

# Self-Guided Tour

3rd to 5th Grade

## Plants and the World Around Them



Time Required: 60 min  
April to October

### Topic:

Observing plant/animal interactions in the Garden

### Materials:

#### For each student:

- Pencil, crayons, colored pencils
- Clipboards (recommended)
- Observing Flowers Worksheet
- Pollinators Observation Worksheet
- Design Your Own Flower Worksheet (print worksheets front to back to save paper)

#### For each teacher/leader:

- Leader Sheet

### Locations:

- Events Plaza
- North Mixed Border
- Jones Rose Garden
- Children's Garden

### Student Outcomes:

- Students will observe how plants interact with other organisms, primarily pollinators
- Students will understand how the structure of a plant or animal is related to its use
- Students will improve observation and description skills

### Standards Reached:

Nat. Sci: K-4 Science as inquiry, abilities necessary to do scientific inquiry  
Nat. Sci: K-4 Science as inquiry, understanding about scientific inquiry  
Nat. Sci: K-4 Life Science, the characteristics of organisms  
Nat. Sci: K-4 Life Science, life cycles of organisms  
Nat. Sci: K-4 Life Science, organisms and environments  
Nat. Sci: 5-8 Life Science, structure and function in living systems  
Nat. Sci: 5-8 Life Science, diversity and adaptations of organisms

### Preparation:

Copy all worksheets. They can be copied front to back to save paper. Students will be writing and drawing often in this lesson. Putting together 'packets' of colored pencils for each student to carry may be beneficial. This lesson will work best with one classroom of no more than 30 students. It is not recommended that one teacher/leader attempt to conduct the lesson for more than one classroom, simply because the size and outdoor environment make it difficult. The Gardens' areas, however, are big enough to have multiple classrooms concurrently take the tour.

### Background Information:

Plants are an essential part of everyday life for many different organisms, including humans. They are the base of the food chain and understanding how plants live and reproduce is important. To understand the plant life cycle you must first be familiar with plants. The six basic plant parts are:

1. Seed – contains a small embryonic plant and usually some stored food
2. Root – provides an anchor for plants in the ground and conducts water and other nutrients to the other parts of the plant
3. Stem – serves both as structure for the plant's leaves, flowers, etc. and as a place for water and other nutrients to be transferred to other parts of the plant
4. Leaf – contains a majority of the chloroplasts which convert energy from the sun into energy the plant can use through a process called photosynthesis

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### Background Information (continued):

5. Flower – the reproductive part of the flower where pollination occurs to form a seed. Flowers are comprised of four major “:whorls” of parts. Sepals protect the flower while in bud and are sometimes showy. Petals are often showy and attract insects to the flower. Stamens are made up of the anther (which holds the pollen) and the filament (the anther stalk). Pistils are made up of the stigma (covered in substance to which the pollen sticks), ovary (holds the ovule and once fertilized, develops into the fruit) and style (connects the stigma to the ovary).

6. Fruit – a sometimes fleshy covering developed from the flower that contains seeds.

Botanically speaking a fruit is anything with seeds inside.

Many are confused by the distinction between fruit and vegetable. In culinary terms, fruit is typically any plant served as a dessert and a vegetable is any plant served during the meal. However, “vegetable” is not a botanical term and is not used by botanists and biologists when studying in their field. Confusion comes in because the term fruit is used in both the culinary field and the botany field but have a different definition in each context.

Pollination is central to successful reproduction in most plants. Simply stated, it is the transfer of pollen grains from the stamen of one flower to the stigma of the same or another flower. Some plants are self-pollinated or wind-pollinated, but most depend on insects, birds, bats, and other organisms – collectively referred to as pollinators – to transport the pollen for them.

The co-evolution of pollinators and the pollination process is one of nature's unique solutions to the dilemma of sexual reproduction among stationary plant organisms. Plants have developed scents, colors, and shapes that make them attractive to pollinators who, in turn, have developed physical characteristics that allow them to gather and transport pollen as they seek food.

The relationships between flowering plants and their pollinators have evolved since the early Cretaceous period, some 140 million years ago. These relationships are usually mutually beneficial to both parties. Pollinators assist in the reproduction of plants by transporting pollen. (Flowers that are not pollinated are not able to produce fruits and seeds.) In return, flowering plants produce nectar, a highly nutritious, sugar-based substance and a critical source of food for pollinators.

Pollinators may be generalists, such as bees, that make visits to many different types of flowering plants. Or they may be specialists, such as yucca moths, that pollinate only one type of plant.

Whether specialists or generalists, pollinators are responsible for:

- bringing us an estimated 1 out of every 3rd bite of food,
  - assisting 90% of the world's flowering plants to reproduce, and
  - providing an indispensable food source for countless other animals,
- as well as providing beauty and educational opportunities to gardens, fields and farms. The availability of pollinators is as important as moisture, sunlight, and soil fertility to the reproductive success of the world's flowering plants.

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### **Background Information (continued):**

Pollination is also vital to the well-being of humans. The most obvious example of our link to pollination is agriculture. Pollination, by managed honey bees and wild pollinators, is a key factor in the productivity of the seed, fruit, and fiber crops that we depend upon. Almost all fruit and grain crops require successful pollination in order to produce the harvested crop.

While it is true that some very important agricultural crops, such as rice, corn, and wheat, are self- or wind-pollinated, the majority requires the services of pollinators. Over 150 food crops in the United States — among them apples, alfalfa, almonds, blueberries, cranberries, kiwis, melons, pears, plums, and squash, depend on pollinators. Thirty percent of the food we eat is dependent upon pollinators for production.

### **Pre-Visit Activity:**

Have the students draw a plant labeling all the various parts (leaves, roots, etc.)

Create a 6-column chart on chart paper titled, Which Part Do We Eat? Pass around various vegetables and have students determine which part they eat: leaf=lettuce, root=carrot, stem=celery, fruit=apple, seed=bean, flower=broccoli. Discuss what each part does. (root gets water and food from the soil, etc.)

### **Post-Visit Activity:**

After you have started a number of seedlings you can start assigning them to different conditions. Label one group "A" and the other group "B". Put "A" in a sunny place and put "B" in a darker place. Always water "A" and "B" the same amount. Have the students write predictions about what will happen. Later, have the students describe and record in writing what happened to "B".

Start seeds or other plants in a terrarium. Use a any closed sealed container or large sealable plastic bags. Fill with potting soil with added perlite or sand. Wet thoroughly and plant seeds, cuttings, or plants. Place in warm, bright location. Keep a journal about what happens in the terrarium and discuss those observations.

Have students research a plant and its pollinator. Create a poster or give a presentation on that interaction.

Using the Design Your Own Flower Worksheet completed at the Gardens, have the students build their flower out of a variety of materials such as foil, pipe cleaners, paper, buttons, boxes, packing peanuts, egg cartons, and any other recycled materials.

### **Notes:**

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Leader Sheet



### Station 1: Parts of a Plant—Events Plaza

Today we are going to use our eyes to explore the many different plants in the Gardens. Plants are made up of many of the same basic parts.

What are those plant parts?

*Divide the class up into six groups. Assign each group one plant part and have them find a good example of it. Depending on time of year some parts may not be around (fruit, seed) or may not be easily seen (roots). Reassign a new part if they cannot find one or ask the group to speculate why they cannot find that particular part.*

Walk through this area and find a good example of your groups' assigned plant part. Once you have found it, talk with your group members about what that part of the plant does. Be prepared to report your findings to the rest of the class. Write things down if that helps.

*Let students wander and find matches, when they have found a match and have prepared something gather them back up. Have each group report their findings.*

- What plant part did you find?
- What is this part used for?
- What about this plant part make it good for that use? *For example, roots are under ground to hold the plant up and absorb water; leaves are large to collect sunlight; flowers smell to attract pollinators; etc.*

Good Job! Lets move on to the next area and learn more about one of those plant parts in particular, the flower.

### Station 2: Observe and Describe the Flower—North Mixed Border

All along this sidewalk are flowers with many different sizes, shapes, and colors.

*Distribute the Observing Flowers worksheet*

I want each of you to describe and draw the various flower parts. Look carefully, some of these flowers are quite small. If you don't know the flower name, find a sign for it. If you cannot find a sign, create your own name based on its characteristics. *(For example, Bird's Nest because the flower is shaped like a bird's nest)*

*Note: this activity can also be done in pairs or small groups.*

Now lets select a couple of flowers and talk about what you observed.

- What about this shape or structure of this flower would make it good for pollination?
- What type of pollinator do you think would pollinate this flower?
- Why?

Now that we have discussed some pollinators, let see if we can find some in action.

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### Station 3: Pollinators—Jones Rose Garden

*Note: This activity can also be completed in the adjacent Herb Garden or Campanile Garden, depending on what is blooming.*

*Distribute the Pollinators Observation Worksheet*

Now we will look at some of the pollinators you predicted pollinated flowers in the last garden. I want each of you to choose an area about 3' by 3' and observe and record the pollinators that visit your area for 10 to 15 minutes. This will take patience and time and its important that you are still and quiet so you do not disturb potential visitors to your area. Once again if you do not know the name of the flowers in your area, come up with your own name based on its appearance.

*Have students make observation on the Pollinators Observation Worksheet. It will take time to get a number of observations and you will need to encourage students to stay on task and continue to observe carefully.*

Now lets select a couple of flowers and talk about what you observed.

- How is the insect benefiting by its visits to the flowers?
- What do you think the flowers and plants get from the insects?

### Station 4: Design You Own Flower—Children's Garden

*Break students into pairs. Distribute the Design Your Own Flower Worksheet*

Now I want each of you to interview your partner and answer the questions at the top of your worksheet. Then in the space below you will draw a flower perfect for your partner if he/she was a pollinator. Then in the space at the bottom of the worksheet, describe why the flower you created would appeal to your partner.

- If you were a pollinator what would your flower partner look, smell, and taste like?

*Have the students spread out in the Children's Garden and complete the worksheet. They can use clipboards or the various hard surfaces, such as walkways, walls, and tables to work. Encourage lots of creativity and fun; their flowers might have pizza slice petals, a candy bar pistil, a favorite drink could be the nectar, etc.*

These are all things flowers have developed to attract pollinators.

- What are some other examples in nature where a plant or animal might do something to attract a partner? *For example bright tail feathers of a male turkey or peacock, or the bright colors of birds.*
- What about humans? What do we do to attract a partner?

You have all done an excellent job of observing today and learning about the plants and their pollinators.

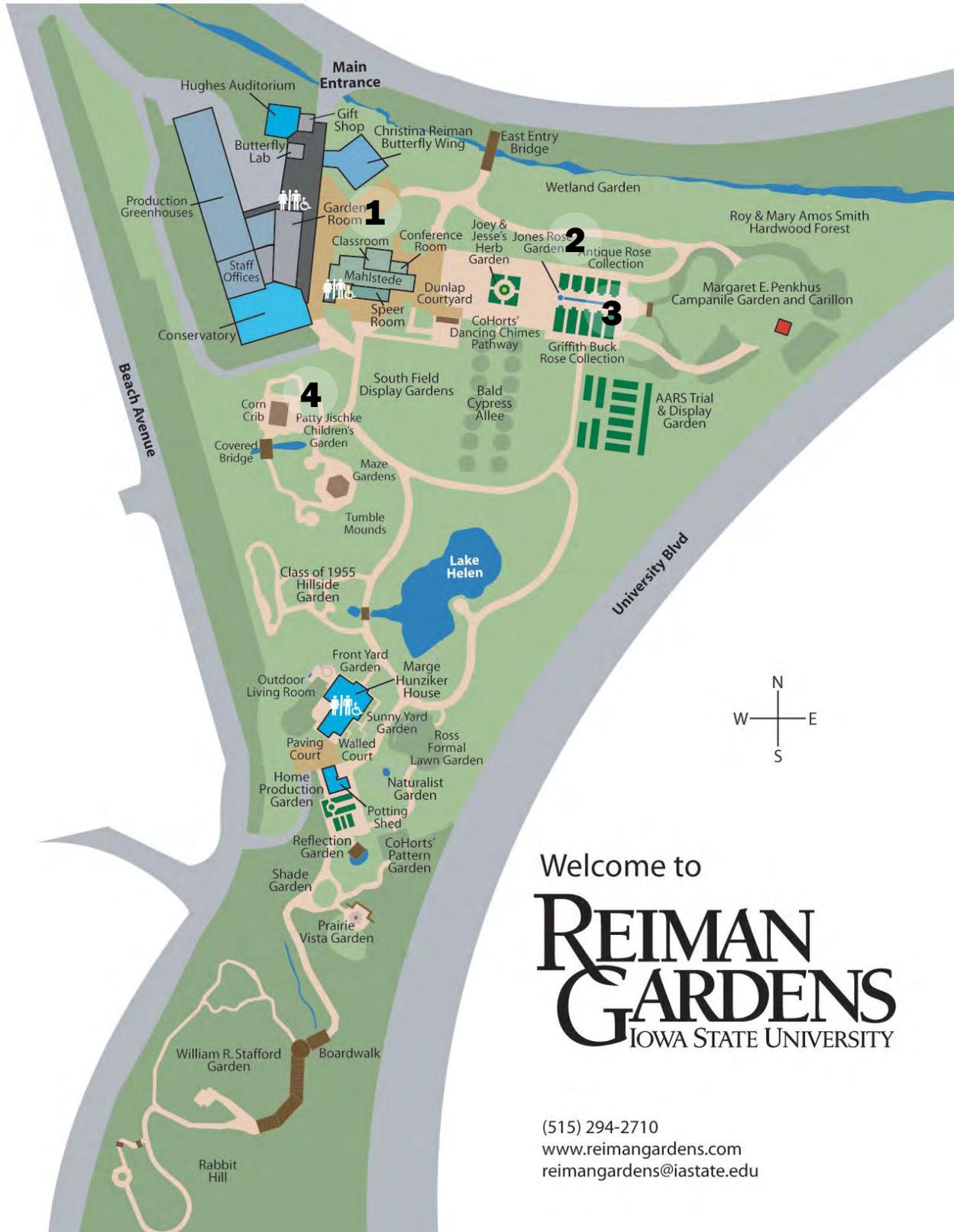
*You are highly encouraged to visit the many other areas of the Garden before returning to the bus. Depending the time of year some other Garden areas are teeming with insects and other pollinators. Some other areas that might be of particular interest for extending and re-enforcing this lesson include: Conservatory, Campanile Garden, Herb Garden, Home Production Garden, Stafford Garden, and South Field*

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Map



Welcome to  
**REIMAN GARDENS**  
IOWA STATE UNIVERSITY

(515) 294-2710  
www.reimangardens.com  
reimangardens@iastate.edu

**Name:** \_\_\_\_\_

Describe the parts of the flower. Include number of various parts, size, colors, patterns, textures, and shape. Draw them if you can.

**Name of Flower:** \_\_\_\_\_

**Sepals & Petals**

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**Stamens (Anther & Filament)**

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**Pistil (Stigma, Style, & Ovary)**

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**Scent**

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**What type of pollinator do you predict would pollinate this flower? Why?**

# Pollinators Observation Worksheet



**Name:** \_\_\_\_\_

Observe a 3-foot by 3-foot area and fill in the table below

Name of Insect	Behavior flying, crawling, drinking nectar, gathering pollen, where they are on the flower, time on flower, # of visits	Flower Name	Flower Shape Draw/Describe	Flower Color	Flower Scent

**Name:** \_\_\_\_\_

Interview your partner to answer these questions.

Your Favorite Color: \_\_\_\_\_

Your Favorite Shape: \_\_\_\_\_

A Smell You Like: \_\_\_\_\_

Your Favorite Snack: \_\_\_\_\_

Now in the space below, draw a flower to suit these preferences and in the box below describe why the flower you created would appeal to your partner.

**Why would this flower appeal to your partner?**