

BACTERIOPHAGES AS AN INNOVATIVE TOOL FOR PLANT BIOPROTECTION AGAINST BACTERIAL PATHOGENS

YAROSHENKO Oleksandr

KOROTIEIEVA Hanna, <https://orcid.org/0000-0002-4059-0741>

ANDRIICHUK Olena*, <https://orcid.org/0000-0001-6219-2149>

Taras Shevchenko National University of Kyiv, Ukraine

**Corresponding e-mail: aom502@knu.ua*

Bacterial infections represent one of the major threats to plants, animals, and humans, causing substantial economic losses and environmental damage. In agriculture, bacterial diseases frequently result in widespread outbreaks in crops, leading to significant reductions in both yield and quality. The increasing prevalence of antibiotic resistance among bacterial pathogens has diminished the effectiveness of conventional control strategies, particularly antibiotic-based treatments, highlighting the urgent need for sustainable alternative approaches to disease management.

One of the most promising approaches to controlling bacterial diseases is the use of bacteriophages - highly specific viruses that infect and lyse susceptible bacterial hosts. Their high specificity and environmental safety make bacteriophages an effective tool for controlling bacterial infections in agriculture, while also supporting applications in human and veterinary medicine.

The aim of this study was to characterize bacteriophages active against phytopathogenic bacteria and to compare their biological properties to identify promising candidates for the development of an environmentally friendly biocontrol agent against bacterial plant diseases.

Plant samples exhibiting symptoms of bacterial disease were collected from vegetable storage facilities. Bacteriophages were isolated from these samples by the direct isolation method using *Serratia marcescens* as the host bacterium. Phage titers were determined as plaque-forming units (PFU/mL) using the standard double-layer agar assay. Pure bacteriophage isolates were obtained through six successive rounds of plaque purification. Two morphologically distinct bacteriophage isolates were selected and combined into a bacteriophage cocktail to evaluate their potential for preserving tomato fruit.

Tomato fruit treated with the bacteriophage cocktail exhibited only mild symptoms of bacterial disease, characterized by a few small lesions without extensive necrosis, tissue maceration, or pronounced softening. In contrast, untreated control fruit developed numerous necrotic lesions accompanied by extensive tissue maceration and severe softening, indicative of active disease progression.

Treatment with the bacteriophage cocktail reduced disease severity by 80-90% compared with the untreated control, demonstrating its high efficacy in suppressing bacterial disease during tomato fruit storage.

Overall, the bacteriophage cocktail shows considerable promise as a biocontrol agent for the management of bacterial diseases in tomato fruit. These findings support its potential application in postharvest disease management. Nevertheless, further research is required to optimize phage formulation and application protocols before large-scale implementation.

Keywords: bacteriophages, phytopathogenic bacteria, *Serratia marcescens*, biological control, tomato fruit, bacterial diseases.