

## Theme: Soil and Compost

### Big Ideas:

- A Dynamic, living, healthy soil is the foundation for successful large (e.g. farms) and small-scale (e.g. gardens) sustainable agriculture.**
- B Soil is made of a variety of living and non-living components.**
- C Decomposers are organisms that break down organic materials into smaller pieces that plants can absorb.**

### Expanded Content:

- D Healthy soil for gardening is approximately 50% air and water, 45% inorganic material and 5% organic material.**
- E Inorganic (non-living) parts of soil:**
  - 1 Some inorganic components come from rocks, such as sand (larger particles), silt (medium particles), and clay (small particles). Others inorganic compounds include air, water and occasionally heavy metals.
  - 2 If your soil contains lots of clay, it will become water-logged and plant roots may mold or rot. Alternately, an extremely sandy soil may drain too quickly, washing away nutrients and not permitting plants sufficient time to absorb water through their roots.
- F Organic (living) parts of soil:**
  - 1 Living organisms and dead organisms in the process of decomposition are the primary sources of organic material.
  - 2 A soil with too little organic material may lack the nutrients necessary for plant growth and require chemical fertilizers.
  - 3 Decomposers, such as worms, certain insects, fungi and bacteria (microorganisms), turn large organic waste into particles that are an appropriate size and/or chemical composition for plant use. FBI is an acronym for fungus, bacteria and invertebrates and is a good memory tool for teaching about decomposers.
  - 4 There are more living organisms in a teaspoon of healthy soil than there are humans on the planet.
- G Worms**

- 1 Worms are invertebrates without eyes, legs or ears and they breathe through their moist skin, although they can drown if there is too much water in the soil (why they crawl out onto the sidewalk when it rains). Worms tunnel through the soil making space for air, water, and plant roots.
- 2 The worms in the worm bin are red wiggler worms, not the same species that probably live in your garden. They are surface feeders and quick composters, but cannot tolerate really cold weather, which is why we keep the bins inside. We feed them our banana peels and apple cores so we don't have to take up space in the landfill. Once the worms eat all our food scraps we will put their nutrient rich castings (a.k.a. poop) in the garden for the plants to absorb.

#### H Compost:

- 1 Compost is broken-down organic matter, that includes nutrients in a form that plants can absorb. This is a natural fertilizer to help plants grow.
- 2 Compost is nature's way of recycling. The nutrients from living things go back into the soil after they die. Then these nutrients are available for plants to use again.
- 3 Everything that came from nature can be composted. Our compost pile is healthiest when we add a balance of "greens," nitrogen-rich ingredients (food scraps, green grass clippings), and "browns," carbon-rich ingredients (dried leaves, mulch).
- 4 The decomposition we facilitate in the compost and worm bins is an imitation of what happens in nature. Logs and vegetation and dead animals are always being broken down into simple nutrients and eventually return to other living things through the soil.

#### Garden elements and activities:

Garden element or activity	Description	Age-level appropriate content suggestions			
		K-2	3-5	6-8	9-12
Digging area	Use small trowels to explore the soil. Share findings freely and limit direct lecturing. For younger groups, look for worms and imagine being a worm.	A,B, G1	A, B, D, E1, F1, F4	N/A	N/A
Herb garden tour	Encourage exploration using all of their senses (taste, smell, feel).	A	A	A, F2, E2	A, F2, E2
Compost bins	Allow students to aerate the pile with forks and	C, H1	C, F3, F4, H	C, F3, F4, H	C, F3, F4, H

	smell compost before and after it has finished decomposing. Teach the basics of how to create compost and why. Measure temperature and discuss why they are hot.				
Nature Explorer Classroom (NEC)	Read a book, tip over some of the big stumps in search of invertebrates or just let the students run and play.	B, C	B, C, F3	B, C, F3	N/A
Path through the woods	Make the garden tour a loop by returning through the woods. Point out (or have students find) naturally decomposing objects. Explain how we compost in the garden to mimic this natural process. If there was no decomposition? What would happen to things that died?	A, C, H4	A, C, H4	A, C, H4, F2, F3	A, C, H4, F2, F3
Soil drainage demonstration	Set up a table and fill containers with holes in the bottom with equal quantities of clay (or flour), silt (or cornmeal), and sand (or lentils). Have student volunteers pour water into the top of each container and time how long it takes for the water to flow out. Use this to introduce soil particle size and how it can help provide good/poor drainage.	N/A	N/A	A, D, E1, E2	A, D, E1, E2
Worm bin	Take out the worms and feed them food scraps. Older students may enjoy helping to sort the worms from the castings and putting them in new bins with bedding.	C, G1	B, C, F3, G1, G2	B, C, F1, F3, G1, G2, H	B, C, F1, F3, G1, G2, H
Garden Labor	If you have a longer field trip, students may enjoy mulching or planting, both of which put them in close	A	A	A, E2, F2	A, E2, F2

	contact with the soil and provide teaching opportunities.				
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**Materials List:**

Worm bin

- Worm bin
- Metal trays
- Extra buckets
- Bedding (shredded newspaper or coconut fibers)
- Food scraps

Digging area

- Trowels/hand forks

Compost pile

- Hand forks
- Thermometer

Nature Explorer Classroom:

- *Diary of a Worm* (ages:
- *Compost Stew* (ages:

Soil drainage demonstration:

- 3 containers with holes in the bottom
- Measuring device
- Clay or flour
- Silt or cornmeal
- Sand or lentils
- Pitcher of water
- Small table

Garden labor:

- Wheelbarrow
- Buckets

- Trowels
- Seeds
- Watering cans
- Labels (pre-done, or with marker)