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Isolation and characterization of bacteriophages infecting *Pectobacterium* spp. causing soft rot in carrots

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Soft rot in carrots caused by *Pectobacterium* spp., is one of the most widespread and economically important diseases in carrots. As available methods to control bacterial phytopathogens are unsatisfactory, phage-mediated biocontrol is considered as an attractive, environmental friendly, relatively cheap and safe alternative for the control of bacterial plant diseases. Hence, the objective of this study was to isolate and characterize bacteriophages that could effectively be used against the bacteria that causes soft rot disease in carrots. Bacteriophages were isolated from infected carrots with trapping hosts followed by the single plaque isolation using agar double-layer technique. Several locally isolated *Pectobacterium* strains, as well as *P. caratovorum* type strain, were used as trapping bacterial hosts for phage isolation. Fourteen bacteriophages were isolated and evaluated for their host range by spotting each phage on a lawn of bacterial host. Phages P9-PC2B7, P10-Pcc and P11-Pcc showed the broadest host range against all tested bacterial pathogens including *P. carotovorum* subsp. *caratovorum*^{T}. Phage isolates P12-PC2B6, P13-PC2B7 and P14-PC2B8 showed clear lysis with previously isolated *Pectobacterium* strains C2B6, C2B7 and C2B8, but not with *P. carotovorum* subsp. *caratovorum*^{T}. However, none of the isolated bacteriophages showed lysis against *P. caratovorum* subsp. *odoriferum*^{T}, *P. atrosepticum*^{T} and *P. betavasculorum*^{T} indicating the host specificity of these phages. Further characterization of these phage isolates together with field trials will enable the development of a promising solution for the bacterial soft rot disease in carrots.

Key words: *Carrot, bacterial soft rot, bacteriophages, biocontrol*

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