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POTENTIAL OF PYRANOCARBAZOLE ALKALOIDS IN THE CONTROL OF CITRUS CANKER

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Citrus canker, caused by the bacterium *Xanthomonas citri*, is a phytopathological disease of high economic relevance, compromising both productivity and fruit quality in citrus crops. The search for natural antimicrobial agents is an important strategy for developing sustainable alternatives to synthetic pesticides, aiming to reduce environmental impacts and bacterial resistance. In this study, five pyranocarbazole alkaloids were isolated from the leaves of *Murraya koenigii* using the ethyl acetate extract. The extract was subjected to adsorption liquid chromatography with silica gel 230–400 mesh as the stationary phase and a solvent mixture with increasing polarity as the mobile phase. The fractions obtained were further processed by solid-phase extraction using a C18 (octadecyl – 10 g) silica-based cartridge (C18 SPE) and subsequently analyzed for chemical profiling by high-performance liquid chromatography (HPLC) using an analytical C18 column with ultrapure Milli-Q® water (line A) and HPLC-grade acetonitrile (Sigma-Aldrich®) (line B) as mobile phases in reverse-phase mode. The samples were monitored at a wavelength of λ 250 nm. Structural characterization of the alkaloids was confirmed by nuclear magnetic resonance (NMR) spectroscopy. For antibacterial activity assessment, the compounds were solubilized in DMSO and tested in triplicate against *X. citri* using the broth microdilution method in 96-well plates, with standardized bacterial inoculum. Appropriate controls were included: DMSO, copper, inoculum alone, and compounds dissolved in DMSO alone, ensuring result reliability and absence of contamination. All compounds exhibited a minimum inhibitory concentration (MIC) of 1000 µg/mL, demonstrating consistent antibacterial activity. The results indicate that pyranocarbazole alkaloids have potential as natural antibacterial agents against *X. citri*, providing a promising basis for the development of formulations applicable to citrus plants, with prospects for activity optimization and in planta studies in future investigations.

Keywords: *citrus, antibacterial activity, Xanthomonas citri, bioactive compounds, integrated pest management (IPM), Rutaceae.*