

Bioenergy: From Field to Fuel

Soybean Life Stages Models



Objectives: Students will learn about the life cycle of a soybean plant and exhibit their knowledge through the creation of building brick models of each life stage.

Oklahoma Academic Standards:

Science: PK.S.3 N; K.LS1.1; K.ESS3.1; 3.LS1.1; 5.LS1.1

Teacher Background:

Soybeans are a common and high-use crop in the United States. Soybeans are used for both human and animal feed, plastics, and biofuels (along with many other things). In 2021, the value of soybean production in Oklahoma was 146 million dollars with over 530,000 acres of soybeans being harvested. Soybeans are one of the main crops used for biofuels, a form of bioenergy, which is a topic of growing interest and importance for environmental sustainability and to reduce our reliance on fossil fuels and foreign oil imports. This lesson serves to introduce students, at a base level, to what soybeans are, their use, and how they grow.

Important Vocabulary:

Seed: a flowering plant's unit of reproduction, capable of developing into another such plant.

Seed Coat: protects the seed when it is dormant (not growing)

Embryo: the part of the seed that grows into the plant

Cotyledon: first food for the soybean seedling and the first two leaf-like parts of the plant when it emerges

Dormancy: the state of being temporarily inactive

Germination: the development of a plant from a seed or spore after a period of dormancy

Emergence: when the cotyledons (first leaves) are pushed up through the soil

Vegetation: when leaves develop along the stem

Reproduction: when flowers begin to bloom and pollination occurs

Maturity: fully developed seeds are present and harvest can occur

Materials:

- [Soybean Growth Stages Image Cards](#)
- [Soybean Growth Stages Slides](#) (optional)
- [Soybean Growth Stages Labels](#) (optional)
- Interlocking Building Bricks

It is also possible to use alternative materials.



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Lesson:

1. Project an image of plant or have a live plant at the front of the room. Ask students: What do plants need to grow? Allow students to brainstorm and answer aloud.
 - a. Answers: sunlight, water, air, warmth (proper temperature), and nutrients (food).
1. Now ask students: How do plants grow?
 - a. Answers can vary. You may draw connections with human or other organisms life cycles as they go from small-large.
1. Tell students that they will be looking at the life cycle of a soybean plant today. Ask students: What do you know about soybeans? Have you seen soybeans?
 - a. If you have soybean seeds or products made from soy, show them some examples.
1. Group students into groups of 3-4. Pass out pre-printed [image cards](#) of the soybean growth stages: germination, emergence, vegetation, reproduction, and maturity. Have students work within their group to put the cards in consecutive order from first-last based on the image alone.
1. Once complete, discuss the parts of the soybean plant and stages of growth presented in the [Soybean Growth Stages Slides](#) as a class.
1. To wrap up, pass out the building brick sets to each group of students. Have them create models of each of the five stages of soybean growth. You may let them verbally explain their models to you, physically label the models themselves, or use [pre-printed labels](#) based on their abilities.
 - a. Variations/Extensions:
 - i. Use alternate materials to the building bricks for their models
 - ii. Follow up this activity with the Aerogarden lesson to see the stages of soybean growth in your classroom!



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Information Sources:

2021 State Agriculture Overview. USDA/NASS 2021 State Agriculture Overview for Oklahoma. (n.d.). Retrieved June 29, 2022, from https://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=OKLAHOMA

Nancy Zenger-Beneda, A. and Y. M. G. (n.d.). *Soybean growth stages*. Kansas Foundation for Agriculture in the Classroom. Retrieved June 28, 2022, from <https://ksagclassroom.org/ksresource/soybean-growth/>

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Soybean uses. Oklahoma Soybean Board. (n.d.). Retrieved June 29, 2022, from <https://www.oksoy.org/soybean-uses>

Image Sources:

Building Block Image: Image by [Francis Ray](#) from [Pixabay](#)

Soybean Emergence: Image by [Julio César García](#) from [Pixabay](#)

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