THE IMPORTANCE OF SPECIES DIVERSITY IN SUSTAINING ECOSYSTEM SERVICES.

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Species diversity is measured as the effective number of species, that is the number of equally-abundant species needed to obtain the mean proportional species abundance observed in the dataset of interest. Abundance can be quantified using any relevant measure, such as number of individuals or biomass. Diversity is greatest when all the species in the system are equally abundant according to the chosen measure. In that case, the effective number of species equals the actual number of species observed. Functional guilds are comprised of species with similar enough feeding habits and life course characteristics that they contribute similarly to the same ecosystem service. Nematodes in decomposition food web channels that contribute to nutrient mineralization can be assigned to a set of functional guilds based on the nature of their prey (bacteria or fungi) and life course characteristics (e.g. position along the colonizer-persister gradient). The total species diversity in a dataset can be partitioned into 1) the mean effective number of species per functional guild and 2) the effective number of functional guilds of the mean species diversity. The two components can be considered to represent different aspects of functional diversity. The first component, mean within-guild species diversity, may represent both functional redundancy (performance of the same function by multiple species) and functional complementarity associated with physiological and behavioral differences not accounted for in the assignment of species to guilds. Within-guild species diversity may serve as a buffer which ensures that the function of a guild is fulfilled by one species or another as conditions vary across differences in the physical and chemical nature of the habitat. Guild diversity, the second component of total species diversity, quantifies the functional diversity among species that is apparent from major differences in life history or other characteristics. The guilds can be considered complementary in their ecological role, so that high guild diversity ensures the continuity of ecological functions in a system. Both components of functional diversity may be important for sustaining the ecosystem service of the guilds across space and time in, for example, successional contexts.

Journal of Nematology 45:289-290.