Soil Health & Management Strategies

Johnny's Selected Seeds

OUR PRESENTERS

Collin Thompson
Farm Ops Manager

Jill Porchetta
Farm Technician III

Johnny's Research Farm

Original farm was purchased in 1976 and still functions as our "home farm".

Dedicated to:

- **Breeding:** Development of new vegetable and flower varieties
- **Seed production:** Foundation, stock, and commercial seed productions
- **Product trialing:** Field and high tunnel trials of Johnny's and partner products

Every product in the Johnny's catalog and website is field-tested on the research farm.

The Farm

Consists of:

- 31 Farm Operations Staff
- 10 farm locations (4 owned, 6 leased)
- 203 acres total, 50-75 in active production
- 50% or more of acreage in cover crops annually

Today's Discussion

What Is Soil Health?

Physical, Chemical, and Biological Aspects of Soil

Building Better Soil Through Management

Soil Health in Practice

What Is Soil Health?

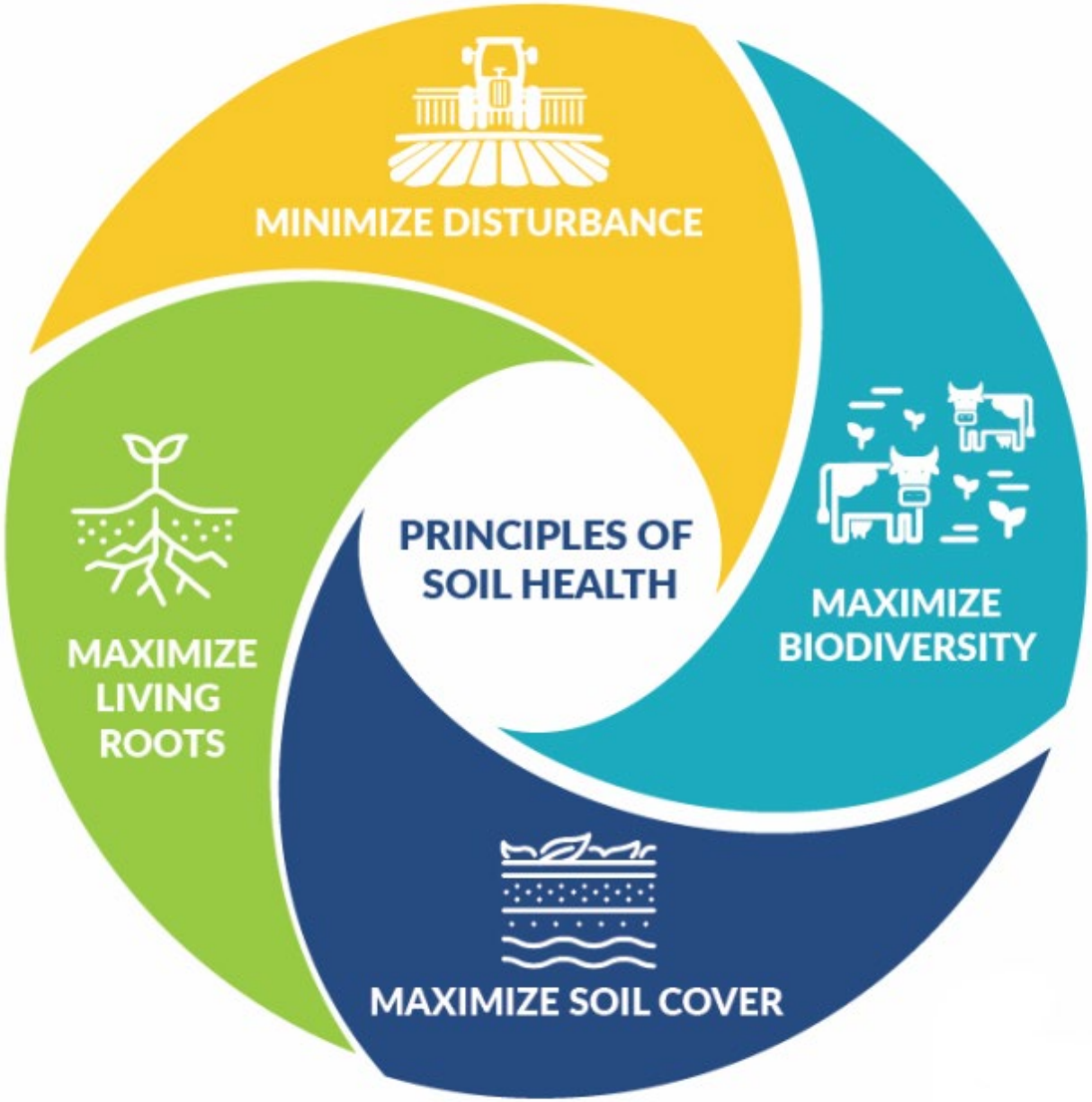
Soil health is the continued capacity of soil to function as a living ecosystem that sustains plants, animals, and humans.

Why It Matters

- Supports plant growth/enhances nutrient density
- Enhances water retention and drainage
- Builds resilience against pests and diseases
- Carbon sequestration and climate impacts
- Foundation of the **Soil Food Web**

Key Properties:

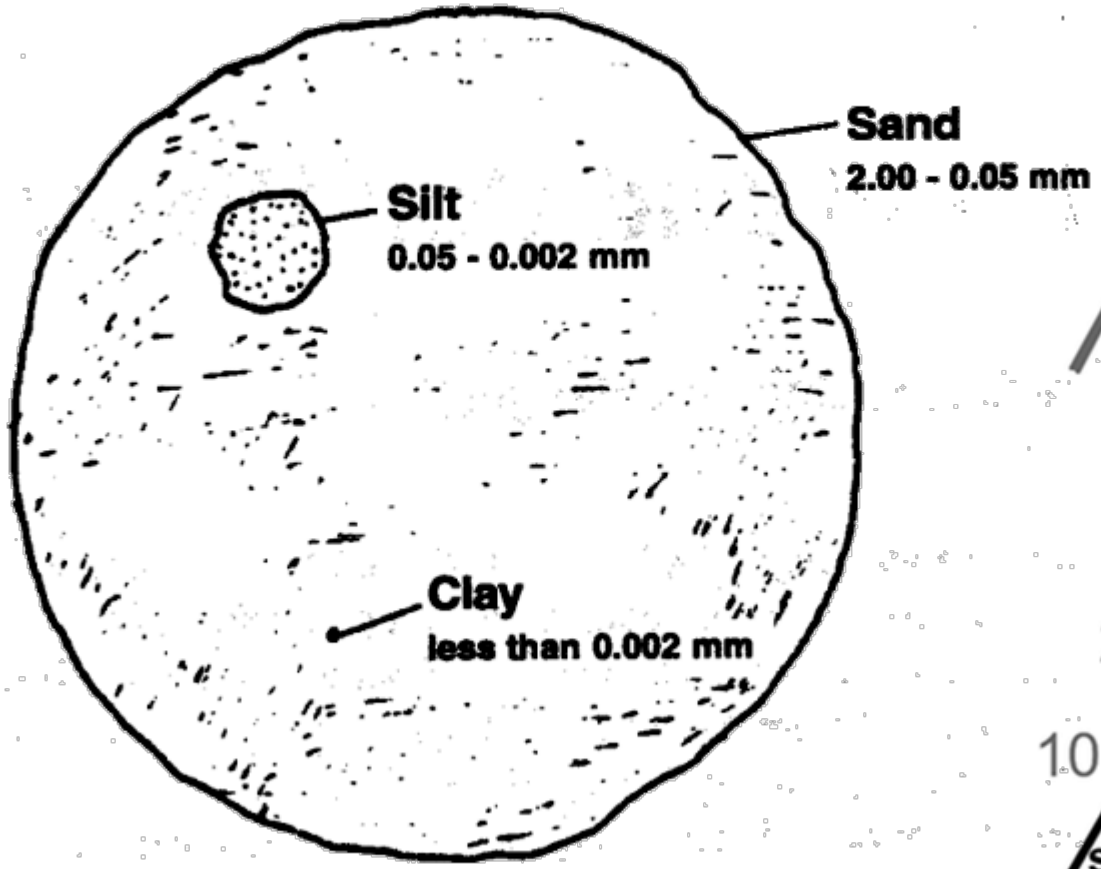
- Physical – texture, structure, compaction
- Chemical – pH, nutrient levels
- Biological – microorganisms, small invertebrates, fungi

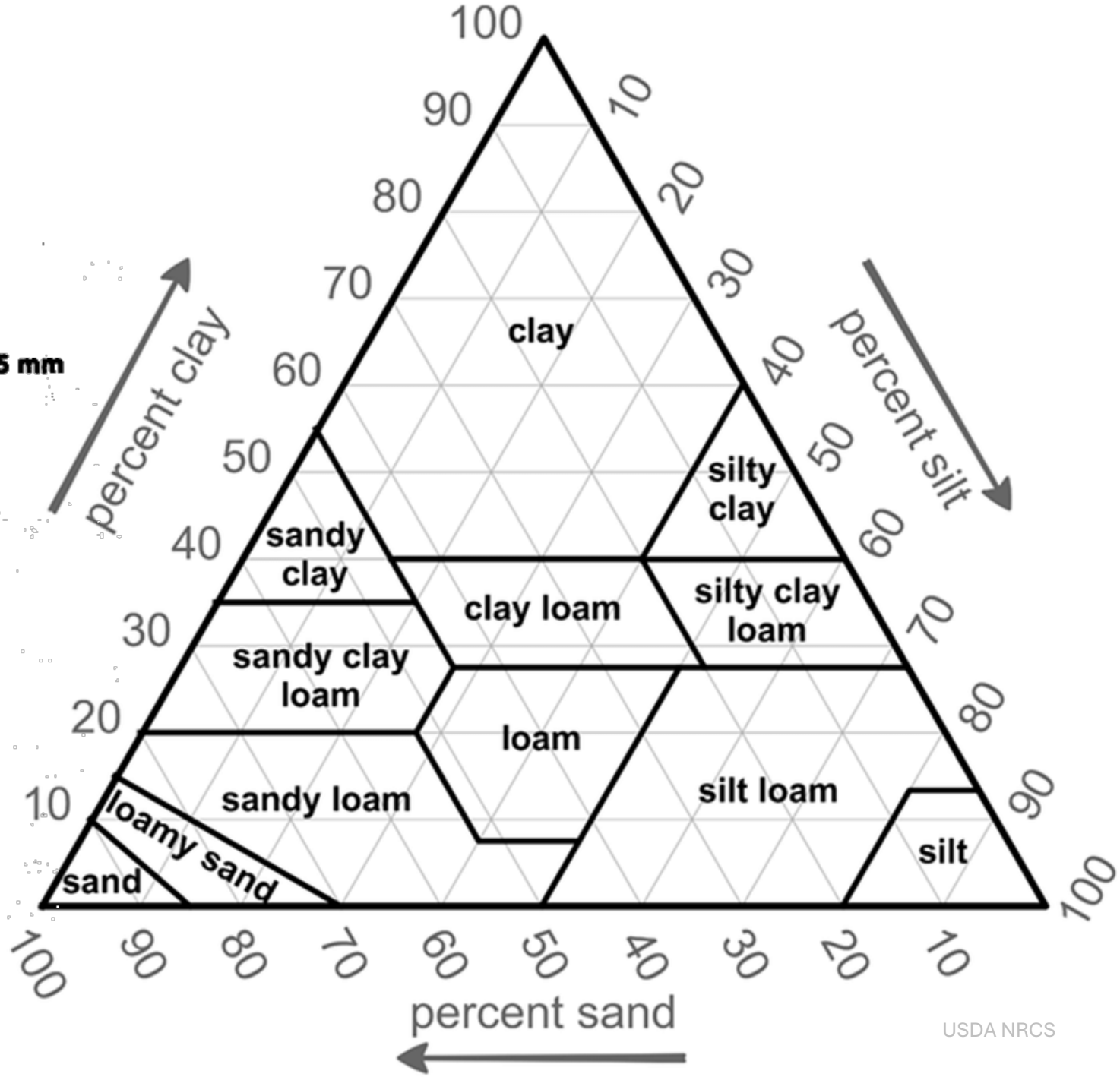


USDA NRCS

Physical Characteristics

Soil Texture





USDA NRCS

Physical Characteristics

Jar Test

1. Collect soil sample and sift
2. Fill jar 1/3 full of soil
3. Fill remainder of jar with water
4. Cap and shake
5. Set on a level surface for 1 minute, measure and mark **sand** layer
6. Return after two hours, measure and mark **silt** layer
7. Return after 48 hours, measure and mark **clay** layer
8. Measure the layers and the total of all layers to determine percentage of each

Clemson Cooperative Extension

Chemical Characteristics

Professional Soil Testing

What you'll get:

- pH
  - Soil acidity (scale of 0-14)
- Macronutrients
  - Primary - Phosphorus (P) and Potassium (K)
  - Secondary – Calcium (Ca), Magnesium (Mg), Sulfur (S)
- Micronutrients
  - Iron (Fe), Manganese (Mn), Zinc (Zn), Copper (Cu), Boron (B), *and maybe Molybdenum (Mo), Chlorine (Cl), and Nickel (Ni)*
- Organic matter %
- Cation exchange capacity (CEC)
  - *How well soil can hold and exchange nutrients*
- Amendment recommendations
- Optional tests – nitrate, microbial activity, soluble salts, heavy metals

1/16/2024	84	ALBION COMPOSITE	KENNEBEC	19 Acres
PRINT DATE	LAB NO.	SAMPLE IDENTIFICATION	COUNTY	ACRES OR SQ. FT.

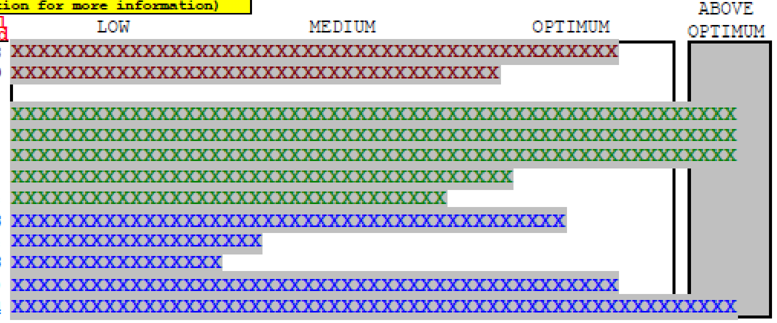
•SOIL TEST REPORT FOR:

COLLIN THOMPSON
955 BENTON AVENUE
WINSLOW ME 04901

MAINE SOIL TESTING SERVICE
UNIVERSITY OF MAINE
5722 DEERING HALL
ORONO,MAINE 04469-5722

•SOIL TEST SUMMARY & INTERPRETATION
(see Numerical Results section for more information)

	Level Found
Soil pH	6.8
Organic Matter(%)	5.9
Major nutrients	
Phosphorus (lb/A)	250
Potassium (% Sat)	5.2
Calcium (% Sat)	82.5
Magnesium (% Sat)	12.2
Sulfur (ppm)	14
Micronutrients	
Boron (ppm)	0.8
Copper (ppm)	0.14
Iron (ppm)	2.8
Manganese (ppm)	6.9
Zinc (ppm)	2.4



•RECOMMENDED ADDITIONS FOR ORGANIC GROWING - Crop Code # 392

No lime recommended. Soil pH is at or above the optimum level for this crop.

To meet major nutrient requirements, apply (on each 1000 sq. ft.):
Nitrogen(2.5 lb) - from 20 lb bloodmeal or feathermeal or 35 lb soybean meal.

If you are using wood ash, discontinue until lime is needed again.
Excessive potassium: If you are using wood ash, discontinue.
Provisional organic matter credit: 1/2 of recommended N should be sufficient.

Apply fertilizer in spring. Apply 1/2 Nitrogen at planting time, 1/2 3-4 weeks later.

For information on micronutrient management and recommendations, see enclosed form.

•NUMERICAL RESULTS (Test methodology: pH in water and Mehlich buffer, available nutrients by modified Morgan extract) (Organic matter measured by LOI, P determined colorimetrically, all others measured by ICP-OES)

CEC and nutrient balance calculations are based on present pH of 6.8

	Soil pH	Lime Index 2	Phosphorus (lb/A)	Potassium (lb/A)	Magnesium (lb/A)	Calcium (lb/A)	CEC (me/100 g)	K (% Saturation)	Mg (% Saturation)	Ca (% Saturation)	Acidity
Level Found	6.8	6.31	250	437	319	5412	10.7(A)	5.2	12.2	82.5	0.0
Optimum Range	6.0-7.0	N/A	20-40	see % Saturation levels			> 5	3.5-5.0	10-20	60-80	< 10

	Organic Matter(%)	Sulfur (ppm)	Copper (ppm)	Iron (ppm)	Manganese (ppm)	Zinc (ppm)
Level Found	5.9	14	0.14	2.8	6.9	2.4
Normal Range	5 - 8	> 15	.25-.60	6 - 10	4 - 8	1 - 2

(Extras)	Boron (ppm)	Sodium (ppm)	Soluble Salts (mmhos/cm)	Nitrate-N (ppm)	Ammonium-N (ppm)
Level Found	0.8	N/A	N/A	N/A	N/A
Normal Range	0.5-1.2				

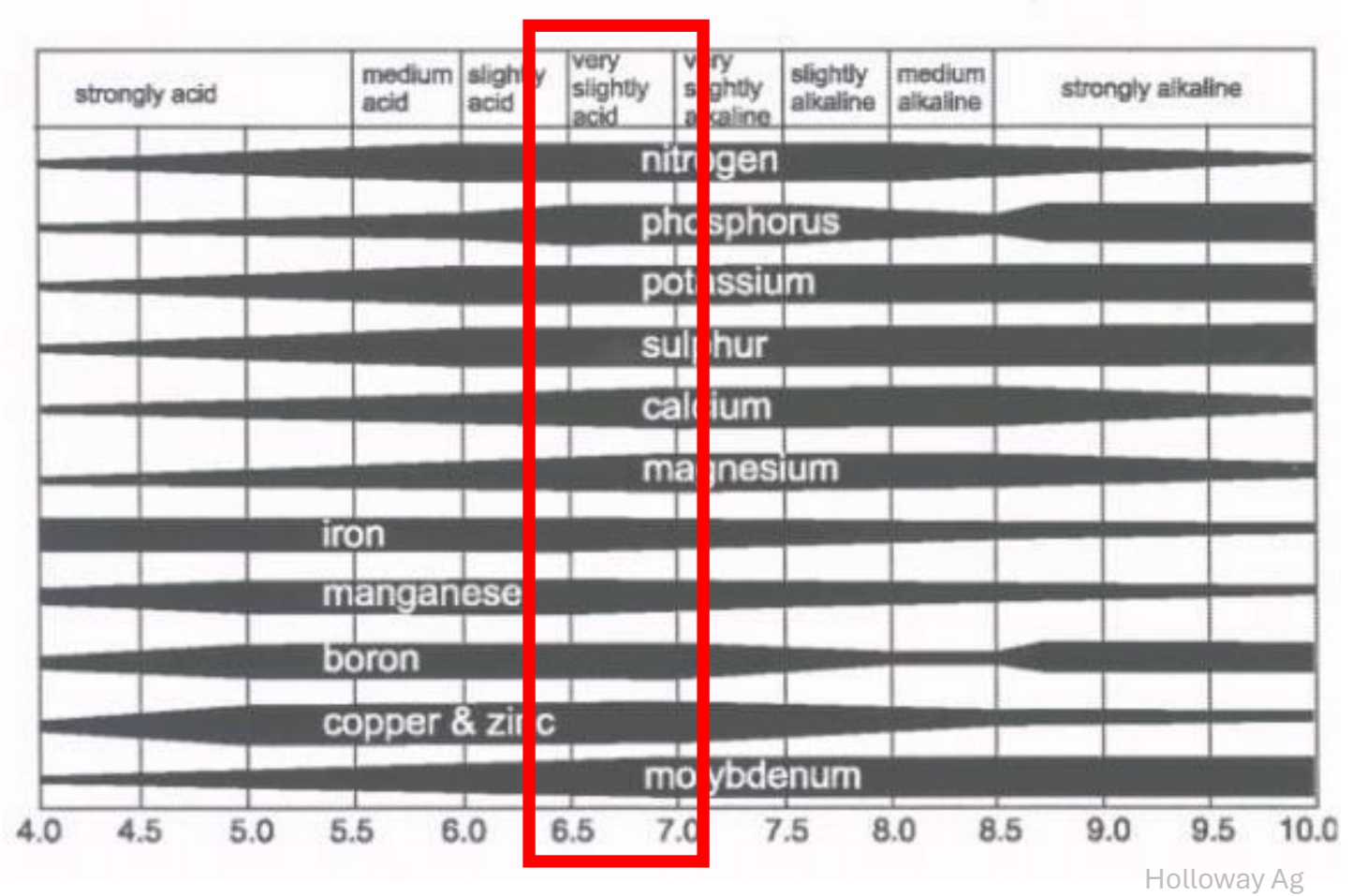
Additional Results or Comments:

Metals scan:
NORMAL BACKGROUND LEVEL - no health risk.
Till in 5 lb yellow sulfur/1000 sq ft.
This rate will cause only minor acidity.

Chemical Characteristics

Understanding and Managing pH

- pH is a measure of soil acidity
  - < 7.0 is acidic
  - > 7.0 is alkaline
  - 7.0 is neutral
- Most plants and soil microorganisms prefer near neutral pH (6.5-7.0)
- pH can have impact on chemical, biological, and physical properties of soil
- Can be adjusted with soil amendents:
  - Raise pH – agricultural lime
  - Lower pH – elemental sulfur, peat moss, pine needles



Holloway Ag

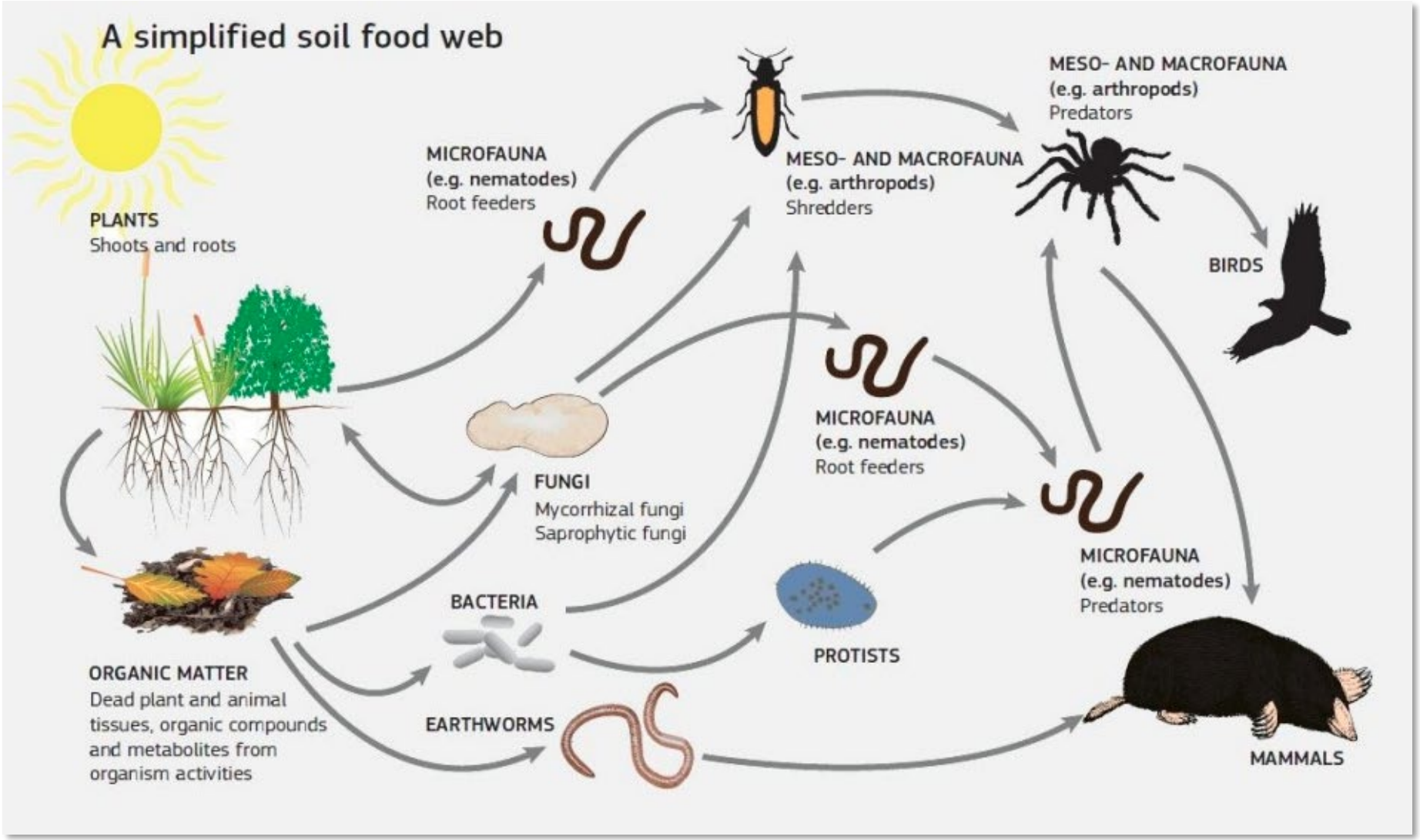
Building Better Soil

Fertility Management

- First test, then amend
- Every soil is different – understand your context
  - Sandy soils vs. clay soils
  - High SOM vs low SOM
  - Climate and weather
  - Crop(s) and their nutritional demands
- Primarily aim to increase biological activity – “feed the soil, not the plant”

Biological Characteristics

Soil Food Web

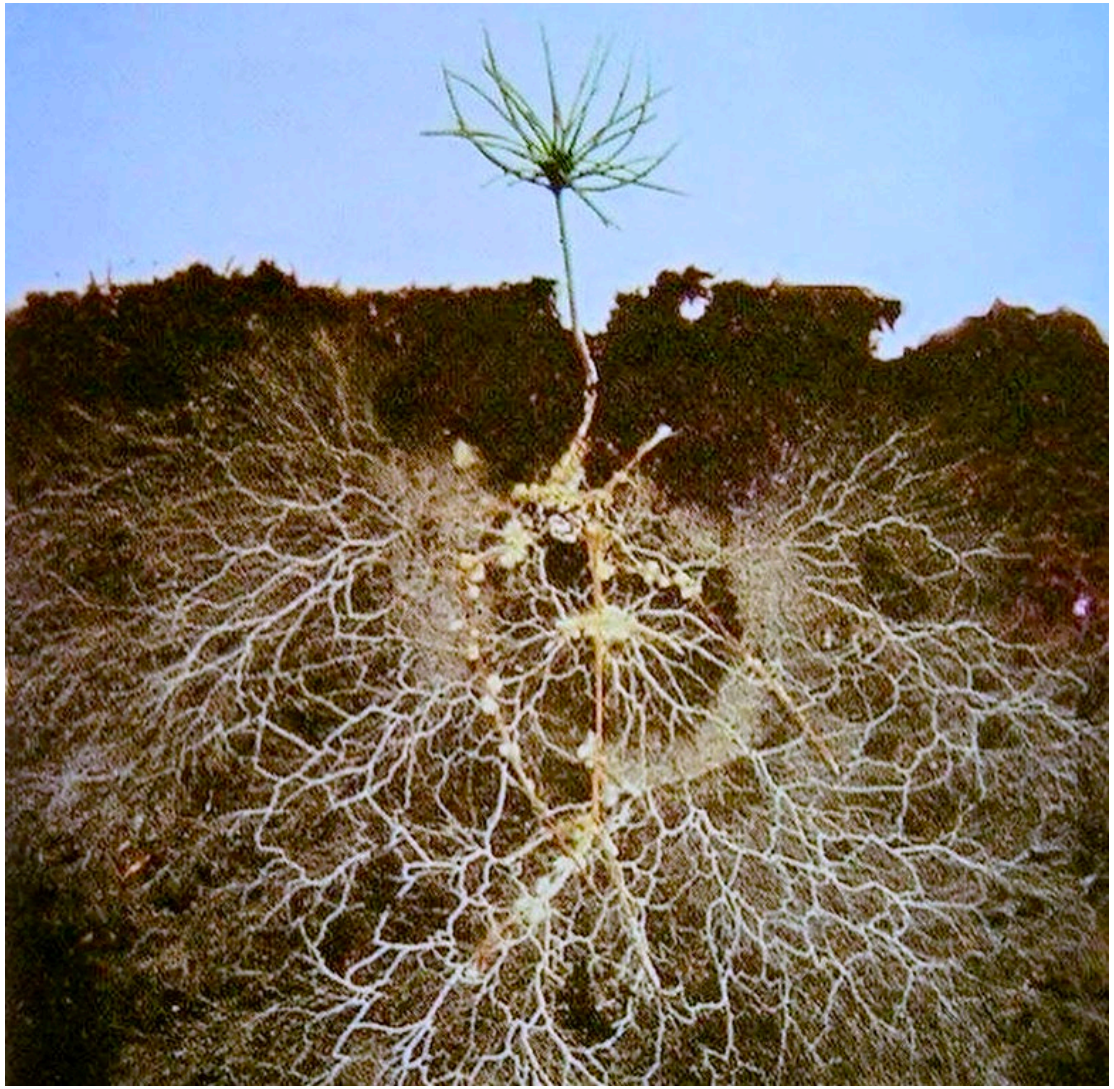


Global Soil Biodiversity Atlas. 2016. Orgiazzi, Bardgett, Barrios et al. Luxembourg, European Commission, Publications Office of the European Union: 176p.

Biological Characteristics

Soil Food Web

Julie Grossman, NC State University



Sheryl Karas, CSU Chico

Building Better Soil

SOM Savings Account

Withdrawals

Tillage

Removing residues

Erosion

Deposits

Carbon based amendments

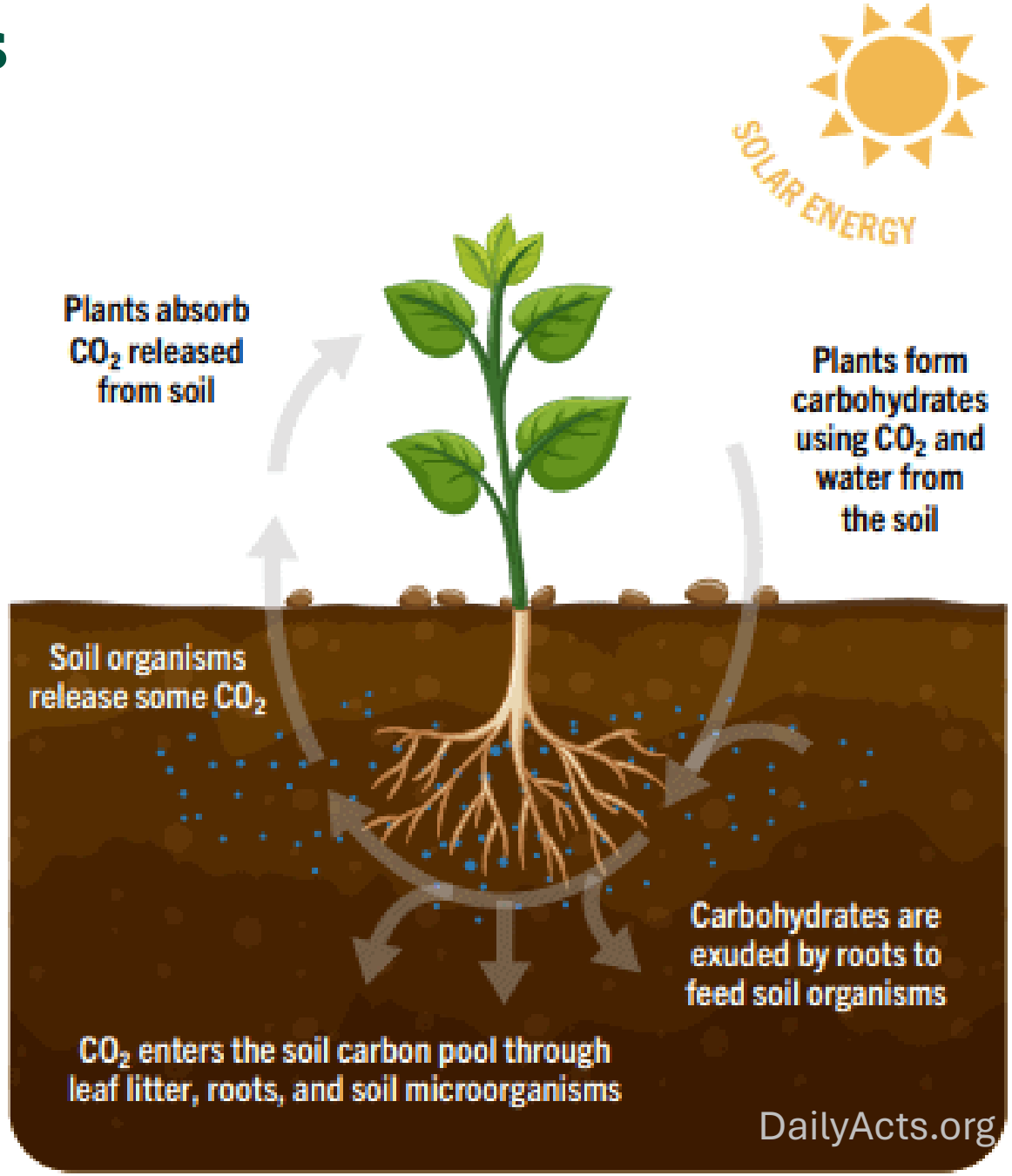
Cover cropping

Keeping soil covered

Root exudates

Biological Characteristics

Soil Organic Matter (SOM)



Soil Health In Practice

Reduced Till Production System

Soil Health In Practice

No-Till Brassica Trial

Goals:

- Improve soil health
- Reduce plastic use
- Suppress weeds

Trial Setup:

- **Cover Crop:** Spring Green Manure planted in spring
- **Termination:** Crimped in summer
- **Tarping:** Silage tarp used to suppress regrowth and warm soil
- **Transplanting:** Brassicas planted directly into residue

Soil Health In Practice

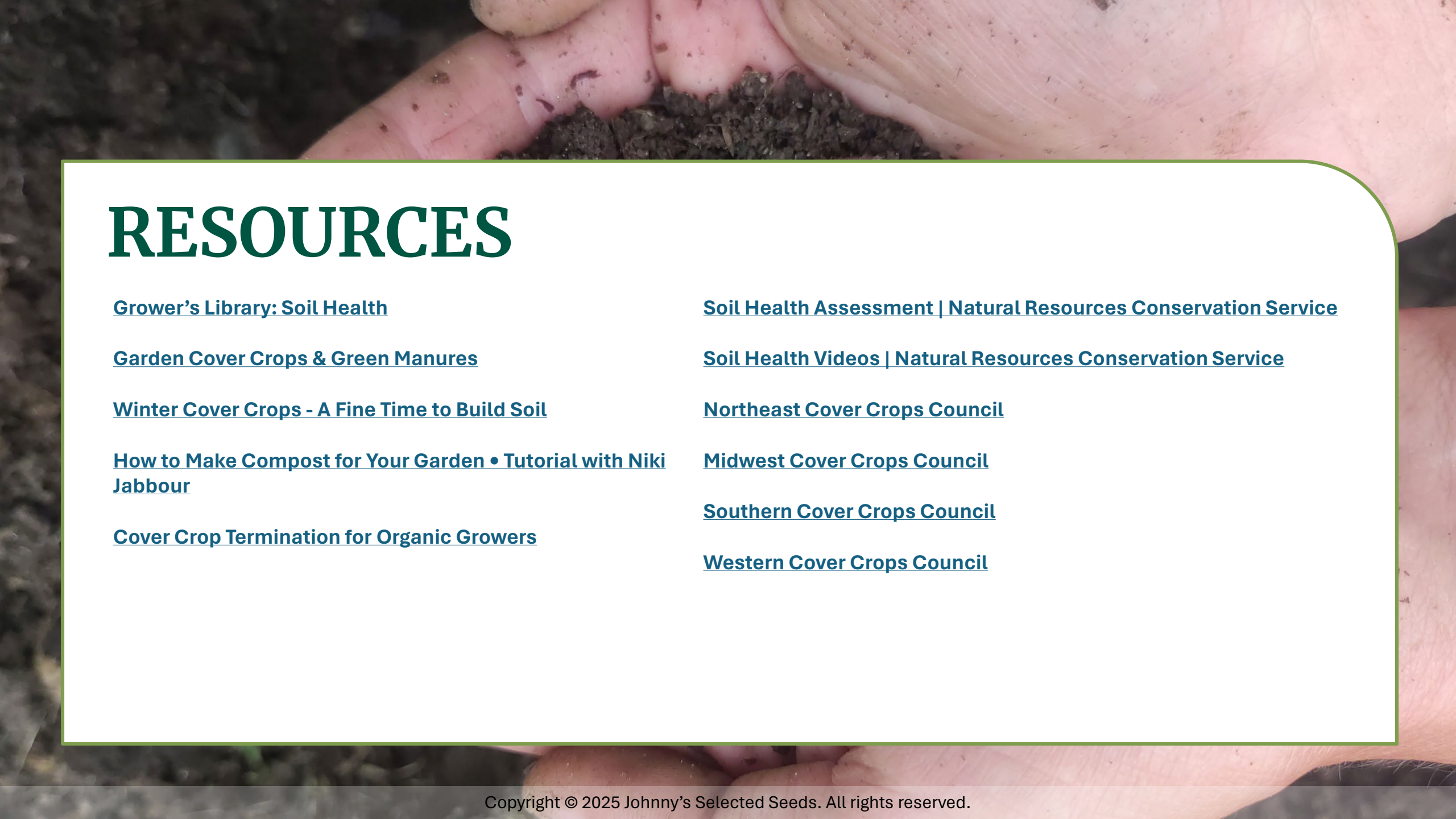
No-Till Brassica Trial

Challenges:

- Increased slug pressure
- Mulch complicates transplanting slightly
- Timing is critical
- Not ideal for all crops

Broader Applications:

- **Works well for** tomatoes, peppers, squash, garlic
- **Less suitable for** carrots, lettuce, small-seeded crops
- Choose cover crops carefully and plan ahead



RESOURCES

Grower's Library: Soil Health

Garden Cover Crops & Green Manures

Winter Cover Crops - A Fine Time to Build Soil

How to Make Compost for Your Garden • Tutorial with Niki Jabbour

Cover Crop Termination for Organic Growers

Soil Health Assessment | Natural Resources Conservation Service

Soil Health Videos | Natural Resources Conservation Service

Northeast Cover Crops Council

Midwest Cover Crops Council

Southern Cover Crops Council

Western Cover Crops Council