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Abstract

Characteristic of a Distant Relative of *Teseptimavirus* Genus Phages That Acquired the Ability to Lysogenize Its Host †

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Abstract: *Pseudomonas syringae* is a plant pathogen, which groups over 40 pathovars. Climate change and international trade facilitate the worldwide spread of pathogenic *P. syringae* strains. In recent decades, infections with *P. syringae* have been causing large losses in vegetable growing and horticulture. With the aim to look for biocontrol agents that could minimize these losses, we isolated bacteriophages infective for certain *P. syringae* strains. One of these phages, designated by us as vB_PsyP_3MF5 (3MF5), appeared to have atypical properties. It formed clear plaques on the layers of sensitive cells at elevated temperatures but was unable to form plaques at room temperature. It quickly adsorbed to its host cells and had a short latent period and a large burst size at permissive temperature. However, several survivors of the phage infection could be isolated in a standard killing assay. They appeared to form a lysis zone when placed on a layer of cells that were not treated with this phage, indicating that they are 3MF5 lysogens. In support of that, their DNA could serve as a template for PCR amplification with 3MF5 specific primer pairs. The analysis of the 3MF5 genomic sequence (GenBank. Acc. No. MT597419) revealed features typical of *Teseptimavirus* genus phages which are obligatorily lytic and are unable to lysogenize cells. Additionally, comparative analysis of the predicted 3MF5 proteins excluded the presence of any obvious homolog of a typical phage repressor that inhibits transcription of early phage genes in lysogens. Conceivably, the repression is achieved either by the interaction of a temperature-sensitive host/phage protein with a region controlling the expression of phage early genes or by temperature-induced structural changes in phage RNA, which could act by the occlusion of ribosomal binding sites of early phage genes. Surprisingly, the results of our preliminary studies indicate that despite its conditionally temperate nature, 3MF5 exhibits biocontrol properties.

Keywords: bacteriophage; *Pseudomonas*; *Teseptimavirus*; phytopathogen; genome; integrase; *Autographiviridae*; biocontrol