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# Exploring the contribution of free-living nematodes in soil to plant health

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Soil is a reservoir of a myriad of plant-beneficial to plant-hostile (micro)organisms. Plant-parasitic nematodes (PPN), which contribute to around 15% of annual global yield losses, are particularly important soil-borne pests. Several bio-products based on specific microbial strains with PPN-antagonistic properties have appeared on the market as an alternative to the environmentally harmful chemical pesticides, but the efficiency of these bio-products is usually low in the field. By contrast, we know nothing about the potential and antagonistic mechanisms of complex assemblages of soil microorganisms and of free-living nematodes as the most abundant animals on Earth in regulating PPN damage on plants. Here we present how the microbiome associates with PPN in soil and explore the potential of free-living nematodes to boost the antagonistic effects of these microbiomes. We show that the soil-borne stages of PPN acquire specific microbiomes on their surface and that different factors including the soil type, nematode designation, microbial density and competition affect the outcome of microbial attachment to nematodes. We also show that some of these microbiomes suppress PPN and reduce their root-invasion rate. In addition to a direct antagonism, we demonstrate that some PPN-attached microorganisms are able to trigger pathogen-associated pattern-triggered immunity in plants upon nematode penetration into the roots. We are currently expanding these results by elucidating how the biological action of nematode-antagonistic microbes can be increased in a native soil system that is dominated by free-living nematodes. Together we show the importance of the complexity of soil biodiversity as a potent player in the suppression of PPN and therefore as a potential measure to increase sustainability in agriculture.