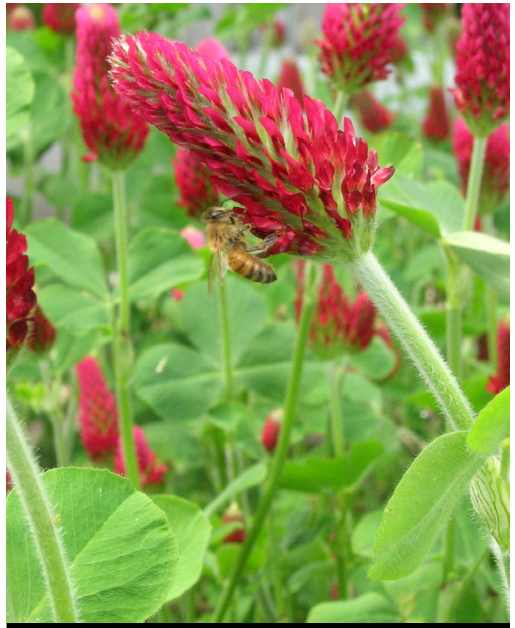
COVER CROPS IN THE HOME GARDEN

Nature's Soil Builders

What are Cover Crops?

Not grown for harvest or sale—cover crops stay in the garden to protect and improve soil

Cover Crop



An Old Practice with Modern Benefits

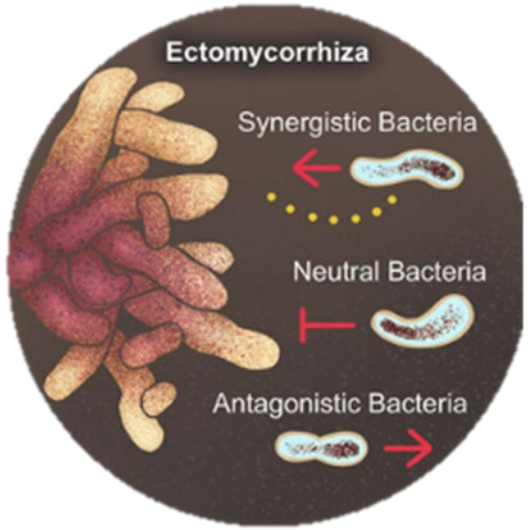
- Plants grown to protect and improve soil ("green manure")
- Benefits: more sustainable gardens
- Reduce erosion and suppress weeds
- Retain soil moisture
- Increase organic matter and long-term fertility
- Reduce fertilizer needs (legumes provide natural nitrogen)

ORGANIC MATTER

Made up of the Cover Crop

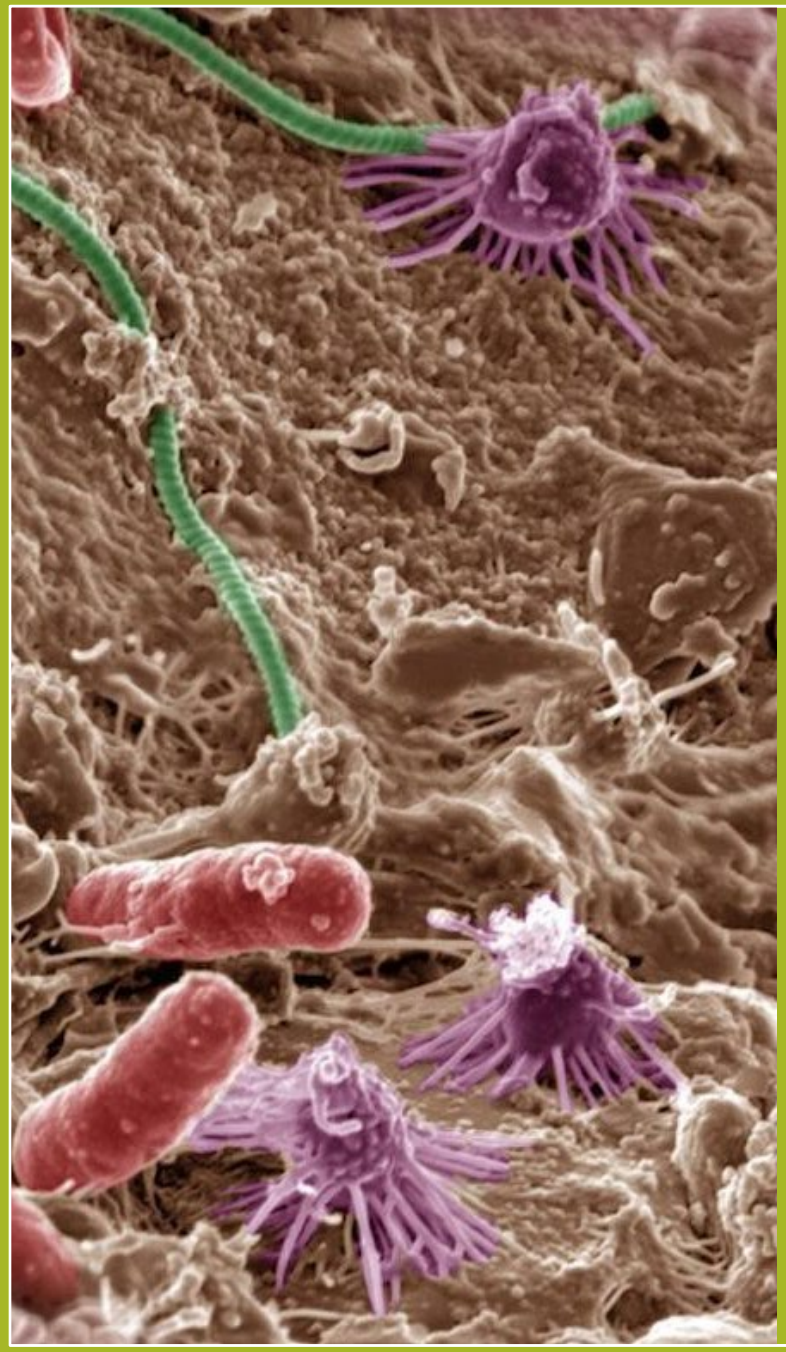
Why This Matters

- Healthy soil is alive with microbes, fungi, and organic matter
- Soil building is ongoing, not a one-and-done process
- Organic matter continually decomposes, so it must be replenished



Cover crops + mycorrhizae/bacteria = synergistic partners

Improve nutrient cycling–Build soil structure–Increase plant resilience



What Microbes Do for Soil

1 Recycle nutrients

2 Build soil structure

3 Support Plant Health

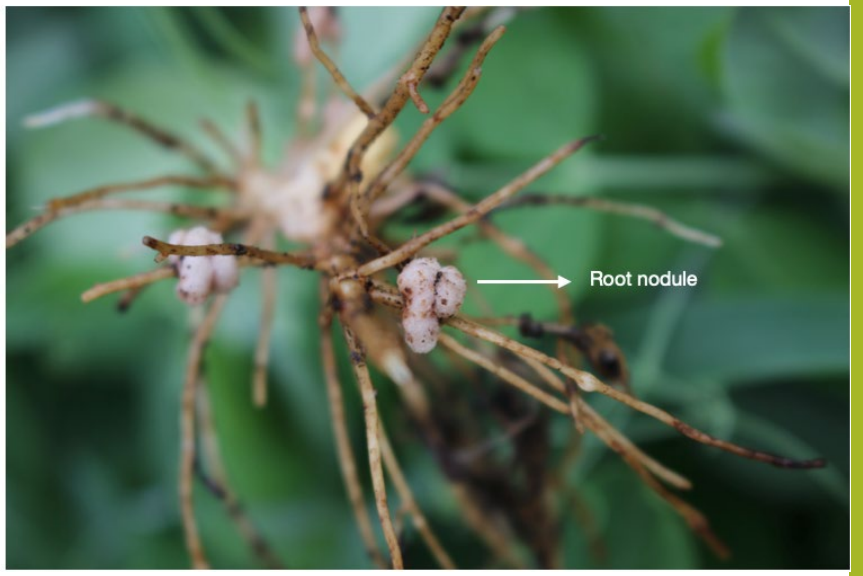
4 Boost fertility

5 Form partnerships

Microbes in the soil; Photo by Ward Lab, Inc.; https://www.wardlab.com/feeding-soil-microbes-a-how-to-guide/

How Cover Crops, Legumes, and Mycorrhizae Interact to Improve Soil

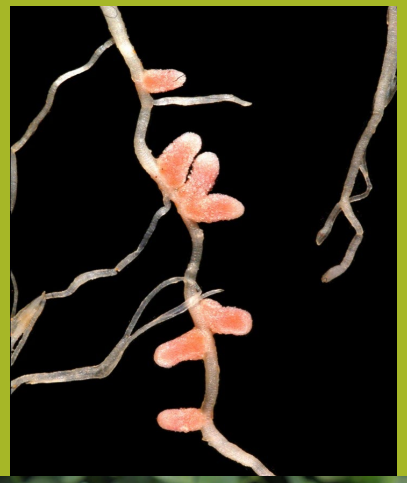
- **Root Systems: Fine roots of cover crops absorb excess moisture, stabilize soil, and prevent erosion**
- **Legumes: Clover, vetch, and other legumes fix atmospheric nitrogen through root nodules, naturally enriching soil.**
- **Mycorrhizae: Cover crops boost beneficial fungi that form symbiotic root relationships.**
- **Glomalin: This plant–fungal glycoprotein binds soil particles, improving structure and stability.**
- **Uptake: Mycorrhizal networks increase water and nutrient absorption.**



Types of Cover Crops

- **Legumes** –clover, vetch
- **Grasses/Grains** –rye, oats
- **Brassicas** –radish, mustard
- **Broadleaves/Herbs** –buckwheat

REMEMBER:
LEGUMES ADD NITROGEN; NON-LEGUMES PROTECT AND CONDITION THE SOIL



Legumes

WHAT DO THEY DO?

- Fix nitrogen from the air into the soil by root nodules
- Reduces fertilizer needs
- Build soil fertility naturally for future crops
- Encourage beneficial microbes and mycorrhizal fungi activity

Improve soil structure with fine root systems that add organic matter as they decompose.

Best for: Improving soil nutrients and preparing beds for heavy-feeding crops (like tomatoes or corn)

Microbes in the soil; Photo by Ward Lab, Inc.; https://www.wardlab.com/feeding-soil-microbes-a-how-to-guide/

Grasses and Grains

What they do:

- Provide **excellent erosion control** and **root mass** that stabilizes soil
- **Suppress weeds** by shading and outcompeting them
- **Scavenge leftover nutrients**, preventing nutrient leaching over winter
- Add **organic matter** and improve **soil tilth** when tilled under or left to decompose

Best for: Holding soil over winter and adding long-term organic matter

Microbes in the soil; Photo by Ward Lab, Inc.; https://www.wardlab.com/feeding-soil-microbes-a-how-to-guide/

Brassicas

What they do:

- Act as natural soil tillers—deep taproots break up compacted soil layers ("bio-drilling")
- Improve water infiltration and root penetration for future crops
- Help control pests and diseases (especially mustard, which releases natural biofumigants)
- Capture nutrients from deeper soil layers

Best for: Breaking up hardpans, loosening soil, and reducing soilborne pests

Microbes in the soil; Photo by Ward Lab, Inc.; https://www.wardlab.com/feeding-soil-microbes-a-how-to-guide/

Broadleaves/Herbs

What They Do

- Grow quickly, providing rapid weed suppression (allelopathy)
- Add biodiversity and attract pollinators and beneficial insects such as parasitoids
- Contribute easily decomposable organic matter to boost soil biology
- Scavenge phosphorus and make it more available to plants
- Serve as an excellent smother crop between plantings or in idle garden beds

Best for: Short-term cover between crops and attracting beneficial insects

Common Cool-Season Options

Planted in fall, grows through winter

- Cereal rye
- Winter wheat
- Oats
- Hairy vetch
- Crimson clover

Cereal Rye, NRCS

Common Warm-Season Options

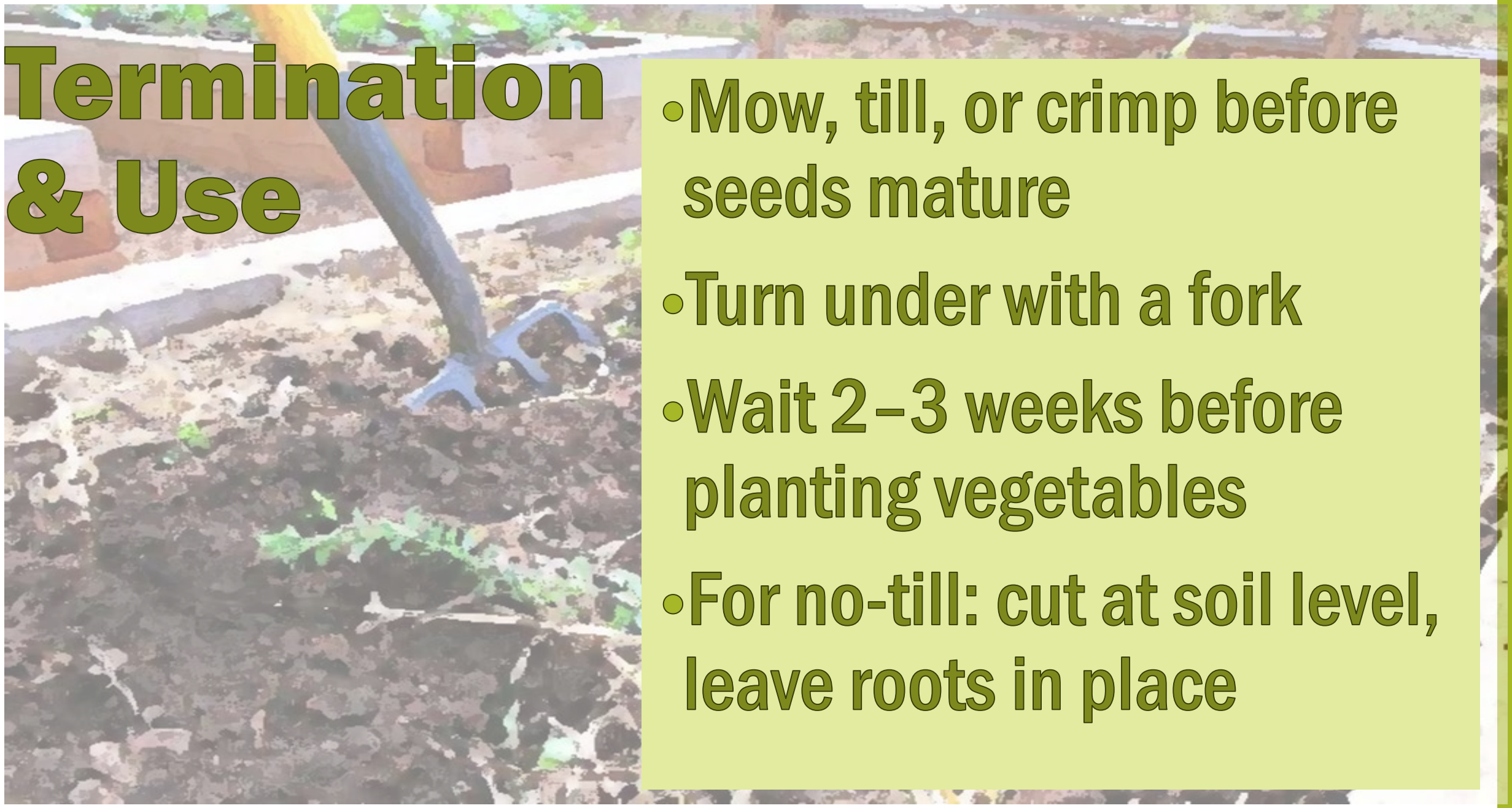
Planted in summer between crops; dies out in winter

- Buckwheat
- Cowpeas
- Sudangrass

Planting Cover Crops

- Fall - immediately after vegetable harvest
- Remove weeds and plant debris first
- Sow seeds at least 4 weeks before cold weather
- Follow seeding directions for broadcast rates
- Water as needed
- Spring/Summer - between early and late-season crops
- Broadcast seed, rake lightly, and water
- Many seed mixes available for beginners to simplify planting

Photo: Researchgate



Termination & Use

- Mow, till, or crimp before seeds mature
- Turn under with a fork
- Wait 2–3 weeks before planting vegetables
- For no-till: cut at soil level, leave roots in place

Common Name	Family	Scientific name	Cover crop attributes
Cereal Rye	Grass	*Secale cereale*	Well-suited to fall planting. Fibrous root system holds soil together. High biomass production and weed suppression potential. Strong establishment potential. High nutrient capture, low nutrient release.
Winter Wheat	Grass	*Triticum aestivum*	Well-suited to fall planting. Fibrous root system holds soil together. Produces less biomass than cereal rye. Low seed cost.
Annual ryegrass	Grass	*Lolium multiflorum*	Potential for improving productivity of fragipan soils. Excellent for- age quality. Strong establishment potential. Can be difficult to terminate. Aggressive weed in wheat and therefore not recommended for fields that may be rotated to winter wheat.
Daikon Radish	Brassica	*Raphanus sativus var. longipinnatus*	Large tap root. Potential to alleviate some soil compaction. High nutrient capture, low nutrient release. Likely will not survive winter. Will not impede spring planting of the cash crop. Minimal weed sup- pression. High seed cost.
Turnip	Brassica	*Brassica rapa, Brassica spp.*	Potential to alleviate some soil compaction. Likely will not survive winter. Will not impede spring planting of cash crop. High seed cost.
Crimson Clover	Legume	*Trifolium incarnatum*	Legume that will fix and contribute some N to subsequent cash crop. Low soil nutrient capture. Minimal weed suppression potential. High seed cost.
Hairy Vetch	Legume	*Vicia villosa*	Legume that will fix and contribute some N to subsequent cash crop. Produces more biomass than crimson clover. Can be difficult to terminate and plant into. High seed cost.

Table from UKY Extension Publications AGR-240- Table 1. *Example of plant species used as cover crops.*

Tips for Success

- Match crop to season & goals
- Prevent reseeding (can become weeds)
- Mix legumes + grasses for multiple benefits (example: oats, clover)
- Even small beds benefit

QUESTIONS

RESOURCES

- **University of Kentucky Cooperative Extension**
- UK College of Agriculture, Food & Environment fact sheets on cover crops, legumes, and sustainable soil management.
- Example: *ID-113: A Comprehensive Guide to Cover Crops in Kentucky* (UK CES).
- **Sustainable Agriculture Research and Education (SARE)**
- *Managing Cover Crops Profitably, 3rd Edition* (free PDF)
- Excellent reference on cover crop benefits, species, mixes, and management.
- SARE Cover Crops Resource Center
- **NRCS (Natural Resources Conservation Service, USDA)**
- *Cover Crop Termination Guidelines* (NRCS Conservation Practice Standard).
- Guidance on planting, timing, and best practices.
- **University of Kentucky Research**
- Moreno-Cadena, P., Poffenbarger, H., et al. (2023–2024). *Cover crop mixtures improve adaptability to soil nitrogen conditions.*
- UK Department of Plant and Soil Sciences, Martin-Gatton College of Agriculture, Food & Environment.
- **The Penn State University College of Agricultural Sciences**
- Penn State Extension. Improve Vegetable Garden Soil with Cover Crops
- Southern Exposure Seed Exchange; Cover Crops for Beginners; https://blog.southernexposure.com/
- **University of Maryland Extension**
- Sara Via, Professor & Climate Extension Specialist, UMD College Park; https://marylandgrows.umd.edu/2018/06/29/beyond-dead-dirt-healthy-soil-is-alive/Role of Soil Fungus

- James J. Hoorman, Assistant Professor and Extension Educator, Agriculture and Natural Resources, Putnam County; Fungi are an important part of the microbial ecology

Microbes in the soil; Photo by Ward Lab, Inc.; https://www.wardlab.com/feeding-soil-microbes-a-how-to-guide/