

Antimicrobial activity of selected spices against *Pectobacterium carotovorum* isolated from some vegetables in Sri Lanka

W. P. Wasana*, K. A. P. P. Kuruppuarachchi, P. N. Yapa and S. Hettiarachi

*Department of Biological Sciences, Faculty of Applied Sciences,
Rajarata University of Sri Lanka, Sri Lanka
Email: wasanaprasadini@gmail.com

Bacterial soft rot caused by *Pectobacterium carotovorum* (*Erwinia carotovora*) is a destructive disease found worldwide, resulting in economic loss. It is important to implement disease control measures and management strategies in order to prevent economic and further crop losses. Antibacterial nature of spices offer promising solutions to pesticidal hazards, environmental pollution, and pesticide residues in crops and to ever increasing cost of plant protection operations. Although there are a number of studies on the antibacterial nature of spices on various pathogens, its effect on *Pectobacterium carotovorum* is unknown. Therefore, this study was carried out with the objective of determination of the antimicrobial activity of selected spices against *Pectobacterium carotovorum*. Specific objectives were to determine minimum inhibitory concentration of aqueous and ethanolic extracts of selected spices against *Pectobacterium carotovorum*. Disease samples of *Allium porrum*, *Solanum tuberosum*, *Brassica caulorapa*, *Daucus carota*, *Allium cepa*, *Phaseolus vulgaris*, *Brassica oleracea* var. *capitata* and *Raphanus sativus* were collected from various geographical regions in Sri Lanka. These samples were transported in an icebox to laboratory at Faculty of Applied Sciences, Rajarata University of Sri Lanka for further experiments. *Pectobacterium carotovorum* colonies were isolated on MacConkey agar and pure cultures obtained. Different *Pectobacterium* isolates were identified using physiological, biochemical and pathogenicity tests. The crude aqueous and ethanolic extracts of nine spices, garlic (*Allium sativum*), garcinia (*Garcinia cowa*), cinnamon (*Cinnamomum verum*), tamarind (*Tamarindus indica*), clove (*Syzygium aromaticum*), mustard (*Brassica nigra*), turmeric (*Curcuma longa*), pepper (*Piper nigrum*) and ginger (*Zingiber officinale*) were prepared with concentrations of 0.005 g/ml to 0.5 g/ml. Extracts were assessed for antibacterial activity by agar well diffusion method. Sodium hypochlorite was used as the positive control while sterilized distilled water and ethanol were used as negative control. The zones of inhibitions were measured after incubation at room temperature for 24 hours. Among the nine spices, only four spices, garlic, garcinia, cinnamon and tamarind were active against *P. caratovorum*. The largest zone of inhibition was shown by aqueous extract of garlic while the aqueous and ethanolic extracts of cinnamon showed lowest zones of inhibition. The ethanol extract of garlic had the highest diameter of zone of inhibition among ethanolic extracts of spices. There was no significant difference ($p>0.05$) in inhibition zones between aqueous and ethanol extract of a particular spice. Aqueous and ethanol extracts of clove, ginger, mustard, pepper and turmeric were unable to inhibit the bacterium with the tested concentrations. Minimum inhibitory concentrations of the spices, which inhibited the growth of *Pectobactrium* were 0.5 g/ml. The 0.5 g/ml aqueous extract of garlic possess an effective antibacterial activity against *P. caratovorum* and can be used as cost effective and eco-friendly preventive strategy to eliminate *P. caratovorum* rather than using chemical control methods. Evaluation of antibacterial activity of these extracts in field, is needed before a cost-effective formulation is developed.

Keywords: *Garlic, extract, Inhibition zone, Soft rot, Spice, Pectobacterium caratovorum*