ECM 2025 Conference

The 3rd International Electronic Conference on Microbiology

01–03 April 2025 | Online

MDPI

Bark extract of *Melia azedarach* inhibits motility and viability of *Ralstonia solanacearum* growing in humid substrate

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INTRODUCTION & AIM

Bacterial wilt of tomato is caused by the soil bacterium *Ralstonia solanacearum* (*Rs*). The disease is difficult to manage because *Rs* colonizes and obstructs xylem vessels and generates necrosis in medullary tissues (Figure 1), resulting in large economic losses.

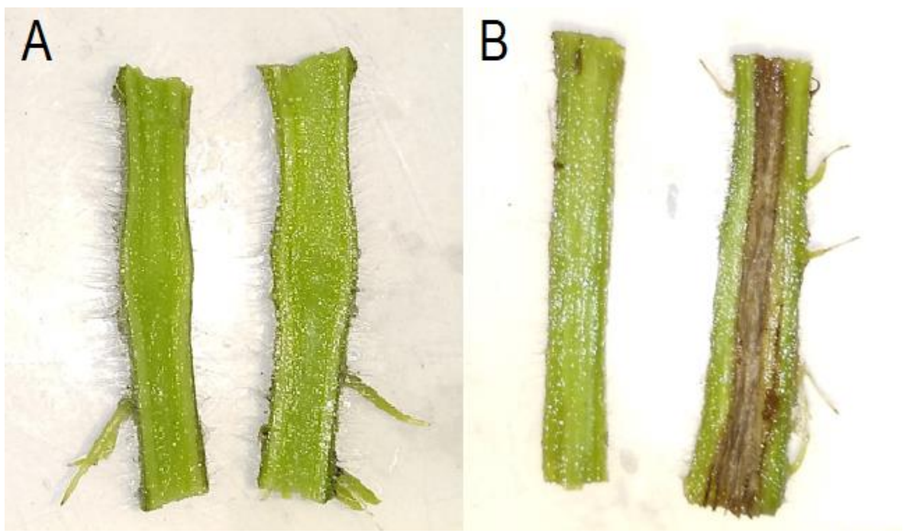

Figure 1. Longitudinal section of tomato (*Solanum lycopersicum*) stem. A) Control plant, B) Plant infected with *R. solanacearum*, showing medullary necrosis.

Natural products, such as plant extracts, are currently considered as potential control tools to manage crop diseases, which are also environmentally friendly. Some species, such as *Melia azedarach*, have shown bioactivity against different types of microorganisms, making it a promising species for controlling bacterial wilt of tomato.

The aim of this study was to evaluate the antibacterial efficiency of *M. azedarach* bark extracts against the phytopathogenic bacterium *Rs*.

METHOD

Three bark extracts were made using water and/or ethanol as solvents. The ethanolic extracts were distilled under reduced pressure. The minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) of the bark extract against Rs were determined by broth microdilution method. Inhibition of motility and changes in colony morphology were evaluated by measuring the diameter of colonies grown in the presence of different concentrations of extract or no extract (control), after 24 h of incubation. Bacterial survival was evaluated in humid substrate supplemented with different amounts of bark extract, incubated for 24 h and resuspended in physiological solution to be inoculated and counted in TSA medium.

RESULTS & DISCUSSION

Bark extract affected the viability, colony morphology (where changes in the shape, cell density, and edge morphology of the colony were observed), and motility (with swarming motility reduced by 47.61% with ½ bark extract MIC, and 66.67% with bark extract MIC) on *Rs* (Figure 2). The application of the extract on the humid substrate controlled *Rs* in fewer amounts than MIC (0.176 g/l), (Figure 3).

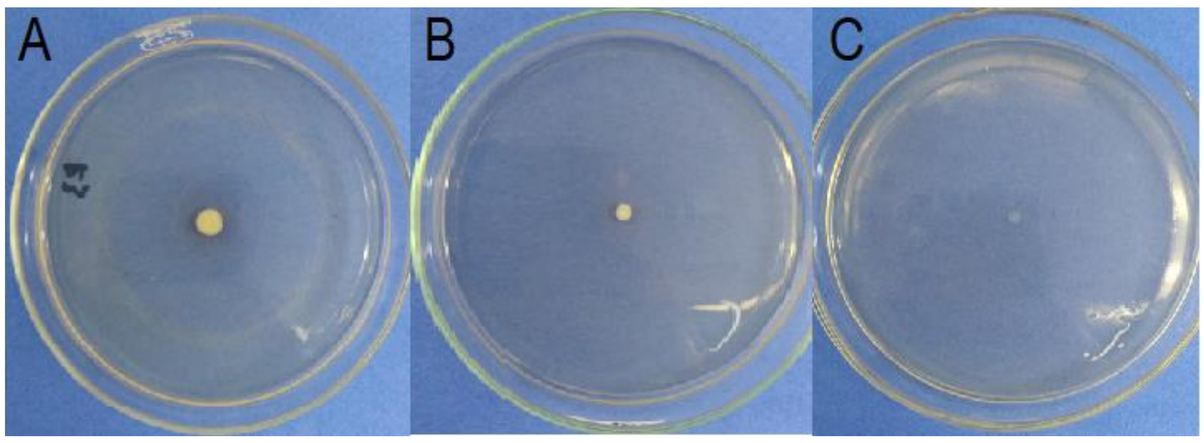

Figure 2. Motility inhibition assay in medium with different bark extract concentrations. A) Control, B) ½ MIC, C) MIC.

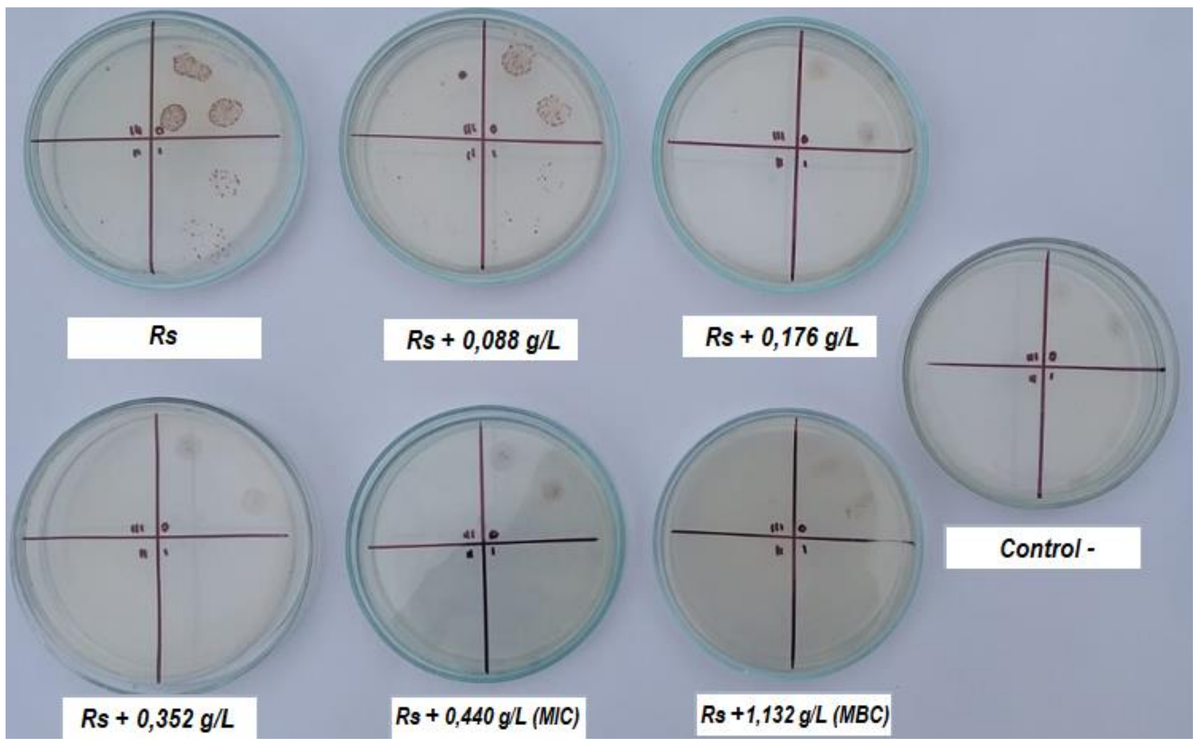

Figure 3. Evaluation of viability of *Rs* in humid substrate added with different amounts of bark extract. Petri dishes are divided into four quadrants, each with a 10-fold dilution of the culture (0, I, II, III). Growth of *Rs* is observed only in bark extract concentrations less than 0.176 g/L.

CONCLUSION

Bacterial motility has been previously described as a key feature for pathogenicity in *Rs*. In this context, the inhibitory effect of *M. azedarach* bark extract on bacterial motility, and its bactericidal activity when applied on the substrate (where *Rs* survives between growing seasons), showed that this natural product is a promising tool to be used as an efficient sustainable strategy for the control of bacterial wilt of tomato.