

Plant Seedling



LEVEL: Grades 4-6

SUBJECTS: Science and Social Studies

AZ ACADEMIC STANDARDS: ISS-F2, ISS-E1, 3SS-F2, 3SS-E5, 3SS-E6, 3SS-E7; SC04-S1C1, C2, C3, C4, S2C1, C2, S3C1, C2, S4C1, C3, C4, S6C2, C3; SC05-S1C1, C2, C3, C4; S2C1, C2, S3C1, C2, S4C1, S6C2, C3; SC06-S1C1, C2, C3, C4, S2C1, C2, S3C1, C2, S4C1; SC06-S6C1, C2

MATERIALS

Pan or tray for materials, masking tape, marker, scissors, hand lenses, container filled with water, sponge for spills, lettuce and pinto bean seeds. Each child will need: 2 inch by 3 inch paper towel, ziploc sandwich bag, pencil, Copycat pages flipbook, and copy of "Parts of a Seed."

VOCABULARY

cotyledon, embryo, endosperm, seed coat

RELATED LESSONS

If it Smells Good, is Edible and Attracts Wildlife, Then it's a Practical Garden!
Where do They Go?
Don't Wait, Just Propagate!
Let's Make Stew
How do Plants Make Food?
Survival of the Fittest
Getting to the Root of the Matter
This Can't be a Plant
Soggy Seeds
Plants, Plants and More
Plants

SUPPORTING INFORMATION

Seeds have to be stored- not always an easy task. Stored in places too dry, seeds will shrivel, which means poor growth or yield. Stored in places too

wet, seeds will sprout or rot. Over time people learned the best way of storing seeds was in a dry (but not too dry) cool place, not subject to extreme hot or cold. They learned the length of time seeds could be stored depends on the kind of seed. Some seeds can be stored for a year (onion), others 5 to 10 years (squash, pumpkin or cucumber) and others for centuries (wheat, grain).

After storage, seeds have to be tested to see if they will sprout. A random sample of seeds placed in moist, warm soil or rolled up in moist warm towels for 2 to 4 days gives a good percentage count of how many seeds to plant to achieve maximum desired growth. The uses for seeds have changed since man first started collecting. They were used as currency until coins were minted from metals. When artificial dyes were created, natural dyes were used less and less. However we still use seeds in dyes, spices, ornaments, lubricants, jewelry, waxes, feed for animals, drugs, and genetic engineering.

Today people grow plants from seeds without soil. This is called hydroponics- letting water in combination with select nutrients do the work of soil, which was the idea of the Aztecs, Chinese and Babylonians.

Seeds are amazing because they contain all the food they need to start a plant growing and sustain it until it is capable of producing its

BRIEF DESCRIPTION

Plants have played a critical role throughout time. They are necessary in the web of life.

OBJECTIVES

Students will:
-Label the basic parts of a seed.
-Record, through observation, data obtained from "plantings."
-Complete flipbooks.

ESTIMATED TEACHING TIME

One week. (First day, 45-50 minutes, each day after that, 15-20 minutes)

SUPPORTING INFORMATION (cont'd)

own food. Scientists use the same process as the students will be using such as observing, guessing and experimenting to see what seeds need and do not need to grow into a plant.

Cotyledon- the primary leaf of the embryo of seed plants.

Embryo- an organism in the earliest stages of development. The beginning or rudimentary stage of life.

Endosperm- food stored for the seed growth.

Seed Coat- hard, protective, outer covering of a seed.

GETTING STARTED

Teacher needs: 18 inch by 24 inch piece of construction paper, 9 plastic sandwich bags, and tape. Students should have, 2 inch by 3 inch paper towel, ziploc sandwich bag, pencil and copycat flipbook and "Parts of a Seed" sheet.

PROCEDURES

The first experiments will be done for the class. Each bag will be taped to construction paper with predictions written next to it.

Teacher demonstration:

- "I am putting a piece of paper towel and pinch of lettuce seeds into the first bag and nothing else. Raise your hand if you think the seeds will grow. (Count and record the numbers on the chart.) How many think the seeds will not grow? Does anyone think otherwise? Why?"

- "In the second bag I will put the towel, seeds and lots and lots of water." (Complete this process and record the students' predictions.)

- "The third bag will contain a towel soaked in salt water and seeds. What do you predict?" (Record)

- "The fourth will have a biodegradable soapy water." (Record)

- "The fifth will have a non-biodegradable soapy water." (Record)

- "The sixth one will have dirt and no water." (Record)

- "The seventh will have dirt and some water." (Record)

- "The eighth, not yet taped to the paper, will have a towel dipped in water and seeds but will be twisted up into a tight little wad allowing no air or space." (Tape up the twisted bag and record the students' predictions.

- "The ninth bag will have seeds and a towel dipped in water. We will put this bag in the refrigerator." (Record again)

Student Experiment:

-Tell the students they will conduct the last experiment. This includes dipping a paper towel in water, adding pinto bean seeds, putting the towel and seeds in a plastic bag and selecting a spot in the classroom to hang the experiment. Students will draw the seed each day and record any changes on a special paper (data sheet) that will become their own flipbook. Tell them to write their predictions on the back of the paper. Younger children can write "yes" or "no" as to whether they think their seeds will grow.

-Give the students the Copycat page Flip book data sheet and have them write their names on it. Distribute a couple of seeds to each student and 2-3 hand lenses (optional) for each group of students. Ask them to take turns looking at their seeds through the hand lenses. The students should look carefully to be able to draw the right shape. It may be a new experience to draw what they see. Explain that scientists draw what they see too.

-Ask the students to draw the seed on the Copycat page Flipbook data sheet. Tell them they will draw the seed each day for a week. Ask them to draw it on the dot provided on the data sheet and to make it larger than the dot. Demonstrate how to do it. Have the students write the number of the day (Day 1, Day 2, etc.) On their drawing for each day they record the seed's growth. Collect the students' papers. Invite the students to taste the seed if they wish.

-Have the students "read" the directions for their "planting" on the blackboard or in a hand out. Be sure to tell them to place the tape at an angle so the bag is hung securely. Suggest that they separate one or two of the seeds from the rest so they can observe these more easily.

-When the seeds are all in labeled bags, allow the students to place them where ever they want in the classroom. (If no one chooses a very dark place, put your experiment in that location.)

Each day of the week:

-Each day at the same time, return the data sheets and hand lenses to the students. Ask them to take five minutes to draw the seeds; show the students what the class chart results are so far. They may need to add a tiny bit of water to their bags if dry. The students will have to guess what happened to their experiments over the weekend to complete their drawings. Remind them to observe very carefully as they complete their drawings. Check the students' drawings to see whether they have drawn the roots, leaves and stem.

One week later:

-Review what happened to the seeds and make flipbooks.

-Making flipbooks: 1. Cut the rectangles on the data sheet apart on the dotted lines. 2. Stack them in order from Day One to the last day, and put the title page on top. The rectangles can be slightly staggered with the edge of rectangle two peeking out behind the first one, and so on, for easier flipping. 3. Staple the rectangles on the solid line with three staples. 4. Flip the pages with your thumb to see your seed grow.

Evaluation:

Collect flipbooks. These should have a page for however many days of observation the student did and have a drawn and colored picture to show growth of the seed. Data sheets will be collected with results written in complete sentences. Test given over the parts of the seed. Students will label a diagram of the seed with the correct name parts.

EVALUATION OPTIONS

Have students answer these questions on a sheet of paper for you, or discuss as a group:

- Which part of the plant grew first?
- Which day did the brown seed coat come off?
- Look closely at the coat. Does it still have food for the seed inside it? Why not?
- When could you see the leaves?
- Can you tell where the stem meets the root?
- Does your plant have tiny root hairs growing yet?
- What surprised you? Why?

EXTENSIONS AND VARIATIONS

-Take a piece of celery and cut two inches up the stalk to make two legs. Put one leg in red-colored water and another leg in plain or other colored water. Observe the celery throughout the week.

This will show how a plant consumes and transports water and possible pollutants. -Put one piece of celery in the refrigerator and the other out to dry for several weeks. Ask the children to observe the celery and notice the differences between the two. The celery that is allowed to dry out will dehydrate. The contrast between the two plants will demonstrate how much of a plant consists of water.

-Introduce an extensive vocabulary for the seed. Have students dissect a large seed and label the parts.

RESOURCES

Gibbons, Gail. Seed to Plant. Holiday House, 1991.
Jordan, Helene. How a Seed grows. Let's Find Out About Science Series, Harper and Row, 1992.
International Plant Genetics Resources Institute, via delle Sette Chiese 142, 00145 Rome, Italy.
Seeds.
<http://users.ren.com/jkimball.ma.ultranet/BiologyPages/A/Angiosperm.html>

CREDITS

Project Food, Land and People Resources for Learning.2002.

EDUCATORS' NOTES

CURRICULUM DESIGN

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This Arizona Grown Specialty Crop Lesson Plan was paid for by a grant from the Arizona Department of

Will Alfalfa Seeds Grow In:



Guesses
 Yes ___
 No ___
 ? ___

No Water?

Results: _____



Guesses
 Yes ___
 No ___
 ? ___

Lots of Water?

Results: _____



Guesses
 Yes ___
 No ___
 ? ___

Salty Water?

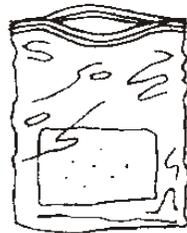
Results: _____



Guesses
 Yes ___
 No ___
 ? ___

Soapy Water?
 (Biodegradable)

Results: _____



Guesses
 Yes ___
 No ___
 ? ___

Soapy Water?
 (Not Biodegradable)

Results: _____



Guesses
 Yes ___
 No ___
 ? ___

Dirt & No Water?

Results: _____



Guesses
 Yes ___
 No ___
 ? ___

Dirt & Water?

Results: _____



Guesses
 Yes ___
 No ___
 ? ___

Water & No Air
 & No Space?

Results: _____

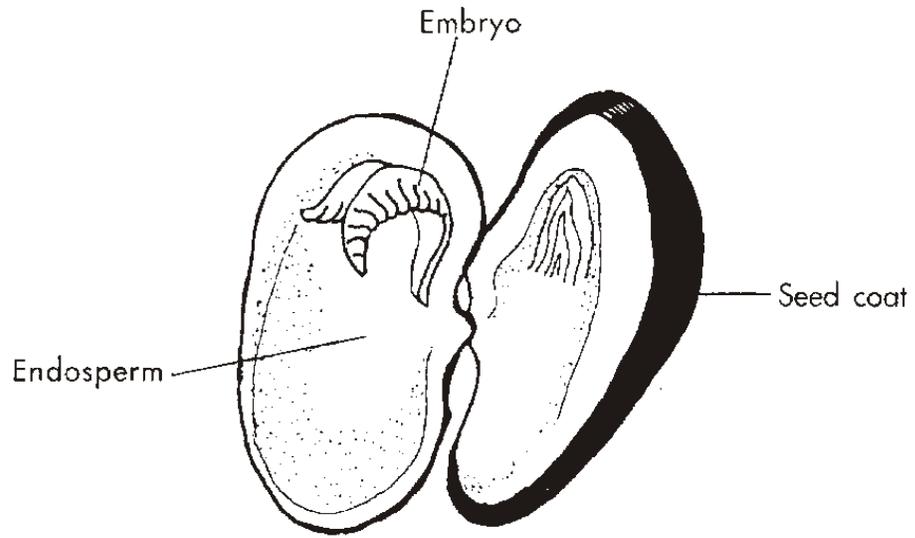


Guesses
 Yes ___
 No ___
 ? ___

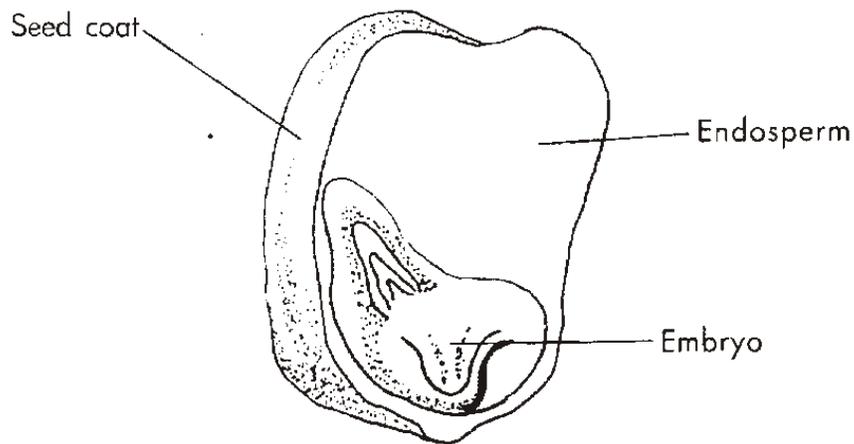
Refrigerator
 & Water?

Results: _____

PARTS OF A SEED



Dicot (plant with 2 cotyledons)



Monocot (plant with 1 cotyledon)



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Day

CUT ON DOTTED LINES

STAPLE ON SOLID LINES

.

Day



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Day

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Day



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Day

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Day

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Day


Plants Change
 by _____
