

Whole Cycle Tuesday

The Bigger Picture

Soil health is built over time. While synthetic inputs can quickly adjust chemistry, compost enhances the soil's natural capacity to regulate itself. By improving buffering capacity, compost reduces volatility, protects plant roots, and supports a biologically active soil system.

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"The environment is where we all meet; where we all have a mutual interest; it is the one thing all of us share." — Lady Bird Johnson

Soil pH Buffering with Compost Additions

Understanding Soil pH and Why It Matters

Soil pH controls the solubility of nutrients. In acidic soils, elements like aluminum and manganese can become overly available and toxic to plants, while phosphorus, calcium, and magnesium may become limited. In alkaline soils, micronutrients such as iron, zinc, and manganese may become less available.

Ideal pH ranges vary by crop, but most plants perform best between 6.0 and 7.0, where nutrient availability is optimized and biological activity is strong.

What Is Buffering?

Buffering refers to a soil's ability to resist sudden changes in pH when acids or bases are introduced. Soils with low organic matter and low clay content tend to have weak buffering capacity, meaning their pH can fluctuate quickly due to rainfall, fertilizer inputs, or irrigation water quality.

Compost improves this buffering capacity primarily through its organic matter content.

How Compost Buffers Soil pH

Compost contains stable organic compounds, particularly humic and fulvic substances, that have numerous negatively charged sites. These sites allow compost to:

- Bind and release hydrogen ions (H^+), moderating acidity
- Chelate metal ions such as aluminum, reducing toxicity in acidic soils
- Increase cation exchange capacity (CEC), improving overall nutrient retention
- Support microbial communities that influence soil chemical balance

In acidic soils, compost often produces a gradual pH increase over time, particularly if the compost contains base-forming cations like calcium, potassium, and magnesium. In alkaline soils, compost may slightly lower pH in the root zone through microbial respiration and organic acid production.

Importantly, compost does not typically create dramatic pH shifts. Its value lies in stabilization rather than rapid correction.

