Lessons: Inherited traits and growth stages; selective breeding for traits and extension

These lessons describe genetic traits in soybeans, when they appear during stages of growth and how to predict the appearance of traits.

Sequence
Inherited traits and growth stages in soybeans
Soybean Punnett squares
Root fluorescence in soybeans

Time
2 class periods to 2 weeks (if completing Extend portion of unit)

Grade Level
6-12

Materials
Soybeans 101 e-learning
Heritable traits deck
Soybean growth stages
Soybean Punnet squares lesson
Plant breeding e-learning course
Root fluorescence in soybeans lesson
soybean seeds
plastic bags or petri dishes
paper towels
UV light source
various soil media

Objectives/Target
Students will review the history and uses of soybeans.
Students will see heritable traits of soybeans.
Students will determine when the traits are observable.

Vocabulary
hilum, pubescence, pod, abscission layer

Prior Knowledge
Students should have an understanding of plant flower parts for reproduction (stamen, anther, pistil, ovary) and how traits are inherited from parent to offspring. Knowledge of specific steps in meiosis is not required.

5E Plan:
Engage
Show students photos of soybeans, the graphic in lesson 3 of Soybeans 101 e-learning course, or bring in a soybean plant. Have them identify parts of the plant in table groups.

Explore
Ask students to identify which traits in soybeans are inherited by writing down their thoughts on a KWL chart. Show the *Heritable traits in soybeans* deck to identify which traits are inherited and use the soybean growth poster to determine when those traits are observable. Ask students to update their KWL chart with what they learn. Describe how Punnett squares are used to predict breeding crosses and resulting traits. Collect the KWL chart as an exit ticket.

Soybean Growth and Genetics

Explain
Have students complete *Predicting traits in soybeans* individually and answer the questions (could be assigned as homework after Engage and Explain activities). Return KWL chart at beginning of class on day 2. Allow students to review *Plant breeding techniques* e-learning course to find other traits that are being developed in soybeans either through selective breeding or genetic engineering.

Extend
Have students germinate soybean seeds to determine root fluorescence. Ask them to design an experiment to try to figure out if root fluorescence has a discernible use.

Evaluate
Have students discuss in groups the benefits of selective breeding, genetic engineering and other techniques.

Additional Resources:
Creating better soybeans https://cfaes.osu.edu/news/articles/creating-better-soybeans