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Stabilization of bacteriophage for military and civilian applications

Foodborne outbreaks involving fresh produce is a concern to the United States Military deployed worldwide to countries that lack food sanitation standards and enforcement resulting in food-borne disease outbreaks. These outbreaks have potential harmful effects on troop health and readiness. Simultaneously, military commanders want to maximize the availability of freshly prepared meals, to improve the overall troop morale. Fruits and vegetables supporting these meals are generally procured locally in the region of deployment. Fresh produce are commonly consumed uncooked and have been identified as primary causes of illnesses associated with outbreaks of foodborne disease. Strategies to eliminate food pathogens on fresh produce are a need for military and civilian use. An old anti-pathogen technology that has recently emerged as a novel method for improving produce safety is bacteriophages. Bacteriophages are naturally occurring predators of bacteria that reduce the levels of their specifically-targeted pathogenic bacteria. The Army has work with industry to develop a series of lytic bacteriophage cocktails specific against *Escherichia coli* O157:H7, *Salmonella* and *Shigella*. Studies were conducted to identify potential best approaches for eliminating these pathogens from broccoli, cantaloupe and strawberries. Bacteriophage cocktails, levulinic acid produce wash, and a combination of treatments (BCPW) were compared to the Army standard of 200 ppm free available chlorine. Results indicated that the BCPW treatment was very effective for treating produce contaminated with pathogens even in the presence of elevated organic loads. Presently bacteriophage are sold as concentrated, aqueous, phage preparations that must be stored refrigerated (2-8°C) and diluted with clean water prior to application. Due to the cost of shipping liquid products around the world, the Army has investigated strategies for drying and increasing the shelf-life of phage cocktails. Electrospraying and freeze drying studies were conducted and demonstrated potential promise for storing phage at room temperature for extended periods.

Biography

Andre Senecal received a BA in Biology from Assumption College; a MS in Biological Sciences from Long Island University; and a Ph.D. in Biological Sciences from the University of Rhode Island. He presently serves as the scientific technical advisor for the Food Protection and Innovative Packaging Team, at the Natick Soldier Research Development and Engineering Center. In his 29 years at Natick, he has been as a senior research food technologist with responsibilities for advancing military field ration quality, stability, performance, and food safety. Presently, he is the lead scientist for researching technologies for improving military food safety and detection. He is a member of the Department of Defense Veterinary Services Activity, Office of the Surgeon General Food Risk Evaluation Committee and Laboratory Working Group where he serves as a technical consultant for food sampling protocols and detection technologies.

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