



# Northern New York Agricultural Development Program FACT SHEET

#1 in a series on soil health

---

## Improving Soil Health in NNY

Principal Investigators: Harold van Es,  
Crop & Soil Science, Cornell University;  
George Abawi, Plant Pathology,  
NYS Agricultural Experiment Station, Geneva; and  
David Wolfe, Horticulture, Cornell University

---

**What is  
soil health and  
why should we  
measure the  
health of soils  
in Northern  
New York?**

**The purpose of  
assessing soil  
health is to  
protect and  
improve the  
long-term  
agricultural  
productivity of  
the region**

### Introduction:

#### What is Soil Health?

Soil health is an assessment of the soil's ability to grow plants, recycle nutrients and organic wastes, filter and buffer water sources, provide habitat, store carbon, and provide an engineering medium for constructing roads and buildings. Soil health assessment is receiving increased attention from Northern New York farmers and agricultural researchers because of a growing awareness that crop productivity losses are associated with the gradual degradation of a soil.

Researchers funded by the Northern New York Agricultural Development Program are interested in the agricultural viability of soils in Jefferson, Lewis, St. Lawrence, Franklin, Clinton and Essex Counties.

"The purpose of assessing soil health is to protect and improve the long-term agricultural productivity of the region," says Cornell Cooperative Extension of Jefferson County agronomy educator Mike Hunter. "By monitoring changes in soil health, a farmer can determine if current soil management practices are the best for his or her farm."

#### Farm Soil Management Directly Affects Soil Health

"Soils supply us with nearly all of our food," says Hunter. "A soil's physical condition has a lot to do with the soil's ability to grow crops. Managing for healthy soils involves implementing farming practices that maintain organic matter levels in the soils to improve water holding capacity and nutrient availability to crops, and to reduce soil erosion," Hunter says.

**Soil health researcher Dr. Harold van Es is co-author of Building Soils for Better Crops**

**... a set of guidelines for assessing the quality of regional soils with recommendations for more sustainable and practical soil management practices**

**“If you follow practices that build and maintain good levels of soil organic matter, you will find it easier to grow healthy and high-yielding crops... with less reason to use as much commercial fertilizer and lime” — Magdoff and van Es, Building Soils for Better Crops**

Manure application, returning crop residue to fields and tillage style (intensive or minimum plowing and disking) all affect soil health.

### **Methods: Research Begins in 2004**

Because soil health cannot be directly measured, Dr. Harold van Es, professor of soil and water management at Cornell University and author of Building Soils for Crops, leads the research to develop indicators to determine the health of the various types of soils found across Northern New York.

With funding from the Northern New York Agricultural Development Program, a farmer-driven research funding program, Dr. van Es, has begun a multi-year soil health research project. He will be working with plant pathologist George Abawi, horticulture Professor David Wolfe and Northern New York Cornell Cooperative Extension field crop educators to develop a set of guidelines for assessing the quality of regional soils with recommendations for more sustainable and practical soil management practices.

Research will be conducted on 12 farms throughout the region, and at the William H. Miner Agricultural Research Institute in Chazy and Willsboro Research Farm in Essex County.

### **From Earthworms to Erosion, Color to Compaction**

Researchers will be looking at the physical or structural quality and chemical composition and biological activities of soils throughout the region. Many indicators are related to soil health. The number of earthworms present in the soil, the microbial community, color as an indicator of the amount of organic matter and evidence of erosion, compaction, water and nutrient holding capacities and pH level are all important to the study of soil health as is an understanding of how farm management.

Researchers will also collect and analyze crop yield data in developing criteria for interpreting soil health in relation to economic as well as environmental impacts.

## Selected Bits of Soil Health Commentary from Building Soils for Better Crops

The following citations from Building Soils for Better Crops by Fred Magdoff and Harold van Es offer some food for thought about the potential for profit to be gained from understanding and applying soil health management.

- “The value of the nutrients in manure from a 70-cow dairy may exceed \$7,000 per year” - depending upon what time of year the manure is applied, how quickly it is worked into the soil and the type of soil on each farm - p. 77
- “Manure analysis should become a routine part of the soil fertility management program on animal-based farms.” - p. 79
- “One large Holstein ‘cow year’ worth of manure is about 20 tons.” - p. 80
- Using crop rotation leads to “fewer problems with insects, parasitic nematodes, weeds and diseases caused by bacteria, viruses and fungi” - p. 99
- “Yields of crops grown in rotations are frequently about 10 percent higher than when grown in monoculture.” - p. 99
- “Farm-quality composts can be produced by turning the pile only once or twice.” - p. 113
- “There is evidence that compost application lowers the incidence of plant root and leaf diseases.” - p. 115
- “Build up the soil and remedy compaction problems before converting to no till.” - p. 142
- “Farmers are learning that the combination of reduced tillage, cover crops, and better rotations can have a dramatic effect on their soils and the health of their crops.” - p. 211

## Developing Soil Health for Your Farm

As results become available, Cornell Cooperative Extension educators in the six Northern New York counties will be available to help farmers develop a customized soil health plan. Those educators are:

- Clinton County - Amy Ivy, 518-561-7450
- Essex County - Anita Deming, 518-962-4810
- Franklin County - Carl Tillinghast, 518-483-7403
- Jefferson County — Mike Hunter, 315-788-8450
- Lewis County - Jen Beckman, 315-376-5270
- St. Lawrence County - Pete Barney, 315-379-9192.

## A Soil Health Glossary\*

**Aggregates** - the structures, or clumps, formed when soil minerals and organic matter are bound together with the help of organic molecules, plant roots, fungi and clays

**Cover crops** - crops grown specifically to help maintain soil fertility and productivity instead of for harvesting

**Heavy soil** - contains a lot of clay, usually more difficult to work than coarse texture soil, normally drains slowly following rain, also called fine texture soil

**Penetrometer** - a device for measuring soil resistance which is an indicator of soil compaction

**Tilth** - the physical condition, or structure, of the soil as it influences plant growth. Soil with good tilth is very porous, allows rainfall to infiltrate easily, permits roots to grow without obstruction, is easy to work.

\* definitions drawn from Building Soils for Better Crops

## Soil Health Project Sponsors

The Soil Health Project is sponsored by: the Northern New York Agricultural Development Program and the USDA Northeast Sustainable Agriculture Research and Education Program.

## Principal Investigators

Dr. Harold van Es, Crop and Soil Sciences, Cornell University; George Abawi, Plant Pathology, NYS Agriculture Experimental Station, Geneva; and David Wolfe, Horticulture, Cornell University.

## Participating Farmers

Essex County: Sam Hendren, Eric Leerkes, Chris Spaulding; Franklin County: Dennis Egan, Ralph Child, Doug Malette; Jefferson County: Don Nohle; Lewis County: Bernhard Gohlert, Marc Larabee; St. Lawrence County: Dan Chambers, David Fisher, William White.

## Participating CCE Educators and Research/Education Partners

Clinton County: Amy Ivy, 518-561-7450; Essex County: Anita Deming, 518-962-4810; Franklin County: Carl Tillinghast, 518-483-7403; Jefferson County: Mike Hunter, 315-788-8450; Lewis County: Jennifer Beckman, 315-376-5270; St. Lawrence County: Peter Barney, 315-379-9192; William H. Miner Institute, Chazy: Everett Thomas, 518-846-7121; Willsboro Agricultural Research Farm: Mike Davis, 518-963-7492.

## Acknowledgements

Some of the information in this Fact Sheet first appeared in an article on soil health written by Agronomy educator Mike Hunter of Cornell Cooperative Extension of Jefferson County.

**For more information on the Soil Health project,** contact: your local Cornell Cooperative Extension office; or John Idowu, Soil Health Project Coordinator, 1015 Bradfield Hall, Cornell University, Ithaca, NY 14853, [oji2@cornell.edu](mailto:oji2@cornell.edu).

*September 2004*

---

**The Northern New York Agricultural Development Program** selects and prioritizes research the results of which can be practically applied to farms in the six-county region of northern NY: Jefferson, Lewis, St. Lawrence, Franklin, Clinton and Essex Counties.

**To learn more about the Northern New York Agricultural Development Program,** contact Co-Chairs Jon Greenwood, 315-386-3231, or Joe Giroux, 518-563-7523; or R. David Smith, Cornell University, 607-255-7286. ♦



# Northern New York Agricultural Development Program FACT SHEET

Northern New York  
Agricultural Development  
Program  
162 Morrison Hall  
Cornell University  
Ithaca, NY 14853  
607-255-7286  
[www.nny.org](http://www.nny.org)