

USE OF NONPATHOGENIC BACTERIA, *PAENIBACILLUS ALVEI*, AS A NATURAL BIOCONTROL AGENT FOR ELIMINATION OF FOOD-BORNE PATHOGENIC BACTERIA

Technology Summary

Foodborne illness is a serious public health concern and can be caused by numerous pathogens. Bacteria such as salmonella cause about 30,000 cases of food-related gastrointestinal illness per year in the US alone, resulting in billions of dollars each year in lost productivity and healthcare costs. Certain foods are associated with foodborne illnesses, including fresh produce. Bacterial contamination of produce by pathogens like salmonella can occur at any point in the produce supply chain. While treating crops with harsh chemical bactericides or fungicides is effective at controlling disease, it is undesirable because of the harmful effects on humans and the environment. There is a need for natural or microbial biocontrol reagents that have minimal effect on the environment, and are effective against pathogens without being harmful to humans.

FDA researchers isolated a new strain of *Paenibacillus alvei* TS-15 that can be used as an effective microbiological biocontrol agent to combat plant-based pathogens. A safer alternative to harsh chemical bactericides, TS-15 effectively inhibits or eliminates the growth of bacterial human foodborne pathogens and bacterial plant pathogens on the surface of plants. Effective at inhibiting growth of both gram-negative and gram-positive bacteria, TS-15 can combat pathogens that destroy produce-related crops, such as, tomato-plant diseases. FDA demonstrated TS-15 antagonized growth of *Salmonella* and eliminated pre-existing colonies of the pathogen found to contaminate organs of tomato plants, including fruit, leaves and blossoms.

Potential Commercial Applications

- TS-15 can be used as a part of a natural bactericide or soil pretreatment against bacterial pathogens, such as, *Salmonella*, *Escherichia*, *Listeria*, *Shigella*, *Enterobacter*, and *Staphylococcus*.

Competitive Advantages

- Low cost of production for protecting food supply.
- Natural alternative to harsh chemical bactericides.
- Safe method of preventing food-borne bacterial illness.

Development Stage: Pre-development

Inventors: Eric Brown, Jie Zhang

Publications:

"In situ evaluation of *Paenibacillus alvei* in reducing carriage of *Salmonella enterica* serovar Newport on whole tomato plants." *Appl Environ Microbiol*. 2014 Jul;80(13):3842-9 PMID: [24747888](#)

"Identification and Structural Characterization of Naturally-Occurring Broad-Spectrum Cyclic Antibiotics Isolated from *Paenibacillus*." *J. Am. Soc. Mass Spectrom*. 2015 Oct;26(10):1768-79 PMID: [26250559](#)

Intellectual Property:

United States patent: US [9,920,296](#) B2, issued 03.20.2018

Canada patent application: CA 2836256, filed 11.14.2013

Mexican patent application: MX/a/2013/013509, filed 11.19.2013

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Product Area: antimicrobial; antibacterial; bactericide; anti-pathogen

FDA Reference No: E-2011-003

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