

5-LS1-1 From Molecules to Organisms: Structures and Processes

Students who demonstrate understanding can:

- 5-LS1-1. Support an argument that plants get the materials they need for growth chiefly from air and water.** [Clarification Statement: Emphasis is on the idea that plant matter comes mostly from air and water, not from the soil.]

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Engaging in Argument from Evidence

Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).

- Support an argument with evidence, data, or a model.

Disciplinary Core Ideas

LS1.C: Organization for Matter and Energy Flow in Organisms

- Plants acquire their material for growth chiefly from air and water.

Crosscutting Concepts

Energy and Matter

- Matter is transported into, out of, and within systems.

Observable features of the student performance by the end of the grade:

1	Supported claims
a	Students identify a given claim to be supported about a given phenomenon. The claim includes the idea that plants acquire the materials they need for growth chiefly from air and water.
2	Identifying scientific evidence
a	Students describe the given evidence, data, and/or models that support the claim, including evidence of: <ol style="list-style-type: none"> Plant growth over time. Changes in the weight of soil and water within a closed system with a plant, indicating: <ol style="list-style-type: none"> Soil does not provide most of the material for plant growth (e.g., changes in weight of soil and a plant in a pot over time, hydroponic growth of plants). Plants' inability to grow without water. Plants' inability to grow without air. Air is matter (e.g., empty object vs. air filled object).
3	Evaluating and critiquing evidence
a	Students determine whether the evidence supports the claim, including: <ol style="list-style-type: none"> Whether a particular material (e.g., air, soil) is required for growth of plants. Whether a particular material (e.g., air, soil) may provide sufficient matter to account for an observed increase in weight of a plant during growth.
4	Reasoning and synthesis
a	Students use reasoning to connect the evidence to support the claim with argumentation. Students describe a chain of reasoning that includes: <ol style="list-style-type: none"> During plant growth in soil, the weight of the soil changes very little over time, whereas the weight of the plant changes a lot. Additionally, some plants can be grown without soil at all. Because some plants don't need soil to grow, and others show increases in plant matter (as measured by weight) but not accompanying decreases in soil matter, the material from soil must not enter the plant in sufficient quantities to be the chief contributor to plant growth. Therefore, plants do not acquire most of the material for growth from soil. A plant cannot grow without water or air. Because both air and water are matter and are transported into the plant system, they can provide the materials plants need for growth. Since soil cannot account for the change in weight as a plant grows and since plants take in water and air, both of which could contribute to the increase in weight during plant growth, plant growth must come chiefly from water and air.