

Detection and Chracterization of a Lytic *Pediococcus* Bacteriophage

Chin, Hwa-Sup, Eui-Sook Jung, Jun-Su Shim, Sung-Sik Yoon
Department of Biological Resources and Technology, Yonsei University

Pediococcus strains are used for meat and vegetable fermentations, and they are also considered to be desirable flora in the human intestinal tract. Little is known, however, about the effect of lytic bacteriophage active against *Pediococci* in these fermentations. Our objective was to investigate the phage susceptability of a *Pediococcus* starter culture in commercial vegetable fermentations. To our knowledge, the effects of bacteriophage on lactic acid bacteria starter cultures used in meat and vegetable fermentations has not previously been characterized. Bacteriophage were enriched and isolated from cucumber fermentations using a standard agar overlay method. Twelve lytic bacteriophage were recovered from five commercial cucumber fermentation tanks that were capable of infecting the *Pediococcus* sp. LA0281 starter culture. One of these lytic phage, Φ ps05, was selected for further study. Phage plaques for Φ ps05 were clear, round-shaped, and surround by slight turbid layer on the LA0281 lawn, indicating a lytic cycle. Electron micrographs showed with a small isometric head and a flexible non-contractile tail; the morphology indicated that the phage was from the Siphoviridae family or Bradley's group B1. The average size of the phage was measured to be 51.2 nm in head diameter and 11.6 nm wide \times 129.6 nm long for tail. A single-step growth kinetics curve showed that the eclipse and the latent period were 29 min and 34 min respectively, and an average burst size was calculated to be 12 particles per infective center. The optimum proliferating temperature was 35°C, and was lower than the optimum for LA0281 cell growth (40°C). The structural proteins were shown by SDS-PAGE to consist of one main protein of 34 kDa and three minor proteins of 85, 58 and 52 kDa, respectively. The phage genome was found to be linear double stranded DNA without cohesive ends. A physical map of the genome was generated by digestion with restriction enzymes, and the size of the phage DNA was estimated to be 24.1 kb. This work represents the first characterization of a bacteriophage active against a vegetable fermentation starter culture. These results imply that the presence of lytic phage must be considered when evaluating the effectiveness and predominance *Pediococcus* starter cultures in vegetable fermentations.