

ECOSYSTEM SERVICES OF NEMATODES IN SUSTAINABLE SOIL MANAGEMENT

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In the course of their metabolic and behavioral functions, organisms of the soil food web affect each other directly, by competition or predation, or indirectly, by altering the biotic and abiotic environment. The currencies of the soil ecosystem are carbon and energy, which drive the metabolic processes of their consumers. The metabolic and production functions of the organisms that successively use them rapidly deplete the available carbon and energy. Nematodes affect food web structure and function by: 1) channeling resources derived through feeding on roots; 2) predation on other organisms; 3) serving as prey for higher-level predators; 4) redistributing organisms in the soil matrix; 5) sequestering minerals, C and energy; 6) converting organic molecules to mineral forms available for uptake by plants and microbes; and 7) regulating opportunistic species. From a soil management perspective, the various functions of organisms may constitute either services or disservices. Disservices attributable to nematodes include overgrazing, which diminishes the services of prey organisms, and feeding that damages plants, which reduces carbon fixation and availability for all organisms in the food web. Management to ameliorate potential disservices often results in unintended, but long-lasting, diminution of services by components of the web subjected to collateral disruption. The nematode assemblage provides useful indices of soil food web structure but the magnitude of the services depends on biomass and activity of the organisms. Respiration estimates of key components of the nematode assemblage may be useful metrics, particularly with regard to contributions to soil enrichment and the regulation of opportunistic species. Opportunities for managing the service roles of nematodes in soil food webs include enhancement of mineralization by edaphic and environmental alteration, prolonging service effects through space and time by enhancing biodiversity and, consequently, functional complementarity and functional continuity. Enhancement of predator abundance, by managed increase of prey species that do not provide disservices, may increase predation pressure on target prey.