Paper ID	121
Author(s)	Mika Nomura
Title	Plant-Microbe Symbiosis: Evolution and Applications in Sustainable Agriculture

Abstract

The emergence of oxygen on Earth marked a critical turning point in the evolution of life and environmental transformation. Photosynthetic organisms, including cyanobacteria and plants, produce oxygen through photosynthesis, which plays a crucial role in sustaining life on Earth. While plants acquire carbon from the atmosphere via carbon fixation, they must absorb other essential nutrients, such as nitrogen, phosphorus, and potassium, from the soil. Soil microorganisms not only decompose organic matter but also form beneficial symbiotic relationships with plants, facilitating nutrient exchange. These interactions are essential for maintaining soil health and promoting plant growth.

In recent years, advances in bioinformatics have increasingly clarified the complex relationships between plants and soil microorganisms. One well-known example of such symbiosis is the association between leguminous plants and rhizobia. Plant-microbe symbiosis has the potential to reduce excessive fertilizer use and contribute to mitigating global warming.

This study introduces the co-evolution of leguminous plants and rhizobia and reports on the symbiosis between sugarcane and soil microorganisms cultivated in Higashikagawa City, Kagawa, Japan. The sugarcane grown in this region is used to produce wasanbon sugar. By focusing on the symbiotic microorganisms associated with locally cultivated sugarcane, we aimed to isolate beneficial microorganisms and explore their potential as valuable agricultural resources.

Keywords	Nitrogen fixation, Plant and microbe interaction, evolution, Sustainable agriculture