Same Goals-New Names

Fertility Programs, Soil Health, and Water Quality

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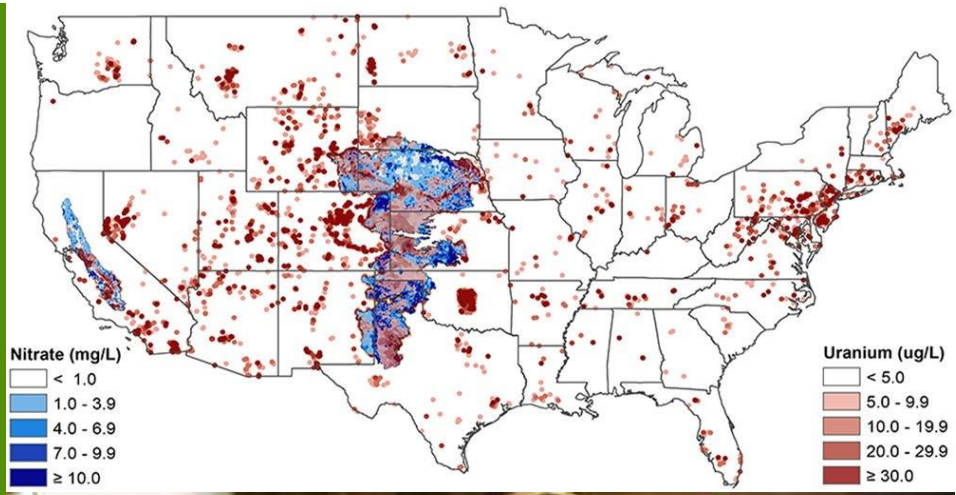
Today's Presentation

- Challenges our industry faces today
  - Are they really challenges at all?
- on the interaction between Fertility Programs, Soil Health and Water Quality
- Soil Health
  - Benefits
  - Management Requirements
- Water Quality
  - Importance
  - Potential impact on our industry
- Fertility Programs
  - What we do right
  - What needs to improve
- Where do we go from here?

Challenges We Face



Trends

Consumer Preferences

- Shifting Demographics
- Environmental awareness
- Desire for more information about where their food comes from.

Environmental Pressures

- Sustainability
- Assurance Standards
- Traceability and data management.
- Soil Health and Water Quality

Economic Pressures

- Reduced Farm Margins
- Increased Competition
- Need for new metrics to determine farm Sustainability

Opportunities

Increasing Awareness

- Community Involvement
- Environmental Focus
- Increasing the ability for our growers to derive value from sustainability.

Emerging Technologies

- Biotechnology
- Applied data technology
- Revolution of services, that focus on operational efficiency and sustainability

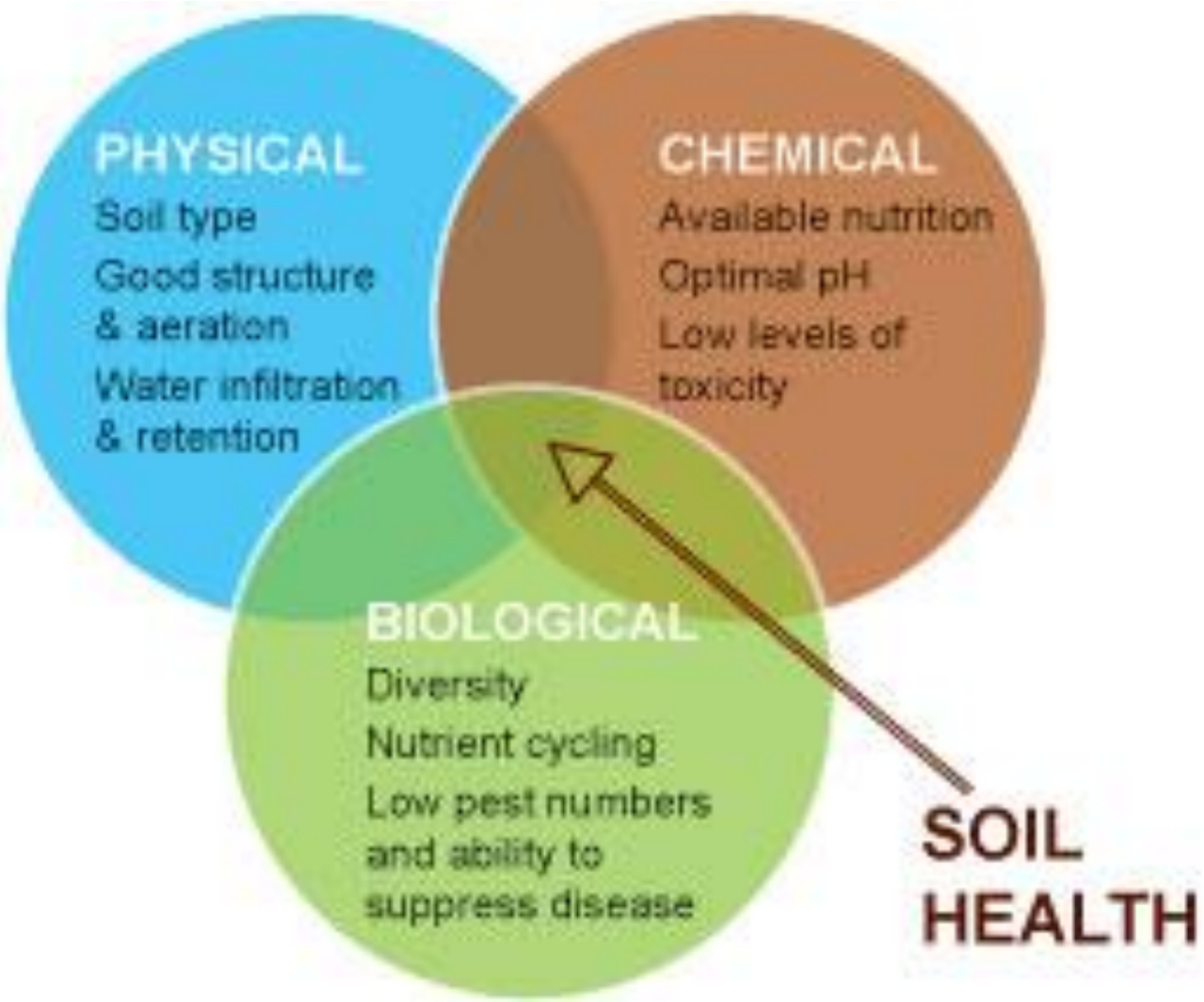
Record Keeping

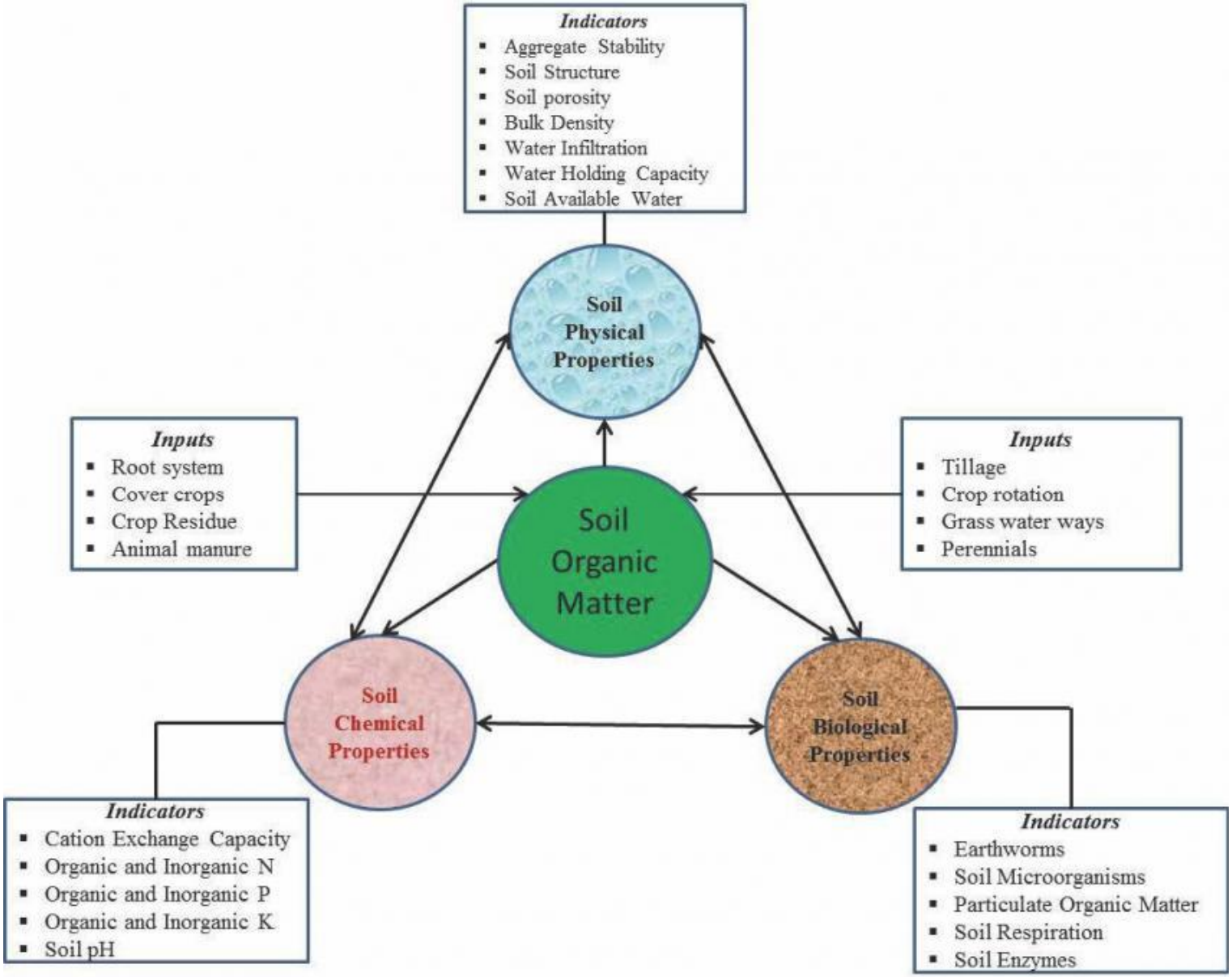
- Data collection and storage
- Growing need for info on resource management
- Reliance on a trusted advisor to help in a changing system

Soil Health

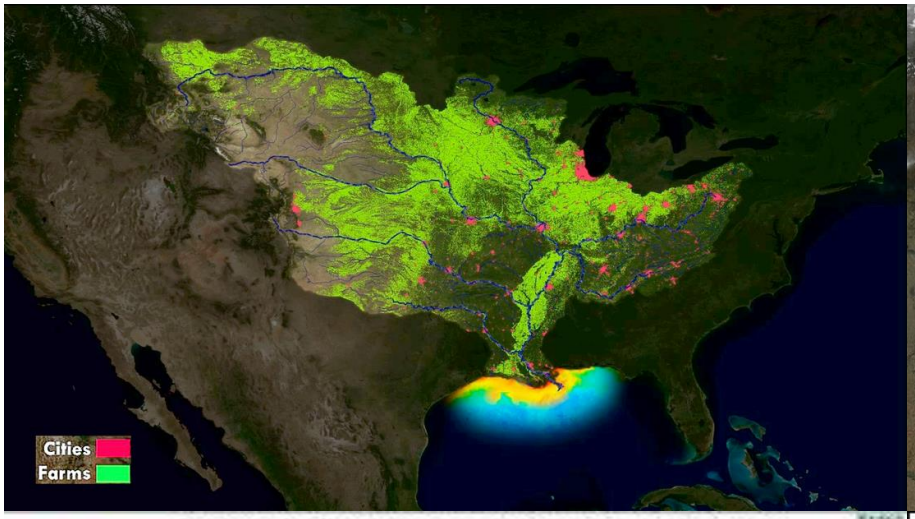
- Objectives today are no different than when the original No-Till movement started.
  - Increasing soil OM
  - Improving soil structure and stability
  - Increasing soil biological activity
- Focus has shifted
  - From No-Till to Cover Crops
  - Improving Biological, Physical and Chemical soil properties.
- Unproven or Unpredictable Yield benefits
  - No Standard Metric
    - Haney test
    - PFLA
    - Cornell Soil Health Assessment
  - Work Needed in Calibration & Correlation
  - Added Management
    - Species Selection
    - Nutrient Needs
    - Termination

Soil Health


PHYSICAL
Soil type
Good structure & aeration
Water infiltration & retention
CHEMICAL
Available nutrition
Optimal pH
Low levels of toxicity
BIOLOGICAL
Diversity
Nutrient cycling
Low pest numbers and ability to suppress disease
SOIL HEALTH


Indicators
Aggregate Stability
Soil Structure
Soil porosity
Bulk Density
Water Infiltration
Water Holding Capacity
Soil Available Water
Soil Physical Properties
Inputs
Root system
Cover crops
Crop Residue
Animal manure
Soil Organic Matter
Inputs
Tillage
Crop rotation
Grass water ways
Perennials
Soil Chemical Properties
Soil Biological Properties
Indicators
Cation Exchange Capacity
Organic and Inorganic N
Organic and Inorganic P
Organic and Inorganic K
Soil pH
Indicators
Earthworms
Soil Microorganisms
Particulate Organic Matter
Soil Respiration
Soil Enzymes

Water Quality



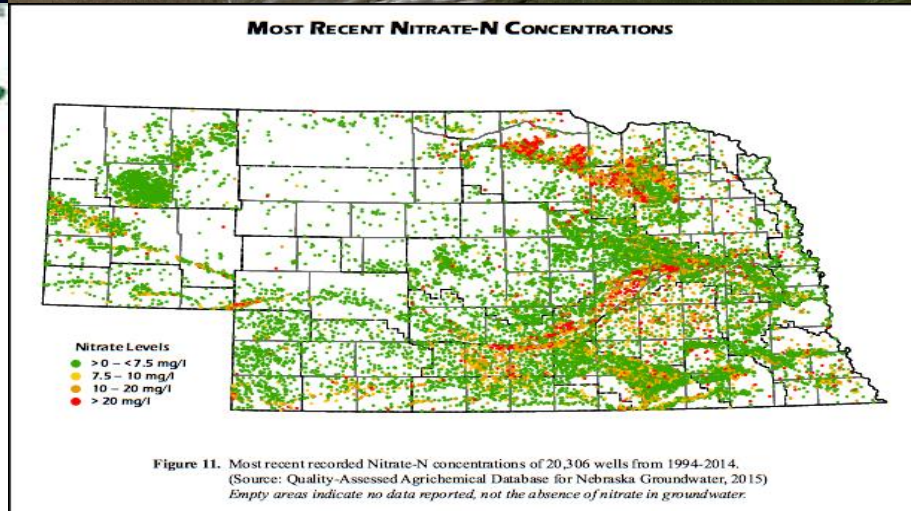
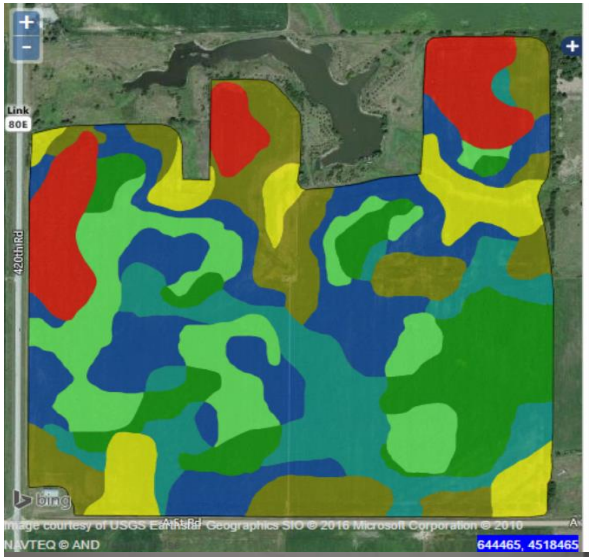


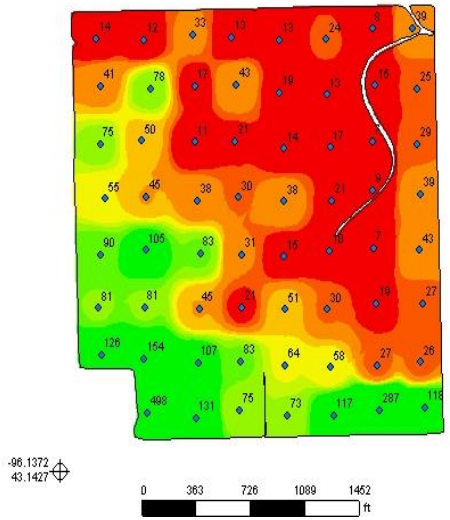
Figure 11. Most recent recorded Nitrate-N concentrations of 20,306 wells from 1994-2014. (Source: Quality-Assessed Agrichemical Database for Nebraska Groundwater, 2015) *Empty areas indicate no data reported, not the absence of nitrate in groundwater.*

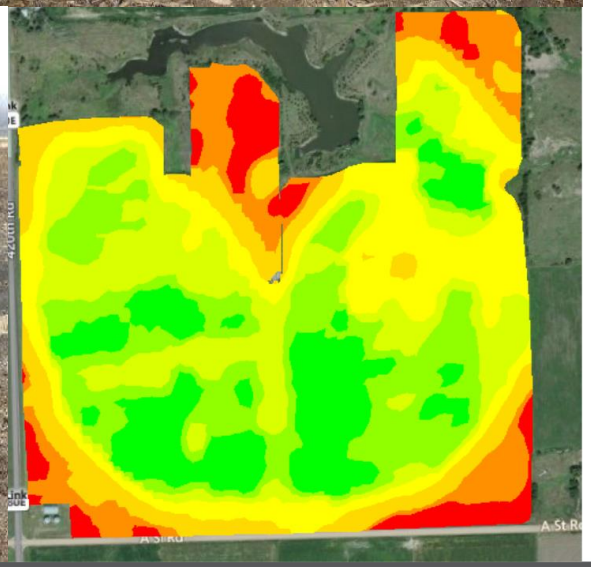
Water Quality Improvement Strategies

- Take a look at edge of field measures
  - Wood Chip Bioreactors
  - Native Grass Filter Strips
    - Associated costs are high
- Improvements in soil health
  - Recovery of leachable nutrients
    - Nitrogen
    - Potassium
  - Stabilization of soil aggregates
    - Reduction in runoff and soil erosion
- Implementation of 4R Strategies
  - Right Rate
  - Right Source
  - Right Placement
  - Right Timing

Fertility Programs





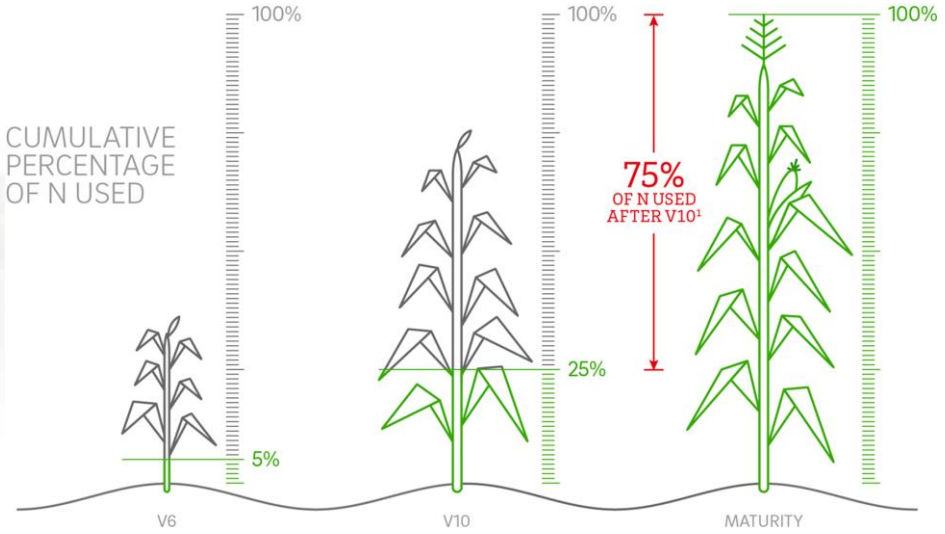


New Challenges In Soil Fertility

- Increased Scrutiny
  - Growers watching costs
  - Others watching growers
- Increased Needs
  - Soil P levels still dropping at an alarming rate
  - Increasing Crop Removals
- Cover Crops will Increase Complexities
  - Understanding mineralization
  - Replacement of Nutrients used by a cover crop
- The Water Quality Issues will not go away
  - NRCS Study on the Ogalla Aquifer
  - Des Moines Water Works
  - Great Lakes Algae Issues
- Distractions and Confusion
  - New Players in the game
  - Transitioning Farms

Moving Forward

"We have the **KNOWLEDGE** and **TECHNOLOGY** to improve how we do things, let's **DO** it" – Randy Uhrmacher Farmer near Hastings Ne



Summary

- None of these challenges are new, they just have more weight than in the past.
- Data and Technology will only take us so far
  - Strong Agronomics will be a MUST
- Complex problems NEVER have simple solutions
  - This is when the good Trusted Advisors get closer to their growers
  - Embrace the Complexity
- Fertility Programs, Soil Health and Water Quality are deeply interconnected
- Focus on the 4R Principles
  - Every Decision is a 4R Decision

Thank You

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