EXPLORATION 2

Growing Pains

Examine the impacts of overcrowding on plant growth.

What basic things do you think help a plant grow? Plants need six basic things to grow: sunlight, water, air, temperature, nutrients, and space. Plants usually get water and nutrients from soil. Soil provides not only nutrients but also an anchorage point for plant roots to support the plants. With this support, plants can grow upright and stay in place. However, if an area is overcrowded with plants, will the growth of the plants be affected?

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Level of Difficulty: moderate

Time Needed: 5 weeks

In this experiment, you will explore how the growth of plants is affected by the density of plants.

Hypothesis:

Circle the correct word(s) to show your hypothesis.

Overcrowding **affects / does not affect** plant growth.

Materials:


water


soil


beans


scissors


2 milk cartons

Steps:

1. Clean the milk cartons and cut out one side of each milk carton.
2. Fill each carton with soil. Do not pack the soil.
3. Label the cartons A and B.
4. In Carton A, plant eight beans. Place them far apart. In Carton B, plant 50 beans.
5. Water the beans and put the cartons in sunlight.

Wait for the seedlings to grow and observe them every week for three weeks. Record your observations in the table on the next page.

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My Observations

Conditions of Plants	Plants in Cartons	Week 1	Week 2	Week 3
No. of Seedlings Grown	A			
	B			
Height of Seedlings	A			
	B			
No. of Leaves on Seedlings	A			
	B			
Colour and Size of Leaves	A			
	B			
Thickness of Stems	A			
	B			

Conclusion:

Circle the correct words after conducting the experiment.

After three weeks, the plants in Carton A **are / are not** growing healthier than those in Carton B.

My hypothesis was **correct / incorrect** .

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Explanation:

You should have noticed that the seedlings in the cartons had grown to almost the same height in the first few days. However, after the first week, only the seedlings in Carton A grew steadily and looked healthy. Also, the leaves of the seedlings in Carton A were greener and bigger than those in Carton B. The stems of most seedlings in Carton B were thinner and stunted. After the next two weeks, you might have seen that some seedlings in Carton B died, but the seedlings in Carton A stayed healthy and strong. All this happened because the seedlings in Carton B were too close together so they competed with one another for resources. Since the seedlings in Carton B grew in a crowded environment with limited water, nutrients, and space for the roots, they could not grow healthily and some would die eventually.

plants growing healthily with sufficient space

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Read about the farming practices. Then compare them and list their pros and cons.

Monoculture is a farming practice in which only one type of plant is grown. While monoculture is simple to manage, can be efficient for harvesting desired plants, and results in greater yields of the produce, continuous monoculture can be harmful. It can eventually degrade the soil, reduce biodiversity, and lead to great losses from pest buildup and diseases. This is why planting multiple species and practising crop rotation is beneficial. Although crop rotation requires higher initial investment costs, knowledge of different crops, and more farming experience, this farming practice is more sustainable as it improves soil fertility and is a natural remedy against pest and weed. This ensures less use of fertilizers and pesticides as compared to monoculture.

Monoculture

_____ species of plants

Pros:

Cons:

Crop Rotation

_____ species of plants

Pros:

Cons: