

## Trends in Soilborne Disease on Two Long-term Organic Farms in the West

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### Abstract

A main tenet of organic farming is 'a healthy soil makes a healthy plant'. There is considerable evidence that organic soil management practices (organic amendments, cover cropping, rotation, sod-based rotation, tillage) improve soil health, but there is considerably less information on the impact of organic soil management on plant health. Soilborne diseases are serious problems affecting plant health on conventional vegetable farms in the west. Soilborne pathogen populations build up over time as rotations are typically too short to 'wear out' long-lived pathogens and include multiple hosts for pathogens with a broad host range. However, little is known about long-term trends in soilborne disease incidence on organic vegetable farms in the west.

One goal of this project is to describe trends in soilborne disease incidence and severity on long term organic farms. A second goal is to identify critically important disease so as to prioritize the development of solutions such as resistant varieties. Farm data sets (yields, cropping histories, disease diagnoses, scouting records) from successful long-term organic farms—Phil Foster Ranches in California and Persephone Farm in Oregon—were analyzed to document changes in vegetable crop soilborne disease incidence and severity over time. Both farms have practiced crop rotation and soil building (e.g. cover cropping, organic amendments, reduced tillage) to improve soil and plant health. At Phil Foster Ranch, lettuce anthracnose (*Microdochium panattonianum*); brassica clubroot (*Plasmodiophora brassicae*); lettuce drop (*Sclerotinia minor*); and pepper root rot (*Phytophthora capsici*) declined in importance or did not change over time. In contrast, Fusarium basal rot of onion (*Fusarium oxysporum* f. sp. cepae) and Verticillium wilt of watermelon (*Verticillium dahliae*) increased over time. At Persephone Farm, *Plasmodiophora brassicae*; Fusarium wilt in spinach (*Fusarium oxysporum* f. sp. spinaciae), and a soilborne disease complex causing root and crown rot and vascular wilt in cucurbits (*Fusarium* and *Plectosphaerella* spp; diagnosis as yet incomplete) increased over time.

Results indicate that organic soil management for soilborne disease control can be helpful, but for some diseases is unsuccessful. The diseases named above that are increasing on organic farms should be organic farming research priorities.

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