

# Biofertilizer for Plant and Crop Growth and Protection

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## Technology Summary

Current agricultural practices worldwide increasingly have affected soil structure and biological equilibrium, resulting in the need for alternative farming practices to minimize and mitigate those impacts. Researchers at Oak Ridge National Laboratory have developed a novel biofertilizer using a microbial community to increase plant biomass, resistance, and resilience to stress for field crops while maintaining crop stability. The SAFE (Symbionts to Advance Food and Energy Crop Production) biofertilizer contains a mix of microbes to maintain soil and crop health in an ecofriendly manner, thus eliminating the negative impacts of agrochemicals such as traditional fertilizers and herbicides. The ORNL-developed biofertilizer offers key advantages over other biofertilizers: it maintains crop stability throughout the growing season and can be used on different types of crops.

Plants harbor a diverse array of microorganisms, including some that are beneficial to plant growth and productivity; these are being used in biofertilizers to improve the availability of nutrients and defense against pathogens. However, biofertilizers already on the market generally have drawbacks or limitations, including narrow geographic range and poor persistence in the field. The ORNL technology is a microbial biofertilizer mix that significantly increases yields and resistance to pathogens and other stresses on crops such as poplar (a bioenergy crop) and corn (a food and bioenergy crop). Combining harmless, beneficial microbes in the ORNL-developed proprietary mixture for use with a wide array of crops worldwide will increase nutrient availability in soils and enhance soil quality, leading to increased growth of economically important plants.

## Advantages

- Enhanced soil quality
- Increased plant growth and biomass yield
- Increased drought resistance and stress tolerance
- Increased efficiency in acquiring water and nutrients such as phosphorus and nitrogen
- Increased resistance and resilience to pests and pathogens
- Enhanced carbon sequestration

## Potential Applications

- Tree nurseries and other plant-related production companies
- Sustainable farming, particularly for economically important crops such as corn and sorghum

## Patent

Jessy Labbe, Wellington Muchero, and Cyd Elizabeth Hamilton. *Complex of Mutualistic Microbes Designed to Increase Plant Productivity*, Provisional US Patent Application 62/294,048, filed February 11, 2016.

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