**Not entirely unlike fertilizers, foliar fungus *Pseudozyma aphidis* promotes plant growth.**

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**Abstract**

Increasing global population and necessity for higher agricultural yield while avoiding the use of harmful products in agriculture creates new challenges. The use of beneficial microorganisms is an eco-friendly approach to replace/reduce the use of fertilizers and plant growth enhancing products. *Pseudozyma aphidis* (PA)is a yeast like fungus related to the phytopathogenic fungus *Ustilago*. Unlike its relative, PA is not only non-pathogenic but rather beneficial to the host plant. We isolated a unique PA strain that has shown significant anti-fungal and anti-bacterial activity. Tomato plants exhibited enhanced growth and improved crop quality and yield. We extracted bioactive compounds from PAcultures and purified the most active fraction in order to examine their activity on plants. Our extract has shown significant plant growth promoting activity and improved crop yield and quality. Plants treated with PA extract had longer roots and behaved in dose dependent response similar to phytohormones. Characterization of the plant response to the extract has led us to investigate phytohormones secreted by PA. We found that PAsecretes auxins like molecules that enhance the auxin related activity in the plant root up to two weeks after treatment. Our data on fungal auxins and additional plant growth promoting mechanisms of PA will help to enrich the knowledge of beneficial microorganisms. Furthermore, identification and characterization of the non-pathogenic fungal auxin activity and additional plant growth promotion mechanisms in PA will help to develop eco-friendly sustainable agricultural products, thus reducing the use of fertilizers and the environmental footprint of agricultural practice.