SESSION TWO
SEEDS, SEEDS AND MORE SEEDS

PURPOSE

- To use critical thinking skills in observing, identifying, sorting, and classifying different types of seeds and plant parts.
- To understand the importance of seeds to agriculture and food production
- To encourage participants to eat five or more fruits and vegetables a day

BACKGROUND INFORMATION

A first glance a seed may seem small and insignificant. But, seeds are very powerful. In less than 100 days a single kernel of corn can multiply itself over 500 times. Tiny wheat seeds produce field after field of amber waves of grain. The single bean seed develops into a luscious green plant. A huge oak tree starts life as an acorn half an inch long. An apple tree grows from a little pip or seed.

The seed represents our nation's history, livelihood and future. With a handful of seeds, early Americans provided food for their families. Modern researchers today are developing ways to improve our health and environment with a handful of seeds. The most controversial and possibly the most influential, changes in agriculture at the beginning of the 21th century are associated with genetic engineering of agricultural species. This 25-year-old approach to genetic improvement has introduced valuable agronomic traits into some crops and promises many other improvements in our ability to more efficiently raise animals and crops and to generate new and improved agricultural products. Nonetheless, the road to commercializing genetically engineered or "transgenic" product has been and likely will continue to be slow.

The power of the seed is unlimited. From seeds come plants that give food for people and animals, thread for clothing, wood for homes and fuel, and habitat for animals, birds and insects. A world without seeds would be a stark landscape with no life or chance of survival.

Seeds need air, water and warmth to germinate and they need these things in the right order. Not all seeds grow into new plants. Many seeds land in a place where they cannot germinate or are eaten by animals, and eventually they die. Even after germinating, the plant is not safe. For example, lawns that are regularly mowed never get a chance to grow fully and produce seeds.

Seeds are alive. The tiny embryo inside the see can grow into a full size plant. The seed coat protects the tiny embryo until everything is right to germinate. The length of time a seed is alive depends on how it is stored and the type of seed it is. Some seeds can be stored for only two weeks. Others can be stored for years. Many seeds have been stored for more than 70 years and still germinated! It is best to store seeds in a dry and cool place.

For continued survival, it is very important that the plant scatters its seeds over a wide area. This is called dispersal of seeds. Some seeds are light enough to be spread by the wind. Certain seeds have little hooked hairs that stick onto animal fur or clothing. Many seeds are hidden within attractive fruits so that birds will eat them. The plant naturally disperses others.

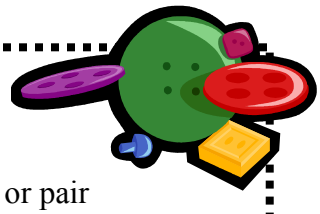
People need at least five fruits and vegetables of day for optimum health. Teaching children about where food comes from and helping them explore new foods will encourage them to eat more vegetables and fruits. There are six basic plant parts: roots, stems, leaves, flowers, fruits and seeds. We eat all of these plant parts. Here is a list of plant parts and sample foods.

ROOTS:	onions, carrots, turnip, rutabagas, beets, radish, parsnip, jicama, potatoes, yams
STEMS:	celery, asparagus, rhubarb, nopales (cactus), kohirabi
LEAVES:	lettuce, spinach, chard, bok choy, cabbage, greens, cilantro, parsley, basil, oregano
FLOWERS:	broccoli, cauliflower, squash flowers, nasturtium, saffron
FRUITS:	squash, cucumber, tomato, pea pods, green beans, grapes, apples, pears, oranges, peppers, eggplant, olives, peach
SEEDS:	nuts, beans, rice, wheat, oats, corn, peas, pomegranate, peanuts

Usually, a fruit is any seed-bearing food on a plant. Therefore, tomatoes, cucumbers, peppers and squash, for example, are actually fruits even though we usually refer to them as vegetables. We also typically identify fruits as high acid foods when vegetables are usually low acid.

ACTIVITY A: Sorting Seeds and "Sorta Seeds"

OBJECTIVE: Participants will learn about the importance of sorting and classifying plants to aid in identification.



MATERIALS YOU WILL NEED

Gallon size plastic bag with zippered closure – 1 for group
Sandwich size plastic bags with zippered closure - 1 per participant or pair
Non-seed items, collection of 10-12 items such as metal nuts, pebbles, jelly beans, shells, noodles, buttons, paper clips, etc.
Assorted seeds, 10 or more varieties - 1 seed variety per person or pair
Examples include varieties of beans, corn, peas, peppercorns, sesame seeds, peanuts, pistachios, walnuts, rice, etc (A soup mix provides a good variety)

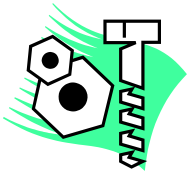
GETTING READY

Obtain all necessary materials. For Part A, make a collection of 6-12 non-seed items and 10 seeds in a plastic bag. For Part B, make a seed collection for each person or pair by placing a handful of seeds in each bag. **Hint:** Buy a soup mix with a variety of beans for the basis of the seed collection.

SUGGESTED GROUPING

For Part A, large group or divide into small groups of 3-4 with a seed & non-seed collection for each group. For Part B, groups assigned individually or pairs of participants to encourage participation by all.

ACTION (observing, communicating, organizing and inferring)



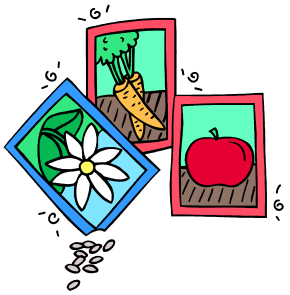
Part A: Group Classifying

1. Place the mixture of seed and non-seed items in the middle of the table.

2. Ask one participant to look at the items and sort them into groups such as big/little, seed/non-seed, food/non-food, etc.

3. Then ask other participants to re-sort them in different ways.

Part B: Sorting Seeds



1. Give each individual or pair one bag of seeds.
2. Spread out the seeds on a flat surface.
3. Observe the seeds carefully. Notice how they are alike and different.
4. Sort them in a different way. Sort them another way. And another.
5. Share findings with others.

SCIENCING

Communicating, Comparing and Applying:

- Explain how you sorted the collections. How did you determine how to sort?
- What knowledge did you need to know?

Inferring and Applying:

- Why is it important to sort and classify plants?
- Does classifying help to determine how plants are related?
- Does classifying help to determine the plants' needs and how they grow?
- What are some other things that are classified in science?

Communicating and Applying:

- What are some non-food seeds that are important to agriculture? (e.g. cottonseeds, ornamental plants, flower seeds, tree seeds, grass seeds for erosion control, etc.)

ACTIVITY B: Finding Seeds

OBJECTIVE: Participants will use their five senses to learn about seeds and parts of plants that we eat.

MATERIALS YOU WILL NEED

A variety of fruits and vegetables with and without seeds, and parts of plants we eat such as tomatoes, apples, zucchini, cucumber, potatoes, seedless and seeded grapes, melons, cherries, lemons, broccoli, corn, peas, carrots, etc.
Paper plates- 1 or 2 per group
Clear plastic wrap - 1 roll
Toothpicks - 1 box
Paring Knife - 1 per pair or group
Magnifying glass - 2 per pair or group

GETTING READY

- Obtain all necessary materials.

- Cut the fruit and vegetables into sections so "seeds" can be easily seen, if any. Place an assortment of cut fruits and vegetables on each plate for each group. Cover with plastic wrap.

- If the students are older and able to safely handle cutting utensils, you can have each group cut open their own fruits and vegetables to explore.

SUGGESTED GROUPING:

Pairs or small groups of 3-4 participants.

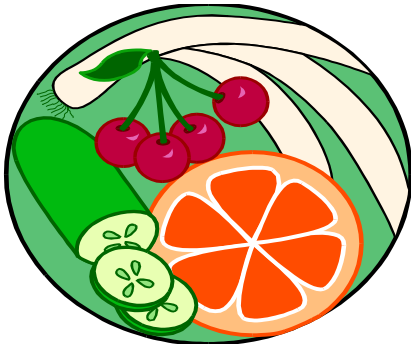
ACTION (observing, communicating, comparing, and organizing)

1. Have participants look at the samples of fruit and vegetables. Can they find the seeds? Are all of the seeds the same size, color or shape?

2. Ask the participants to sort the samples into categories.

3. Have them explain how they sorted the samples.

4. Are there other ways to sort the samples? Explain.



SCIENCING

Communicating, comparing and organizing:

- What categories did the groups use to sort the samples?
- Why did they choose those categories?
- How many other ways can they sort the samples?

Communicating, organizing, and inferring:

- What parts of the plants do the samples represent?
- What parts of plants are not represented?
- Do we eat all of the plant?
- What parts of the plants do we usually eat?

Communicating, organizing, and inferring:

- How many samples have seeds?
- What samples did not have seeds?
- How do the samples without seeds reproduce?

Inferring:

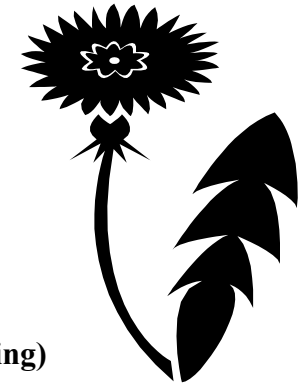
- Can you identify the sample as a fruit or vegetable by comparing and organizing the samples into the different characteristics?
- What characteristics make the sample a fruit? A vegetable?

ACTIVITY C: Dispersal of Seeds

OBJECTIVE: Participants will explore how seeds are dispersed in our environment.

MATERIALS YOU WILL NEED

Seeds such as bean, corn or pea - 12 seeds per group
Construction paper - 10 pieces per group
Tape – 1 or 2 rolls per group
Glue stick – 1 or 2 per group
Scissors – 1 or 2 pair per group
Pencils - 1 per participant
Collection of materials, 4-5 of each item per group
i.e. rubber bands, toothpicks, balloons, plastic bags, corks, cotton, feathers, tacks, metal springs, wire.
Extension activity:
Peppers - 1 or more
Knife to cut peppers - 1 or more



GETTING READY

Obtain all necessary materials.

SUGGESTED GROUPING

Small groups of 2-4 participants.

ACTION (observing, communicating, relating, inferring, and applying)

1. Ask participants to share ways that seeds are dispersed in our environment or take a walk to explore ways seeds are dispersed and then share.

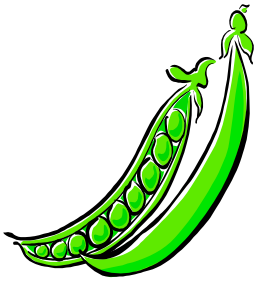
We know plants grow from seeds. But, how does a seed get to a certain place? Where did the weed seeds in the garden come? Have you ever seen seeds flying in the air? Floating on water? Being carried by a dog? If you examine seeds, you will see features that help them travel in a special way. This activity will encourage participants to explore and design seeds to travel in different ways?

2. Divide the group into small groups of 2-4 participants.

3. Give each group seeds to be adapted.

4. Ask the different groups to adapt their seed to . . .
    - float on water at least five minutes or
    - attract a bird or animal or
    - hitchhike on an animal or person for 20 feet or
    - fly at least three feet.

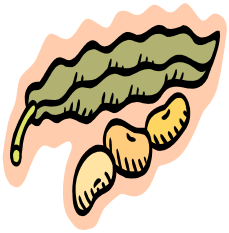
5. When dispersal inventions are complete, have groups demonstrate how they work.



SCIENCING

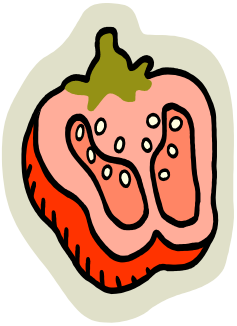
Observing, communicating and inferring:

- What are some ways seeds are dispersed?
- Why do seeds have dispersal mechanisms?
- Predict what would happen if a plant dispersed all of its seeds directly beneath itself? Could the seeds grow into healthy plants?
- Why do not all seeds become new plants?



Communicating, organizing, and inferring: (OPTIONAL)

- Take a pepper and cut it open. Count the number of seeds.
- How many pepper plants could grow from the seeds in that one pepper?
- If one pepper produces 30 peppers, how many plants could be grown from all the seeds of those 30 peppers?
- Why don't peppers grow everywhere and cover the earth?



Inferring and applying:

- How does seed dispersal affect farming?
- What practices does a farmer do to decrease the amount of weeds or unwanted plants in his fields? *(mechanical, chemical or integrated)*
- Why is it important to control the weeds in a field growing crops? *(Weeds create competition for water and nutrients.)*
- Are weeds always not wanted? When are weeds good for our environment? *(Habitat for insects, decrease soil erosion)*