Unless otherwise specified, "descriptions" referenced in the evidence statements could include but are not limited to written, oral, pictorial, and kinesthetic descriptions.

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	Disciplinary Core Ideas	Crosscutting Concepts
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.	**LS1.C: Organization for Matter and Energy Flow in Organisms** • Plants acquire their material for growth chiefly from air and water.	**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:
		i. Plant growth over time.
		ii. Changes in the weight of soil and water within a closed system with a plant, indicating:
		1. 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).
		2. Plants' inability to grow without water.
		iii. Plants' inability to grow without air.
		iv. 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:
		i. Whether a particular material (e.g., air, soil) is required for growth of plants.
		ii. 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:
		i. 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.
		ii. 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.
		iii. Therefore, plants do not acquire most of the material for growth from soil.
		iv. 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.
		v. 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.

5-LS2-1 Ecosystems: Interactions, Energy, and Dynamics

Students who demonstrate understanding can:

5-LS2-1. **Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.**[Clarification Statement: Emphasis is on the idea that matter that is not food (air, water, decomposed materials in soil) is changed by plants into matter that is food. Examples of systems could include organisms, ecosystems, and the Earth.] [Assessment Boundary: Assessment does not include molecular explanations.]

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

Developing and Using Models
Modeling in 3–5 builds on K–2 models and progresses to building and revising simple models and using models to represent events and design solutions.

- Develop a model to describe phenomena.

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Connections to the Nature of Science

Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena

- Science explanations describe the mechanisms for natural events.

Disciplinary Core Ideas

LS2.A: Interdependent Relationships in Ecosystems

- The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as "decomposers." Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem.

LS2.B: Cycles of Matter and Energy Transfer in Ecosystems

- Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment.

Crosscutting Concepts

Systems and System Models

- A system can be described in terms of its components and their interactions.

Observable features of the student performance by the end of the grade:		
1	Components of the model	
	a	Students develop a model to describe* a phenomenon that includes the movement of matter within an ecosystem. In the model, students identify the relevant components, including:
		i. Matter.
		ii. Plants.
		iii. Animals.
		iv. Decomposers, such as fungi and bacteria.
		v. Environment.
2	Relationships	
	a	Students describe* the relationships among components that are relevant for describing* the phenomenon, including:
		i. The relationships in the system between organisms that consume other organisms, including:
		1. Animals that consume other animals.
		2. Animals that consume plants.

		3. Organisms that consume dead plants and animals.
		4. The movement of matter between organisms during consumption.
		ii. The relationship between organisms and the exchange of matter from and back into the environment (e.g., organisms obtain matter from their environments for life processes and release waste back into the environment, decomposers break down plant and animal remains to recycle some materials back into the soil).
3	Connections	
	a	Students use the model to describe*:
		i. The cycling of matter in the system between plants, animals, decomposers, and the environment.
		ii. How interactions in the system of plants, animals, decomposers, and the environment allow multiple species to meet their needs.
		iii. That newly introduced species can affect the balance of interactions in a system (e.g., a new animal that has no predators consumes much of another organism's food within the ecosystem).
		iv. That changing an aspect (e.g., organisms or environment) of the ecosystem will affect other aspects of the ecosystem.