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ANTIBACTERIAL ACTIVITY OF LAPACHOL DERIVATIVES AGAINST THE CITRUS CANKER PATHOGEN *XANTHOMONAS CITRI SUBSP. CITRI*

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Citrus canker, mainly caused by *Xanthomonas citri subsp. citri*, is one of the most destructive citrus diseases, severely affecting yield, fruit quality, and international trade. In Brazil, especially in São Paulo State, the world's leading orange juice producer, millions of trees have been eradicated, resulting in significant economic losses. Current management relies on eradication programs and copper-based bactericides, which reduce incidence but promote bacterial resistance, soil accumulation, and environmental risks. Lapachol is a 1,4-naphthoquinone mainly isolated from *Tabebuia spp*. (Bignoniaceae), with a redox-active structure capable of generating reactive oxygen species, a mechanism underlying its broad antimicrobial spectrum. Its reported activities include antibacterial, antifungal, antiviral, antiparasitic, and insecticidal effects, in addition to antitumor properties. Importantly, both lapachol and its derivatives have demonstrated inhibitory action against phytopathogens, as well as herbicidal, reinforcing their applicability in agriculture. β-Lapachone, a structural isomer, further expands this potential by exhibiting selective antimicrobial and cytotoxic effects. Altogether, these features suggest that lapachol and its analogs represent promising candidates for the development of novel control strategies against *X. citri* and citrus canker, contributing to sustainable crop protection and reduced dependence on copper-based compounds. The aim was to evaluate the antibacterial activity of lapachol and its derivatives on *Xanthomonas citri subsp. citri*. Lapachol was isolated from wood of *Handroanthus sp.*, and its derivatives were synthesized according to procedures described in the literature, with modifications. All compounds were characterized by NMR spectroscopy. Minimum inhibitory concentrations (MICs) were determined following CLSI (Clinical and Laboratory Standards Institute) guidelines, using serial dilutions of compounds from 400 to 0.195 $\mu g.mL^{-1}$. Copper sulfate was the positive control, and the inoculum was standardized to 10^6 CFU. All assays were performed in triplicate. The MIC values obtained in this study were: lapachol (412.7 μM), α-lapachone (103.2 μM), β-lapachone (6.4 μM), β-lapachone-3-sulfonic acid (4.8 μM), sodium salt of lapachol (189.2 μM), and copper sulfate (1566.3 μM). Notably, the MICs of α-lapachone, β-lapachone and β-lapachone-3-sulfonic acid were approximately 15, 245 and 326 fold lower, respectively, than that of copper sulfate; highlighting mainly the potential of β-derivatives as promising candidates for the control of *Xanthomonas citri*.

Keywords*:* *Xanthomonas citri subsp. citri*, citrus canker, citriculture, lapachol, β-lapachone.