PUZZLERS

#3 | SEED SPROUT

Puzzle

Sprout seeds without using soil.

Standards & Connections

NGSS.3-5-ETS1, NGSS.MS-ETS1, NGSS.MS-LS2-5, NGSS.5-LS2-1, NGSS.HS-ESS3-4

Background:

All fully developed seeds contain an embryo and, in most plant species, a store of food reserves, wrapped in a seed coat. Temperature, moisture, air, and light conditions must be correct for seeds to germinate. Aeration in the soil media allows for good gas exchange between the germinating embryo and the soil. Seeds need oxygen and produce carbon dioxide (CO_2). If the soil or media is not well aerated due to over watering or compaction, the CO_2 will not dissipate, and seeds can suffocate. Most seeds germinate best under dark conditions; however some seeds require sunlight. Most seeds germinate at around 70-90 ºF.[i] Can you sprout a seed without using soil?

Suggested Materials:

Paper towels, napkins, water, variety of seeds, glass jars, plastic Ziplock bags

IDENTIFY

Share the background information with the students, then share the puzzle to be solved. Determine constraints (e.g., time alotted, space, materials provided, etc.) and divide students into small groups.

IMAGINE

Ask a series of questions to help students brainstorm solutions to the puzzle. Encourage students to list all ideas – don't hold back! Before moving on, make sure each group selects a solution that fits within the contraints.

Ask: How can you can solve this puzzle? Which of your ideas can you build a prototype for given the constraints?

DESIGN

Students diagram the prototype, identify the materials needed to build the prototype, and write out the steps to take. Students describe the expected outcomes.

Ask: What steps will you take to create your solution? What do you expect your solution to look like and be able to do?

CREATE

Students follow their design plan and build their prototypes. Monitor their progress and remind them about how much time they have.

TEST & IMPROVE

Students evaluate their creation and compare it with the expected outcomes. Students seek areas of improvement and make changes where needed.

SHARE

Students share their solution to the puzzle and communicate lessons learned.

Ask: What was your biggest takeaway? What would you do differently?

Additional Resources:

For more background information on this topic, please visit www.purpleplow.org.

Once the seed has sprouted, have the students analyze whether their seeds are monocots or dicots! NOTE: It will take 1-2 weeks for the seeds to germinate.

[i] Pennsvylania State University Extension. (2012, August 28). Seed and seedling biology. Retrieved from https://extension.psu.edu/seed-and-seedling-biology