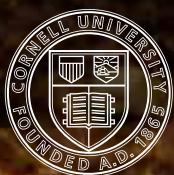


Comprehensive Assessment of Soil Health

The Cornell Framework Manual

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Table of Contents

Acknowledgements	iv	
Introduction	viii	
Part I Soil Health Concepts.....	1	
What is soil?	2	
Life in the soil	5	
What is Soil Health?	12	
Characteristics of a healthy soil	13	
Common soil constraints	15	
Part II Soil Health Assessment.....	19	
In-field soil health assessment	20	
Development of Cornell 's Comprehensive Assessment of Soil Health	22	
Assessment of Soil Health overview	25	
Soil sampling protocol	27	
Materials needed for one sample.....	27	
Field sampling design.....	27	
Steps for soil sampling.....	28	
Soil sample storage requirements.....	29	
Soil sample packaging and shipping.....	29	
Submission form example.....	30	
Regulated soils.....	31	
Soil Health scoring functions.....	32	
Regional updates.....	32	
Cumulative normal distribution.....	33	
CASH summary report page example.....	35	
Scoring types.....	36	
Soil Health Indicator Protocols and Scoring.....	37	
Soil Texture	37	
Available Water Capacity	39	
Surface and Subsurface Hardness	41	
Wet Aggregate Stability	44	
Organic Matter	47	
Soil Protein Index.....	49	
Soil Respiration	51	
Active Carbon	53	
Standard Nutrient Analysis	55	
Soil Health Indicator Protocols and Scoring cont.		
Add-on Test: Potentially Mineralizable N.....	59	
Add-on Test: Root Pathogen Pressure.....	61	
Add-on Test: Heavy Metal Contamination.....	64	
Add-on Test: Salinity and Sodicity	69	
Soil Health Assessment Report	72	
Six parts of the CASH summary report	73	
Using the Assessment of Soil Health info.....	74	
Using the Assessment of Soil Health in Soil Health Management Planning.....	75	
Part III Soil Health Management.....	79	
Soil Health Management Planning Framework..	80	
Six Steps of the Soil Health Management Planning Process.....	82	
Soil Health Management Options and Opportunities.....	87	
The Soil Health Management Toolbox	87	
General management considerations.....	88	
Tillage considerations	88	
Crop rotation considerations	90	
Cover cropping considerations.....	92	
Organic amendment considerations	96	
Considerations for adapting to and mitigating climate change.....	98	
Part IV Additional Resources.....	103	
Selected Book and Journal Resources	104	
Selected Web Resources	107	
Appendix A. Sample 2016 Standard Package Comprehensive Assessment of Soil Health Report	110	
Appendix B. Soil Health Management Planning Process Worksheet	121	

Introduction

Soil health, or the capacity of the soil to function, is critical to human survival. Soil health constraints beyond nutrient limitations and excesses currently limit agroecosystem productivity and sustainability, resilience to drought and extreme rainfall, and progress in soil and water conservation. With mounting pressure to produce food, feed, fiber, and even fuel for an increasing population, soil health is gaining national and international attention.

Research on both assessment and management of soil health, as well as farmers' innovations in soil health management approaches have matured over the decades. Multiple regional, national, and global efforts are now leveraging that work to reach new stakeholder audiences, so that soil health management is expanding into mainstream agriculture. Public recognition of the critical importance of maintaining and rebuilding healthy soils for long term sustainable agricultural production is growing. But while much progress has been made, there is much more to be done.



The more comprehensive assessment of soil health described in this manual is available to the public on a fee-for-service basis, and provides field-specific information on constraints in biological and physical processes, in addition to standard soil nutrient analysis (soilhealth.cals.cornell.edu/). In essence, the assessment expands on a well understood approach that has been foundational to high agricultural productivity. Just as standard soil testing has informed nutrient management based on identified deficiencies and excesses since the 1900s, the assessment developed here, similarly, identifies constraints to biological and physical soil functioning. This information then guides land managers in making targeted management decisions to plan and implement systems of soil health management practices to alleviate identified constraints and maintain healthier soils. The current (2016) version of the assessment and its interpretive scoring was developed for the Northeastern United States. However, the concepts, framework and indicators for soil health



assessment and management planning described here can be expanded and adapted for national and global applications. The most relevant components of the framework are 1) measurement of indicators that represent critical soil processes, 2) scoring of measured values that allows for interpretation, and 3) linkage of identified constraints with management practices. The main benefit of this approach is that the identification of physical biological and chemical constraints prompts farmers to seek improved and more sustainable soil and crop management practices. We hope that this framework will evolve and be used widely to measure and monitor soil health status. It is expected that a more comprehensive understanding of soil health status can lead to better, regenerative, and sustainable management of soils through holistic, adaptive, and data-driven approaches.

This manual is laid out in four parts:

- I. Soil Health Concepts (1–18)
- II. Soil Health Assessment (19–78)
- III. Soil Health Management (79–101)
- IV. Additional Resources (102–108)

The purpose of this manual is to:

- Provide an overview of soil health concepts.
- Provide an overview of Cornell University laboratory methods used to assess the health status of soil, the report generated from this more comprehensive assessment of soil health, and its interpretation.
- Present a framework for soil health management planning and implementation based on information gained from soil health assessment that can be adapted for use in other land management systems, soils, and climates.
- Provide a brief overview of in-field qualitative soil health assessment.
- Provide a how-to guide for proper soil health sampling.
- Describe soil constraints and soil health issues common to soils in the Northeast region, especially in vegetable and field crop production systems.
- Identify management strategies for improving soil health based on measured constraints.
- Provide guidelines for standardized and quantitative laboratory-based soil health assessment.
- Provide links to additional soil health assessment and management resources.

