

**EVALUATION OF PLANT EXTRACTS ON THE SUPPRESSION OF
COLLETOTRICHUM GLOEOSPORIODES CAUSING ANTHRACNOSE
DISEASE IN PAPAYA**

R. D. W. M. W. P. Lankachandra^a and M. I. S. Safeena^{a*}

^aDepartment of Biological Sciences, Faculty of Applied Sciences, South Eastern University of Sri Lanka, Sammanthurai, Sri Lanka.

*safeenim@seu.ac.lk

Abstract

Papaya is one of the most important fruit crops in the world due to its nutritional and economic value, medicinal and culinary uses and export potential. The fungus *C. gloeosporioides* attacks papaya fruits after harvesting, causing anthracnose disease. This anthracnose disease directly affects the reduction of shelf life and postharvest quality of fresh papaya fruits. Nowadays, there's a global focus on developing greener management techniques as sustainable approaches to minimize the use of synthetic fungicides to reduce anthracnose disease in papaya. This study examines the antimicrobial properties of the ethanolic extract of ginger rhizomes and the essential oils of ginger and cinnamon against *C. gloeosporioides*. These plant materials were selected based on their medicinal properties, edibility, and the presence of antifungal substances active against *C. gloeosporioides*. Ethanol was chosen as the solvent for ginger extract because of its effectiveness in extracting key bioactive compounds. The crude extracts were initially tested to determine the Minimum Inhibitory Concentrations (MIC) against the *C. gloeosporioides*. Evaluation of the same crude extracts based on the MIC value and above for Antimicrobial Susceptibility Testing (AST) revealed that all tested plant materials (ginger extract, ginger oil, and cinnamon oil) exhibited antimicrobial activity against *C. gloeosporioides*. Among the tested materials, cinnamon oil showed the most significant zone of inhibition (14.88 ± 0.02 mm) against the tested pathogen. Ginger oil exhibited a zone of inhibition with a diameter of 11.686 ± 0.05 mm. Ginger extract also displayed notable activity against the tested pathogen, with a zone of inhibition measuring 9.873 ± 0.07 mm in diameter. However, its activity was less than that of the ginger and cinnamon essential oils. In the *in vivo* study, surface sterilized papayas were injected with spore suspension of *C. gloeosporioides* and the extract and plant oils were applied on the injected places of the papaya fruits separately. The *in vivo* study showed that all the treated areas of the papaya fruits with the ginger oil, cinnamon oil, or ginger extract had a lower diseased percentage (area of disease spread %) compared to the negative control over time. The ranking based on the potential of tested materials to inhibit the pathogen from highest to lowest was as follows: cinnamon oil > Ginger oil > ginger extract.

Keywords: *Colletotrichum gloeosporioides*, Ethanolic Extract, Minimum Inhibitory Concentrations (MIC), Antimicrobial Susceptibility Testing (AST), Cinnamon, Ginger