Today’s and Tomorrow’s Soil Survey is Essential for Developing Locally Adapted Soil Health Management Systems

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Soil Health and Soil Quality

“The continued capacity of soil to function as a vital living ecosystem that sustains plants, animals, and humans”

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Soil Health and Soil Quality

• Inherent Soil Quality: Generally not changeable by mgmt
• Dynamic Soil Quality = Soil Health
  • Changeable aspects
  • Management influenced, biologically driven
  • Measured indirectly by indicators: Soil quality indicators = soil health indicators = dynamic soil properties

Challenges

• Population growth
• Loss of ag soils
• Changing climate
• Water quality and quantity

Benefits

• Nutrient cycling
• Pest suppression
• Carbon sequestration and energy savings
• Water infiltration
• Less runoff, less flooding
• Water storage and soil stability
• Resiliency
• Biodiversity, groundwater, clean water and air
• Long-term economic viability
• Sustained reliable productivity, to feed 9 billion

Win-Win Opportunities: Return on our Nation’s Soil Health Investment

GOAL: Mainstream SHMS adoption via known return on investment

Locally-Adapted Soil Health Management Systems

• Understand inherent resource challenges and opportunities
• Identify and alleviate dynamic constraints to functioning
• Regenerate and maintain high levels of soil health/functioning
• Given producer, current resource status, climate, production system: Which practices? What change can be expected, how fast? What economic outcomes?
There are many success stories …

**Goals of the new NRCS Soil Health Division**

- Leverage Partners
- Ensure Scientific Basis
- Evaluate Economics
- Quantify Benefits

Today’s Soil Survey

- Country is nearly completely mapped
- Provides critical information on
  - Diversity and variation of inherent soil properties
  - Influence on production potential and risks
  - Implications for management options

But the current soil survey did not prepare these farmers for this:
Tomorrow's Soil Survey

Several major needs:
• Range of functioning obtainable, by soil type?
  – Standardized soil health measures included in soil survey and publicly available
  – Site-adapted interpretation of measures
• Status assessment – Soil Health Survey:
  – What is the state of the health of our nation’s soils?
    • Biologically as well as physically and chemically
  – Changing how fast? What direction?

In the design phase at NRCS: Soil Health Monitoring and Enhancement Network

– Statistically representative
– Efficient
  • Ability to return for repeated samples over 100 years
  • ~5000 points across the country leveraging existing NRI and CEAP points
  • Making use of soil survey infrastructure

Adapting Soil Health Management Principles to soils, regions, and cropping systems requires broad collaboration!

\[ \text{do not disturb} \quad \text{mix it up} \quad \text{discover the cover} \quad \text{tap into roots} \]

\[ \checkmark \] Minimize soil disturbance.

\[ \checkmark \] Maximize diversity (plants, animals, amendments, inoculants…).

\[ \checkmark \] Keep the soil covered.

\[ \checkmark \] Maximize living roots.
Tomorrow’s Soil Survey

• Inclusion of temporal interactions between inherent and dynamic soil properties and management represents the future of expanded soil survey products
• Tomorrow’s Soil Survey is essential for developing and promoting adoption of locally adapted Soil Health Management Systems