

## SOIL HEALTH IN ORGANIC POTATO SYSTEMS

Introductory Research Report E2006-22

### ORGANIC POTATO PRODUCTION

Recently, there has been a growing interest by consumers in certified organic potatoes (*Solanum tuberosum* L.) with an insufficient supply to meet this demand. As production of organic potatoes expands, there is a need to understand the effects of management options on crop yield and quality as well as their effect on soil health. Maintenance of soil quality or soil health is central concept in all sustainable agriculture systems. Soil is a dynamic living system, and agricultural management practices should aim to preserve and protect this nonrenewable resource. Soil health has been defined as "the capacity of a specific kind of soil to function within natural or managed ecosystem boundaries, to sustain biological productivity, maintain environmental quality, and promote plant and animal health."

Soil degradation is difficult to avoid under intensive (short rotation) potato production systems as they return little or no organic matter back into the soil. Recent research (Boiteau, 2005, pers comm.) suggests biological indices of soil health fail to recover when the frequency of potato in rotation is high. Organic potato production systems are characterized by extended rotations (4yr+) involving leguminous crop green manures, often combined with organic amendments. The ability of organic management to bring the system back to a state of health in potato production has not been well studied.



Successful organic potato production depends on good soil health (D. Lynch)

### INDICATORS OF SOIL HEALTH

Indicators used to assess soil health have not been rigidly defined, though major components of the soil such as soil organic matter (SOM) are considered a key aspect in determining soil health. Light fraction (LF) organic matter has been determined to be an accurate and early indicator of changes in SOM because of farm management practices. The LF is comprised mostly of plant residues but also contains microbial and microfaunal debris. Studies have found that the soil LF content was greater in extended rotations than in continuous crop rotations.

Bioindicators are soil organisms (such as microbes, microarthropods, and earthworms) whose biomass, abundance or diversity responds to changes in management practices and can potentially be used as early warning systems for detrimental conditions. The occurrences of springtails have been found to be greater in organic systems than in conventional production systems, and are already used as indicators for changes in pH. Earthworms play a key role in organic matter decomposition and nitrogen cycling and are considered the most important invertebrate in temperate soils. Monitoring the abundance and diversity of these and other soil organisms in agrosystems can give us useful information on the sustainability of different soil management systems.

### FUTURE WORK

Commencing in 2006, planned research will examine the impact of extended rotations and use of organic amendments in organic potato production on soil health.

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