

Create a Soil Aggregate

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Standard Statement(s):

To explain how IPM affects the environment

Content Objective(s):

To simulate the interrelationships occurring in a soil aggregate, to explain how IPM affects the environment

Assessment Strategies:

Observation, discussion, journal entry

Background/Introduction to Topic:

Soil is alive; it has living and non-living components. Soil is a function of climate, organisms, relief, parent material and time.

Soil is ideally made up of:
45% mineral (sand, silt, clay)
25% air
25% water
5% organic matter

“What living organisms might we find in soil?”

- Earthworms
 - Arthropods
 - Nematodes
 - Bacteria- “How many do you think are in this cup of soil?” Billions!
 - Fungi/plants
 - Protozoa
- ❖ All of the above & more make the soil food web

Suggested Level:

2nd-7th Grade

Standard Category:

4.5.7 B

Materials:

- character signs (with string to wear around neck)
- nitrogen, carbon, energy, good guy cards
- string (roots)
- hand trowel
- whisk
- container of glue
- 3 vitamin bottles labeled “Nutrients”
- water bottle
- plastic insect
- plastic or stuffed toy beetle
- plastic spider

Instructional Strategies:

simulation

Cast of Characters & Their Roles

Each child wears an identification tag

Note: If playing with more than 25 students, make more bacteria signs

Plant (2)	-hold string to represent roots, (also for later, hold carbon and energy card to be handed to fungi)
Earthworm (2)	-Creates spaces for water (Hold a hand trowel) -Mixes soil (hold a whisk) -Leave casts (hold elmer's glue)
Nematode (1)	-“Roundworm”, grazer, predator, bacteria or fungal feeder -Releases plant-available nutrients into the soil (hold vitamin bottle, then hand to plant) -make chomping sounds
Arthropods (4)	-Millipede (hold plastic insect)-shredder-chews plant matter -Spider (hold plastic spider)-predator-eats other arthropods -Ground Beetle (hold beetle beanie baby)-predator -Mite (hold “Good Guy” sign)-predator, shredder, or fungal feeder -many eat disease causing pests, help decomposition, improve root development, water intake, drainage, and aeration
Fungi (2)	-Attach to roots (actually hold string roots)-symbiotic relationship -transfer nutrients and water to plants (hand water bottle and vitamin bottle to plants) -in return, plant gives it carbon and energy (get signs from plants) -decomposers (saprophytic), mutualist (mycorrhizal) or pathogens (or parasites)
Bacteria (6-11)	-tiniest & most numerous (1 cup of soil=billions) -work with fungi to mineralize -decompose dead organic matter & convert it to nutrients for the plants (hold vitamin bottle, then hand to plant)
Protozoa (3)	-types: Ciliate, Flagellate, & Amoeba -microscopic grazers -enhance mineralization by releasing nitrogen (throw nitrogen signs)

Procedures:

Review background information if needed. Assign parts, before starting the simulation, review with each participant what their action is, and sound if needed. Have them do the simulation (move around) for 30 seconds or so. Ask them to stop, look around, and process. “What occurred here?” “What would happen if a homeowner or farmer applied pesticides to the soil to get rid of the potato beetle?” Relate to non-point source pollution. Simulate again, this time without the arthropods because the homeowner sprayed a broad-spectrum pesticide onto the soil. Ask, “Is the soil food web in the same healthy balance?” “What would be a better IPM alternative?” Questions could be presented in the form of discussion or journal response.

Conclusions:

Spraying a broad spectrum pesticide could effect the health and relationships of the organisms in the soil food web.

References:

Soil Biology Primer, Soil and Water Conservation Society, 2000

Related Web Sites: <http://www.swcs.org>