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Plant parasitic nematodes are associated with plants throughout the world and it is only by disruption of their native habitat or the introduction of another nematode species that an imbalance between nematode species occurs within a given niche. This can result in positive, negative, or neutral responses of the nematode species present, and there may be a direct or indirect effect on the growth of native or introduced plant cultivars. The effects of a four-year barley-corn-pinto bean-sugarbeet rotation under different herbicide regimens on the population dynamics of five plant parasitic nematode species were determined. Heterodera schachtii soil populations increased on sugarbeet, but decreased by approximately 50% per year under rotation with pinto bean, barley, and corn. A root lesion nematode, Pratylenchus neglectus, and ectoparasitic nematodes, Merlinius brevidens, and Helicotylenchus crenacauda maintained soil population densities under sugarbeet while another ectoparasitic nematode, Xiphinema americanum declined. P. neglectus made the greatest increase in nematode population density on bean, and was followed by H. crenacauda, M. brevidens, and X. americanum. Corn was a good for P. neglectus and M. brevidens, a fair to good host for H. crenacauda, and a poor to fair host for X. americanum. There were yearly differences in crop yields in the different herbicide treatments, but nematode reproduction was not affected. Root lesion and ectoparasitic nematodes did not significantly affect the growth of sugarbeet.