

Bacteriophages Isolated in China for the Control of *Pectobacterium carotovorum* Causing Potato Soft Rot in Kenya

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Abstract

Soft rot is an economically significant disease in potato and one of the major threats to sustainable potato production. This study aimed at isolating lytic bacteriophages and evaluating methods for and the efficacy of applying phages to control potato soft rot caused by *Pectobacterium carotovorum*. Eleven bacteriophages isolated from soil and water samples collected in Wuhan, China, were used to infect *P. carotovorum* host strains isolated from potato tubers showing soft rot symptoms in Nakuru County, Kenya. The efficacy of the phages in controlling soft rot disease was evaluated by applying individual phage strains or a phage cocktail on potato slices and tubers at different time points before or after inoculation with a *P. carotovorum* strain. The phages could lyse 20 strains of *P. carotovorum*, but not *Pseudomonas fluorescens* control strains. Among the 11 phages, *Pectobacterium* phage Wc5r, interestingly showed cross-activity against *Pectobacterium atrosepticum* and two phage-resistant *P. carotovorum* strains. Potato slice assays showed that the phage concentration and timing of application are crucial factors for effective soft rot control. Phage cocktail applied at a concentration of 1×10^9 plaque-forming units per milliliter before or within an hour after bacterial inoculation on potato slices, resulted in $\geq 90\%$ reduction of soft rot symptoms. This study provides a basis for the development and application of phages to reduce the impact of potato soft rot disease.

Keywords: *Pectobacterium carotovorum*, Potato soft rot, Bacteriophages, Phage resistance

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