

Make Your Own, Edible Soil Profile

Activity courtesy of:
Doug Wolf, IDEM*

Tool Kit

- Digital camera (optional)
- Sheet of white paper [8 ½ x 11 inch]
- 2 Honey Graham Crackers
- 1 Chocolate flavored Graham Cracker
- Pen or marker
- Brown Icing/frosting (canned or homemade colored brownish enough to thickly cover 1 graham cracker)
- Shredded/flake Coconut (longish flakes/strands approximately ¼ cup or less)
- 2 sandwich bags
- Food coloring [green or (blue and yellow to mix) and brown]
- Baking Caramels (5-6 blocks each about 1 inch or so square)
- Bowls, dishes, spatulas, sharp paring knife or similar small knife, cutting board, small bowls for mixing, spreading and storing materials
- Optional: Small red gummy type worm shapes or a few short pieces of shoelace/thin red licorice etc. to represent soil organisms.



Do It:

- Take photos of each of the steps of making your soil profile.
- Ice/frost a honey graham cracker thickly and completely with brown icing. The icing will be a sort of edible glue to hold/stick your soil components as well as it will represent coatings on the soil structure.
- Color the coconut by using the 2 sandwich bags. In one bag place 3 or so drops of green food coloring (enough to color green or green can be made by placing 2 drops of each blue and yellow in to the bag and mix). In the other bag place 3 or so drops of brown food coloring. Place less than a teaspoon or so of coconut in each bag and shake/knead contents until colored.
- Place the brown colored coconut on the upper part of the cracker then place the green coconut just on the very top edge of the cracker. The green represents grass/vegetation/plants growing on the soil. The brown represents the organic matter of the O horizon such as the thatch that is just beneath lawn grass that is just



Notice coconut being colored in sandwich bag and placing colored coconut onto iced graham cracker. Notice caramels have been cut in to progressive smaller blocks. Notice a half of honey graham cracker has been cut in to thin strips.

on top of the soil surface.

- Crunch up the chocolate graham cracker into small pieces or crumbs. Place these crumbs just below the brown coconut about 1 inch or so wide. This will represent the A horizon.

Question: What colors or tints the topsoil dark in real soil?

--- Humus or organic matter – Just as when using coco for baking the darker to result the more coco added so it is soil with more organic matter/humus the darker the soil.

Question: What does the crumb structure of the crunched up cracker represent?

--- Good topsoil has a granular, crumbly. If topsoil did not have a soft crumbly granular like structure it would be hard and chunky like the unbroken cracker.

--- Highly compacted, packed down soil with little humus could be an example of hard topsoil poor quality.

- Option: Place a couple of small gummy worms or short pieces of thin licorice in the brown coconut layer and chocolate graham cracker layer for soil organisms.
 - Soils are a live with many different kinds of soil organisms so soil organisms are an important aspect of soil development and soil health.
- Cut up about 4 caramels with a sharp knife (have adult assistance in cutting) using a cutting board.
 - Cut 2 caramels in half
 - Cut 1 in half then halves into quarters
 - Cut one in half then halves into quarters then cut each resulting piece in half again. (These blocks of caramels will represent subsoil blocky structure and remind us that subsoils often contain the highest about of clay content in the soil profile since this is where clay that is formed (transformed) higher up in the profile is moved (translocated) to and concentrates.
- Cut half of a honey graham into to 4 strips. It does not matter if a couple of strips break up some.
- Place the 4 cut cracker strips on edge (so the broken/cut rough edge is exposed) on the very bottom edge of the iced cracker.
- Place the least broken cracker strips on the bottom edge with the broken up pieces above towards the middle.
 - This will represent underlying C horizon and R horizon for bedrock (where present in different geographic/geologic areas).
 - Additional broken crackers can represent partial weathering of the bedrock to represent the C horizon Parent Material and the unbroken crackers the R Horizon for dense unweathered bedrock.

Question: How do you think bedrock can become broken or soften in nature?

--- Weathering from freezing and thawing will break up/fracture the bed rock, rock layers can be weathered/softened/broken down by action of water percolation/soaking into the ground/rock.

- Next, place the caramels in the remaining area between the A horizon (crumbled chocolate cracker) and the C and R horizon (honey cracker strips).

- Place the largest caramel blocks next to the cracker strips.
- Press the caramel blocks into the icing to squeeze some of the brown icing between the blocks.
- Next place the mid-sized blocks above the largest and lastly place the smallest block to fill the space below the A horizon.
 - The result should be just below the A horizon are the smallest blocks grading to the largest blocks towards the honey graham crackers.
- You can also place a few long strands of coconut long wise/up and down in the icing cracks.

Question: Why are the caramel blocks arranged this way?

--- In natural soil profiles the soils that have subsoil structure often start out as very fine blocky like structures

Question: What does the brown icing that is squeezed/exposed between the blocks represent?

--- Coatings of clay that coat the soil structure.

--- Clay is formed (transformation) in the upper part of the soil during weathering of the minerals of the soil and is washed/carried (translocated) by water soaking/infiltrating deeper into the soil profile along the soil structure/blocks.

Question: What does the brown coconut represent in the icing cracks?

--- Plant roots

--- Plant roots follow the cracks between soil structure blocks as also the clay coating wash down the between the soil structures. The cracks between the blocks represent an important characteristic for soils for water movement and root penetration. Without soil structure there would be no pathways/highways for root or water movement.

- Put your finished cracker on a sheet of white paper. Draw lines to mark the horizon changes and label each of the soil horizons of your project.
- Remember to take a photo of your finished project.
- Now for the final action, (optional, of course): eating your project which could be the most enjoyable part of the activity. Also clean up i.e. eat any leftover scraps/materials also and wash the dishes and utensils used.

Question: Which of the soil layer is your favorite? Which one is the hardest/slowest to eat?

--- Just as feeling the soil from a hole/excavation the horizon with the most clay is often the hardest/stickest to squeeze/manipulate such as your B Horizon.

Now that you have made an edible soil profile, can you think of other types of soil profiles that you could make to represent different kinds of soil for example dark to gray soils, soils with grays and brown blotched subsoil, gravelly or sandy parent material soil?

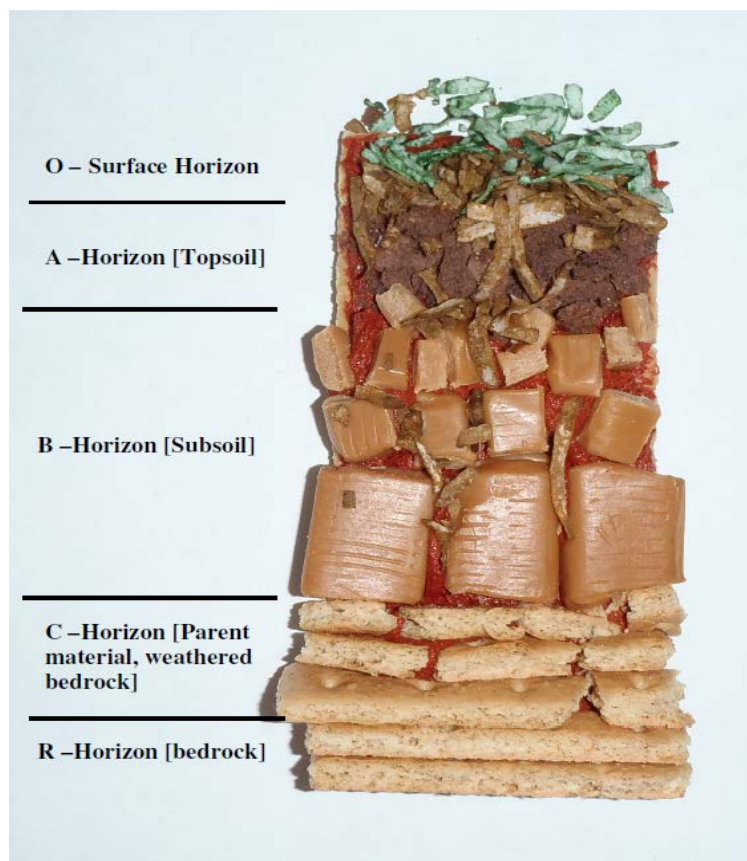
*Douglas R. Wolf, CPESC

Storm Water Specialist, Wetlands, and Storm Water Section

Surface Water, Operations & Enforcement Branch

Office of Water Quality

Indiana Department of Environmental Management



O – Surface Horizon

A –Horizon [Topsoil]

B –Horizon [Subsoil]

C –Horizon [Parent material, weathered bedrock]

R –Horizon [bedrock]

Completed edible soil profile....

Now after a photo you can start the optional activity, eating and enjoy your work. Remember where does our food come from?....

The Soil!