The Science Source for Food, Agricultural, and Environmental Issues

Agriculture and the Microbiome

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Overview:

Agriculture is one of the keystones of human civilization, providing a reliable, stationary source of food that allowed ancient populations to grow and eventually build cities. Modern agriculture is successful today because of advances in mechanization, breeding, nutrients (e.g., fertilization), and pest and disease management, all of which enhance crop productivity and provide greater food security. Yet even with this progress, the amount of cropland per capita has declined, available farmland is being consumed by urban development at unprecedented rates, and crop yields are plateauing. Crop yields must continue to increase and the gap between plant productivity and consumption must be bridged. Expanding the use of crop microbiomes to improve plant production is that next agricultural revolution.

Learning Outcomes

- *Identify how microbes help agricultural crops.*
- *Explain the regulatory process for microbial commercialization.*
- *Explore different academic and industry partnerships and methods of student training.*

Resources

Access the Issue Paper, Ag quickCAST, and webinar here: https://www.cast-science.org/publication/agriculture-and-the-microbiome/

"From flask to field: How tiny microbes are revolutionizing big agriculture": https://theconversation.com/from-flask-to-field-how-tiny-microbes-are-revolutionizing-big-agriculture-67041

"The Science Behind Microbial and Biological Products": https://www.agriculture.com/crops/the-science-behind-microbial-and-biological-products

"Microbes Help Grow Better Crops": https://www.scientificamerican.com/article/microbes-help-grow-better-crops/

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Assessment Questions

1. Write a summary of this article highlighting 3-5 important facts you learned.

2. Describe the different ways how microbes help out a plant.

3. Explain the research and development and then the regulatory process to commercialize a new microbial product.

4. What are some of the challenges in academia and industry when it comes to creating a new microbial product? How are academia and industry working together to overcome these challenges?

5. What major you might choose if you wanted to pursue a career in agriculturally relevant microbiome science, and then list the other disciplines you would need to be able to communicate/work with to be successful?

Student Reflection

1. Imagine you work in a marketing department of a microbial products company. How would you advertise a new microbial-based fertilizer to farmers to encourage them to purchase and use your product? Write an advertisement promoting such a product.

2. What are some additional ways can universities and corporations partner together to integrate research?