Title Effect of bacterial phytopathogen damage on the survival and proliferation of *Escherichia coli* O157 in the phyllosphere of lettuce and tomato plants

Author Daniel Aruscavage, and Jeffrey T. LeJeune

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Abstract

The ecology of the vegetable leaf surface is important to the survival and proliferation of enteric pathogens. Applying information about changes created by physical damage and phytopathogen infection on foodborne pathogens to the vegetable management practices can help minimize the hazard of contamination of fresh fruits and vegetables. Healthy plants were compared to physically damaged and bacterially infected lettuce plants for their ability to harbor *Escherichia coli* O157 over 10 days. Leaves from lettuce plants cracked along the central vein, plants infected with *Xanthomonas campestris* vitians, and healthy plants were inoculated with *E. coli* O157. *Escherichia coli* O157 were counted on these leaves and also on non-inoculated leaves for 10 days. While the density of *E. coli* O157 decreased on lettuce leaves for all three treatments, the decrease was greatest and most rapid on the healthy plants. There was limited dissemination of the enteric pathogen to non-inoculated leaves over the 10 day period. Counts of *E. coli* O157 on *Xanthomonas* -infected plants decreased significantly over 10 days while physically-damaged plants maintained stable counts.

Contamination of vegetables with foodborne pathogens is a growing public health concern. Biotropic plant pathogens cause lesions and change the abundance and composition of exudates on leaf surfaces. *Escherichia coli* O157 proliferation was determined on tomato leaves infected with *Pseudomonas syringae* and *Xanthomonas campestris* . Gas chromatography was used to determine the sugars and sugar alcohols released by tomato leaves damaged by the same biotropic plant pathogens. The in vitro proliferation of *E. coli* O157, P. syringae, and *X. campestris* incubated in the presence of different combinations of exuded sugars was analyzed using a mixture model design. *Escherichia coli* O157 survived better on tomato plants damaged by *Xanthomonas campestris* than on healthy plants ($P = 0.012$). The most common sugars and sugar alcohols in the leaf exudate were glucose, fructose, inositol, and sucrose. The abundance of sucrose and inositol differed between the healthy and infected plants ($P<0.05$). Phytopathogen damaged increased nutrient availability and offered attachment sites for *E. coli* O157.

Maintaining healthy plants might help limit the risks associated with foodborne pathogens on fresh vegetables