Identification of Novel Broad-Spectrum Antimicrobial Compounds in Curcuma amada

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Clostridium difficile and Methicillin-resistant Staphylococcus aureus (MRSA) have been the main source of nosocomial infections in North America since 2003. There is currently no effective antibiotic against both C. difficile and MRSA. Similarly, plant pathogenic bacteria such as Erwinia amylovora cause billions of dollars in crop damage. Previously, an extract (Curcuma amada Crude Extract; CACE) from mango ginger (Curcuma amada) was proven to have antimicrobial properties. In this research project, CACE was purified into four fractions using Sep-Pak filtration in order to identify antimicrobial compounds from mango ginger. These four fractions were tested for antimicrobial activity on two plant pathogenic bacteria, two human pathogenic bacteria, and two plant pathogenic fungi: Erwinia amylovora, Xanthomonas campestris, Escherichia coli, Clostridium difficile, MRSA, Verticillium dahliae, Rhizoctonia solani, respectively, and observed using fluorescent microscopy. Results proved fraction A was the most effective against fungi, while fraction D showed antibacterial activity. Since fraction D was effective against plant and human pathogens, it was investigated as a preventative and curative treatment against bacteria. Bacterial growth was significantly suppressed with both treatments. Based on these promising results, Fraction D was analyzed using Mass Spectrometry, revealing a peak at 6.8min, which contained a compound of mass 395. This compound was identified as 2,4,6-trihydroxy-3,5-diprenylhydrochalcone, the first report of this compound's potential antibacterial activity. This compound can be developed into an antibiotic for patients suffering from nosocomial infections, a surface sanitation method in hospitals, and as an organic pesticide for crops.

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