

Isolation and Characterization of Bacteriophage for the Control of Enterohemorrhagic *Escherichia coli* on Fresh Produce

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Major: Food Science and Technology

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Bacteriophages are viruses that infect bacteria, and are potentially applicable for the control of foodborne pathogens. Bacteriophage is particularly relevant to the safety of fresh produce and other minimally processed products since it can be used as a non-destructive treatment. The purpose of this study was to isolate bacteriophages specific for pathogenic *Escherichia coli* from environmental sources and evaluate their ability to control the host pathogen on fresh produce.

A phage active against *E. coli* O157:H7 EDL933, was isolated from waste water. Cross-reactivity studies showed this phage had strong activity against eight of twelve additional *E. coli* strains. Application of phage for biocontrol was evaluated on green peppers and baby spinach. Cut peppers were treated with UV light to eliminate background biota, then spot-inoculated with *E. coli* O157:H7 EDL933 on cut edges. Baby spinach leaves were spot-inoculated with GFP labeled *E. coli* O157:H7.

Inoculated pepper was stirred for 5 min in phage lysate, stored at 25°C or 4°C, and plated periodically for up to 72 h. Spinach leaves were treated with a 2 min dip and stored at 25°C. Control samples were dipped in LB broth.

Phage treatment provided a reduction of 1.2 log *E. coli*/g pepper compared to the initial population which remained virtually unchanged for 72 hr at 4°C. For samples stored at room temperature, a maximum reduction of 2.1 log *E. coli*/g pepper and 3 log *E. coli*/g spinach was achieved during the first 5 hr of incubation. After 72 h, growth of surviving cells occurred, but the difference between the treatment and the control was 2 log for both products.

These findings suggest the suitability of bacteriophage to selectively control pathogens on fresh produce without damaging the product. Further testing is warranted to evaluate the potential of phage biocontrol in other food products and conditions.