

Perennial crop legacy effects on nematode community structure in semi-arid wheat systems

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ABSTRACT

The effects of diversifying wheat-based cropping systems in the Northern Great Plains (NGP) on soil chemical and physical properties is well documented: better soil tilth, improved water infiltration, and higher soil organic matter with crop rotations. However, the impact of crop rotations on soil biology is not as well understood. Nematode communities reflect soil quality and are directly observable, readily quantifiable, and occupy most of the consumer trophic levels in the soil food web. Within more humid climates, the community structure is better characterized to make associations with soil health and crop management strategies, but little is known about their community structure in semiarid regions such as the NGP. For this study, soils under contrasting cropping systems were sampled in the 15th year of a long-term study to quantify and assess the nematode community. Prior to planting, wheat-chemical fallow had a higher total nematode population than that of wheat-tilled fallow ($P < 0.05$). A wheat-pulse system with a history of crop perennation had a greater abundance of uncommon, omnivorous nematodes than a wheat-pulse system without a prior history of crop perennation. However, plant parasitic nematodes also were higher in abundance under the converted perennial system. Our results suggest that reducing soil disturbance and including a perennial component to cropping systems will foster a more diverse and balanced nematode community under semiarid dryland conditions, but potentially at the expense of increased plant parasitic nematode pressure.

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