**ACTIVITY: Growing fungi on bread**

**Activity idea**

In this activity, students design a simple investigation to explore the conditions that encourage fungal growth.

By the end of this activity, students should be able to:

* design a simple investigation
* describe a range of experimental conditions to test
* describe and record their observations.

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**Introduction/background**

Fungal spores are all around us all the time, floating in the air. When they land on food, they can eventually grow into a fungus, causing the food to decay or go mouldy.

Fungi grow well on bread. In a moist environment, fungi will generally grow on bread within a week. In this activity, students design investigations to explore the conditions that encourage fungi to grow.

For more information on how to set up a student investigation, refer to ‘What is an investigation in science?’*,* *Making Better Sense of the Living World Level 1–4*, Learning Media, 2001

For more information on culturing microorganisms in the classroom, refer to *Safety and Science: A Guidance Manual for New Zealand Schools,* Learning Media, 2000.

***Safety***

Remind students that fungal spores can be dangerous if they are breathed in. This activity is conducted in sealed plastic bags to keep everything enclosed. Do not open the bags, even at the end of the investigation.

**What you need**

* Access to the video clips [Fungi kingdom](https://www.sciencelearn.org.nz/videos/753-fungi-kingdom) and [Fungi in the lab](https://www.sciencelearn.org.nz/videos/759-fungi-in-the-lab)
* Sealable plastic bags (zip lock or similar)
* Slices of bread
* Paper towels
* Permanent markers or adhesive labels

**What to do**

1. Begin by watching the video clips [Fungi kingdom](https://www.sciencelearn.org.nz/videos/753-fungi-kingdom) and [Fungi in the lab](https://www.sciencelearn.org.nz/videos/759-fungi-in-the-lab) where Dr Peter Buchanan explains about fungi, their role in the environment and how he grows fungi in the lab. (Additional information can be found in the article [Making a case for the 5th kingdom](https://www.sciencelearn.org.nz/resources/1439-making-a-case-for-the-5th-kingdom).)
2. Ask students to brainstorm what humans need to live and grow. Record these on the board or on paper.
3. Ask students to brainstorm what fungi need to live and grow. Record their ideas. Use any uncertainties or questions students may have about fungal life needs as the basis for this activity.
4. Choose some of the conditions students think fungi need for life – food, moisture, air, warmth and light are easily investigated in the classroom.
5. Group students and ask each group to choose one condition to test.
6. Talk about what makes up a good investigation:

* Limit the investigation to a single question.
* Define the variables.
* Only change one variable per investigation.
* Include a control. (For this activity, an additional overall ‘control’ could be a sealed slice of bread on a dampened towel, left undisturbed on the teacher’s desk.)

1. Encourage each group to record their question and how they will go about their investigation. They need to decide how many bags of bread to use, including a control. Use the following table for guidance.

|  |  |  |  |
| --- | --- | --- | --- |
| **Condition to test** | **Variables to keep identical** | **Variable to change** | **Control** |
| **Food source:** Does the type of bread make a difference to fungal growth? | * Plastic bag per slice. * Moist paper towel per slice. | Slices of white, brown, grain, toast, sandwich bread. | The type of bread common to all other investigations. |
| **Moisture:** Does water make a difference to fungal growth? | * Bread slices. * Plastic bag per slice. | Moisture content of the paper towel in each bag – one should be dry. | Paper towel of similar dampness to the other investigations. |
| **Air:** Does air/oxygen make a difference to fungal growth? | * Plastic bag per slice. * Moist paper towel per slice. | Push out or use a straw to suck out as much air as possible to ‘vacuum seal’ the bag. | Seal the bag without removing the air. |
| **Warmth:** Does temperature make a difference to fungal growth? | * Plastic bag per slice. * Moist paper towel per slice. * If a bread slice is kept in the refrigerator, all other bread slices must be kept in a dark environment. | Place the bags in locations of varying temperature. | Bread slice at room temperature. (Place it in a shoebox if one bread slice is put in a refrigerator.) |
| **Light:** Does light a make a difference to fungal growth? | * Plastic bag per slice. * Moist paper towel per slice. | Place the bags in dark and light places around the classroom. These should be at room temperature. | Bread slice left on a table. |

1. Give students access to the materials they need to investigate their question. All investigations will require a similar set-up:

* For safety reasons, all bread must be kept in sealed plastic bags.
* Use the same brand of bread for each investigation, except when investigating the food source.
* Place each slice of bread on a dampened paper towel prior to sealing the bag, except when investigating moisture.

1. Label each bag with the condition to be tested. Label the control bag. Add a piece of bread, damp paper towel and apply the chosen experimental condition. Seal all bags tightly.
2. As the investigations progress, ask students to describe and draw or photograph the fungi that grow on the different slices of bread and keep notes about these findings. (Explain that this is what scientists do in the laboratory. They document their plans, ideas and findings.) Students can then use their records to plan further investigations or to talk to others about what they found out.
3. Go back to the students’ initial brainstorm regarding what fungi need to live and grow. Did their investigations help to prove or clarify their understating of fungal life processes? Are there further questions they can safely investigate?

**Remember:** The fungi spores that concentrate in the bags can be very dangerous. Do not open the bags at any time during the investigation. They should be disposed of in the rubbish at the end of the investigation, still sealed.

**Extension ideas**

In addition to the questions your students’ investigations set out to answer, they might also like to consider these discussion questions:

* Does more than one type of fungi grow on a piece of bread?
* Does the bread start to disappear? Perhaps your students could try weighing the bread bags every couple of days to see if the bags are becoming lighter with time.