ECOSYSTEMS UNITED

Soil Microbial Health Checklist

A practical tool for assessing and improving your soil's living ecosystem

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HOW TO USE THIS CHECKLIST

Soil is alive — and healthy soil starts with a thriving microbial community. This checklist is designed to help you assess, understand, and improve the biological health of your soil through practical, observable steps.

You'll walk through three parts:

1. **Self-Assessment**: Evaluate your current soil management practices across key categories like disturbance, cover, diversity, inputs, and pest management.
2. **Microbial Health Indicators**: Use simple visual cues and hands-on tests to spot signs of a thriving (or struggling) microbial ecosystem.
3. **Improvement Plan**: Set priorities based on your results and choose realistic actions that build soil health over time.

This tool works for farms, gardens, and everything in between. Use it once a year to track progress, or more often as you implement new practices.

Healthy microbes mean better structure, nutrient cycling, water retention, and plant resilience. Let's dig in.

PART 1: SELF-ASSESSMENT

SOIL DISTURBANCE

Rate your current practices on a scale of 1-5:

- **Tillage Frequency**

  [ ] 1 - Intensive tillage (multiple passes per season)
  [ ] 2 - Conventional tillage (1-2 passes per season)
  [ ] 3 - Reduced tillage (minimal, shallow disturbance)
  [ ] 4 - Strip tillage or zone tillage only
  [ ] 5 - No-till or permanent beds with no disturbance

- **Root Zone Disturbance**

  [ ] 1 - Deep cultivation or subsoiling regularly
  [ ] 2 - Annual deep cultivation
  [ ] 3 - Shallow cultivation only
  [ ] 4 - Surface cultivation only for weed management
  [ ] 5 - No cultivation; mulch or other non-disturbance weed management

SOIL COVERAGE

Rate your current practices on a scale of 1-5:

- **Living Root Presence**

  [ ] 1 - Less than 4 months/year with living roots
  [ ] 2 - 4-6 months/year with living roots
  [ ] 3 - 6-9 months/year with living roots
  [ ] 4 - 9-11 months/year with living roots
  [ ] 5 - Year-round living roots (cover crops, intercropping, etc.)

- **Soil Surface Protection**

  [ ] 1 - Bare soil common throughout season
  [ ] 2 - Temporary coverage after planting only
  [ ] 3 - Mulch or residue covers ~50% of production area
  [ ] 4 - Mulch or residue covers ~75% of production area
  [ ] 5 - Complete soil coverage year-round (mulch, residue, living plants)

PLANT DIVERSITY

Rate your current practices on a scale of 1-5:

- **Crop Rotation Diversity**

  [ ] 1 - Monoculture (same crop repeatedly)
  [ ] 2 - Simple rotation (2 crops)
  [ ] 3 - Basic rotation (3-4 crops)
  [ ] 4 - Complex rotation (5+ crops from different families)
  [ ] 5 - Advanced rotation (7+ crops with intentional soil health benefits)

- **Cover Crop Usage**

  [ ] 1 - No cover crops used
  [ ] 2 - Single species cover crop occasionally used
  [ ] 3 - Single species cover crop regularly used
  [ ] 4 - Simple cover crop mixes (2-3 species) used
  [ ] 5 - Diverse cover crop mixes (4+ species from different families)

INPUTS & AMENDMENTS

Rate your current practices on a scale of 1-5:

- **Fertilizer Approach**

  [ ] 1 - Conventional synthetic fertilizers only
  [ ] 2 - Primarily synthetic with occasional organic amendments
  [ ] 3 - Balanced approach (both synthetic and organic sources)
  [ ] 4 - Primarily organic amendments with minimal synthetic inputs
  [ ] 5 - 100% organic inputs (compost, manure, organic amendments)

- **Microbial Inoculants & Biostimulants**

  [ ] 1 - No microbial products used
  [ ] 2 - Occasional use of basic microbial products
  [ ] 3 - Regular use of microbial products
  [ ] 4 - Strategic use of specific microbial inoculants based on needs
  [ ] 5 - Comprehensive microbial management program

PEST & DISEASE MANAGEMENT

Rate your current practices on a scale of 1-5:

- **Pesticide Impact on Soil Life**

    [ ] 1 - Regular broad-spectrum pesticide applications
    [ ] 2 - Routine conventional pesticide use with some IPM
    [ ] 3 - IPM with reduced chemical interventions
    [ ] 4 - Minimal pesticide use, primarily biological controls
    [ ] 5 - No synthetic pesticides; entirely biological/cultural management

PART 2: MICROBIAL HEALTH INDICATORS

VISUAL INDICATORS

Check all that you observe in your soil:

Positive Indicators:

[ ] Earthy smell (geosmin produced by actinomycetes)
[ ] Stable soil aggregates that don't easily break apart when wet
[ ] Abundant earthworms and other soil macrofauna
[ ] Visible fungal hyphae or mycelium in residue or soil
[ ] Quick breakdown of organic residues
[ ] Plants show mycorrhizal associations (fine network of white filaments on roots)

Negative Indicators:

[ ] Sour or putrid smell
[ ] Compacted layers that resist root penetration
[ ] Few visible soil organisms
[ ] Slow decomposition of organic matter
[ ] Surface crusting or poor water infiltration
[ ] Plants show signs of nutrient deficiency despite adequate fertilization

FUNCTIONAL TESTS

Simple tests to gauge microbial activity:

Soil Aggregation Test:

1. Take a small handful of soil and wet it thoroughly but gently
2. Observe how well it holds together and its aggregate structure

   Poor: Soil falls apart easily when wet, indicating weak aggregation
   Moderate: Soil holds together somewhat, but breaks with light pressure
   Excellent: Soil forms stable, crumbly aggregates with a honeycomb-like structure

   Your Score: _____

Decomposition Test:

1. Bury a cotton swatch 3" deep in soil
2. After 60 days, dig up and assess the decomposition

   Poor: Wet soil easily falls apart when wet, indicating weak structure and low microbial activity
   Moderate: Soil holds together somewhat but crumbles under light pressure
   Excellent: Soil forms stable, crumbly aggregates with a honeycomb-like structure

   Your Score: _____

Infiltration Test:

1. Push a 6" diameter pipe 3" into soil
2. Pour 1" of water and time how long it takes to infiltrate

   Poor: Cotton swatch remains mostly intact; slow microbial breakdown
   Moderate: Partial decomposition with visible thinning or tearing
   Excellent: Swatch mostly or completely decomposed; active microbial community

   Your Score: _____

SOIL HEALTH SCORE SUMMARY

Calculate Your Overall Score:

PART 1: SELF-ASSESSMENT	Your Score	Max
Soil Disturbance (2 questions)		/10
Soil Coverage (2 questions)		/10
Plant Diversity (2 questions)		/10
Inputs & Amendments (2 questions)		/10
Pest & Disease Management (1 question)		/5
PART 1 TOTAL		**/45**
PART 2: MICROBIAL HEALTH INDICATORS	**Your Score**	**Max**
Positive Indicators (count × 2 points)		/12
Negative Indicators (count × -1 point)		/-6
Functional Tests:		
• Aggregation Test (Poor=1, Moderate=2, Excellent=3)		/3
• Decomposition Test (Poor=1, Moderate=2, Excellent=3)		/3
• Infiltration Test (Poor=1, Moderate=2, Excellent=3)		/3
PART 2 TOTAL		**/15**
OVERALL SOIL HEALTH SCORE		**/60**

Interpret Your Score:

Score Range	Soil Health Status	Priority Actions
50-60	**Excellent**	Maintain current practices; fine-tune for optimization
40-49	**Good**	Strong foundation; focus on 1-2 improvement areas
30-39	**Moderate**	Significant opportunity; implement 2-3 key practices
20-29	**Poor**	Urgent attention needed; start with basic soil protection
Below 20	**Critical**	Immediate intervention required; consider professional consultation

Quick Action Guide by Score:

Excellent (50-60): Focus on advanced practices like diverse cover crop cocktails, precision nutrient management, or carbon farming protocols.

Good (40-49): Add one major practice (cover crops OR no-till OR diverse rotation) and refine existing systems.

Moderate (30-39): Prioritize soil protection first (reduce tillage, add cover), then build diversity and organic inputs.

Poor (20-29): Start with the fundamentals: stop leaving soil bare, reduce disturbance, add any organic matter.

Critical (Below 20): Emergency soil protection needed. Focus on immediate cover, cease intensive tillage, and consider bringing in outside expertise.

PART 3: IMPROVEMENT PLAN

Based on your lowest scores above, identify 3 priority areas for improvement:

1. Priority Area: _____ Current Score: ___ Target Score: ___
   Action Steps:
   - _____
   - _____
   - _____
2. Priority Area: _____ Current Score: ___ Target Score: ___
   Action Steps:
   - _____
   - _____
   - _____
3. Priority Area: _____ Current Score: ___ Target Score: ___
   Action Steps:
   - _____
   - _____
   - _____

RECOMMENDED MICROBIAL-BOOSTING PRACTICES

FOR LOW-DISTURBANCE SYSTEMS:

- Transition to no-till gradually (start with 1 field/section)
- Use tarps, mulch or roll-crimping for terminating cover crops
- Invest in appropriate no-till equipment or adapt existing equipment
- Consider strip-till as an intermediate step if full no-till is challenging

FOR INCREASING LIVING ROOTS:

- Plant cover crops immediately after harvest
- Use relay cropping or intercropping techniques
- Select cover crops with different root architectures (fibrous, tap, etc.)
- Include mycorrhizal-friendly crops in rotation (most grasses, alliums, etc.)

FOR ENHANCING DIVERSITY:

- Aim for minimum 3 crop families in rotation
- Include legumes for nitrogen fixation
- Add flowering species for beneficial insects
- Consider perennials in field borders or alleys

FOR IMPROVING ORGANIC INPUTS:

- Start a compost program or source quality compost
- Apply thin layers frequently rather than thick layers occasionally
- Consider compost extracts or teas for microbial delivery
- Reduce synthetic nitrogen applications gradually (15-20% per year)

TRACKING PROGRESS

Record key observations and measurements annually:

Indicator	Baseline Date:	Year 1 Date:	Year 2 Date:
Soil organic matter %			
Water infiltration rate			
Earthworm count (per sq ft)			
Residue decomposition rate			
Root health/mycorrhizal colonization			
Yield			
Input costs			
Notes on soil appearance/smell			