

Plant Adaptations Activity: What kind of plants should you plant in your raingarden?

Overview: What kind of plants should you choose for your raingarden?

Rain gardens are gardens that are planted where rainwater is purposely channeled into the site. Depending on the slope and amount of rain that can move into the garden, there may be standing water for up to 36 hours or only after a significant rainfall. Your plants will also have to endure periods of drought. So these plants have to have adaptations for both wet and dry soil conditions.



Benchmarks:

- 5.4.1.1.1** *Describe how plant and animal structures and their functions provide an advantage for survival in a given natural system. For example: Compare the physical characteristics of plants or animals from widely different environments and explore how each has adapted to its environment.*

Objectives:

1. The student will be able to give examples of Minnesota native plants and the special adaptations that allow them to survive in their environment.
2. The student will be able to explain the concept of adaptation in terms of living things.

Terms:

- **Plant Adaptations** - Adaptations are special features that allow a plant or animal to live in a particular place or habitat.
- **Biome** - A place characterized by its climate and the plants and animals that live there.

Materials Needed:

- A computer with internet access. If you do not have computers for all you could do this as a group activity using the LCD projector.

How to Start:

Students will be researching Minnesota Biomes and learn which adaptations help plants survive in the biome in which we live. Students will then have the background to determine which plants will be successful in their raingarden. Have students work on the worksheet and use the link to the DNR website to find out the answers to the questions listed below. They will discover that:

- Plants have adaptations to help them survive (live and grow) in different areas and these adaptations might make it very difficult for the plant to survive in a different place.
- Common turf grasses are not a native plant and have trouble surviving in Rochester.
- Turf grasses need fertilizer, frequent watering and weeding to survive.

Questions:

1. What type of biome is Rochester located in?
<http://www.dnr.state.mn.us/biomes/index.html>
2. What are the environmental conditions that make it difficult to survive in the biome in which we live?
 - a. What is our average rainfall?
 - b. What is our average Annual Temperature?
 - c. What is the average Growing Season Length?



3. What kind of adaptations would plants need to survive in Southeastern Minnesota?
4. Even though the Dandelion is a foreign invader species, what adaptations make it able to survive in our environment?
5. What kind of adaptations would plants need to survive and thrive in a raingarden?

After researching the questions, students will find suitable raingarden plants. They will use the Blue Thumb Plant Selector and find a plant to research: <http://www.bluethumb.org/plants/> When they have selected their plant they will check in with the teacher to make sure each group has a different plant.

Wrap up:

After students have researched, have them share their answers to the questions. The main point is to have them realize that certain adaptations help native plants survive in our Minnesota Climate. They should realize that the most valuable adaptation of native plants is the length of their root systems. Groups could share information about their plant by showing it on the projector for the rest of the class.

After choosing raingarden plants then the fun begins. You will need to create a layout of the raingarden, how many and where the plants are going to go. There are many resources on the internet with raingarden layout options.

Additional Information:

Advantages of Native Plants

Native plants are species that were present in the local landscape at the time of European settlement. Over thousands of years, these plants have adapted to the climate, soil and water conditions of the area. Since they are well adapted to their region, native plants tend to need less water and fertilizers, and therefore less maintenance than non-native plants. Local wildlife have similarly adapted to their surroundings. Native plants best meet the food and shelter needs for native wildlife and their young. In general, native plants will not outcompete other plants in a natural area or more broadly in an ecosystem but instead generally enhance biological diversity.

Teacher Tips:

Discuss how adaptations such as extensive root systems and different blooming times enable native plants to survive in their environments. What are some threats to these plants' survival? Emphasize that there is a wide variety of ways plants and animals adapt to their environment. Talk about how plant adaptations support the functioning of a raingarden to reduce polluted runoff and to improve water quality. (Topics to consider include deep root systems, different growing times, and the ability to withstand both droughty and wet conditions.)

Important Plant Selection Criteria

Growing the right plant species for your raingarden site helps ensure survival of your raingarden plants. A raingarden built on your school grounds collects water after a rain and then dries out. This alternating of wet and dry soils requires that you choose plant species that can tolerate these extreme conditions. Native plants that survive in this environment are usually flood tolerant species including those that grow in flood plains and along rivers (i.e., riparian). Plants suited for a raingarden often have a bimodal characteristic, which means they are able to grow well in opposite site conditions such as in wet or dry soils.

Other important considerations for selecting species for successful plant survival include light availability and soil type. Plant height, attracting wildlife, and aesthetics such as flower color, leaf textures and fruits can also play a role in plant selection. See "Criteria for Selecting Raingarden Species" below for more details.



1. **Sunlight availability:** The amount of sunlight an area receives determines the types of plants that will survive, flower, and set seed. Plants that need full sun need at least 6 to 8 hours of direct sun during the growing season; plants that require shade cannot tolerate more than 3 hours of direct sun. The hours and angle of sunlight change with the seasons, too. Some areas shaded most of the day at one time of the year may be in full sun other times of the year, or areas sunny in the spring may be shady in summer.

Common guides for choosing plants based on the amount of sun or shade available are:

- **Sun** – Areas that receive a minimum of 6 to 8 hours of sun per day during the growing season. Prairie and wetland species including sedge meadow species grow well under these conditions.
 - **Partial shade** – Partially shaded areas that receive 3 to 6 hours of sun per day.
 - **Shade** – Areas of shade that receive less than 3 hours of direct sun.
2. **Phenology:** One of the best known and most dramatic sequences in a raingarden involves flowers blooming from mid-April through October. With planning and proper plant selection, one new plant will bloom each week of the growing season in a raingarden. This sequential or phenological change is striking and attractive to pollinating insects such as butterflies. In shady areas, blooming peaks in the spring with a few species blooming during summer and fall.
 3. **Height:** When selecting species, be aware of each plant's ultimate height and spread at maturity. Plant height should be in proportion with the size of your planting. Typically, small raingardens are planted with short species. Large plants in a small area tend to overwhelm the site and appear unkempt. Large areas can be planted with a mix of short and tall prairie species. Short prairie species are less than four feet; tall prairie species are greater than four feet.
 4. **Color:** Flower color is an aesthetic consideration. Look for color combinations and contrasts within each blooming interval. Pairing complimentary colors (yellow/purple, red/green, orange/blue) tends to intensify the colors.
 5. **Species that attract specific insects, birds, and other wildlife:** Planting a diversity of native wildflowers and grasses, along with shrubs and trees nearby (or in the garden), provides maximum habitat and opportunity to attract a variety of insects and birds. Wildlife in the schoolyard adds life, beauty, discovery, and educational opportunities.

