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In search of biological indicators for soil health and disease suppression

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Abstract

While soil quality encompasses physical and chemical besides biological characteristics, soil health is primarily an ecological characteristic. Ecosystem health has been defined in terms of ecosystem stability and resilience in response to a disturbance or stress. We therefore, suggest that indicators for soil health could be found by monitoring responses of the soil microbial community to the application of different stress factors at various intensities. The amplitude of a response and time to return to the current state before application of stress could serve as measures of soil health. Root pathogens are an integral part of soil microbial communities, and the occurrence of epiphytotics forms an indication of an ecosystem in distress. Disease suppression can be viewed as a manifestation of ecosystem stability and health. Thus, indicators for soil health could possibly also function as indicators for disease suppressiveness. Previously suggested indicators for soil health and disease suppression have mainly been lists of

variables that were correlated to more or less disturbed soils (ranging from conventional to organic agricultural soils, grassland and forest soils) or to conduciveness to disease. We suggest a systematic ecological approach to the search for indicators for soil health and disease suppression, namely, measuring biological responses to various stress factors and the time needed to return to the current state.

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Keywords

Microbial diversity; Microbial succession; Resilience; Stability; Stress

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