YOUR SOIL, READ CLOSELY

Soil Health Report

Prepared for **Sample Report** · *sampled May 2026*

SOIL NUTRITION

95/100 *Thriving*

pH is dialed in and nearly every nutrient sits in the optimal range for a vegetable garden.

SOIL LIFE

74/100 *Building*

Organic matter and carbon are excellent — but mycorrhizae and key beneficial bacteria are underrepresented.

GROWING
Backyard vegetable garden — tomatoes, peppers, squash, and beans

AMENDMENTS
Home compost added to the beds regularly

SAMPLE DEPTH
0 – 6 inches

Personalized to this context — reply to your report email if anything's wrong or has changed.

This soil is in **excellent shape on the fundamentals** — pH, calcium, magnesium, and most micronutrients are all where they should be. **Regular composting is doing a lot of the heavy lifting:** 7.4% organic matter is well above what a typical backyard garden holds, and it's why the Soil Life score isn't lower than it is. A common worry with steady composting is over-fertilizing — but the data says no here: **phosphorus and potassium both sit comfortably inside the optimal range**, and the potassium-to-magnesium balance is healthy. What's underperforming are the **living organisms on top of that substrate**: mycorrhizal fungi, plant-growth-promoting bacteria, and several key beneficial *Bacillus* species are all low. We also found **elevated Fusarium**, **elevated Rust**, and **elevated White Mold** — all three matter for a garden growing tomatoes, peppers, squash, and beans. The plan on the next few pages focuses on those things.

Soil Nutrition

SECTION 1

MEASUREMENT	VALUE	VALUE VS. TARGET	STATUS
pH	6.55	6.2 – 6.8	In range

Phosphorus (M3)	45.22 ppm	30 – 50 ppm	In range
Potassium (M3)	243.11 ppm	120+ ppm	In range
Nitrogen (NO3 - KCL)	10.99 ppm	20 – 40 ppm	Low

A note on nitrogen: soil nitrogen is highly mobile — it leaches, converts, and cycles quickly — so any single test captures one moment, not a lasting measure.

The fundamentals are excellent. pH is right in the sweet spot for a vegetable garden, and calcium, magnesium, and every micronutrient sit in the optimal range. Phosphorus and potassium are both at healthy levels — so despite regular composting, this soil is **not** over-fertilized. The one gap is **nitrogen, which reads low** — but it's the most changeable number on the panel, not a lasting deficiency (see the plan below).

Soil Life

SECTION 2

MEASUREMENT	VALUE	VALUE VS. TARGET	STATUS
Organic Matter	7.42 %	4%+	In range
Diversity index (Shannon)	8.21	Higher is better	Somewhat low
Mycorrhizal Fungi (AMF)	0.53 ppm	Higher is better	Low
Plant Growth Promoters	1.32 ppm	Higher is better	Low
Cellulose Breakdown	312.77 ppm	Higher is better	Low
Urease	97.22 ppm	Higher is better	Low

The substrate is great: 7.4% organic matter is well above a typical backyard garden, and the bean nitrogen partner (*Bradyrhizobium*) is present. What's under-built is the living community on top of it — **mycorrhizal fungi, plant-growth-promoting bacteria, and the tougher-residue decomposers all read low**, and microbial diversity reads low too. That's the real opportunity here, and it's what the plan focuses on.

PATHOGENS OF NOTE

ORGANISM	LEVEL	*WHAT IT AFFECTS*	STATUS
Green Stem Nematode	■■□	*Broad host*	Moderate
Early Blight	■■□	*Tomato and pepper foliar risk*	Moderate

Anthracnose		*Broad host — tomato, pepper, beans, cucurbits*	**Moderate**
Root-Lesion Nematode		*Broad host — many vegetables*	**Elevated**
White Mold		*Beans especially; also tomatoes and squash*	**Elevated**
Rust		*Bean rust — direct threat to beans*	**Elevated**
Fusarium		*Tomato wilt, pepper root rot, squash seedling loss*	**Elevated**

Each organism has its own healthy threshold, so the bar shows the level for that organism — not a raw amount you can compare across rows. Full panel in the appendix.

What to work on

SECTION 3

1. Good news: regular composting isn't over-fertilizing this soil

A common worry with steady composting is that it loads the soil with too much nutrient. The numbers say otherwise. Phosphorus is **45 ppm** and potassium is **243 ppm** — both sit inside the optimal range for a vegetable garden. More importantly, the **potassium-to-magnesium saturation ratio is 0.24**, well below the 0.33 point at which excess potassium starts blocking magnesium uptake. There's no imbalance here to correct.

So keep composting — it's the single biggest reason the organic matter and soil structure are as good as they are.

WHAT TO DO

- **No need to add any P or K fertilizer** — skip the "10-10-10," bone meal, wood ash, kelp meal, and greensand. Compost already covers those; adding more is where you'd eventually create the imbalance to worry about.
- To feed the soil beyond compost, reach for **carbon-heavy mulch** — shredded leaves in fall, wood chips on paths, straw around plants. It feeds the biology without piling on more P and K.
- Re-test periodically to confirm P and K are holding steady with continued composting.

2. Nitrogen is low — but this is a snapshot, not a trend

The nitrogen reading is 11 ppm, in the "low" band. Two likely explanations for a reading this low:

- The sample was taken in spring before compost output had fully mineralized into plant-available forms, or
- The microbial community is genuinely slow at converting organic nitrogen into plant-available nitrate/ammonium. The **urease** and **nitrification** activities are both flagged as underperforming, which supports this.

WHAT TO DO

- Side-dress leafy plants (tomatoes and squash going into fruit set, peppers early in the season) with a light nitrogen source — **blood meal or fish emulsion** — until biology catches up.
- Don't add a synthetic complete fertilizer; the P and K aren't needed.

3. The biology is under-built — mycorrhizal fungi are the priority

Three things stand out on the biology side:

- **Mycorrhizal fungi (AMF) are low.** These fungi extend a plant's effective root system 10–100× and are especially important for phosphorus and micronutrient uptake in tomatoes, peppers, and squash. Beans partner with a different set (rhizobia). AMF gets knocked back by tillage, bare soil over winter, and — this is the one to notice — **readily-available phosphorus reduces the plant's willingness to invite AMF in.** Phosphorus here is in the upper part of the optimal range, which may be part of why AMF is low. That's not a reason to lower P — it's a reason to build the fungal community back with the steps below.
- **Plant Growth Promoters and key *Bacillus* species** (*subtilis, velezensis, amyloliquefaciens, megaterium*) are all low. These are the bacteria that produce plant hormones, suppress disease, and free up locked-up nutrients.
- **Cellulose breakdown activity is low.** Surprising given the compost output. Likely means the compost inputs are all similar (food scraps = mostly sugars and proteins) and the community that specializes in breaking down tougher plant material — leaves, stems, wood — is thin.

WHAT TO DO

- **Diversify carbon inputs.** Add shredded fall leaves, straw, chipped wood, or a cardboard-and-coffee-grounds combo on top of the beds. Feeds the fungi and the cellulose decomposers.
- **Plant a fall cover crop.** Winter rye + crimson clover in October, chop-and-drop in April. Live roots over winter feed mycorrhizae and rebuild community.
- **Reduce tillage.** If rototilling each spring, switch to a broadfork or just top up mulch. Fungal networks don't survive being sliced.
- **Optional: inoculate.** A commercial mycorrhizal inoculant at transplant is a reasonable one-time boost for tomatoes, peppers, and squash. Skip on beans.

4. Fusarium is elevated — matters for tomatoes, peppers, and squash

The **Fusarium** reading is 10.55 ppm — flagged elevated. Fusarium is a broad group of soil-borne fungi that cause wilts and root rots. What to expect:

- **Fusarium wilt of tomato** — yellowing leaves, wilting from the bottom up, plants that never recover. Common in warm humid summers.
- **Fusarium in squash and pepper** — less specific, but Fusarium root rot can knock back seedlings.

WHAT TO DO

- **Rotate.** Don't plant tomatoes in the same bed two years running. Move to where the beans were.
- **Buy Fusarium-resistant varieties.** Look for "F," "FF," or "FFF" codes on tomato tags (resistance to Fusarium races 1, 2, 3). Nearly every hybrid at a garden center has at least F1.
- **Sanitation.** Don't compost tomato/pepper stems that showed wilt symptoms — that recycles the pathogen.

5. Rust and White Mold — both hit beans

Two elevated bean pathogens showed up in the same sample:

- **Rust** (0.92 ppm, elevated) — *Uromyces* species on beans. Rusty orange pustules on the underside of leaves, defoliation, reduced pod set.
- **White Mold** (*Sclerotinia*, 0.13 ppm, elevated) — cottony white growth on stems near the soil line, sudden vine collapse. Sclerotinia produces hard "sclerotia" that survive in soil for 5–10 years.

WHAT TO DO (APPLIES TO BOTH)

- **Trellis beans vertically.** Both rust and Sclerotinia thrive in dense, humid canopies at the soil line.
- **Space plants for airflow.** Wider row spacing than the seed packet suggests.
- **Avoid overhead watering late in the day.** Drip or morning watering only.
- **Rotate bean beds every 2–3 years,** and don't put beans where you had beans, squash, or tomatoes last year.
- **Remove and destroy — don't compost — infected plants.** Both pathogens over-winter in debris.

6. Root-lesion nematode is elevated — it feeds on roots across crops

A **root-lesion nematode** (*Pratylenchus penetrans*) came back elevated. These are microscopic roundworms that tunnel through roots, leaving brown lesions that let in rot organisms. They have a broad host range — tomatoes, peppers, squash, and beans are all susceptible — so damage shows up as patchy, stunted, or slow-to-establish plants rather than a specific disease. Healthy, biologically active soil (which is exactly what the biology plan above builds toward) is the best long-term defense.

WHAT TO DO

- **Plant French marigolds** (*Tagetes patula*) as a cover or interplant — they're one of the few things shown to suppress *Pratylenchus*. Grow them densely for a season in the worst-hit bed, then chop-and-drop.
- **Build organic matter and biology.** The mulch, cover crops, and reduced tillage in the biology plan feed the fungi and predators that keep nematodes in check.
- **Keep plants vigorous** — well-watered and fed. Strong roots tolerate nematode pressure far better than stressed ones.
- **Rotate away from repeated hosts** where you can, and pull and destroy badly affected root systems rather than tilling them back in.

Proposed action plan

SECTION 4

NEXT 30 DAYS

- Skip P/K amendments (bone meal, kelp, wood ash) — compost already covers those.
- If planting tomatoes: use Fusarium-resistant varieties (F/FF/FFF codes on tag).
- Side-dress with a light nitrogen source — blood meal or fish emulsion.
- If transplanting tomatoes, peppers, or squash: dust roots with a mycorrhizal inoculant.

NEXT 60 DAYS

- Diversify mulch — shredded leaves, straw, or wood chips on top of beds.
- Plan bean beds to be **outside** last year's bean/tomato/squash footprint.

NEXT SEASON (FALL THROUGH SPRING)

- Plant a cover crop mix (winter rye + crimson clover) in October.
- Chop-and-drop the cover crop in April — don't till it in.
- Re-test next summer to check whether biology has moved.

Appendix

ALL MEASUREMENTS

SOIL NUTRITION

MEASUREMENT	VALUE	TARGET	STATUS
pH	6.55	6.2 – 6.8	**In range**
Phosphorus (M3)	45.22 ppm	30 – 50 ppm	**In range**
Potassium (M3)	243.11 ppm	120+ ppm	**In range**
Calcium (M3)	2720.78 ppm	1,000+ ppm	**In range**
Magnesium (M3)	334.35 ppm	150+ ppm	**In range**
Sulfur (M3)	12.82 ppm	10+ ppm	**In range**
Boron (M3)	0.86 ppm	0.5 – 2.0 ppm	**In range**
Iron (M3)	383.23 ppm	50+ ppm	**In range**
Copper (M3)	7.83 ppm	1 – 10 ppm	**In range**
Zinc (M3)	9.40 ppm	3 – 15 ppm	**In range**
Ca:Mg ratio	4.69	4 – 8	**In range**
CEC	14.92 meq/100g	Higher is better	**In range**
K:Mg saturation ratio	0.24	< 0.33	**In range**
Nitrogen (NO3 - KCL)	10.99 ppm	20 – 40 ppm	Low
Buffer pH (Sikora)	6.86	—	Used in lime and CEC calculations

SOIL LIFE — FOUNDATION & COMMUNITY

MEASUREMENT	VALUE	TARGET	STATUS
Organic Matter	7.42 %	4%+	**In range**
Total Inorganic Carbon	0.08 %	—	Informational
Total Carbon	4.27 %	—	Informational
Community weighted growth rate	1.71	Higher is better	**In range**
Bacterial:Fungal ratio (DNA)	11.55	Lower is better	**In range**
Diversity index (Shannon)	8.21	Higher is better	**Somewhat low**

NUTRIENT CYCLING & PLANT-PARTNER ACTIVITY

MEASUREMENT	VALUE	TARGET	STATUS
N fixation potential	10.42 ppm	Higher is better	**In range**
P solubilization activity	196.02 ppm	Higher is better	**In range**
Nitrification	16.62 ppm	Higher is better	**In range**
Ammonification (Anaerobic Respiration)	144.97 ppm	Higher is better	**In range**
Lignin Breakdown	58.97 ppm	Higher is better	**In range**
Root colonization potential	833.03 ppm	Higher is better	**In range**
Siderophore production	172.15 ppm	Higher is better	**In range**
Sulfur solubilization	298.39 ppm	Higher is better	**In range**
Mycorrhizal Fungi (AMF)	0.53 ppm	Higher is better	**Low**
Plant Growth Promoters	1.32 ppm	Higher is better	**Low**
Cellulose Breakdown	312.77 ppm	Higher is better	**Low**
Urease	97.22 ppm	Higher is better	**Low**

BENEFICIAL NAMED ORGANISMS

ORGANISM	VALUE	STATUS
Bradyrhizobium japonicum	31.26 ppm	**Present**
Bacillus subtilis	1.19 ppm	**Present**
Azospirillum brasilense	0.40 ppm	Trace
Bacillus amyloliquefaciens	0.40 ppm	Trace
Bacillus velezensis	0.26 ppm	Trace
Bacillus megaterium	0.00 ppm	Not detected

RELEVANT PATHOGENS DETECTED

ORGANISM	LEVEL	STATUS
Aspergillus (pathogenic)		**Low**
Reniform Nematode		**Low**
Alternaria Leaf Spot		**Low**
Pythium		**Low**
Green Stem Nematode		**Moderate**
Early Blight		**Moderate**
Anthracnose		**Moderate**
Root-Lesion Nematode		**Elevated**
White Mold		**Elevated**
Rust		**Elevated**
Fusarium		**Elevated**

Our panel screens 99 organisms including ones that mainly affect commercial field crops. Detected but not a home-garden concern: *Fusarium Root and Crown Rot of Wheat, Fusarium Wilt of Alfalfa, Fusarium Cotton Boll Rot, Pokkah Boeng, Common Scab of Potato, Ratoon Stunting Disease, Maize White Spot, Red Stripe Disease, Pythium of wheat, Soybean Stem Canker, Sclerotinia Stem and Crown Rot of Alfalfa*. Exact figures available on request.

Glossary

Soil Nutrition score — a 0–100 roll-up of how close your nutrients and pH sit to home-garden ranges.

Soil Life score — a 0–100 roll-up of organic matter, microbial diversity, and the balance of beneficial vs. harmful organisms.

pH — how acidic or alkaline your soil is (0–14; 7 neutral). Most vegetables like 6.2–6.8.

ppm — parts per million. For biology it means reads-per-million from DNA analysis, not a weight.

M3 (Mehlich-3) — the standard lab extractant used to measure nutrients.

CEC — cation exchange capacity: how much nutrient your soil can hold and hand to plants.

Organic matter — decomposed plant/animal material; stores water and nutrients and feeds soil life.

Mycorrhizal fungi (AMF) — fungi that extend roots' reach for water and nutrients, especially phosphorus.

Bacterial:Fungal ratio — gardens generally do better with relatively more fungi, so lower is usually favorable.

Diversity (Shannon) — how many microbes live in your soil and how evenly; more usually means resilience.

Community weighted growth rate — higher is better: slower, stable bacteria that release nutrients steadily.

Pathogens — disease-causing organisms; each has its own threshold, shown as Low/Moderate/Elevated.

Sample ID SAMPLE-0000 (example report) · Report generated 2026-07-16. Optimal ranges are tailored to home gardeners and may differ from commercial or university-extension guidelines. Recommendations draw on peer-reviewed extension guidance (Penn State, OSU, NC State, Cornell, Delaware). Living Soil Lab is a service of EarthOptics.