Antibacterial activity of eight invasive alien plants against selected multi-drug resistant microorganisms

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Introduction
Antimicrobial resistance is a major concern for public health, and it has accelerated the search for new antimicrobials from natural sources. Invasive plants are a major threat to the ecosystem and economy of a country. This study attempts to address these two problems by screening eight invasive alien plants for their inhibitory potential against selected multidrug-resistant (MDR) organisms.

Methods
Samples of 15 parts from 8 invasive plants (Dillenia suffruticosa, Mimosa pigra, Miconia calvescens, Ulex europaeus, Salvenia molesta, Lantana camara, Eichorrhzia crassipes and Panicum maximum) were used in the study. Dry plant powders were extracted using bottle extraction method with 50% methanol in dichloromethane at room temperature. Crude extracts were tested for antibacterial activity against 10 microorganisms: 5 MDR clinical isolates, methicillin-resistant Staphylococcus aureus (MRSA), Pseudomonas aeruginosa, Acinetobacter spp., Escherichia coli and Klebsiella pneumoniae and 5 relevant ATCC controls. Disc diffusion assay was performed in triplicate for each extract and minimum inhibitory concentration determined for the active extracts.

Results
The stem-bark and leaf extracts of Miconia calvescens exhibited antibacterial activity against both Gram-positive (MRSA) and Gram-negative (P. aeruginosa, Acinetobacter spp. and K. pneumoniae) bacteria. Against MDR P. aeruginosa, Miconia calvescens leaf and stem-bark extracts showed average zones of inhibition (ZOI) of 7.67±0.57 mm and 10.66±0.57 mm, respectively, and MIC values of 1.00 mg/mL and 0.1 mg/mL, respectively. Against MDR Acinetobacter spp., the corresponding values were 11.33±1.15 mm and 15.00±1.00 mm (ZOI), respectively, and 1.00 mg/mL and 0.1 mg/mL (MIC), respectively. Most of the extracts showed antibacterial activity against MRSA with ZOI in the range 7.33-16.00 mm and MIC in the range of 0.1-1.0 mg/mL. Eight extracts were active against at least one MDR organism.

Conclusions
Miconia calvescens stem-bark extract showed antibacterial activity against 6 microorganisms including 3 MDR clinical isolates, out of the 10 tested microorganisms. Further studies are required to isolate and identify the active compounds present in the crude extract.

Keywords: Multidrug-resistance, invasive alien plants, Miconia calvescens, antibacterial activity

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