

Is Tillage Beneficial or Detrimental for Insect and Slug Management?

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Frequent and intensive tillage can have negative effects on soil, including increasing risk of erosion, oxidizing organic matter, and disrupting life cycles of soil organisms. Even though tillage can negatively affect soil, this practice is still used across much of the world to prepare fields for planting and to manage pests. Farmers who have adopted reduced-tillage systems can struggle with a suite of insect and mollusc pests; however, reducing the frequency and intensity of tillage may increase predator populations and improve biological control. To better evaluate the effects of reduced-tillage practices (e.g., no-till, harrowing, shallow disking) on the abundance of invertebrate pests and natural enemies relative to high-disturbance tillage practices (e.g., moldboard plowing), we conducted a meta-analysis of studies published between 1983 and 2017. We tested the hypotheses that 1) pest herbivore and arthropod predator abundances are greater where tillage is reduced, 2) soil-associated invertebrates are more responsive to tillage compared with foliar invertebrates, and 3) medium-disturbance tillage practices would have an intermediate effect on pests and arthropod predators relative to high- and no disturbance practices. We found that insect and slug pests were not more abundant in reduced-tillage systems than in high-disturbance tillage systems. Pest herbivores that spend part of their life-cycle in the soil followed this pattern, but foliar pests were more abundant in systems with more intense tillage practices. The abundance of arthropod predators that spend part of their life-cycle in the soil was significantly lower in high-disturbance tillage systems compared with no-disturbance tillage systems, regardless of the intensity of the disturbance, though predators in general were similar in abundance across tillage intensities.