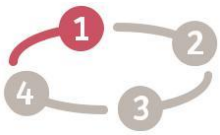
What's hidden in tree buds?

Author
Liběna Dopitová
Czech Republic

Suitable for age/class
Age 11-14

Time needed
45 min + another 45 min after a two weeks break

Setting and requirements
Classroom (lab), school garden (park) with deciduous trees, Phenological site



Aim of the activity:
Students focus their attention on buds of deciduous trees**.**

Lesson objectives - thematic / content

Students get familiar with the structure of the buds of chosen deciduous trees, they observe the bud sprouting and changes that deciduous trees undergo in spring.

Lesson objectives – inquiry skills

Students form hypotheses, carry out observations and record them in drawings, at the end of the lesson they plan further research – phenological observation Green-Up.

Motivation

Activity description:

- Distribute among your students swollen buds of lilac so that some students get leaf bud and others flower bud (do not point out the fact that each bud is different).
- Ask them to carefully dismantle the bud, lay the individual parts on a paper and draw the structure of the bud in their worksheet.

Notes: A week before the lesson remove several twigs of lilac and leave them in a warm room in water; the buds swell and will be easily observable. It is possible to use a different tree but lilac belongs among the tree species used in the GLOBE Program phenological observations, moreover, leaves and flowers in buds are very well observable.

You need:
Swollen lilac buds from different parts of twigs, a sheet of paper, magnifying glass, tweezers, needle, worksheet.

5 MINUTES

Aim of the activity:
Students compare their observations.

Focusing on the topic

Activity description:

1. Ask students to describe what they saw and sketched.
2. Students compare their drawings and dismantled buds.
3. They come to a conclusion – the buds are not all the same. They can even find out that some buds hide the flower and others the leaf (leaves).

Notes:
In the buds can be observed: woody and soft bud scales, leaf base, flower base, twig base.

You need:
Worksheet

5 MINUTES

Aim of the activity:
Students ask questions. They reflect on what they would want to know about buds and spring metamorphosis of deciduous trees.

Asking questions

Activity description:

- Encourage students to ask questions about this contradictory situation.

Notes:
Questions are based on the inconsistent observation of the content of the buds in the previous steps. Questions as follows may occur: '*How come that the buds have different structure?', '**How do I know what sprouts out of a bud?', '**What is hidden in buds?', '**How can we accelerate sprouting?', 'Are buds of different tree species diverse?', 'What is the structure of tree buds that we observed in the autumnal phenological observations Green down?' and 'In which season trees develop buds?'.*
The highlighted questions are all suitable for further research. **These questions are essential: *'What is the structure of tree buds that we observed in the autumnal phenological observations Green down?' 'What is going to sprout out of them?'***
If they do not occur, try to appropriately guide students to them.
Question – '*In which season trees develop buds?*' - requires a long-term observation and it is better to implement it outside of this lesson. Thus oriented research can be linked to phenological observations when students regularly visit a selected tree throughout the year.

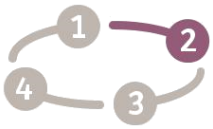
3 MINUTES

Aim of the activity:
Students choose a research question and divide in groups according to their interest.

Selecting research question

Activity description:

1. Familiarize students with the tools, time and space that is available for the observation.
2. Which of the questions written on the board can be explored considering point 1.
3. Highlight such questions on the board.
4. Write the selected questions each on a sheet of paper and place them conveniently in the classroom so that students can work in groups.
5. Encourage students to split in groups according to their interest. Coordinate the division so that the groups are even.
6. Students write the selected question of their group in their worksheet.



Aim of the activity:
Students formulate a hypothesis.

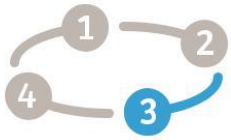
Notes:
It is possible to select one question for all groups. The whole class will thus deal with one topic and the organization of the following part of the lesson will be easier.

You need:
Worksheet

Formulation of hypotheses

Activity description:
Ask students to write down their hypothesis in the worksheet. Monitor the groups and discuss the hypothesis if necessary.

You need:
Worksheet



15 min collection of twigs outdoors (time depends on the distance to the site with trees).

Aim of the activity:
Students plan how to verify their hypothesis and secure the necessary material.

Planning, preparation of the experiment or measurement

Activity description:

1. Tell the groups to draft a detailed plan of procedures to verify their hypothesis (including tools and required material).
2. Go together to the garden (park, forest) and collect material according to the proposed methods.
3. Individual groups place the twigs in classroom in containers with water (ask students to mark their group's twigs and the tree species).
4. It will take approximately 14 days before the twigs sprout.

Notes:
The group that chose the question '*Are buds of different tree species diverse?*' need the twigs not sprouting. Make an agreement that in this step the group only selects trees that will be observed and students collect twigs right before the observation.

You need:
Secateurs, containers with water for twigs

Aim of the activity:
Students carry out the observation.

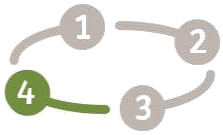
AFTER 14 DAYS

Experiment or measurements

Activity description:

1. Students carry out the observation.
2. Students use the Key to identifying trees in winter and Phenological Guide.
3. Students record sketches and descriptions to their worksheet.

You need:
Worksheet



Aim of the activity:
Students formulate conclusions and compare their findings with the hypothesis.

.

Formulation of conclusions and coming back to the hypothesis

Activity description:

1. Each group formulates conclusions of their observation and record it in the worksheet.
2. Students compare them with the hypothesis and write down whether the hypothesis was confirmed or refuted.

Aim of the activity:
The groups share the results of their observations.

Presentation

Activity description:

- Each group gets the opportunity to make an oral presentation of their research.

Notes:
Encourage students to use their sketches in their presentations.
If your class dealt with only one question, it is sufficient if students from individual groups exchange experiences from their research and compare the conclusions.

You need:
PC, projector (if necessary)

Aim of the activity:
Students reveal part of the observation that can be used for the beginning of phenological observations Green-Up.

Framing

Activity description:

1. Encourage students in considerations about how to use the results of their observations.
2. Pay a special attention to tree species which you use for phenological observations (*What is the position of buds? Where are the flower buds and where are the leaf buds?*).

Aim of the activity:
Students have the opportunity to express their feelings about the lesson; how they felt during the lesson and how they liked working.

Reflection

Activity description:
Students color in a graphic sign that corresponds to their feelings in the worksheet.

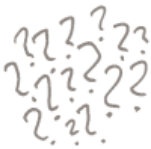
You need:
Worksheet

What's hidden in tree buds?

worksheet

What is hidden in the bud? (draw and describe)

Research question



Hypothesis

How are you going to verify the hypothesis?

1.

2.

What did you observe? (draw, describe, record facts)

What are your conclusions? Did you confirm the hypothesis?

Do you have more questions?

How did you like this exercise?
(color in a pencil)