

Laboratory of Soil Science

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Microorganisms are affected by conditions in nearby soil, not those in soil as a whole. Since soil contains a variety of materials, such as inorganics, organics, and living organisms, as well as water and a gaseous atmosphere, and since these components are distributed heterogeneously in the soil, there exist a variety of physicochemical and biological conditions, even within a given sample of soil. Thanks to the varied, heterogeneous nature of soil habitat at the microsite-level, diverse microorganisms can coexist, and a variety of microbial processes are able to occur, which allows for the elemental cycling that sustains life on Earth. Information regarding which microbes do what in specific soil microenvironments allows us to develop a better understanding of soil ecosystems.

Our research focuses on the activity and composition of microorganisms at particular microsites within soil. We are currently examining the following research topics:

- **Effects of inorganics on the activity and life of microorganisms and the fate of microbial biomass in soil:** Most microbes in soil are associated with soil particles. This association modifies the lives of microorganisms. By examining the activities and the fate of microbes as well as their biomolecules, we intend to provide methods for enhancing both productivity of and carbon sequestration in soil.
- **Rhizosphere microorganisms in Fe-deficient soil:** Root exudates make the chemical and microbiological nature of the rhizosphere different from that of the bulk soil. We currently examine the rhizomicroorganism of *Hyoscyamus albus*, which releases malic acid and riboflavin from roots under Fe-deficient conditions reported by Prof. Kitamura.
- **Effects of deposits from air on soil microorganisms:** Small particulate matter can be carried by the wind across oceans and enter the soil. Our ongoing research examines the collection of particulates in the atmosphere



in Nagasaki, and has occasionally shown that this material can decrease levels of soil microbial activity.

