

2006 NYS IPM Implementation Program Report

Title: An Illustrated Manual on Soil Health Assessment Protocols and Management Options for Training and Outreach.

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Abstract:

The Cornell Soil Health Team has made considerable progress in promoting soil health literacy, developing cost-effective protocols for assessing the health status of soils in New York, demonstrating soil health management options, and conducting hands-on trainings and workshops. The Cornell Soil Health Team has prepared and will soon disseminate an illustrated, user-friendly, color manual on soil health constraints, assessment protocols and management practices for improving the health status of soils in New York State and the Northeast region. The primary purpose of the manual is to: 1) provide an overview of the concept of soil health; 2) describe soil constraints and soil quality issues common to soils in New York and the Northeast region, especially in vegetable and field crop production systems; 3) provide guidelines on how to conduct in-field soil health assessment; 4) provide an overview of laboratory methods used to assess the health status of soil; 5) identify management options for improving soil health based on identified constraints; 6) increase awareness of and literacy on soil health issues; and 7) provide a list of additional resources on soil health and soil health related topics. The manual provides information specific to understanding how to read and interpret the recently developed Cornell soil health report and then links identified soil constraints with needed management practices, both in the short and long-term. Initially, copies of the manual will be provided free-of-charge to those attending the training workshops and will be available to download for free as a pdf file at the Cornell Soil Health website (<http://www.hort.cornell.edu/soilhealth>); but it will later be made available for purchase. The manual can also be printed in variable quantities on demand. This is a valuable resource for continued outreach activities and promotion of soil health management strategies, thus increasing farm profitability and environmental quality.

Background and Justification:

The intensive production of agronomic crops in New York and the Northeast region has contributed to reduced soil quality and resulted in lower crop productivity and farm profitability. Among the causes are soil compaction, crusting, low organic matter, increased pressure and damage from diseases, weeds, insects and other pests as well as a lower density and diversity of

beneficial soil organisms. These constraints have increased the interest of growers and other land managers in assessing their soil health status and in implementing sustainable soil management practices. Many growers now realize that poor soil health severely limits their farm's profitability and viability, as degraded soils increase the need for additional crop inputs, including pesticides, and also reduce yields. Our Cornell Soil Health Team has made significant progress in increasing soil health literacy, developing a cost-effective protocol for soil health assessment, facilitating soil health demonstrations by growers, and promoting multi-disciplinary research and outreach. However, there is a need to provide growers and other interested personnel with a user-friendly manual that illustrates the prevailing soil constraints in the region, as well as how to assess the health status of soil and what management options are available to improve soil health and productivity. Such a manual will contribute to increasing the soil health literacy among diverse groups and will be used as a reference in future hands-on formal and informal training workshops.

Objectives:

1. To prepare a color illustrated soil health manual that will function as a resource on soil health assessment tools and management options for growers and other interested stakeholders in New York and the NE region.
2. To distribute the prepared soil health publication both electronically as well as in hard-copy to reach a diverse audience.
3. To evaluate the project objectives.

Procedures:

Objective 1: The manual is organized into four main sections. The text is laid out in short paragraphs, in easy-to-follow bulleted lists and, where possible, pictures and figures are used to convey concepts, ideas, and methodologies. The first section focuses on background/introductory information relating to what is soil in general. The topics include what is soil, what is the soil health concept, what is healthy soil and its major characteristics, important soil functions, and regional soil health constraints.

The second main section focuses on in-field and laboratory soil health assessments. The first part emphasizes ways growers can conduct a quick field assessment of the health of their soils themselves using a series of subjective rating based on the look, feel, and smell of the soil as well as observing crop roots, vigor and monitoring productivity. The second part focuses on the Cornell Soil Health Assessment Tier I and Tier I-PLUS laboratory protocols. Background behind how the physical, biological and chemical soil health indicators were selected is provided along with a list of necessary supplies, and step-by-step instructions for soil sampling and completing the sample information sheet. Each selected soil health indicator is described thoroughly and the methodology provided together with information on how each relates to soil function. The Tier I and Tier I-PLUS indicators include bulk density, wet aggregate stability (0.25-2.0mm), available water capacity, field penetration resistance, potentially mineralizable nitrogen, active carbon, root health bioassay and the set of standard chemical analyses. Each section of the auto-generated grower-friendly report is explained in detail and examples of several reports are provided.

The third part focuses on the four main management strategies (various adaptations of cover crops, tillage systems, organic amendments, and crop rotation) available for improving soil health, how each strategy impacts the functioning of the soil, and the main points to consider

when selecting a cover crop, organic amendment (compost vs. manure) or tillage method, etc. Both short and long-term management options for the various soil constraints that may be identified based on the soil health report are also provided. In addition to a summary of take-home messages, the fourth and final section of the manual is a list of additional resources organized by topic.

It is anticipated that as protocols are modified and new information becomes available that this manual will be updated both in hardcopy and electronically. Additional text, pictures and figures are currently being solicited from the various project leaders and cooperators. We are working with Communications Services at NYSAES, Geneva to design and layout this publication to ensure that its outreach benefits and user-friendly layout and design.

Objective 2: In order to make the publication readily available to a large and diverse target audience, we are preparing hard copies as well as post electronic versions (html and pdf formats) on the IPM and Cornell Soil Health websites.

Objective 3: The use and number of requested copies of this manual for training and other outreach activities on soil health assessment and management are good indicators of the success of the project as well as the number of “hits” to access the manual on-line. Other indicators that can be used to measure the impact of this publication include the continued interest of growers in assessing the health status of their soils as well as the increased adoption of management practices to improve soil health.

Results and Discussion:

The Cornell Soil Health Assessment Training Manual is in its final stages of completion. The design and layout of the full-color manual were developed in Adobe In-Design. It will be printed double-sided on 8 1/2 by 11-inch digital quality paper with the cover pages printed on heavier weight digital paper and spiral bound. It is in the process of being assigned an ISBN number. Currently, the manual is under review by collaborating Cornell Soil Health Team members and any absent information will be filled. Arrangements have been made for the first printed copies to be published by 20 February 2007, the first in-depth day-long Soil Health Training Workshop planned for 2007.

The primary purpose of the manual is to: 1) provide an overview of the concept of soil health; 2) describe soil constraints and soil quality issues common to soils in New York and the Northeast region, especially in vegetable and field crop production systems; 3) provide guidelines on how-to conduct in-field soil health assessment; 4) provide an overview of laboratory methods used to assess the health status of soil; 5) identify management options for improving soil health based on identified constraints; 6) increase awareness of and literacy on soil health issues; and 7) provide a list of additional resources on soil health and soil health related topics.

The manual provides information specific to reading and interpreting the recently developed Cornell soil health report and then links identified soil constraints with needed management practices, both in the short and long-term. Initially, copies of the manual will be provided free-of-charge to those attending the training workshops and will be available to download for free as a pdf file at the Cornell Soil Health website (<http://www.hort.cornell.edu/soilhealth>); but it will later be made available for purchase. The manual can also be printed in variable quantities on demand.

The distribution of the developed soil health assessment manual will result in increased adoption of good IPM practices by growers using the manual. Improved soil health has been shown to increase soil aggregation, water infiltration and nutrient retention as well as reduce root diseases, nematode damage and pressure from other pests. Reductions in pathogen and pest pressure will reduce the number of pesticide applications made and therefore reduce the negative environmental and human impact of pesticide use as well as reduce grower production costs. The adoption of soil health management practices will promote whole farm pest management and enhance the soil suppressive capacity to crop pests, thus promoting soil-IPM. The results of a brief survey conducted at the 2006 NYS Fruit and Vegetable Expo have already indicated a significant increase in soil health literacy and conscious changes in management practices by growers to improve soil health as a result of the soil health PWT's efforts. This publication will continue to increase the adoption of good soil health practices that will be documented in future surveys and compared with the 2002 baseline soil health survey. Stakeholders have already begun requesting copies of this manual.

Project Location:

Currently, throughout New York State and the Northeast region, but it will eventually be used in trainings at the national and international level.

Samples of Resources Developed:

The most current draft of this major publication is being submitted in hard-copy as a part of this report (the pdf file is too large to email as an attachment).