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Investigation of in vitro Antibacterial Potential of Various Wood Vinegars Against Plant Bacterial Disease Agents

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Abstract

Wood vinegar, also known as pyroligneous acid (PA), is a liquid mixture with organic properties obtained from the condensation of smoke produced by the charring or pyrolysis of wood. The aim of this study was to determine the *in vitro* antibacterial activity of three different PAs obtained from the pyrolysis of apricot kernels (AKPA), hazelnut shells (HSPA), and kermes oak (OPA) against plant pathogenic bacterial species such as *Curtobacterium flaccumfacies* pv. *flaccumfaciens*, *Pectobacterium carotovorum* subsp. *carotovorum*, *Pseudomonas syringae* pv. *phaseolicola* and *Bacillus pumilus*. The antibacterial activity of wood vinegar on the development of disease agents was evaluated by measuring the inhibition zone diameters under in vitro conditions using the disk diffusion technique. According to the mean inhibition zone diameters, the most effective PA was HSPA with a zone diameter of 20.33, followed by AKPA and OPA with zone diameters of 20.13 and 19.33, respectively. The highest antibacterial activity was shown by HSPA against *C. flaccumfacies* pv. *flaccumfaciens* (24.17 mm inhibition zone diameter), followed by AKPA and OPA treatments with 23.33 and 21.17 mm inhibition zone diameters, respectively. According to the mean inhibition zone diameters, the most susceptible bacterial species was shown against *C. flaccumfacies* pv. *flaccumfaciens* with a zone diameter of 22.89, followed by *Pectobacterium carotovorum* subsp. *carotovorum*, *Pseudomonas syringae* pv. *phaseolicola* and *B. pumilus* with zone diameters of 19.89, 18.50 and 18.44, respectively. Among the bacterial disease agents, *C. flaccumfacies* pv. *flaccumfaciens* was found to be the most sensitive to the three PAs used in the study. AKPA and HSPA were the most effective treatments against *C. flaccumfacies* pv. *flaccumfaciens*, while OPA was the most effective against *C. flaccumfacies* pv. *flaccumfaciens* and *P. carotovorum* subsp. *carotovorum*. The results obtained showed that wood vinegar has the potential to be used as a bio-bactericide against important plant bacterial disease agents.

Key Words: *Antibacterial; Wood vinegar; Plant bacterial pathogens; Organic farming*