromaticum* (clove), *Origanum vulgare* L. (oregano), *Cymbopogon martini* (palmarosa), and *Cymbopogon citratus* (lemongrass) against this pathogen, utilizing both direct contact and volatile exposure methods. In the analysis, the EOs were evaluated for their minimum inhibitory concentration (MIC) required to completely inhibit fungal growth. The results indicated that oregano oil exhibited the most potent antifungal activity, with MIC values ranging from 40 to 200 $\mu\text{L/L}$ in the volatile exposure method and between 125 and 500 $\mu\text{L/L}$ in the direct contact method. Notably, the volatile exposure method proved to be more effective, necessitating lower concentrations for fungal growth inhibition. Microscopic examination using Scanning Electron Microscopy (SEM) revealed significant structural damage to the fungal cells following treatment with the EOs, suggesting that these

compounds not only inhibit growth but also compromise cell integrity. This dual action underscores their potential as effective natural fungicides. The findings advocate for the use of essential oils, particularly oregano oil, as viable alternatives to synthetic fungicides in post-harvest applications. These natural agents align with growing demands for sustainable agricultural practices and could enhance food security by reducing losses due to fungal spoilage. Overall, this study contributes valuable insights into the efficacy of various essential oils against *Lasiodiplodia theobromae*, promoting safer and more environmentally friendly pest management strategies in tropical fruit preservation.

Funding: FAPESP (# 2022/10686-6), CNPq (# 383138/2023-0, 138584/2023-0), CAPES (# 001), Empresa Brasileira de Pesquisa Agropecuária (# 20.19.03.0124.00.00) – Embrapa, Rede Agronano, CNPq/MCTI Sisnano (# 442575/2019-0) and M. D. Ferreira CNPq Research Productivity fellowship (# 307141/2022-5).