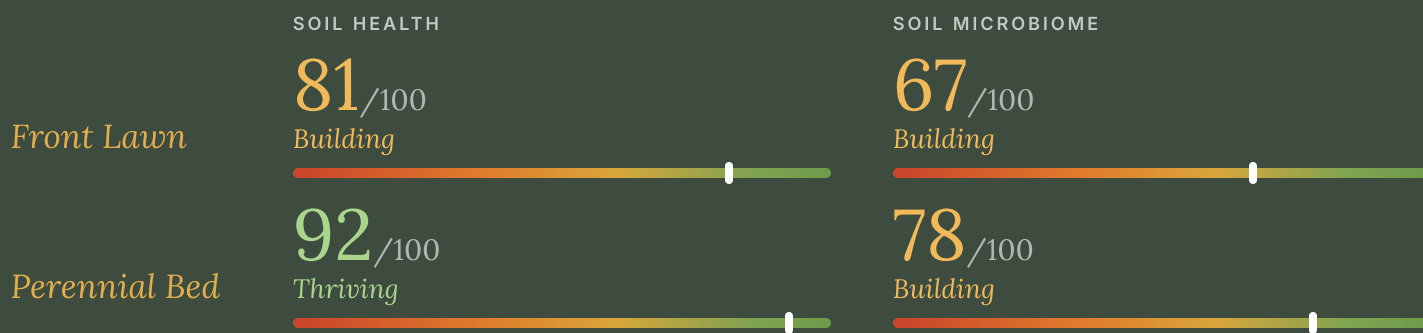


# Soil Report

AREAS *Front Lawn & Perennial Bed*

Prepared for **M. Okonkwo** by Thornhill Grounds · sampled September 2026



**Front Lawn.** A sandy, slightly acidic lawn soil, light on organic matter. Lime and organic matter are the two moves, and the biology tends to follow the organic matter.

**Perennial Bed.** A rich, well-balanced loam carrying more phosphorus than it uses, with a water-mold reading worth planning around.

## FRONT LAWN — WHAT WE'D DO

**We'd lime this fall, then feed the soil, not just the grass.**

At pH 5.3 this lawn sits below where turf does its best work, and calcium is short alongside it. We'd core-aerate, then spread calcitic lime and topdress with screened compost — and re-test next season to see how far the pH has moved.

## PERENNIAL BED — WHAT WE'D DO

**We'd hold off on phosphorus, and protect anything new you plant.**

This bed has everything it needs and more phosphorus than it can use, so we'd skip bone meal and bloom boosters. Pythium came back elevated: when you divide or add plants this fall, we'd give the roots a Trichoderma drench.

### AREAS TESTED

Front lawn, about 4,000 sq ft (tall fescue and Kentucky bluegrass), and a perennial border, about 300 sq ft

### WHAT GROWS

Hydrangea, peony, coneflower and ornamental grasses in the border

### MANAGED BY

Thornhill Grounds

*Personalized to this context — if anything's wrong or has changed, tell us on your report page. You can ask questions about these results there too.*

The two areas came back as different soils doing different jobs. The **front lawn is a sandy loam running slightly acidic (pH 5.3)**, with calcium and organic matter both a little short — a pattern that lime and organic matter correct together. Its microbial community is sound at the base but light on nitrogen cycling and plant-growth promoters. The **perennial bed is the stronger soil**: a loam with 6.8% organic matter, every nutrient but one in range, and the more diverse community of the two. Two things there are worth planning around. **Phosphorus is high**, with mycorrhizal fungi low alongside it, and **Pythium came back elevated** — a water mold that matters most when roots are new or disturbed. Nitrate tests low on the lawn, but a single nitrate reading is a snapshot, so we don't lean on it. The sections that follow show both areas side by side.

# Soil Health

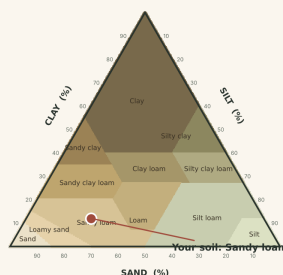
## SECTION 1

The nutrients your plants pull from — NPK, calcium, magnesium, sulfur, micronutrients — plus pH, the organic matter that drives fertility, nutrient holding (CEC), and the texture that determines how your soil holds water.

| MEASUREMENT            | AREA          | RESULT        |               | TARGET           |
|------------------------|---------------|---------------|---------------|------------------|
| pH                     | Front Lawn    | 5.3           | Somewhat low  | 5.5 – 7.0        |
|                        | Perennial Bed | 6.9           | In range      | 6.0 – 7.5        |
| Phosphorus             | Front Lawn    | 38 ppm        | In range      | 25+ ppm          |
|                        | Perennial Bed | 112 ppm       | High          | 30 – 50 ppm      |
| Potassium              | Front Lawn    | 64 ppm        | In range      | 40+ ppm          |
|                        | Perennial Bed | 210 ppm       | In range      | 120+ ppm         |
| Calcium                | Front Lawn    | 780 ppm       | Somewhat low  | 1,000+ ppm       |
|                        | Perennial Bed | 2,450 ppm     | In range      | 1,000+ ppm       |
| Magnesium              | Front Lawn    | 165 ppm       | In range      | 150+ ppm         |
|                        | Perennial Bed | 310 ppm       | In range      | 150+ ppm         |
| Sulfur                 | Front Lawn    | 11.4 ppm      | In range      | 10+ ppm          |
|                        | Perennial Bed | 16.0 ppm      | In range      | 10+ ppm          |
| Iron                   | Front Lawn    | 142 ppm       | In range      | 50+ ppm          |
|                        | Perennial Bed | 118 ppm       | In range      | 50+ ppm          |
| Zinc                   | Front Lawn    | 3.6 ppm       | In range      | 3 – 15 ppm       |
|                        | Perennial Bed | 6.8 ppm       | In range      | 3 – 15 ppm       |
| Copper                 | Front Lawn    | 1.4 ppm       | In range      | 1 – 10 ppm       |
|                        | Perennial Bed | 2.1 ppm       | In range      | 1 – 10 ppm       |
| Organic matter         | Front Lawn    | 3.2 %         | Somewhat low  | 4%+              |
|                        | Perennial Bed | 6.8 %         | In range      | 4%+              |
| Nutrient holding (CEC) | Front Lawn    | 10.6 meq/100g | In range      | Higher is better |
|                        | Perennial Bed | 16.4 meq/100g | In range      | Higher is better |
| Nitrate                | Front Lawn    | 6.2 ppm       | Low           | 20 – 40 ppm      |
|                        | Perennial Bed | 24 ppm        | In range      | 20 – 40 ppm      |
| Boron                  | Front Lawn    | 0.31 ppm      | Informational | —                |
|                        | Perennial Bed | 0.62 ppm      | Informational | —                |

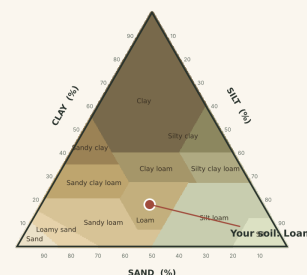
A note on nitrogen: soil nitrogen is highly mobile — it leaches, converts and cycles quickly — so any single test captures one moment, not a lasting measure. Each area carries its own target, because what counts as a good reading depends on what grows there.

## SOIL TEXTURE AND LIME REQUIREMENT



**Front Lawn — Sandy loam.** 64% sand · 24% silt · 12% clay

**Lime requirement:** about 50 lb per 1,000 sq ft to reach pH 6.5



**Perennial Bed — Loam.** 42% sand · 40% silt · 18% clay

**Lime requirement:** none needed

Texture is the fixed physical makeup of the soil; it sets how well the ground drains, holds moisture and hangs on to nutrients. The lawn's numbers hang together. A sandy loam holds less than a loam does, and on sandy ground a low pH and low calcium tend to go together — this lawn is at **pH 5.3** with calcium somewhat low. **Organic matter at 3.2%** is short of the 4% that helps a sandy soil hold water and nutrients. Lime corrects the pH and supplies calcium in the same pass. Phosphorus, potassium, magnesium, iron, zinc and copper are all in range, so the lawn needs nothing beyond lime, organic matter and its normal fall feeding.

The perennial bed is in range on everything but phosphorus, which sits **well above what the plants use**. Section 3 covers what that means and what to do about it.

Soil Microbiome

SECTION 2

The living microbial community inside your soil, read with DNA sequencing — the microbes and fungi feeding your plants, and the pathogens and diseases working against them.

| MEASUREMENT                    | AREA          | RESULT   |          | WHAT'S BETTER    |
|--------------------------------|---------------|----------|----------|------------------|
| Diversity index (Shannon)      | Front Lawn    | 7.86     | In range | Higher is better |
|                                | Perennial Bed | 8.21     | In range |                  |
| Community weighted growth rate | Front Lawn    | 1.52     | In range | Higher is better |
|                                | Perennial Bed | 1.68     | In range |                  |
| Bacterial:Fungal ratio (DNA)   | Front Lawn    | 14.6     | In range | Lower is better  |
|                                | Perennial Bed | 8.9      | In range |                  |
| Mycorrhizal fungi (AMF)        | Front Lawn    | 3.12 ppm | In range | Higher is better |
|                                | Perennial Bed | 0.94 ppm | Low      |                  |
| Root colonization potential    | Front Lawn    | 688 ppm  | In range | Higher is better |
|                                | Perennial Bed | 512 ppm  | Low      |                  |
| Plant growth promoters         | Front Lawn    | 1.12 ppm | Low      | Higher is better |
|                                | Perennial Bed | 5.84 ppm | In range |                  |
| N fixation potential           | Front Lawn    | 0.61 ppm | Low      | Higher is better |
|                                | Perennial Bed | 1.42 ppm | In range |                  |
| Nitrification                  | Front Lawn    | 9.8 ppm  | Low      | Higher is better |
|                                | Perennial Bed | 21.6 ppm | In range |                  |
| Urease                         | Front Lawn    | 92.4 ppm | In range | Higher is better |
|                                | Perennial Bed | 104 ppm  | In range |                  |
| P solubilization activity      | Front Lawn    | 248 ppm  | In range | Higher is better |
|                                | Perennial Bed | 312 ppm  | In range |                  |
| Sulfur solubilization          | Front Lawn    | 236 ppm  | In range | Higher is better |
|                                | Perennial Bed | 251 ppm  | In range |                  |
| Siderophore production         | Front Lawn    | 171 ppm  | In range | Higher is better |
|                                | Perennial Bed | 203 ppm  | In range |                  |
| Ammonification                 | Front Lawn    | 141 ppm  | In range | Higher is better |
|                                | Perennial Bed | 158 ppm  | In range |                  |
| Cellulose breakdown            | Front Lawn    | 402 ppm  | In range | Higher is better |
|                                | Perennial Bed | 488 ppm  | In range |                  |
| Lignin breakdown               | Front Lawn    | 66.2 ppm | In range | Higher is better |
|                                | Perennial Bed | 84.1 ppm | In range |                  |

There is no single number to hit here: each status shows how that function rates for the sample it came from.

The **perennial bed carries the more diverse community** of the two, and almost every nutrient-cycling function is in range. The exceptions are mycorrhizal fungi and root colonization — the fungi that extend a plant’s root reach. High phosphorus is likely one reason: plants tend to host fewer of these fungi when phosphorus is easy to get.

The **lawn’s community is sound at its base** — diversity and growth rate in range — but nitrogen fixation, nitrification and plant-growth promoters are all low. They respond to the same things the lawn’s organic matter does, so one program covers both.

PATHOGENS OF NOTE

| ORGANISM                       | AREA          | RESULT   | LEVEL                                        | STATUS       |
|--------------------------------|---------------|----------|----------------------------------------------|--------------|
| Fusarium                       | Front Lawn    | 0.30 ppm | <div><div></div><div></div><div></div></div> | Low          |
|                                | Perennial Bed | 0.24 ppm | <div><div></div><div></div><div></div></div> | Low          |
| Rhizoctonia                    | Front Lawn    | 0.42 ppm | <div><div></div><div></div><div></div></div> | Moderate     |
|                                | Perennial Bed | 0.18 ppm | <div><div></div><div></div><div></div></div> | Low          |
| Pythium                        | Front Lawn    | 0.18 ppm | <div><div></div><div></div><div></div></div> | Low          |
|                                | Perennial Bed | 0.84 ppm | <div><div></div><div></div><div></div></div> | Elevated     |
| Phytophthora                   | Front Lawn    | 0.00 ppm | <div><div></div><div></div><div></div></div> | Not detected |
|                                | Perennial Bed | 0.36 ppm | <div><div></div><div></div><div></div></div> | Moderate     |
| Lesion nematode (P. penetrans) | Front Lawn    | 0.06 ppm | <div><div></div><div></div><div></div></div> | Detected     |
|                                | Perennial Bed | 0.00 ppm | <div><div></div><div></div><div></div></div> | Not detected |
| Verticillium wilt              | Front Lawn    | 0.00 ppm | <div><div></div><div></div><div></div></div> | Not detected |
|                                | Perennial Bed | 0.06 ppm | <div><div></div><div></div><div></div></div> | Detected     |

Our panel screens 104 organisms, including ones that mainly affect commercial field crops. Detected in these samples but not a concern for these plantings: *Tan spot*, *Soybean brown stem rot* (Front Lawn); *Aphanomyces* (Perennial Bed). Exact figures available on request.

**Pythium** came back elevated in the perennial bed, and **Phytophthora** moderate. Both are water molds: Pythium lives in most soils, while Phytophthora favors wet sites and can arrive on nursery plants. Both attack roots that sit wet or have just been disturbed. **Rhizoctonia** is moderate on the lawn, where it can cause brown patch in hot, humid weather. Section 3 covers what to do about each.

BENEFICIAL NAMED ORGANISMS

| ORGANISM                   | AREA          | RESULT   | STATUS       |
|----------------------------|---------------|----------|--------------|
| Bacillus subtilis          | Front Lawn    | 2.31 ppm | Present      |
|                            | Perennial Bed | 3.06 ppm | Present      |
| Bacillus velezensis        | Front Lawn    | 1.48 ppm | Present      |
|                            | Perennial Bed | 2.12 ppm | Present      |
| Bacillus megaterium        | Front Lawn    | 1.20 ppm | Present      |
|                            | Perennial Bed | 1.86 ppm | Present      |
| Bacillus amyloliquefaciens | Front Lawn    | 0.54 ppm | Trace        |
|                            | Perennial Bed | 1.12 ppm | Present      |
| Azospirillum brasilense    | Front Lawn    | 0.24 ppm | Trace        |
|                            | Perennial Bed | 0.00 ppm | Not detected |
| Bradyrhizobium japonicum   | Front Lawn    | 0.00 ppm | Not detected |
|                            | Perennial Bed | 0.00 ppm | Not detected |

## Front Lawn: raise the pH this fall

At pH 5.3 the lawn sits just below the 5.5–7.0 range turf grows best in, and calcium is somewhat low alongside it. Magnesium is already in range, so calcitic lime is the right material: it raises the pH and supplies calcium in one step.

### WHAT TO DO

- We recommend **calcitic (high-calcium) lime, not dolomitic** — ground or pelletized.
- Rate to reach about pH 6.5: **roughly 50 lb per 1,000 sq ft**, spread this fall right after aerating, and watered in.
- We'd re-test the lawn next season before adding more.

## Front Lawn: build organic matter — the biology comes with it

Organic matter at 3.2% is short of the 4% that helps a sandy loam hold water and nutrients, and the same lawn is low on nitrogen fixation, nitrification and plant-growth promoters. Organic matter feeds that community, so the two tend to improve together — a trend over several seasons of topdressing, not a switch.

### WHAT TO DO

- We'd **core-aerate this fall, then topdress with screened compost** about ¼ inch deep — roughly ¾ cubic yard per 1,000 sq ft — and rake it into the holes. Repeated each fall, this is what moves the number.
- We'd **leave the clippings on the lawn** when you mow.

## Front Lawn: feeding, and brown patch

Nitrate tests low on the lawn and in range in the bed. A single nitrate reading moves with weather and season, so we don't treat it as a deficiency. Rhizoctonia came back moderate on the lawn; it can cause brown patch in hot, humid weather.

### WHAT TO DO

- We'd feed the lawn on its normal fall program; the reading doesn't change that.
- If brown patch shows up next summer, we recommend watering early in the morning and holding nitrogen back until the weather cools.
- The perennial bed needs no nitrogen beyond what its compost supplies.

## Perennial Bed: phosphorus is high — stop adding it

Phosphorus binds to soil and doesn't wash out the way nitrogen does, so any bed where more has gone in than has come out builds a reserve. An ornamental bed removes almost none — nothing is harvested, and leaves and spent flowers break down where they fall — so a reserve builds even from modest inputs, and it reflects the whole history of the ground, including whatever soil the bed was built with. This isn't a mistake anyone made, and the plan is the same whatever the cause. Once additions stop, the reserve draws down over years rather than seasons.

### WHAT TO DO

- **We'd skip phosphorus sources:** bone meal, rock phosphate, bloom boosters, and any fertilizer with a middle number on the label.
- **We'd top-dress with leaf compost or shredded leaves** rather than manure-based compost.
- If a plant looks hungry, a nitrogen-only feed at the label rate is enough.

# Perennial Bed: Pythium and Phytophthora — protect new roots

Pythium came back elevated and Phytophthora moderate. Both attack roots that sit wet or have just been disturbed, so the moments that matter are planting, dividing and wet stretches. This sample’s own biology is part of the picture: mycorrhizal fungi and root colonization are both low here, so the root surface carries less of the beneficial life that, in controlled trials, tends to help roots hold these organisms off. A Trichoderma drench adds a competitor of its own: it colonizes the root surface and competes there directly. It works preventively, alongside the bed’s own fungi rather than in place of them.

Biology has a limit here. No soil product overrides a bed that stays waterlogged; if water stands after rain, drainage comes first. Mulch helps the biology but also holds moisture, so depth and placement matter. Rebuilding the bed’s fungi is slow while phosphorus stays high — a trend over several seasons, not a switch.

### WHAT TO DO

- **When you plant or divide this fall, we recommend a Trichoderma drench on the root zone** (strain T-22 or G-41) — roughly 3–8 oz per 1,000 sq ft in enough water to carry it into the roots, or as a starter solution for new transplants.
- We’d keep mulch two to three inches deep and **pulled back from the crowns**.
- We’d water at the base, in the morning, and only when the top inch is dry.
- If a plant collapses with dark, soft roots, we’d remove it with its root ball rather than composting it.



FROM THORNHILL GROUNDS

### What we carry for this plan

| PRODUCT                  | WHERE         | FOR THIS PROPERTY                     | WHEN                             |
|--------------------------|---------------|---------------------------------------|----------------------------------|
| Core aeration            | Front Lawn    | Our crew, about 4,000 sq ft           | This fall                        |
| Pelletized calcitic lime | Front Lawn    | About 200 lb — five 40-lb bags        | Right after aeration, watered in |
| Screened leaf compost    | Front Lawn    | About 3 cubic yards, ¼ inch deep      | Right after aeration, each fall  |
| Fall lawn fertilizer     | Front Lawn    | Label rate                            | Your normal fall program         |
| Trichoderma root drench  | Perennial Bed | 1–2½ oz per use; the 1-lb pack stores | At planting and dividing         |
| Shredded leaf mulch      | Perennial Bed | Two to three inches, off the crowns   | Top up in spring                 |

## Proposed action plan

SECTION 4

### NEXT 30 DAYS

- Core-aerate the front lawn.
- Spread calcitic lime and topdress with compost; water in.
- Stop adding phosphorus sources to the perennial bed.

### THIS SEASON

- Trichoderma drench at any planting or dividing in the bed.
- Keep mulch off the crowns; water at the base, in the morning.
- Leave clippings on the lawn; feed on the normal program.

### NEXT YEAR

- Re-test the lawn to see how far the pH has moved toward 6.5 and whether organic matter is climbing.
- Re-test the bed to track phosphorus and the fungi.

### Questions about these results?

Ask our soil scientists directly on this report’s discussion page. As many follow-up questions as you want, for as long as you are working from these results.

Open the discussion →

Screened in both areas and not detected in either: anthracnose, *Alternaria* leaf spot, charcoal rot, common scab, early blight, green stem nematode, late blight, lesion nematode (*P. brachyurus*), pathogenic *Aspergillus*, reniform nematode, root-knot nematode, rust and white mold.

The rest of the 104-organism panel covers diseases of commercial field crops — wheat, alfalfa, corn, cotton, sugarcane, soybean, potato and sugar beet. The ones detected here are named in Section 2; exact figures for the rest are available on request.

## Glossary

**Soil Health score** — a 0–100 roll-up of how close nutrients, pH and organic matter sit to the targets for what grows in each area, scored separately for each area.

**Soil Microbiome score** — a 0–100 roll-up of microbial diversity and the nutrient-cycling functions measured by DNA sequencing, scored separately for each area. Pathogens are reported on their own and are not part of this score.

**Thriving · Building · Needs attention** — 85 and above, 65 to 84, and below 65.

**Target** — the range a reading should sit in for what grows in that area. A target with a plus sign ("40+ ppm") has no useful ceiling.

**Informational** — a reading we report without grading it against a target.

**Pathogen levels** — Low, Moderate or Elevated. **Detected** means present at a trace level, too low to grade.

**Lime requirement** — how much lime it takes to bring this soil to the stated pH, which depends on how strongly the soil resists a pH change, not on the pH alone.

**Nutrient holding (CEC)** — how much of the positively charged nutrients (calcium, magnesium, potassium) the soil can hold onto. Clay and organic matter raise it.