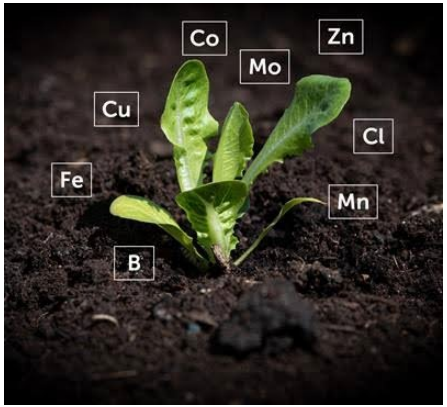
# Soil Health Workshop

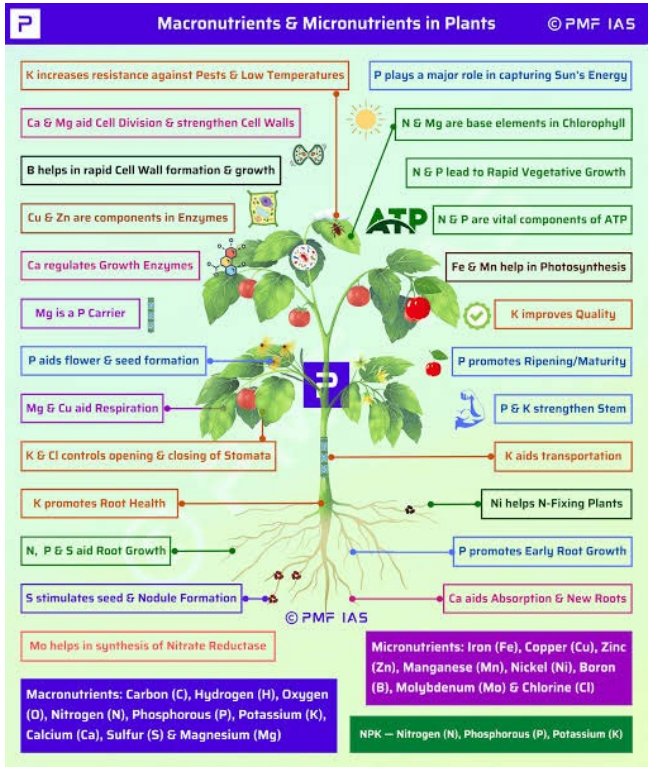
## Understanding Nutrients, Depletion, and Natural Restoration

SOIL STEWARDS

# I. Essential Nutrients in Optimum Soil Health

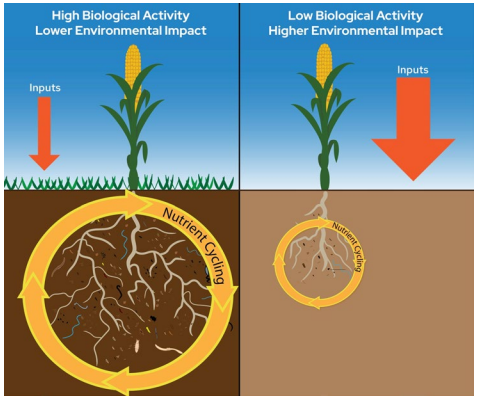
- Macronutrients: N, P, K, Ca, Mg, S
- Micronutrients: Fe, Zn, Cu, Mn, B, Mo, Cl
- Healthy Soil Biology: microbes, fungi, earthworms
- Organic matter and soil structure (tilth)

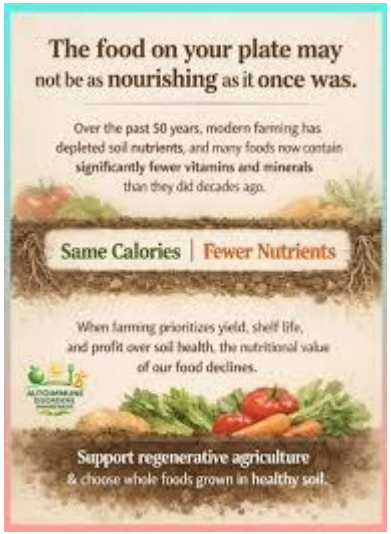



# How Soil Health Affects Food Value

- Higher mineral density in crops
- Improved vitamin and antioxidant levels
- Better flavor and shelf life
- Stronger plant resilience
- Enhanced human health outcomes




Healthy soil is the foundation of plant resilience, defined as the capacity of crops to withstand and recover from abiotic stresses (drought, flood, salinity) and biotic pressures (pests, diseases).

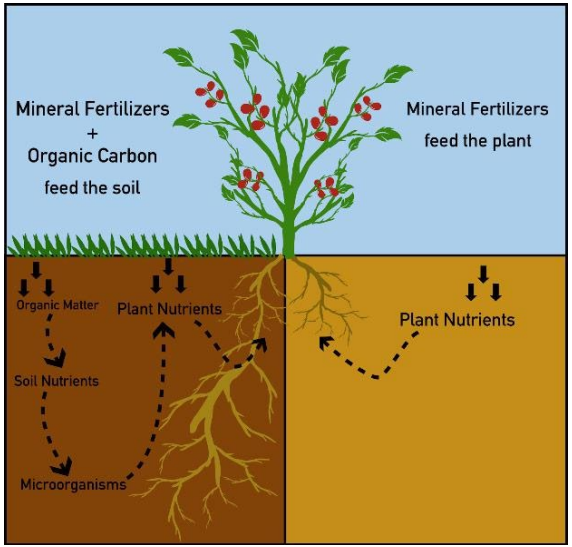
Soil Stewards

# II. Why Soil Has Been Depleted

- Monocropping systems
- Heavy synthetic fertilizer use (NPK-only focus)
- Over-tillage and compaction
- Pesticide & herbicide disruption of soil biology

Over-fertilization degrades soil health by causing nutrient imbalances, acidification, and salt buildup, which can result in a white crust on the surface. Excess synthetic nutrients destroy soil structure, kill beneficial microbes, and reduce biodiversity, leading to poor water infiltration, nutrient lockout, and potential toxicity

# Environmental & Chemical Degradation




- Soil erosion and topsoil loss
- Decline in organic matter
- Reduced microbial diversity
- Nutrient mining without replenishment
- Soil acidification and salinity issues

Decline in soil organic matter (SOM) is the reduction of carbon-based material (residues, humus) in soil, causing degraded fertility, poor structure, and increased erosion. Driven by intensive farming, tillage, and climate change, this loss causes microorganisms to consume existing carbon faster, releasing co2, reducing productive capacity.

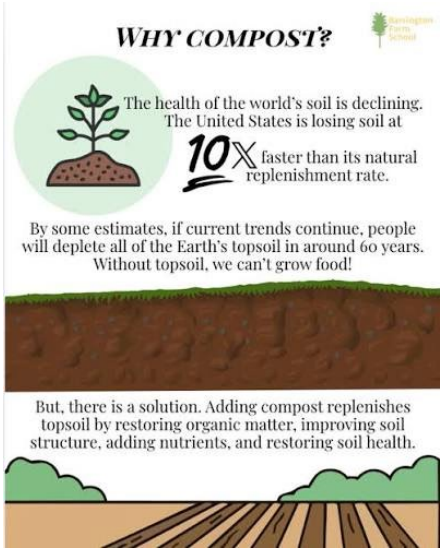
# Impacts of Depleted Soil

- Reduced crop yields
- Lower nutrient density in food
- Increased plant disease
- Greater reliance on synthetic inputs
- Water pollution and economic strain

Depleted soil is agricultural land that has lost essential nutrients, organic matter, and beneficial microorganisms, significantly reducing its fertility and capacity to grow crops. Caused by over-farming, erosion, and poor management, this degradation threatens global food security. Key solutions include sustainable practices like cover cropping, composting, and reduced tillage

# III. Natural Conservation Methods

- Compost, manure, mulching, biochar
- Cover cropping & crop rotation
- Intercropping & polyculture
- Reduced tillage / no-till systems




Composting is a natural conservation method that mimics the forest floor's decomposition process to turn organic waste into nutrient-rich humus. It serves as a sustainable alternative to chemical fertilizers, improving soil structure, enhancing water retention (up to 20,000 more gallons per acre for every 1% increase in organic matter), and reducing landfill methane emissions.

Soil Stewards

# Erosion & Water Management

Contour farming

•Terracing

•Windbreaks

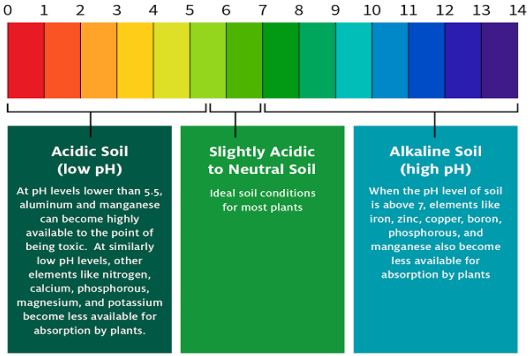
•Riparian buffers

•Managed grazing systems

Terracing is an ancient, highly effective agricultural technique that reduces soil erosion by over 52% and manages water by decreasing runoff by over 41.9%. By transforming steep slopes into flat, stepped benches, it slows water flow, boosts infiltration, increases soil moisture, and enhances crop yields while preventing landslides.

# Nutrient Balancing & Community Support

- Regular soil testing
- Mineral amendments & pH balancing
- Integrated nutrient management
- Conservation incentive programs
- Education and stewardship training




Mineral amendments and pH balancing are critical to soil fertility, as soil pH directly controls nutrient availability, microbial activity, and plant root development. The ideal pH for most plants is between 6.0 and 7.5, where nutrients are most readily available. Soil pH can be adjusted by adding mineral amendments to raise (liming) or lower (acidifying) the pH, typically requiring a 6–12 month timeframe for significant changes.