

Protists as main indicators and determinants of plant performance

Sai Guo
Wu Xiong
Xinnan Hang
Zhilei Gao
Zixuan Jiao
Hongjun Liu
Yani Mo
Nan Zhang
George A. Kowalchuk
Rong Li
Qirong Shen
Stefan Geisen

Video Byte

Keywords: Soil protist community, Soil management, Organic fertilizers, Crop yield enhancement

Posted Date: September 20th, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-923381/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Soil is essential for crop production, providing water, nutrients, and the growth matrix for plants. But agricultural space must compete with other human needs and natural resources. Although new agricultural management systems help meet the increasing food demands of the population continuous cropping systems and high-yield fertilizers can result in the proliferation of soil-borne plant pathogens. While bacteria and fungi have been thoroughly evaluated, a recent study focused on the contribution of protist communities, in particular those that consume microbes, on plant performance. Researchers tracked the entire microbiome of cucumber plants over six growing seasons with different fertilization regimes. They found that organic fertilization treatments resulted in the highest yield. Bio-organic fertilizers led to the most pronounced shifts in protist communities, with microbivorous cercozoan protists the most affected. Plant yield was positively correlated with the abundance of these protists and the density of potentially plant-beneficial organisms and greenhouse experiments confirmed that cercozoan protists can positively impact plant growth. This suggests that protists may play central roles in stimulating plant performance making them an ideal target for new agricultural practices aimed at enhancing plant growth and securing the food supply for a growing population.