

## **Bacteriophages Infecting *Enterobacter cloacae* to Reduce Bloaters Damage in Fermented Cucumbers**

Authors: Samantha Thompson and Jean Lu

Fermented cucumbers are one of the most important fermented vegetables consumed worldwide. During cucumber fermentations, certain undesirable changes may occur. One of such changes is known as bloater defect (hollow cavities in fermented cucumbers), which is primarily caused by gas-producing bacteria including *Enterobacter cloacae*. Bloater defect lowers product quality and leads to significant economic loss to the pickle industry, and effective preventative methods are needed. Bacteriophages (phages) are highly host-specific bacterial killers. Use of phages to control unwanted bacteria in foods is a promising approach because phages do not change food properties. This research was to isolate, characterize, and evaluate phages infecting *Enterobacter cloacae*. Two phages,  $\Phi$ 107E-p1 and  $\Phi$ 115E-p2, were isolated. The transmission electron micrographs revealed that both phages belong to the *Siphoviridae* family. The host range study showed that  $\Phi$ 107E-p1 has a broad host range. In contrast,  $\Phi$ 115E-p2 had a narrow host range. One-step growth curves showed that the two phages have similar latent periods and large burst sizes. Restriction analysis of the phage DNAs demonstrated that the two phages are genetically different. The effectiveness of the phage infection against their hosts were evaluated in cucumber juice as a model food system. Phage infection at the multiplicity of infection of 0.1 caused rapid decrease in cell concentration, suggesting that these phages are potential candidates for use in cucumber fermentations to reduce the incidence of bloater. More research is needed to further evaluate the efficacy of the phage infections against their hosts in cucumber fermentations.