THE NEMATODE SPIN ON SOIL FOOD WEBS

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Energy and carbon fixed through photosynthesis are ingested and degraded in soil by primary consumers that in turn become food to other organisms occupying higher trophic levels. Terrestrial life depends upon the processes arising from the complex array of feeding relationships among the organisms that constitute the soil food web. Knowledge of feeding relationships among organisms provides insight into important processes occurring at microsites, including decomposition, nutrient cycling, and pathogen/pest suppression. Aggregated across microsites, these processes have landscape and global effects. Reliable and efficient biological indicators are invaluable tools for determining food web condition and function. One useful indicator group is the soil nematode fauna. Nematodes are ubiquitous in the soil environment; they occupy many trophic nodes; they constitute functional guilds whose members respond similarly to environmental enrichment, degradation, and stress. Nematode faunal analysis, based on functional guilds, provides a two-trajectory description of the soil food web. The Enrichment Trajectory is the weighted abundance of individuals in opportunistic guilds while the Structure Trajectory similarly measures larger, slower-reproducing omnivores and predators. In soil receiving large quantities of readily-degraded materials replete with nutrients, the abundance of enrichment indicators is high. The abundance and diversity of structure indicators is low in disturbed, contaminated and in heavily-managed agricultural sites. We are applying nematode faunal analysis to identify management practices and contaminants that most affect the abundance and diversity of nematodes in agricultural systems. In addition, we use suppressiveness assays to determine whether soils with a high structure index reduce levels of plant-parasitic nematodes. Soils with a high structure index, based on nematode faunal analysis, appear to have high species richness of other soil organisms and, we suggest, greater functional redundancy with regard to important soil processes.