

Germination and temperature



Biology

Plant Physiology / Botany

Germination, growth, development



Difficulty level

medium



Group size

2



Preparation time

10 minutes



Execution time

40 minutes

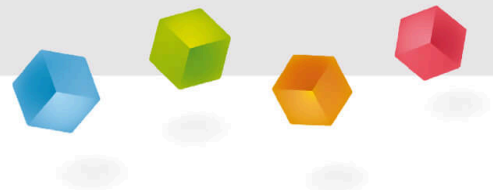
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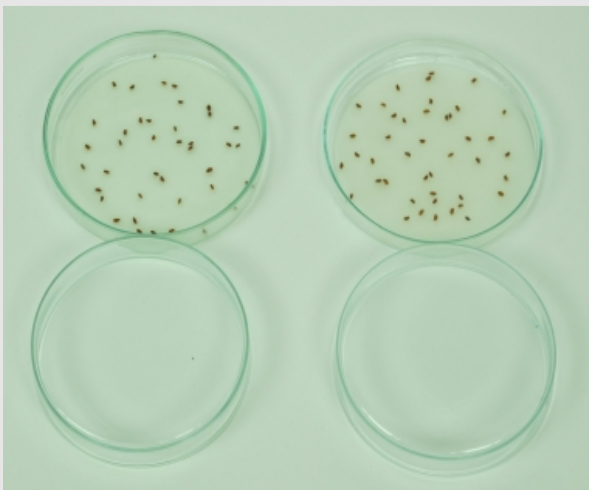
PHYWE

Teacher information



Application

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Experiment setup

The seeds of the different types of plants, e.g. vegetable plants, are not all sown at the same time. Some are sown in early spring, while others are sown in May. Others are even sown in the autumn of the previous year. In this experiment, the students should realize that besides humidity and air, temperature also has an influence on germination.

Other teacher information (1/4)

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Prior knowledge



Students should have already covered seed structure and seed plant reproduction in class.

Scientific Principle



In addition to water and air, seeds are also temperature dependent when it comes to germination.

Other teacher information (2/4)

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Learning objective



Students should realize that seeds depend on temperature in addition to water and air for germination.

Tasks

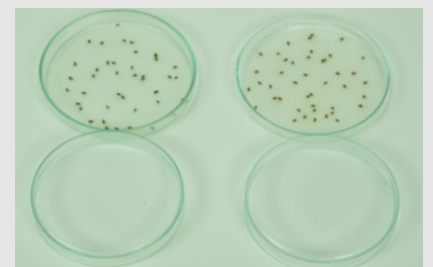
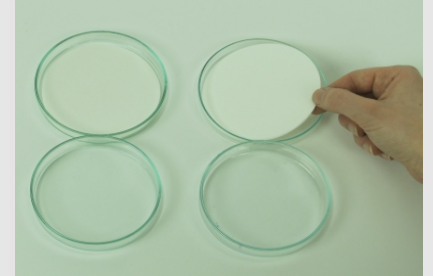


Have students observe the germination of cress seeds at different temperatures.

Other teacher information (3/4)

Notes on structure and implementation

- The trays with cress seeds should be placed at different room temperatures. Care should be taken to ensure that both trays with cress seeds receive sufficient water and light, otherwise the experimental results will be falsified.
- On the right are pictures of the experiments to be prepared.
- To obtain meaningful results, the experiment should be conducted over a period of at least 5-6 days.



Other teacher information (4/4)

Additional information

Different seeds require different temperatures to germinate. Some, for example winter cereals such as winter wheat or winter rye, (there is also spring wheat and spring rye, but the winter varieties can be harvested earlier and produce higher yields) are sown in autumn, as the seeds need a longer frost period before they germinate. Seeds have what is called dormancy, which means that the seeds do not begin to germinate until after a certain period of time. This prevents the seeds from germinating directly on the mother plants and takes into account the seasons; plants are prevented from developing at a time of year when growing conditions are not present. Factors that lead to the breakdown of dormancy include moisture, light conditions, soil conditions, and especially temperature changes. Winter cereals germinate only after a long period of frost, and the same is true of apple seeds. The artificial overcoming of dormancy is called stratification, for example, seeds from which plants are grown can be artificially exposed to the cold by storing them for several days in a refrigerator.

Safety instructions

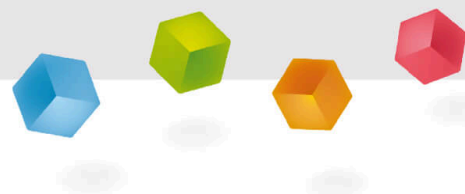
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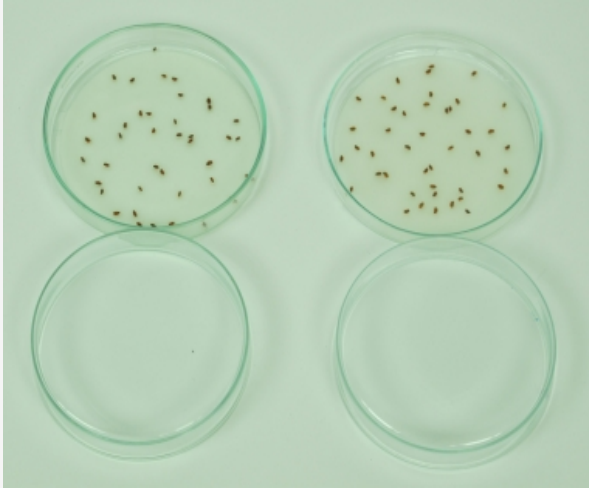
- The general instructions for safe experimentation in science lessons to be applied to this experiment.

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Student Information



Motivation



Experiment setup

The seeds of the different types of plants, e.g. vegetable plants, are not all sown at the same time. Some are sown in early spring, while others are sown in May. Others are even sown in the autumn of the previous year. In this experiment, the students should realize that besides humidity and air, temperature also has an influence on germination.

Tasks



Garden cress (*Lepidium sativum*)

Why are carrots and peas sown as early as March, but beans and cucumbers only in May?

Examine the dependence of germination on temperature using cress as an example.

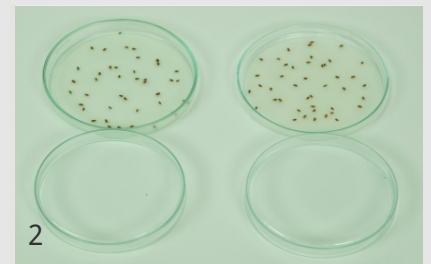
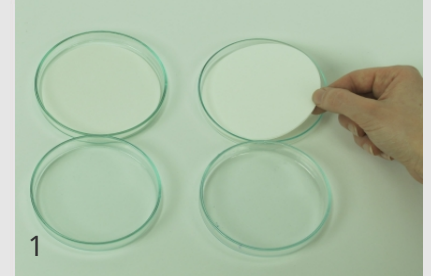
Equipment

Position	Material	Item No.	Quantity
1	Circular filter, d 90 mm, 100 pcs	32977-03	1
2	Beaker, 250 ml, plastic (PP)	36082-00	1
3	Students thermometer, -10...+110°C, l = 180 mm	38005-02	1
4	Laboratory pen, waterproof, black	38711-00	1
5	Petri dish, d 100 mm	64705-00	2

Set-up

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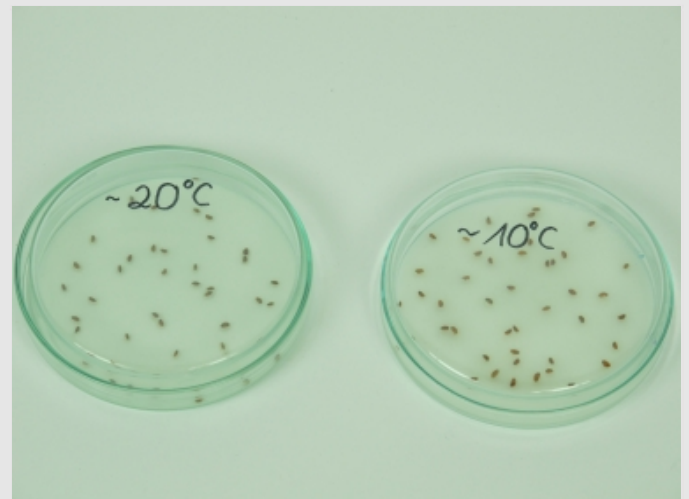
- Place three 90 mm diameter round filters in each of two 100 mm diameter Petri dishes and smooth them out on the bottom of the dishes (Fig. 1).
- Moisten the round filters very well with water and distribute 20-30 dry garden cress seeds on each of them (Fig. 2). Close both trays with the lid.



Procedure

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- Place one dish at room temperature (about 20 °C), the other in the cellar or in a cool place at about 10-11 °C.
- Check the germination of the cress seeds daily over a period of 5-6 days. Make sure that the round filters are always moist.



Label the shells

Report

Task 1

Drag the words to the right place.

Different seeds require different [] to germinate. Some, for example [] such as winter wheat or winter rye, are sown in [] because the seeds need a longer frost period before they []. Many seeds have what is called [], which means that the seeds only start to germinate after a certain period of time.

germinate

temperatures

autumn

winter cereals

dormancy

✓ Check

Task 2

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Choose the correct statements.

- ☐ The seeds of the different types of plants, e.g. vegetable plants, are not all sown at the same time.
- ☐ The seeds of the different types of plants, e.g. vegetable plants, are all sown at the same time.
- ☐ In addition to temperature, humidity and air, among other factors, also have an influence on germination.

✓ Check

Task 3

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Choose the correct statements.

- ☐ Dormancy prevents the seed from developing at a time of year when growing conditions are not present.
- ☐ Dormancy prevents the seed from germinating directly on the mother plant.
- ☐ Dormancy is a myth and does not exist.
- ☐ Dormancy prevents the plant from being eaten by animals.

✓ Check

Slide	Score / Total
Slide 15: Seeds and temperature	0/5
Slide 16: Seeds of plant species	0/2
Slide 17: Dormancy	0/2

Total  0/9



Solutions



Repeat