Need more space for observations or ideas?
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CreositySpace
Connecting Kids to STEM Through Entrepreneurship

My STEM Explorer Notes™

Mushroom Maestros

Can we grow a replacement for Styrofoam?

STEM Explorer:

The Packaging Problem

As long as humans continue to ship goods from one place to another there will be a need for packaging. However, not all packaging materials are created equal. Before you take your first step towards becoming a Mushroom Maestro, lets take some time to think about the requirements and challenges for packaging materials.

In groups of three – five brainstorm some answers to the following questions.

What are some examples of packaging material?

What are the main goals (or function) of packaging material?

What are some disadvantages of common packaging materials?

What are some requirements of improved packaging material?

Pick one requirement from your list on page 3 that you will observe throughout evaluate at the end of the mushroom packaging activity.

Outline here how you are going to observe and evaluate that requirement?

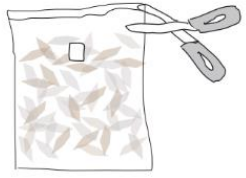
Why did you chose that requirement?

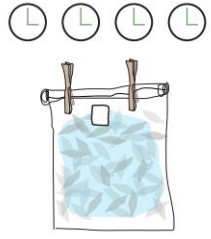
What are some of the other constraints with the mushroom packaging activity?

Step 1: Activation of Dry Materials

Make time: 40 minutes; grow time: 4–5 days

Materials needed for this step:
Grow-It-Yourself bags, tap water, flour, measuring cups and spoons, mixing bowls and spoons, clips or tape, this notebooks

	**Step 1a** Make sure you have a clean work area, clean containers, and clean hands.
	**Step 1b** Open the bag of dry material by cutting the top off along the sealed line. Do not cut below the white filter patch; this is necessary for the material to breathe during growth.
	**Step 1c** In a separate container, add 4 tablespoons (20 g) of flour and 3 cups (700 ml) of room temperature (25 °C) tap water. Stir thoroughly for 1 minute.
	**Step 1d** Pour the flour and water mixture directly into the bag of dry mushroom material. Shake vigorously for 1 minute. When there are no longer any dry patches of material or clumps of flour, the material is ready to grow!

	**Step 1e** Fold the top of the bag over several times and secure shut with tape or a clip. **Do not fold over the white filter patch**. This will prevent oxygen from getting into the material.
	**Step 1f** In a clean area (at room temperature and not in direct sunlight), allow the bag to grow out for 3—4 days. **Write down observations in this notebook.** *Thought prompt:* What do all living things need to grow? How does the mushroom material get all of these things?
	**Step 1g** When the bag appears fully white, the material is ready to use! Proceed to step 2. If you do not plan on using the material right away, place it in the refrigerator for up to 2 weeks.

Record your observations here

Date:

Observations:

Date:

Observations:

Date:

Observations:

Date:

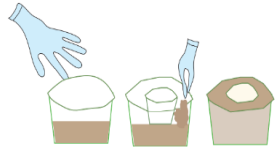
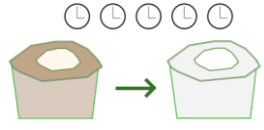
Observations:

Step 2: Growing Your Mushroom Material

Make time: 30—60 minutes; grow time: 4–5 days

Materials needed for this step:
Activated mushroom material, nitrile gloves, flour, measuring spoons, mixing bowls and spoons, molds, pushpin, plastic wrap (if using desk organizers), this notebook

	**Step 2a** Make sure you have a clean work area, clean containers, and clean hands. Put on your nitrile gloves.
	**Step 2b** Remove mushroom material from bag and place in mixing bowl or clean container large enough for mixing.
	**Step 2c** Break up material by hand until particles are loose. (Note: Material will lose most of its white coloring during this stage and look more like the original material.)

	**Step 2d** Add 4 tablespoons (20 g) of flour and mix thoroughly for 1 minute.
	**Step 2e** ***Planters:*** Pack bottom third of large cup with loose material. Place small cup in center of large cup on top of material. Pack loose material around the small cup. Fill to top rim of small cup. It's okay if material gets inside the small cup. **Desk Organizer:** Pack the form with loose material.
	**Step 2f** ***Planters:*** Snap lid closed on top of large cup. Use a push pin to poke three to five holes in the top of the lid above the small cup. ***Desk Organizer:*** Cover the desk organizer with plastic wrap and tape to the underside of the mold. Use a push pin to poke three to five holes.
	**Step 2g** Allow planter/desk organizer to grow in its form for 4—5 days at room temperature and out of direct sunlight.

Record your observations here

Date:

Observations:

Date:

Observations:

Date:

Observations:

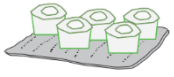
Date:

Observations:

Step 3: Drying

Make time: 20—30 minutes;
Dry time: 3–4 hours (with observations)

Materials needed for this step:
Mushroom materials in molds, cookie sheet, oven, kitchen scale (if available), this notebook

	**Step 3a** Make sure you have a clean work area, clean containers, and clean hands.
	**Step 3b** Gently remove the mushroom material from the mold.
 	**Step 3c** If a scale is available, weigh each planter/desk organizer. Place planters/desk organizer on a baking sheet and bake at 200 °F (93 °C). Check every half hour. Mushroom materials are dry when they weigh about 35% of their original weight. *This step will take between 2–4 hours.*
	**Step 3d** Remove from oven and allow to cool.

Time	Weight	Change in Weight

Follow-up

What packaging material requirement did you identify at the beginning as the one you wanted to evaluate? *(hint: Check what you wrote on page 4.)*

Describe your observations and evaluation of the mushroom packaging material with respect to that requirement.

What are some improvements you would suggest for the mushroom packaging material or process? They DO NOT NEED to be related to the requirement you have been tracking.

Hi Fungi! Are you friend or foe?

Fungi are super cool right! To this point we've learnt lots of interesting facts about fungi and the things they can do for us. There are so many different kinds of fungi out there. Some are big. Some are small. Some are OK to eat, while others would make us very very sick.

Why is that?

Why have fungi developed in different ways?

In this activity you must pick two fungi and gather data about their traits and characteristics. Some questions you should answer are:

- What are some interesting physical traits of the fungi (what does it look like?)?
- What are some interesting chemical traits of the fungi (can we eat it?)?
- What types of variations exist within that type of fungi?
- How are the off-spring similar to their parents? How are they different.

And of course, the most important question,

Why did you choose this fungi to investigate?

Be sure to use at least two different sources of information. Make sure you write down what they were in the *Sources* section.

Fungi:

Interesting trait
Reason trait developed
Variations in trait
Interesting trait
Reason trait developed
Variations in trait

Comparing Parents and Offspring

Similarities	Differences

Sources:

I chose this fungi to investigate because

Fungi:

Interesting trait
Reason trait developed
Variations in trait
Interesting trait
Reason trait developed
Variations in trait

Comparing Parents and Offspring

Similarities	Differences

Sources:

I chose this fungi to investigate because