Building Healthy Soil

WHAT IS HEALTY SOIL? — HEALTHY SOIL IS A LIVING SYSTEM THAT INCLUDES:

- Inorganic material—rock/mineral particles (sand, silt, clay)
- Organic material—living organisms: roots, worms; decomposing organisms. microbes, etc
- Air (especially oxygen)
- Water

CHARACTERISTICS OF HEALTHY SOIL:

- A self-balancing natural ecosystem with stable populations of plants & soil organisms.
- Approx. 5% organic matter with a stable, slightly acidic pH; keeps nutrients supplied in plant-available forms.
- Continuous nutrient cycling throughout the soil system. Plant roots exude sugars & proteins that attract & feed soil organisms. As these organisms die/decompose or are eaten by others, nutrients are released back to plants.
- Strong "crumb" or granular soil structure, with a mixture of pore sizes that hold both air and water.

WHAT CREATES SOIL STRUCTURE? — THE LIFE IN THE SOIL.

- Soil organisms decompose organic matter, slowly producing humus; highly resistant to further breakdown.
- Soil organisms produce glues and filaments that bind tiny mineral particles and humus together into soil crumbs.
- Worms and other burrowing creatures continuously open pathways for roots, air and water.

BENEFITS OF GOOD SOIL STRUCTURE:

- Maintains critical soil air space while acting as a rainfall reservoir...soil becomes like a sponge.
- Drains excess water quickly, avoiding detrimental, disease-friendly anaerobic conditions.
- Helps soil resist erosion & compaction.
- Allows beneficial soil organisms to flourish; maintains the structure, keeps the nutrient cycle going.

WHAT DISRUPTS THE SYSTEM & LEADS TO COMPACTION, EROSION, INFERTILITY, ETC?

- Excessive disturbance, esp. rototilling & construction
- Chemical fertilizers, pesticides, chlorinated water (includes chloramines)
- Working or even walking on wet soil
- Excessive watering; excessive dryness
- Leaving soil bare (leave some bare for native bees)
- Excessive pruning/shearing of plants (stimulates excess growth, depletes soil nutrients)

BENEFITS OF USING COMPOST & MULCH:

- Returns nutrients to the soil; keeps waste out of the landfill.
- Replenishes/supports populations of beneficial soil organisms.
- Helps form soil aggregates, improving soil structure.
    - » Clay soils – improves aeration, water infiltration & percolation.
    - » Sandy soils – increases water-holding capacity, helps hold nutrients.
- Organic mulches decompose in place, providing slower but similar benefits. Sheet mulching is especially effective.
- If you're short on time, keeping the soil covered with an organic mulch is the simplest approach.

SIMPLE THINGS YOU CAN DO TO HELP YOUR SOIL:

- Work with, not against the ecosystem...handle with care, put back what you remove.
- Avoid compaction & excessive soil disturbance.
- Reduce pruning & waste—right plant, right place; design beds carefully.
- Avoid chemical/synthetic fertilizers, overfertilizing, overwatering, severe underwatering.
- Use compost and mulch to supply/recycle soil microbes & nutrients, to nurture the soil organisms that partner with your plants, and thus to keep the engine running!

Building Healthy Soil—Recipes

Aerobic Compost—The Recipe	Serves: Billions
Ingredients: Equal parts browns and greens Chop: into small pieces to improve decomposition Arrange: into pile; reasonable pile size = 3' x 3' x 3' Add: water just to level of wrung-out sponge Stir (turn): often to maintain uniform decomposition	Add: Water as needed to maintain moisture level Harvest: when soil-like in appearance Screen: to remove big chunks before adding to soil Incorporate: into top few inches of soil or potting mix Enjoy: a beautiful & healthy garden.
Mulching: Apply disease and weed-free organic mulch 2-4" thick, keeping it away from the root crowns of plants. Apply coarser mulch more thickly, finer-textured mulch more thinly. Reapply as needed.	
Sheet Mulching: Cut or mow weeds. Apply thin layer of compost, cover with dampened newspaper or cardboard, overlapping edges. Cover with 2-4" of mulch as above. Keep damp to hasten decomposition and soil enrichment.	

Resources:

USDA Natural Resources Conservation Service

- Web Soil Survey. **http://websoilsurvey.nrcs.usda.gov/app/**
- Soil Health. **http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/ An excellent overview**

US Bureau of Land Management

- Soil Biological Communities. **http://www.blm.gov/nstc/soil/index.html A good supplement**

UC Agriculture & Natural Resources

- Composting Is Good for Your Garden & the Environment. **http://anrcatalog.ucanr.edu/pdf/8367.pdf**
- Soil Management & Soil Quality for Organic Crops. **http://anrcatalog.ucanr.edu/pdf/7248.pdf**
- Soil Fertility Management for Organic Crops. **http://anrcatalog.ucanr.edu/pdf/7249.pdf**

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