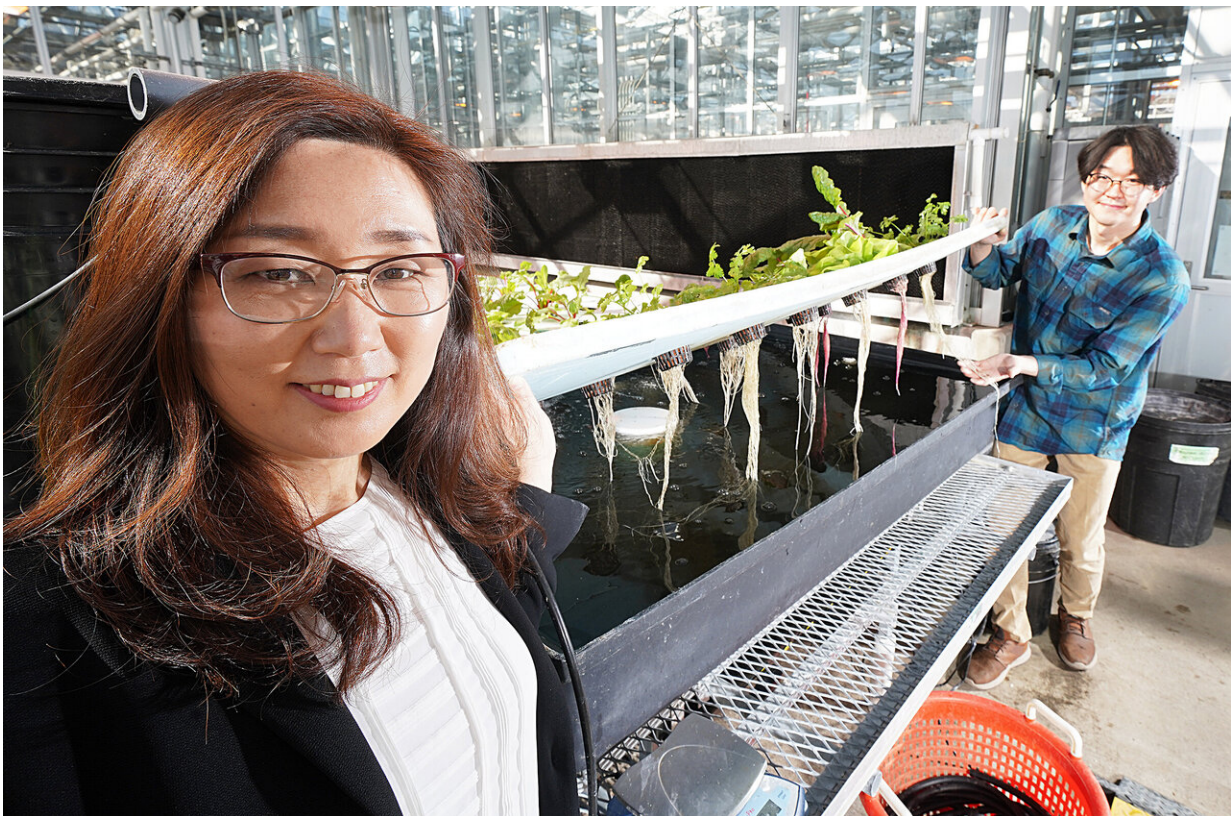


Risk of *E. coli* in hydroponic and aquaponic systems may be greater than once thought

April 7 2020, by Brian Wallheimer



Hye-Ji Kim (left), pictured with graduate student Seunghyun Choi, found the presence of *E. coli* bacteria in aquaponic and hydroponic growing systems, suggesting the bacteria could reach produce consumers. Credit: Agricultural Communication photo/Tom Campbell

A spate of foodborne illnesses in leafy greens and other produce in

recent years has sickened consumers and disrupted growers and supply chains. It's been thought that hydroponic and aquaponic systems could reduce these issues since there is little opportunity for pathogens like E. coli to contaminate the edible parts of plants.

A Purdue University study, however, has found the presence of Shiga toxin-producing E. coli (STEC) – the same bacteria that have made consumers of several produce products ill—in hydroponic and aquaponic growing systems. Hye-Ji Kim, an assistant professor of horticulture and the study's corresponding author, said the findings suggest growers using these systems should be careful in handling and harvesting to avoid contamination.

"Many people think that there is no chance that E. coli could be present in these systems and that risk of contamination is low," said Kim, whose results were published in the journal *Horticulturae*. "Our findings suggest there is some potential for food safety concerns. We're not saying that these foods are unsafe, but that it's important to handle these plants properly and carefully."

The E. coli outbreaks that have occurred in recent years tend to happen in [leafy greens](#) and other vegetables grown in irrigated fields. Potential sources could be from E. coli in manure or groundwater that reaches the edible portions of plants, or from those contaminants getting to plants after root damage by wild animals.



Aquaponic and hydroponic growing systems are thought to have little risk of containing bacteria that can sicken produce consumers. After finding *E. coli* in both types of systems, Hye-Ji Kim suggests growers to use caution to not introduce the bacteria to their operations. Credit: Agricultural Communication photo/Tom Campbell

Proponents of hydroponic and aquaponic systems suggest their growing methods would reduce or eliminate any risk of contamination. Both soilless systems, hydroponic plants are grown in water and chemical fertilizers or nutrient solutions, and aquaponic systems include the raising of fish, with fish wastewater utilized as water and nutrient source for the plants.

Kim, Yi-Ju Wang, a [graduate student](#) in Kim's lab, and Amanda Deering,

a Purdue clinical assistant professor of food science, set up both hydroponic and aquaponic systems for growing lettuce, tomatoes and basil for about two months. The scientists found *E. coli* in both systems at the time of harvest.

In the aquaponic system, the authors believe the *E. coli* was introduced by the fish. The bacteria was found in the water, on plant roots and in fish feces.

"Our separate aquaculture system confirmed that fish feces were a major source of contamination with STEC in the aquaponic system," the authors wrote. "These results indicate that introducing contaminated fish can be a source of foodborne pathogens in aquaponics."



The fish used in aquaponic growing systems may introduce *E. coli* to water and potentially produce crops, and accidental contamination is possible in hydroponic systems. Hye-Ji Kim and Yi-Ju Wang (pictured) suggest growers

take careful steps to ensure that these bacteria don't reach plants that could sicken consumers. Credit: Agricultural Communication photo/Tom Campbell

The presence of *E. coli* in the hydroponic system, in which fish were not used, suggests that the bacteria was introduced accidentally. Kim believes it could have splashed from a nearby aquaponic system or have been introduced by a visitor who brought it in from outside the greenhouse. Either way, the presence in the system suggests that accidental contamination is a real risk.

E. coli was also found on plant roots in both systems, but the bacteria did not internalize in the plants. In other words, even with the bacteria present in water and on the roots, the edible portions of the plants were still safe to consume.

The key, Kim says, is proper handling to ensure that *E. coli* or other pathogens don't make it to the edible parts of plants. Damaged roots would allow bacteria into the plants, potentially making it to edible portions internally. And splashing of water during growing or harvesting could introduce bacteria to the edible portions of the plants.

"The best way to manage these issues is to not touch roots or water throughout production cycles. If you do, you should thoroughly wash your hands before touching the edible parts of the [plants](#)," Kim said. "Proper sanitization of equipment is also important. And acquiring [fish](#) that do not contain *E. coli* would also be beneficial."

Kim's lab is continuing to investigate food safety risks in hydroponic and aquaponic systems. Projects include damaging roots and simulating splashes to understand how much contamination can occur.

More information: Yi-Ju Wang et al. The Occurrence of Shiga Toxin-Producing *E. coli* in Aquaponic and Hydroponic Systems, *Horticulturae* (2020). [DOI: 10.3390/horticulturae6010001](https://doi.org/10.3390/horticulturae6010001)

Provided by Purdue University

Citation: Risk of *E. coli* in hydroponic and aquaponic systems may be greater than once thought (2020, April 7) retrieved 24 May 2024 from <https://phys.org/news/2020-04-col-i-hydroponic-aquaponic-greater-thought.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.