Prof Using Bacteria to Improve Corn

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Inoculating corn seeds with “good” bacteria may help improve one of the world’s most important food crops, according to a University of Guelph professor.

Manish Raizada, Department of Plant Agriculture, says adding useful microbes to corn might be cheaper and more sustainable than expensive chemicals to help plants use nutrients or fight diseases or pests.

Raizada recently surveyed “good” bacteria living in ancestral and modern corn grown across North America. Completed with recent PhD graduate David Johnston-Monje, this study appeared in *PLoS One*. The research was supported by the Ontario Ministry of Agriculture, Food and Rural Affairs, the Ontario Ministry of Research and Innovation, and the Canada Foundation for Innovation, among others.

“We have found and cultured collections of microbes that might be providing different corn with beneficial functions,” said Raizada. “We will be determining if these microbes can be useful incoculants, or biofertilizers, for corn and other cereals.”

Raizada said breeders and agrifood companies might use the results to pack useful bacteria into corn and other cereal crops.

Scientists already knew that bacteria live in corn and other plants. Like the group of microbes in your gut that help digest and absorb food, certain types of bacteria in plants and seeds appear to help the plant survive by, say, making essential nutrients available, Raizada said.

Different corn types carry varying groups of beneficial microbes, but some of the good bacteria have been lost during 9,000 years of human cultivation in North America.

The Guelph researchers set out to determine what good bacteria remain, and where they are found. They looked at 10 kinds of corn and four teosintes (forerunners of domestic corn). They chose varieties between southern Mexico, where people began to cultivate the crop thousands of years ago, and Quebec’s Gaspé region, where First Nations people domesticated a type of corn only hundreds of years ago.

“As indigenous peoples have selected and bred corn plants, they unknowingly have also selected and cultivated microbes,” said Raizada.

They found some bacteria were conserved in all corn types. Others were found only in certain kinds of corn. One microbe in a giant Mexican variety makes a chemical known to promote plant growth. Another bacterium makes a hormone that stimulates roots, which might help a corn variety grow aerial roots to support and nurture itself in swampy conditions.

Raizada plans to test the effects of those bacteria, and that of another fungi-fighting microbe, in Guelph field trials. The researchers will also study such basic questions as how these bacteria move within plants and soil.

Reintroducing microbes into corn may be a good alternative to chemicals, Raizada said. Each year, Canadian farmers already use at least $100 million worth of biofertilizers to help corn plants use nitrogen.

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