



The path to stronger agriculture is  
under our feet.

**Building High Functioning and Resilient Soil  
as a National Team**

# Farm Bill Requirements

- (6) PRACTICE

- (A) improvements to eligible land of the producer, including –
  - (v) soil testing;
  - (vi) soil remediation practices to be carried out by the people
- (B) Conservation activities involving the development of plans appropriate for the eligible land of the producer, including
  - (iii) soil health planning, including planning to increase soil organic matter and the use of cover crops

- (9) SOIL REMEDIATION

- (A) ensure the safety of producers from contaminants in the soil
- (B) limit contaminants in soils from entering agricultural products for human or animal consumption; and
- (C) regenerate and sustain the soil

- (10) SOIL TESTING

- (A) the optimal level of constituents in the soil, such as organic matter, nutrients, and the potential presence of soil contaminants, including heavy metals, volatile organic compounds, polycyclic aromatic hydrocarbons, or other contaminants; and
- (B) the biological and physical characteristics indicative of proper soil functioning

# Resources, Plans, Activities and Practices

# Overview of National Soil Health Products Available

- [“Principles for High Functioning Soils” Factsheet](#)
- Soil Health Resource Concerns and Planning Criteria, integrated in CART
- NB 450-20-2 [National Template for In-Field Soil Health Assessment](#)
- TN 450-03 [“Recommended Soil Health Indicators and Associated Laboratory Procedures”](#)
- TN 450-04 [“The Basics of Addressing Resource Concerns with Conservation Practices within Integrated Soil Health Management Systems on Cropland”](#)
- Soil Carbon Amendment (808) interim standard available for State adoption.

# Overview of National Soil Health Products in Development

## In development

- Updates to Purposes and Criteria in key soil health promoting Conservation Practice Standards
- Performance Result System measures 1.11, 1.13, and 1.14 to better encapsulate soil health management systems
- Soil Health CAP (116) done, to be released by Programs in Dec
- Soil Testing (216) – to cost share soil health testing
- Collaboration with North American Proficiency Testing program. NAPT surveyed commercial labs. 4 plan to offer new NRCS “basic” soil health assessment this year
- Soil Remediation (807) and other work related to this FB mandate continue to be reworked with broad agency collaboration
- Videos of Soil Health course for Conservation Planner Certification
- National Cover Crop Decision Support Tool

# NRCS Soil Health Resource Concerns

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- Compaction
- Organic matter depletion
- Concentration of salts or other chemicals
- Soil organism habitat loss or degradation
- Aggregate instability



# Cropland In-Field Soil Health Assessment Worksheet

## Soil Health Resource Concerns

CPT = Compaction

SOM = Soil Organic Matter Depletion

AGG = Aggregate Instability

HAB = Soil Organism Habitat Loss or Degradation

Location
Field/CMU
Tract#
Client/Customer
Planner
Date
Soil Map Units
Soil Moisture
Topsoil Texture

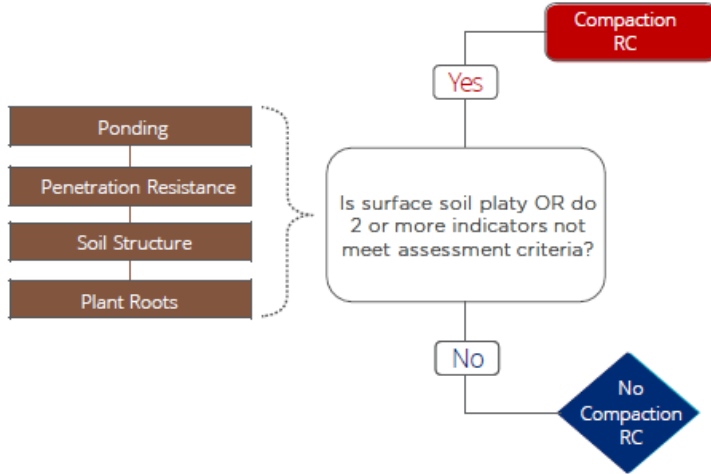
Indicator Timing and Use	Meets Assessment Criteria (Yes/No)
Anytime ☀️   After Rain or Irrigation ☁️   With Adequate Moisture 💧   Before a Tillage Event 🚜 Primarily No-till Systems ⚙️   Before Growing Season 🌱   During Growing Season 🍃   Interview 🗣️	
<b>Soil Cover</b> ☀️   SOM, HAB • Surface cover from plants, residue or mulch; cover greater than 75%	<input type="checkbox"/> Y <input type="checkbox"/> N
<b>Residue Breakdown</b> ☀️ ⚙️ 🗣️   SOM, HAB • Natural decomposition of crop residues is as expected with crop and conditions	<input type="checkbox"/> Y <input type="checkbox"/> N
<b>Surface Crusts</b> 🚜 🌱 🍃   AGG • Crusting on no more than 5% of the field	<input type="checkbox"/> Y <input type="checkbox"/> N
<b>Ponding</b> ☁️ 🗣️   CPT, AGG • No ponding within 24h following typical rainfall or surface irrigation event	<input type="checkbox"/> Y <input type="checkbox"/> N
<b>Penetration Resistance</b> 💧 🚜 🌱 🍃   CPT • Penetrometer rating <150 psi within top 6" depth and <300 psi in the 6-18" depth; • OR Slight or no resistance with wire flag inserted to 12"	<input type="checkbox"/> Y <input type="checkbox"/> N
<b>Water Stable Aggregates</b> ☀️   HAB, AGG • Cylinder: At least 80% remains intact after 5 minutes with little cloudy water; • OR Strainer: soil remains intact with aggregates apparent; • OR Soil Quality Test Kit (SQTK): meets stability class 6	<input type="checkbox"/> Y <input type="checkbox"/> N
<b>Soil Structure</b> ☀️   CPT, SOM, AGG, HAB • Granular soil structure in A horizon and no platy structure in A or B horizons	<input type="checkbox"/> Y <input type="checkbox"/> N
<b>Soil Color</b> 💧   SOM • No color difference between field and fencerow sample; • OR, Value is on the darker range using color chart and soil survey pedon description	<input type="checkbox"/> Y <input type="checkbox"/> N
<b>Plant Roots</b> 🍃   CPT, SOM, HAB • Roots covered in a soil film (rhizosheaths) or are part of soil aggregates; • OR Living roots, if present, are healthy, fully branched and extend into subsoil	<input type="checkbox"/> Y <input type="checkbox"/> N
<b>Biological Diversity</b> 💧 🚜   SOM, HAB • Clearly evident; more than 3 different types of organisms observed without magnification	<input type="checkbox"/> Y <input type="checkbox"/> N
<b>Biopores</b> ☀️ ⚙️   SOM, AGG, HAB • Presence of root or earthworm channels that extend vertically through the soil with some connecting to the surface	<input type="checkbox"/> Y <input type="checkbox"/> N



Legend (for all RCs)  
 = Field indicator  
 = RC present  
 = RC not present

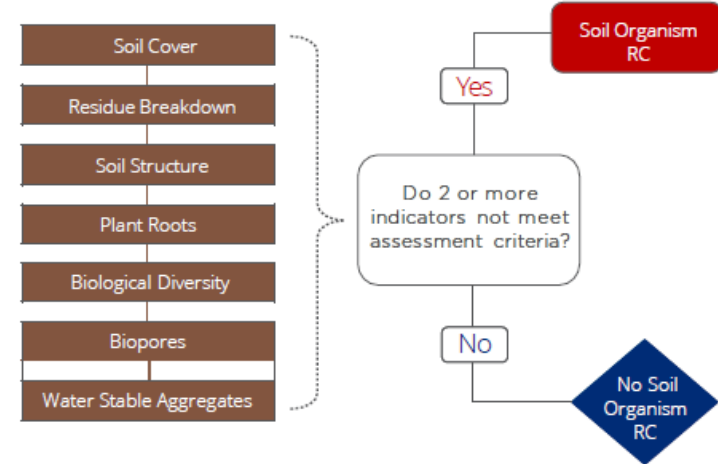
## Compaction Resource Indicator Decision Tree

Circle the indicators that do not meet assessment criteria during the evaluation and follow decision tree below to determine if the given resource concern (RC) is present. Document on worksheet.



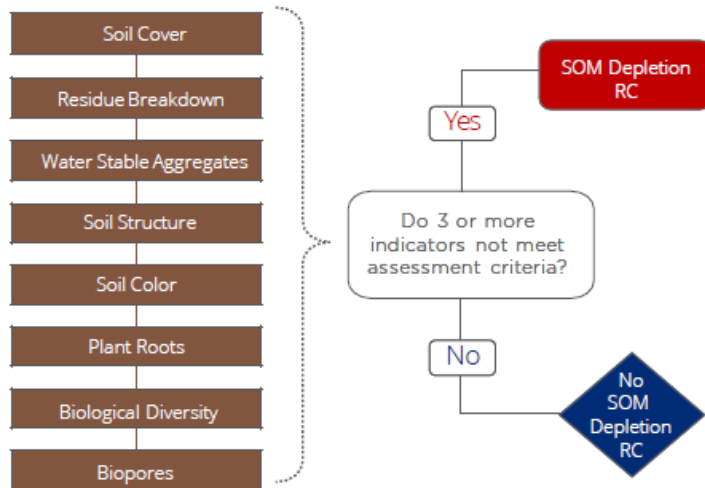
## Soil Organism Habitat Loss or Degradation Resource Indicator Decision Tree

Circle the indicators that do not meet assessment criteria during the evaluation and follow decision tree below to determine if the given resource concern (RC) is present. Document on worksheet.



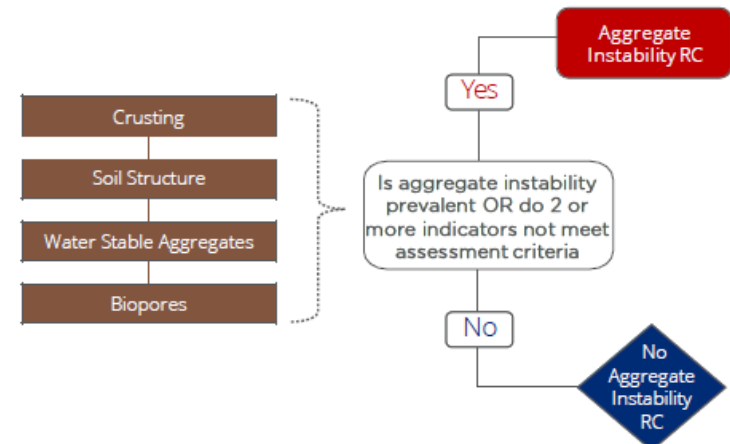
## Soil Organic Matter Depletion Resource Indicator Decision Tree

Circle the indicators that do not meet assessment criteria during the evaluation and follow decision tree below to determine if the given resource concern (RC) is present. Document on worksheet.



## Aggregate Instability Resource Indicator Decision Tree

Circle the indicators that do not meet assessment criteria during the evaluation and follow decision tree below to determine if the given resource concern (RC) is present. Document on worksheet.





# New Soil Health Practices

# New Opportunities

- Soil Health CAP (116)
- Soil Testing Activity (216)
  - Soil Health Assessments
  - ~~Heavy Metal Testing~~
- ~~Soil Remediation (807)~~
  - ~~Not “bioremediation”~~
  - ~~Exclusion or mitigation~~
- Soil Carbon Amendment (808)



**NATURAL RESOURCES CONSERVATION SERVICE**

**CONSERVATION ACTIVITY PLAN CRITERIA**

**SOIL HEALTH MANAGEMENT PLAN**

**CODE 116**

## **DEFINITION**

Component of a conservation plan used to evaluate soil health concerns and develop a cropping management plan to improve overall soil health.

## **PURPOSE**

- This conservation activity plan is used to identify and document soil health resource concerns, problems, and opportunities.

### **CONDITIONS WHERE CONSERVATION ACTIVITY PLAN APPLIES**

This plan applies to cropland.

### **GENERAL CRITERIA**

Develop management alternatives based on landowner-operator objectives and interest in adopting soil health management practices.

Complete a cropping system and field inventory evaluation on the tracts or management units of cropland being evaluated. At a minimum, conduct the following protocols on at least 2 conservation

# Criteria

- Based on the results from the inventory and assessments, develop alternatives to address identified soil health constraints and develop a transitional plan of practices for at least a 3-year interval that, as much as practical, follow the 4 principles of soil health:
  1. Minimize soil disturbance
  2. Maximize soil cover
  3. Maximize biodiversity
  4. Maximize living roots
- This plan will assist the producer with the adoption of new practices and will present alternatives for innovative technology or management changes. Incorporate the following outcomes when developing the plan:
  - Adopting new practices or scenarios that promote a higher level of conservation
  - Adaptive management (incremental, easily-reversible adjustments to the plan to observe on-site results)

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION ACTIVITY**

**SOIL TESTING**

CODE 216

(ea)

**DEFINITION**

Quantitative analysis of the physical, biological, or chemical characteristics of soil using approved laboratory and field methods for soil health assessments. Soil health assessments, soil testing using accepted standardized protocols measures the presence of indicators specific to each test. Results of the soil test are used in the conservation practice implementation to address the resource concern.

**PURPOSE**

- Improve Soil organism habitat loss or degradation
- Improve Aggregate stability

**CONDITIONS WHERE PRACTICE APPLIES**

Soil health assessments may be conducted on cropland, pasture, and developed land.

**CRITERIA**

Follow the soil sampling protocol as determined by LGU or outlined in the NRCS Soil Health Sampling and Submission Guide (*this is in process*)

Laboratories must be approved by North American Proficiency Testing Program (NAPT) for the **NRCS Soil Health Test** as well as for conventional nutrient tests.

At a minimum, analyze all the processes and indicators that are part of the basic soil health test:

- **Organic matter cycling and carbon sequestration:** soil organic carbon content measured by dry combustion
- **Soil structural stability (infiltration):** wet macro-aggregate stability
- **General microbial activity (carbon mineralization):** respiration using a 4-day incubation
- **Food source for soil microbes:** readily available or "active" carbon measured by permanganate oxidation
- **Bioavailable nitrogen:** available, organic nitrogen measured as citrate extractable protein

Conduct a complete chemical soil test based on NRCS State-approved methods if the soil has not been tested for macro- and micronutrients in the last two years. The comprehensive test includes:

- pH, electroconductivity (EC), phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, zinc, and boron.

Heavy Metal  
Analysis  
removed and  
not available  
until FY21

# “Basic” Soil Health Test

Soil Structural  
Stability & Water  
Partitioning

- **Aggregate stability**

May 2019

Soil Organic  
Matter Cycling

- **Soil organic C**

Carbon Food  
Source

- **Permanganate  
oxidizable C (Active  
C)**

Microbial  
Activity

- **Short-term C  
mineralization  
(respiration)**

Bioavailable N

- **Acid Citrate  
Extractable protein**

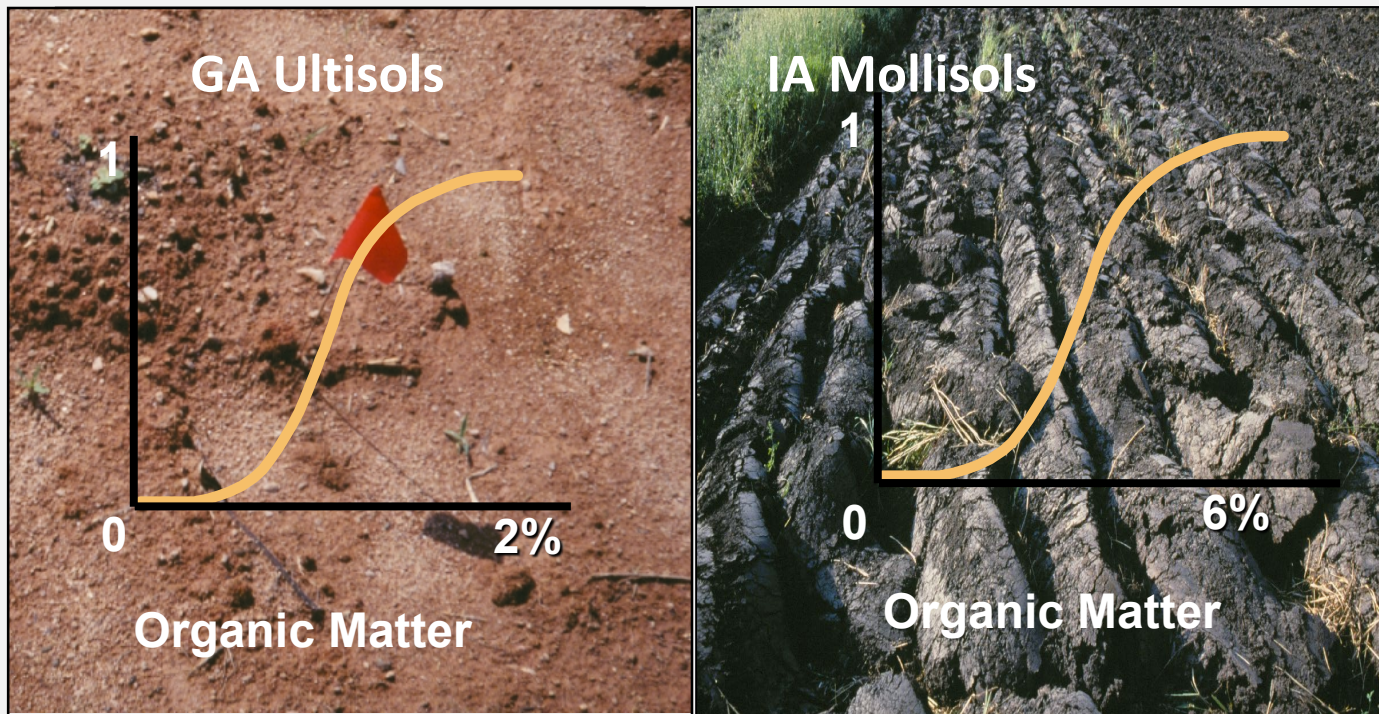
## Soil Health Technical Note No. 450-03

### Recommended Soil Health Indicators and Associated Laboratory Procedures



# Calibration & Interpretation

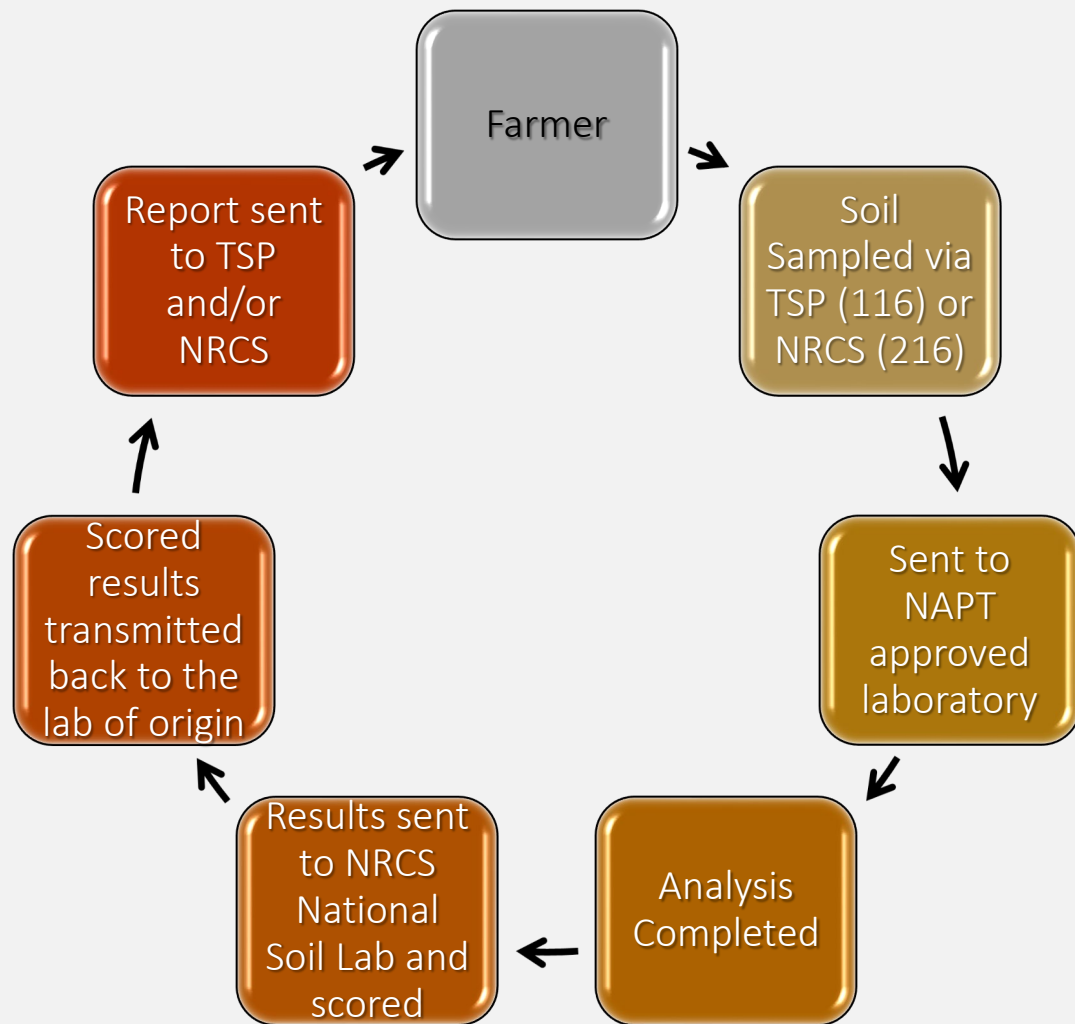
- Indicator interpretation via soil based scoring functions
- Comparison based on soil, climate and cropping system





# Basic Soil Health Test

- Methods for proficiency testing established
  - NAPT
- At least 4-5 labs will offer basic suite in 2020.
  - 14-15 will offer “soon”
- 2 tests per customer in FY20



# Soil Testing Activity (216)

Activity with ~~5~~-2 scenarios



- 1. Soil Health
- 2. Soil Health + Comprehensive Chemical

Nationwide

Soil Health Practices

- ~~3. Heavy Metals~~
- ~~4. Heavy Metals + Soil Health~~
- ~~5. Heavy Metals + Soil Health + Comprehensive Chemical~~

Nationally Designated Pilot States

~~Soil Remediation (807)~~

# Soil Carbon Amendment (808)

## Interim Practice

### **DEFINITION**

Using carbon-based amendments to increase soil carbon and improve the physical, chemical, and biological properties of the soil.

### **PURPOSES**

- Maintain, increase, or improve soil organic matter quantity and quality
- Maintain or improve soil aggregate stability
- Maintain or improve habitat for soil organisms
- Improve plant productivity and health
- Improve the efficient use of irrigation water

### **CONDITIONS WHERE PRACTICE APPLIES**

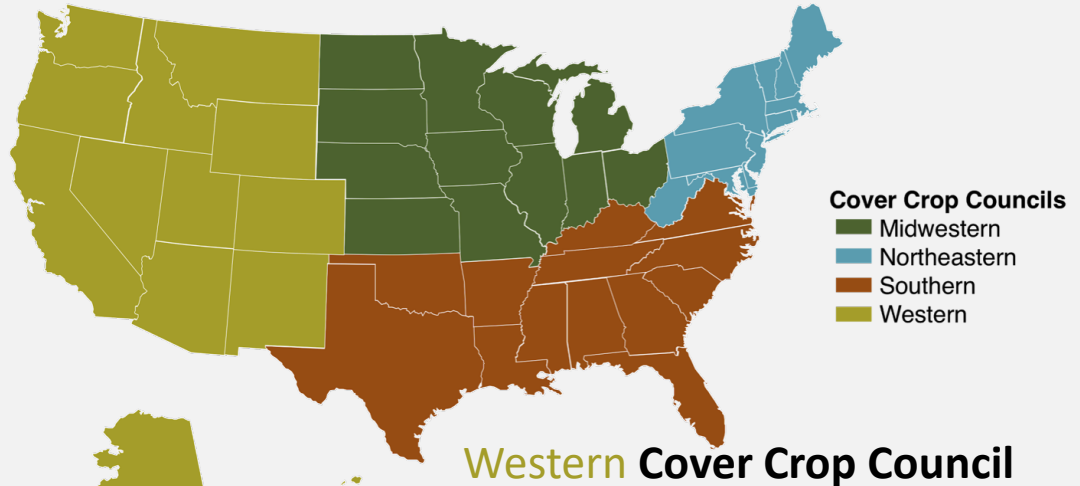
- This practice applies to all land where carbon amendment applications will improve soil conditions.

# Scenarios

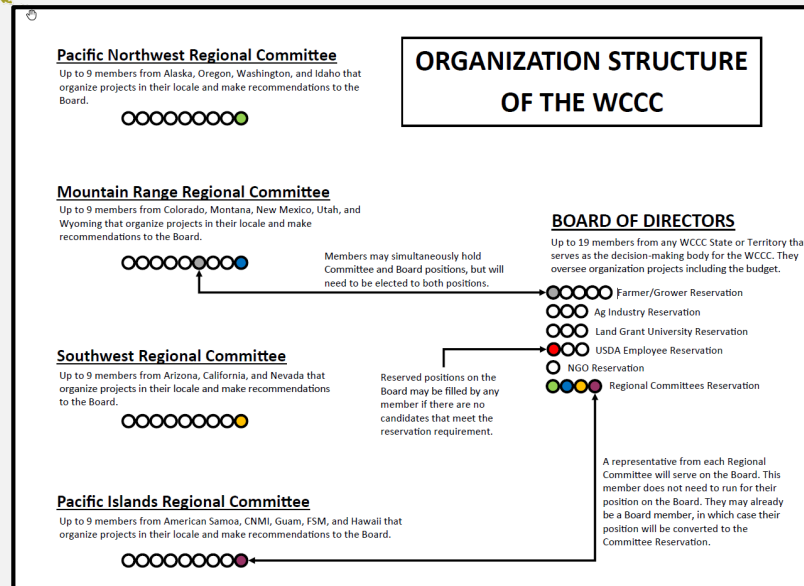
- Compost – Low Rate (on-farm or imported)
- Compost – Moderate Rate (on-farm or imported)
- Biochar (imported)
- Biochar + Compost (imported)
- Carbon By-Product (imported)
- Whole Orchard Recycling

# Projects

# National Cover Crop Decision Support Tool



## Western Cover Crop Council



# Cover Crop Modules

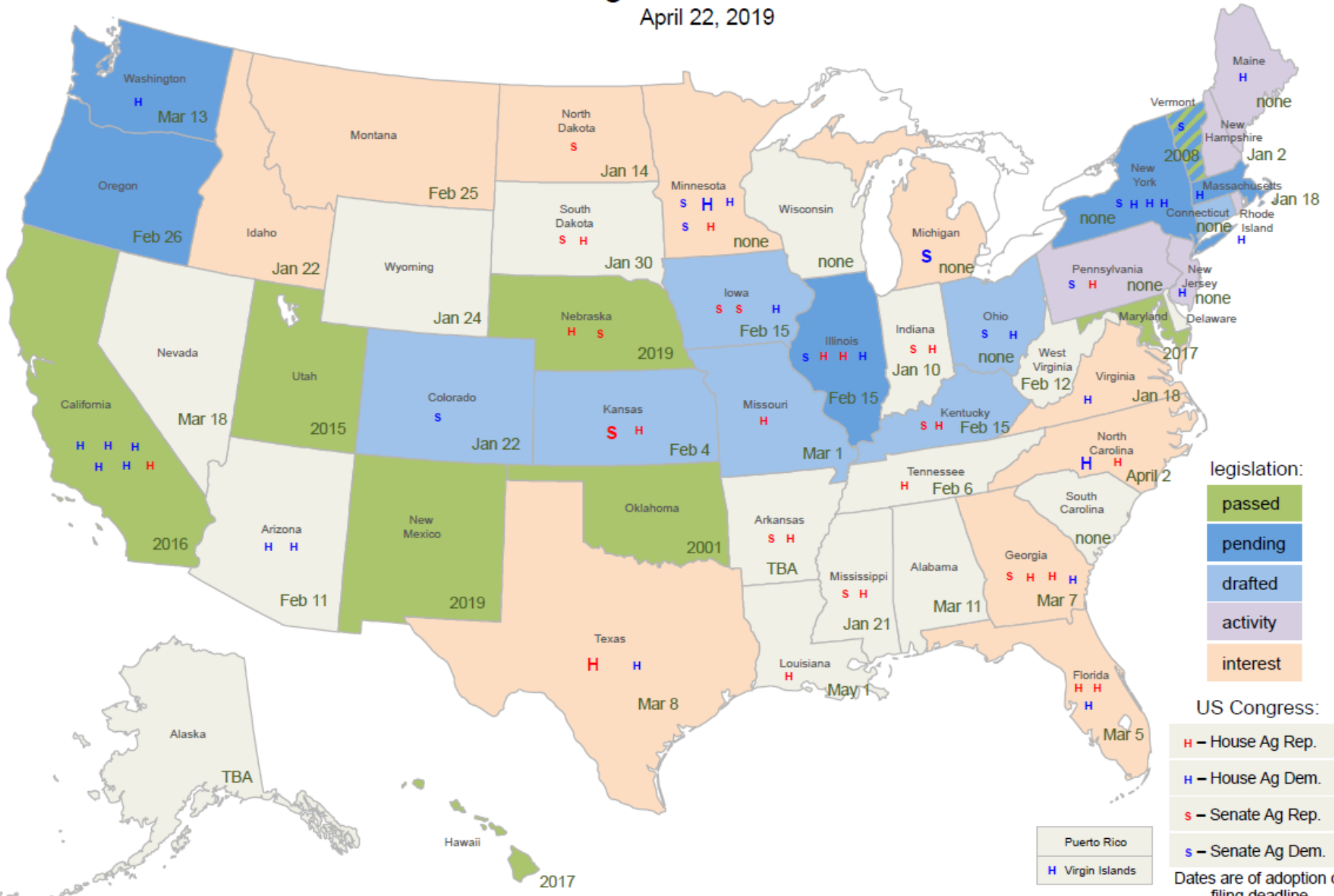
1. Species rates & dates (by PHZ)
2. Mix calculator
3. Economic evaluation (NRCS calculator)



→ Meets NRCS State Specifications

# Healthy Soils legislative status

April 22, 2019



legislation:

- passed
- pending
- drafted
- activity
- interest

US Congress:

- H – House Ag Rep.
- H – House Ag Dem.
- S – Senate Ag Rep.
- S – Senate Ag Dem.

Dates are of adoption or filing deadline  
(TBA = To Be Announced)  
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[healthy-soils-legislation@googlegroups.com](mailto:healthy-soils-legislation@googlegroups.com)




# Soil Health Strategic Plan

Develop a strategic plan to better prioritize where, when, and how to implement practices benefiting soil health in New Jersey

- All-in effort by NRCS, producers, partners, agricultural industry
- Identify valuable partners that we are already working with and those that we are not working with
- Identify challenges and opportunities for soil health implementation
- Identify areas within the state where efforts should be focused based on resources
- Develop a plan to implement soil health practices across the state (field office or N, C, S)
  - Plan will include prioritizing practices in certain areas
  - Any additional needs found during the process
  - Outreach plans will be created
  - Implementation plans will be created

# Webpage Update





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