Optimizing Your Site for Strawberries

Site Considerations

- Compatible with marketing strategy
- Water availability (quality and quantity)
- Adequate soil drainage
- Soil fertility, pH and organic matter
- Slope
- Adequate sun
- Winter temperatures/ Frost pockets/ Microclimates
- Prior site history/ Solanaceous crops/ Nematodes
- Land for future expansion and crop rotation
- PYO parking and customer access

Soil tolerances of berry crops

Strawberries	Raspberries	Blueberries
Not too picky about soil texture	Prefer loamy soils	Prefer sandy loam or sandy soils
Soil depth > 6 inches	Soil depth > 12 inches	Soil depth > 12 inches
Internal soil drainage is important	Internal soil drainage is critical	Can tolerate limited flooding, especially in winter
pH between 5.5 and 7.0	pH between 6.0 and 7.0	pH between 4.3 and 4.8
Fairly tolerant of compaction	Fairly tolerant of compaction	Not tolerant of compaction

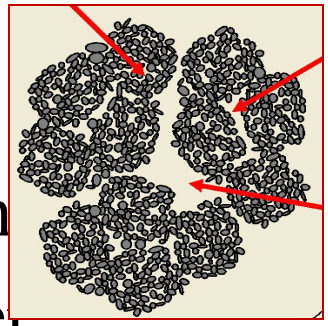
Soil Types

- Ideal soil for most crops is a deep, well-drained, sandy loam soil high in organic matter.

Why?

Sandy loams

- Mixture of pore sizes
  - Allows for root penetration
  - Allows for drainage and aeration
  - Holds some plant-available water



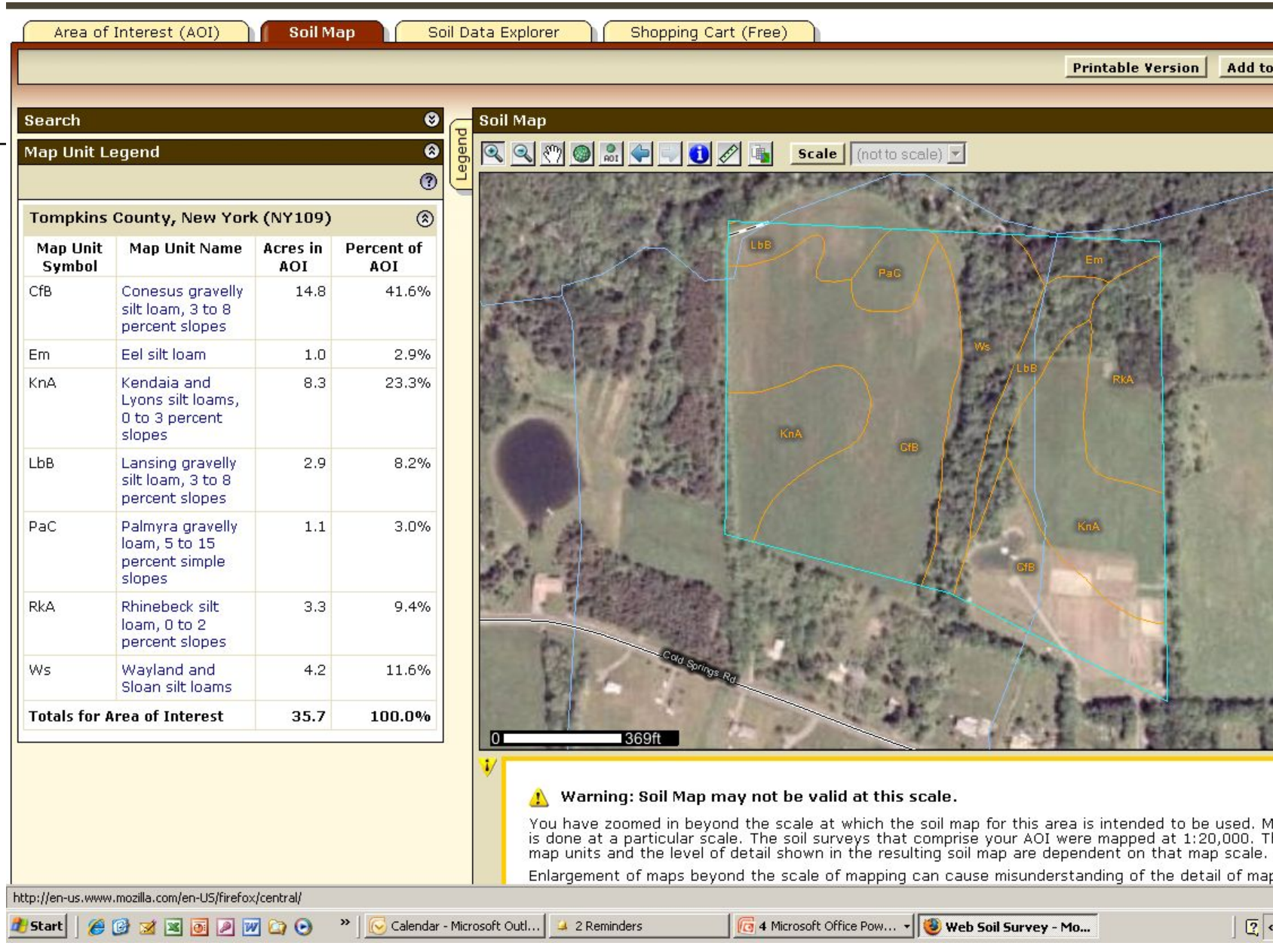
Clays have too much very small pore space, so hold little air and plant-available water

Sands have too much large pore space, so hold little water

- How do I discover my soil type?
- http://websoilsurvey.nrcs.usda.gov/


09:38
97
MapMyRun
iNaturalist
AllTrails
Zoom
Photo & Video
Wegmans
Fly Delta
Seek
TheWeatherC...
Swift911 Public
My Spectrum
Calculator
SoilWeb
NYS Wallet
American
PayPal
57
ReaList
LandGlide
Apple Store
Clips
GarageBand
iMovie
Keynote
Search

How do I discover my soil type?


Area of Interest (AOI)
Soil Map
Soil Data Explorer
Shopping Cart (Free)
Printable Version
Add to
Search
Map Unit Legend
Tompkins County, New York (NY109)
Map Unit Symbol
Map Unit Name
Acres in AOI
Percent of AOI
CfB
Conesus gravelly silt loam, 3 to 8 percent slopes
14.8
41.6%
Em
Eel silt loam
1.0
2.9%
KnA
Kendaia and Lyons silt loams, 0 to 3 percent slopes
8.3
23.3%
LbB
Lansing gravelly silt loam, 3 to 8 percent slopes
2.9
8.2%
PaC
Palmyra gravelly loam, 5 to 15 percent simple slopes
1.1
3.0%
RkA
Rhinebeck silt loam, 0 to 2 percent slopes
3.3
9.4%
Ws
Wayland and Sloan silt loams
4.2
11.6%
Totals for Area of Interest
35.7
100.0%
Legend
Soil Map
Scale
(not to scale)
LbB
PaC
Em
Ws
LbB
RkA
KnA
CfB
KnA
CfB
Cold Springs Rd
0
369ft
Warning: Soil Map may not be valid at this scale.
You have zoomed in beyond the scale at which the soil map for this area is intended to be used. M
is done at a particular scale. The soil surveys that comprise your AOI were mapped at 1:20,000. T
map units and the level of detail shown in the resulting soil map are dependent on that map scale.
Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of map
http://en-us.www.mozilla.com/en-US/firefox/central/
Start
Calendar - Microsoft Outl...
2 Reminders
4 Microsoft Office Pow...
Web Soil Survey - Mo...

Site preparation

- Weed suppression (while minimizing compaction)
- Drainage
- Ensure water availability
- Soil testing and modification
  - pH modification
  - Nutrient addition
  - Organic matter enhancement
  - Physical properties
  - Biological properties

Weed suppression strategies

- Round-up then cover crop the year before planting
- Sequential cover cropping one year or two before planting
- Follow corn or soybeans or some other crop where weed control was practiced
- Plastic mulch
- Plant strawberries then deal with the weeds later

The most important site modification you can do is ensure there is adequate drainage . . .

Field Symptoms

- **Above ground structure stunted, reddened or collapsing**
- **Wilting of leaves**
- **Lack of runnering**
- **Decline of vigor and productivity**

Symptoms of poor soil health from inadequate drainage

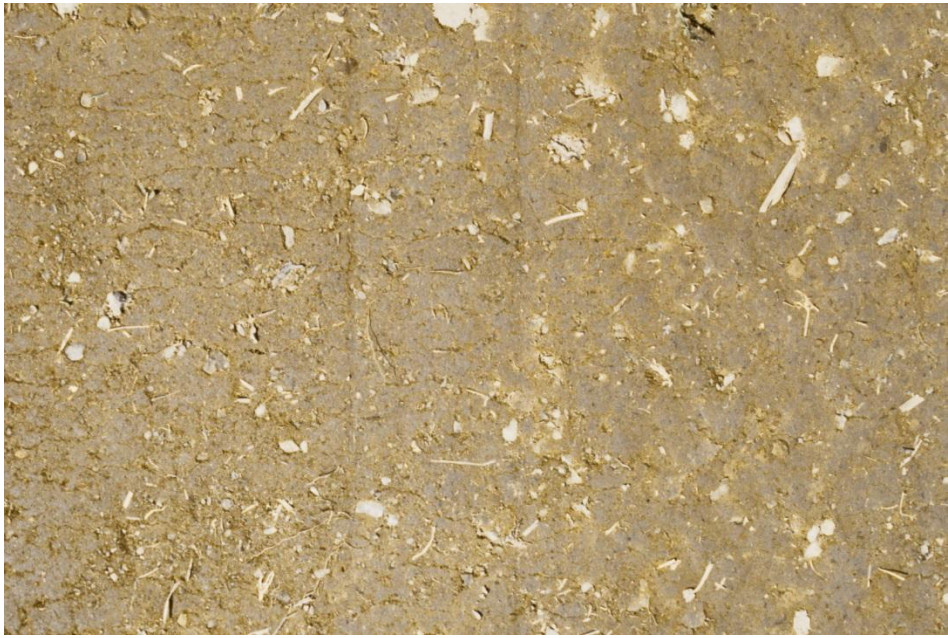
- **Patchy-complete blackening of main/perennial roots**
- **Deterioration of perennial & feeder roots**
- **Smaller root systems**

Black root rot

Red Stele

Not all farms have deep, well-drained, sandy loam soils …

- What is the tolerance of strawberries to variation in soils?



Preplant treatments had an impact on runner production and yield in the first fruiting year.

Treatment	Daughter plants* (#/m)	Yield* (kg/4 m)	Individual fruit weight (g)
Minimum	44.0	7.83	12.0
Moderate	31.0	7.73	12.2
Maximum	28.6	7.19	12.1

A similar trend was continued intothe subsequent year but the impact was not large (<10%).

Treatment	Yield* (kg/4 m)	Individual fruit weight* (g)
Minimum	22.0	13.9
Moderate	21.2	12.4
Maximum	20.3	12.7

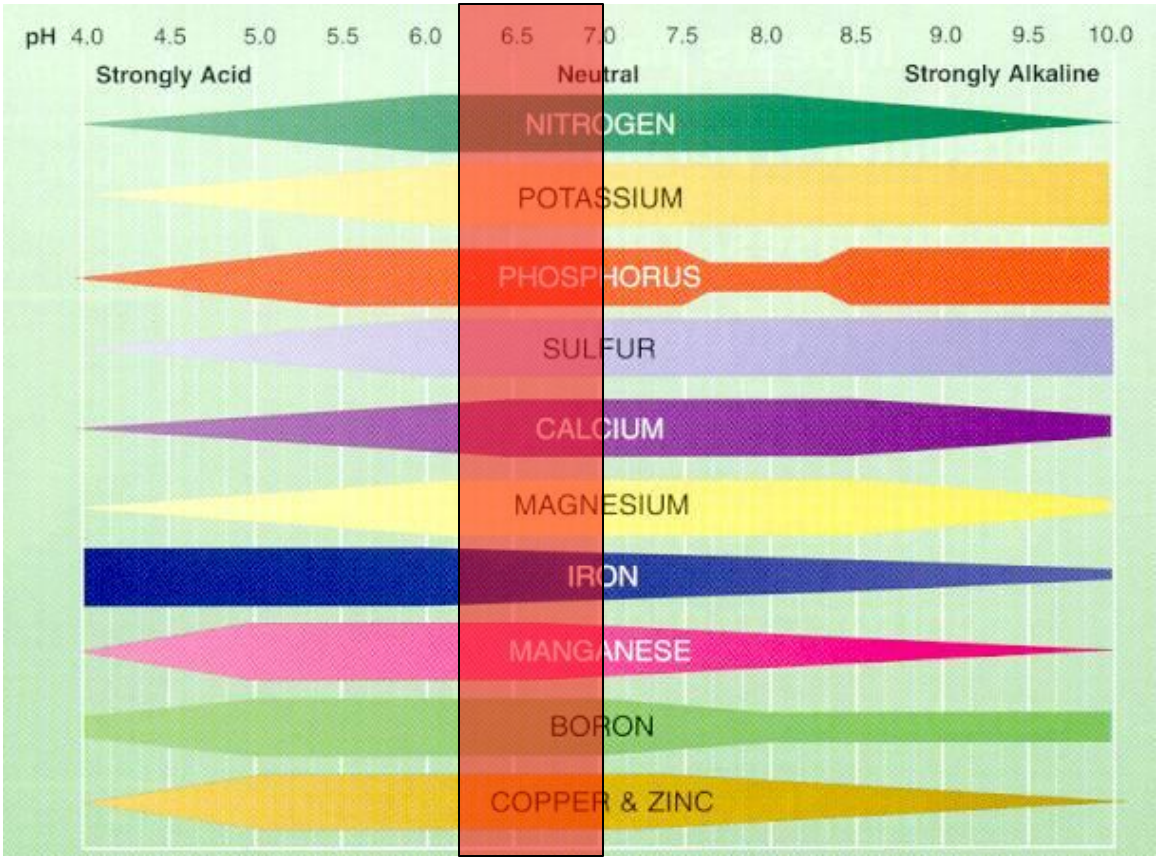
Principles of chemical soil testing

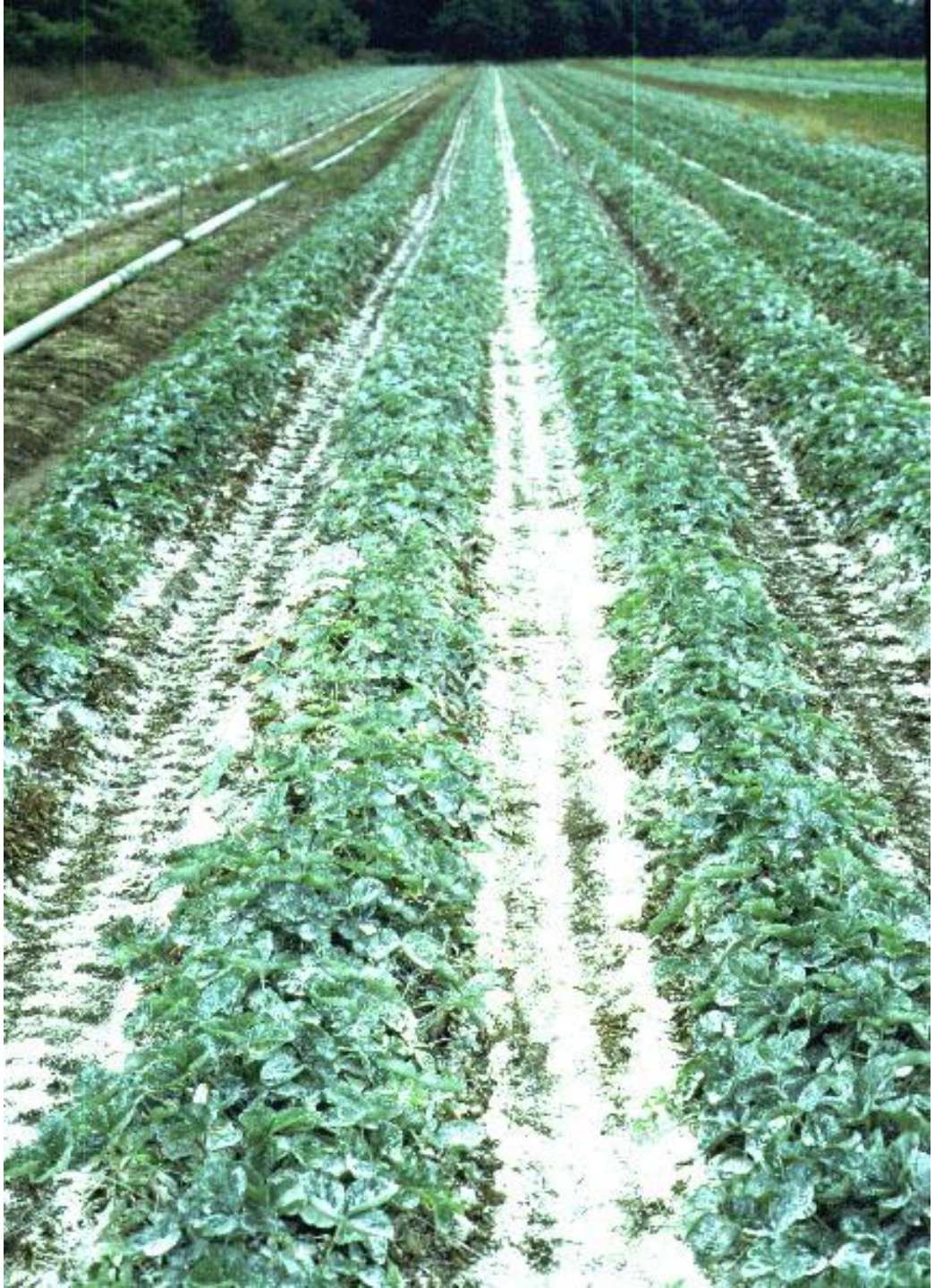
- Soil test prior to planting
  - Adjust pH
  - Adjust nutrient levels
- Leaf analysis once planting is established
  - Mid-summer

Traditional Soil Tests

- Determine optimal nutrient level for crop maximum yield/growth for the
- Use chemical soil test result to determine what is available to the plant from the soil
- Provide fertilizer recommendation to supply the difference via. fertilizer

Soil pH and Nutrient Availability





Note on soil testing:

- Extractants differ between labs
- Recommendations must match the soil extractant

What organic amendments are best?

- Four preplant amendments
  - Straw
  - Wood chips
  - Grass clippings
  - Control
- Two tillage depths

- Measuring growth, yield, PMN, active C, respiration

Unamended

Straw

Sawdust

Plants planted into a straw residue were smaller, slower to establish, and had fewer runners and a lower yield the following year.

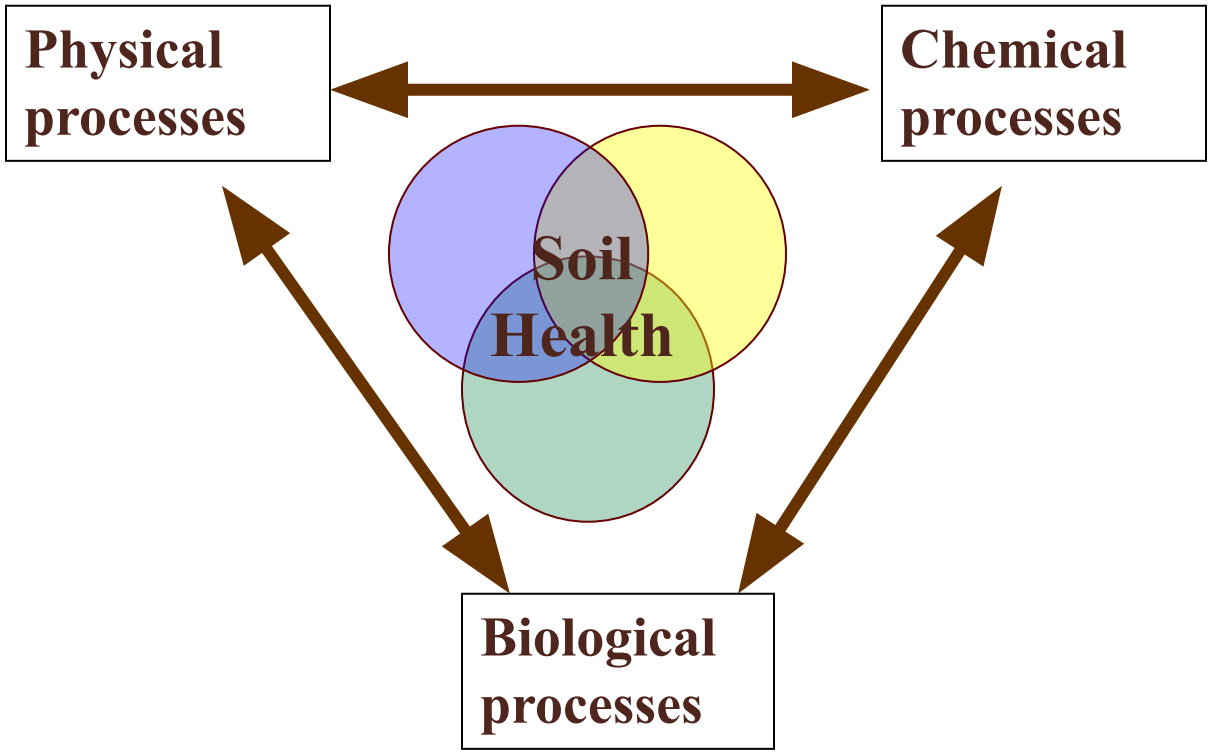
- Straw mulch incorporated between rows once plants are established (as would be typically done during renovation) did not impact yield the following year.

How do we evaluate soil potential?

- Chemical tests (Traditional soil tests)
  - Soil tests, fertilizers, etc.
- Physical tests
  - Tilth
  - Drainage
  - Compaction
- Biological tests
  - The living component of soil
  - Not yet as well-understood, but can be managed!

- Biological and physical tests are available through the Cornell Soil Health Test

Interactions!



Cornell Soil Health Test

1) **Publically available** since 2006, developed for the northeastern USA
2) **Measures 15 indicators**
   a. Represent agronomically essential soil processes
   b. $90/sample
3) **Identifies soil constraints** using scoring functions
4) **Guides management decisions**

http://soilhealth.cals.cornell.edu/

CORNELL SOIL HEALTH TEST REPORT (COMPREHENSIVE)

Name of Farmer: Beth Gugino	Sample ID: E231
Location: Plant Pathology, 630 W. North St. Geneva NY 14456	Agent: George Abawi
Field/Treatment: Gates 72	Agent's Email: 0
Tillage: 9+ INCHES	Given Soil Texture: LOAMY
Crops Grown: CLE/SWC/BNS	Date Sampled: 5/4/2007

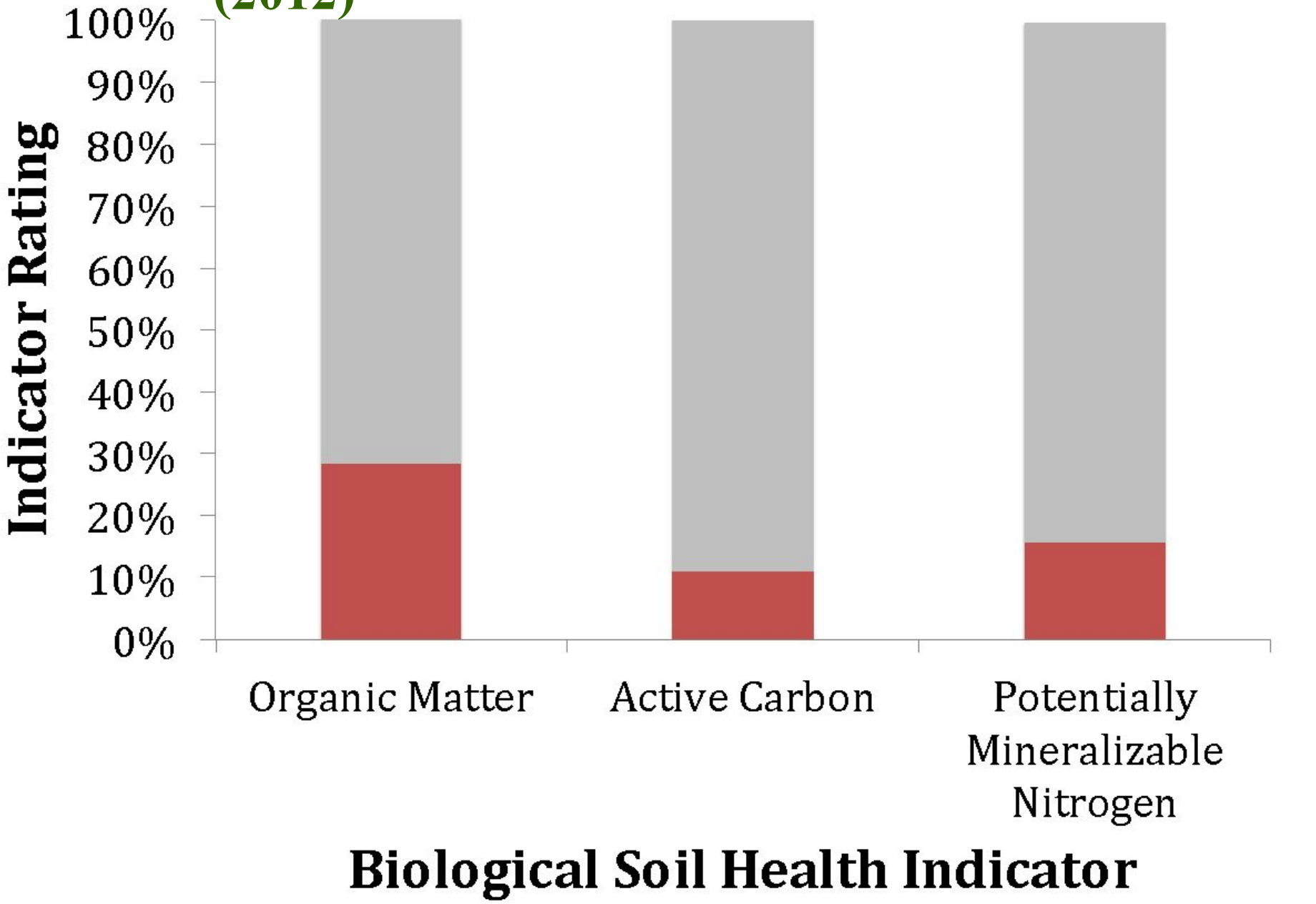
	Indicators	Value	Rating	Constraint
PHYSICAL	Aggregate Stability (%)	26	32	
	Available Water Capacity (m/m)	0.13	29	water retention
	Surface Hardness (psi)	167	53	
	Subsurface Hardness (psi)	300	46	
BIOLOGICAL	Organic Matter (%)	2.3	18	energy storage, C sequestration, water retention
	Active Carbon (ppm) [Permanganate Oxidizable]	554	38	
	Potentially Mineralizable Nitrogen (µgN/ gdwsoil/week)	7.9	10	N Supply Capacity
	Root Health Rating (1-9)	4.3	63	
CHEMICAL	*pH	7.4	78	
	*Extractable Phosphorus (ppm) [Value <3.5 or >21.5 are downscored]	10.0	100	
	*Extractable Potassium (ppm)	50	72	
	*Minor Elements		100	
	OVERALL QUALITY SCORE (OUT OF 100):		53.3	Low

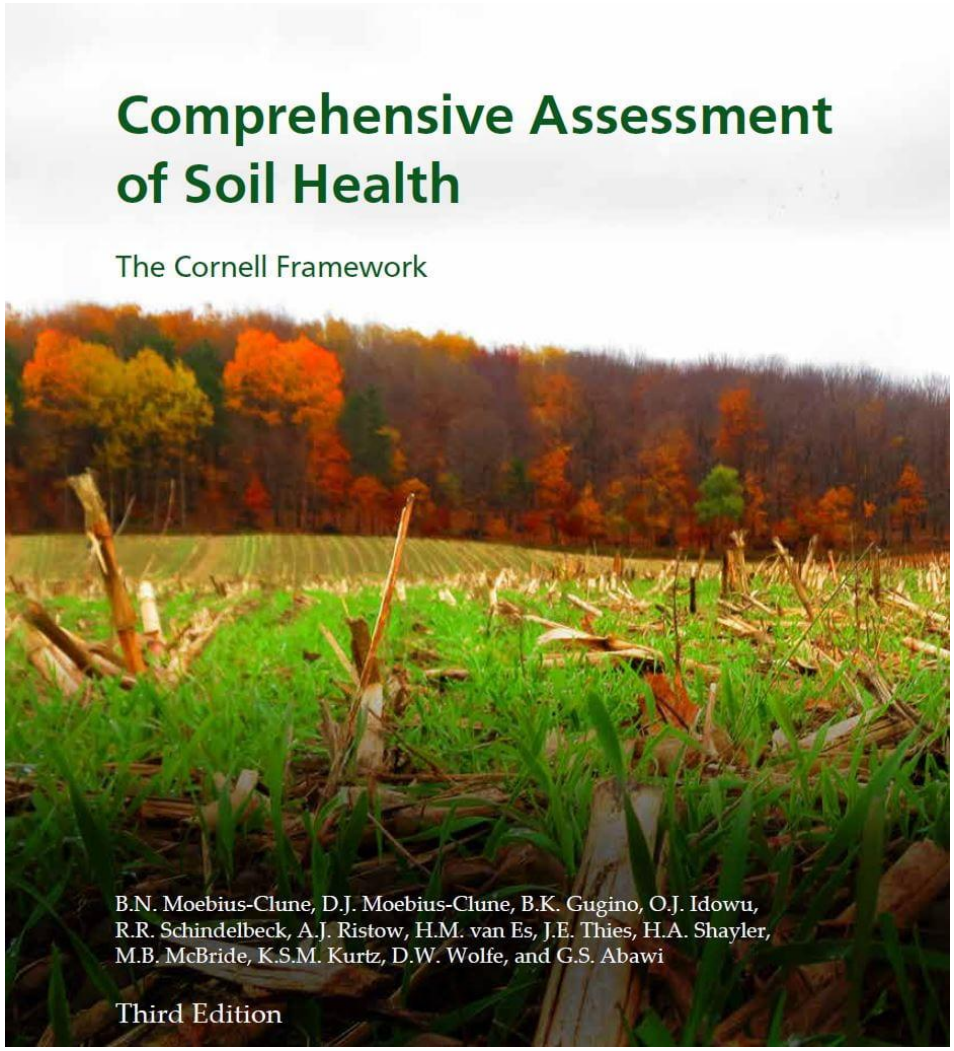
Measured Soil Textural Class:==> silt loam

SAND (%): 44.0 *SILT (%): 50.0* *CLAY (%): 6.0*

Location (GPS): Latitude=> 42.866667 Longitude=> -77.05

NE SARE survey of strawberry farms (2012)





- Overview of Soil Health concepts
- Field sampling
- Description of indicators
- Brief laboratory methodology
- How indicator values are "scored"
- Soil Health Report
- Soil Health Report Interpretation
- Linkages to Management

Available online at http://soilhealth.cals.cornell.edu

A good water supply is essential for long-term sustainability

Why worry about water?

- 2/3 of world's fresh water is used for agriculture
- Water quality is poor in many areas (e.g. high salinity, high pH)
- even humid areas (like the Northeast) experience a 20 - 30 day period without significant rainfall during the growing season 3 times per 20 years

Short-term effects of water stress on berries . . .

- reduces net assimilation rate (photosynthesis) by 50%
- reduces leaf expansion rate and leaf area
- increases rate of leaf death
- accelerated ripening

Long-term effects of water stress on berries . . .

- reduced growth of aboveground tissues
- reduced flower bud initiation
- smaller fruit size
- reduced yield

Consequence of too little water after planting

Water supply considerations

- **Frequency of irrigation**
- **Replenishment rate**
- **Efficiency of irrigation** (60-75% for overhead)
  - To supply 0.6 inches or water with an overhead system requires 27,000 gal. X 0.6 in. /0.75 = 21,600 gal per acre.
  - Twice a week irrigation during the drought
  - For a 5-acre planting during a 30-day drought, this would lower a pond 100 ft. by 100 ft. by 2.5 feet.
- **Water quality**
  - salts/pH < 2.0 ms
  - microorganisms
  - sediment/algae

Site preparation

- ✓ Weed suppression
- ✓ Drainage
- ✓ Ensure water availability
- ✓ Soil testing and modification
  - pH modification
  - Nutrient addition
  - Organic matter enhancement
  - Physical properties
  - Biological properties


NOR CAL NURSERY