

Organic Farming and Tillage – Are the Two Inseparable?

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Consistent, reliable weed management is a major challenge for many organic farmers. For that reason, weed management had the highest research priority ranking among organic farmers growing corn, wheat, and other field crops in a recent U.S. survey of organic farmers, and second highest priority among fruit and vegetable growers, following soil fertility concerns (Walz, 2001). Ngouaijio and McGiffen (2002) suggested that uncertainty about weed management was the major obstacle preventing farmers from transitioning to organic methods who were considering the move.

Tillage is used for weed control on most organic farms, but it can destroy soil structure, reduce organic matter content, and diminish overall sustainability of cropping systems. Numerous studies have shown that soil quality is improved when tillage is reduced. Soil aggregate stability, total carbon, microbial activity, and earthworm populations were increased after eliminating tillage in the U.S. Corn Belt region over a 12-year period (Karlen et al., 1994). Crop performance also can be improved when tillage is eliminated, particularly in semiarid regions. Researchers in the north central U.S. concluded that wheat grain yield was increased when conventional tillage was replaced with no-till practices, probably because plant water-use efficiency was enhanced (Tanaka et al., 2002; Carr et al., 2006). These and other research experiments have led some scientist, like Trewavas (2004), to suggest that conventional no-till farming is superior to organic farming for enhancing soil quality because of the deleterious effects of tillage on soils, coupled with the continued reliance on tillage for weed control on organic farms.

Results of studies in Maryland (Teasdale et al., 2007) and Montana (Miller et al., 2008) suggest that conventional no-till may not be superior to organic farming for improving soil quality. Still, many organic farmers want to grow crops using less tillage but without having a weed problem develop. The concept of decreasing and even eliminating tillage entirely when growing crops organically has been considered since at least the early 1990s, if not before. Nancy Creamer and others (Creamer et al., 1995; Creamer and Dabney, 2002; Morse, 1998) have demonstrated that tillage can be eliminated when growing selected crops organically within a longer rotation; weed suppression is achieved by creating a thick vegetative mulch from killed cover crops that shades the soil surface and inhibits germination and emergence of underlying weed seedlings. However, these systems are not yet perfected and several experiments are underway to refine them. Organic farmer-scientist teams are working together to refine these systems. Preliminary results from this work will be summarized in future newsletters.

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