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Developing biopesticides, biofertilizers and bioproducts for next generation green revolution and sustainable agriculture

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Modern agriculture is largely based on dense cropping and heavy application of pesticides and fertilizers, resulting in very serious issues such as soil pollution and land degradation. Therefore, it is necessary to develop alternative and greener strategies to combat pests and pathogens towards sustainable agriculture and environment. There are large number of microorganisms in nature, soil, capable of suppress crop pathogen, diseases and pests. In addition, accumulating reports uncovered the beneficial microbes for crop growth promotion, including phosphate or potassium solubilization and nitrogen fixation. The beneficial traits of microorganisms can be harnessed and utilized as alternative strategies to fertilize crops or reduce crop disease and pests. Over the years, we have been isolating, characterizing and applying beneficial microorganisms as biopesticides, biofertilizers or bioproduct factories. These include *Paenibacillus polymyxa* CR1, *Burkholderia cenocepacia* CR318, *Bacillus velezensis* 9D-6, *Arthrobacter sp*. LS16 and *Acinetobacter calcoaceticus* CA16. We are also carrying out complete bacterial genome sequencing to further characterize the genetics and regulatory pathways for the beneficial traits of the isolated bacteria. Here, we will summarize our research and latest discovery in develop biopesticides and biofertilizers, and discussing their potential application in reducing chemical fertilizers and pesticides, towards more sustainable agriculture and environment.

Biography

Ze-Chun Yuan is a Research Scientist and Principal Investigator at Agriculture and Agri-Food Canada. He is a Research Professor and Graduate Student's Supervisor at the Department of Microbiology and Immunology, University of Western Ontario, Canada. He has expertise in soil microbiology, bacterial genetics and genomics with great passion in improving crop health and productivity through alternative strategies. He has been isolating and characterizing beneficial microorganisms to manage crop disease or improve crop health and productivity, in particular, developing biofertilizers and biopesticides to reduce the use of classical fertilizers and pesticides in agriculture and horticulture. He is also interested in developing renewable bioproducts from biomass, in particular, crop residues. His research also involves synthetic biology and microbial engineering aiming at rewiring microbial metabolic pathways towards higher productivity of bio-based products and chemicals. He looks for opportunities for collaborative research and training of highly qualified personnel.

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