
Rain Garden Species Selection

Activity Overview

Students create a list of native species for their school rain garden site as determined by environmental, ecological, aesthetic, and educational criteria.

Objectives

Students will:

- Identify criteria for selecting native species that will grow in their rain garden
- Choose species based on functional, ecological and aesthetic considerations
- Work cooperatively as a team
- Outline reasons why their species selections are appropriate for their rain garden
- Learn about native plants and identify species that can infiltrate rain water runoff

Subjects Covered

Science

Grades

3 through 12

Activity Time

Two 50 minute blocks (10 minutes introduction, 10 minutes to develop criteria, 30 minutes to select species, 50 minutes to compile species selections and determine quantities desired for each species)

Season

Any

Materials

Rain garden criteria worksheet, rain garden species selection form, wild-flower and grass field guides, native plant nursery catalogs/websites and the “Rain Garden Species List”

State Standards

Science: A.4.2, A.4.3, A.8.1, B.4.1, C.4.3, C.4.6, C.4.7, C.8.2, C.8.6, H.8.2, H.12.7

Background

Rain gardens are simply a more natural system of managing storm water, allowing natural functions of infiltration and evaporation that contribute to a natural hydrologic cycle. Rain gardens are constructed shallow depressions designed to collect water primarily from downspouts. Storm water from driveways, streets, and parking areas can also be redirected to rain gardens. The concept is to let plants, bacteria, and soils clean and temporarily hold the water as it infiltrates into the ground close to where the rain falls. Before urban/suburban development, the unique relationship of water, vegetation, and soils resulted in very little runoff on the surface of the land. Today with more built surfaces and less porous ground, most of the precipitation becomes surface runoff. The rain garden keeps water close to where it falls by stopping the water from entering the storm water system as excess surface runoff. The principle for choosing species for a rain garden is to select native plants that infiltrate water into the ground. These species typically have deep root systems with water holding capacity and the ability to direct water through the soil. Instead of runoff, water either transpires through the plant's leaves and stems or seeps into the groundwater to later discharge as clean water into springs, fens, streams, or lakes.

Selecting the right plant species for your rain garden site helps ensure survival of your rain garden plants. A rain garden built on your school grounds collects water after a rain or snow melt, 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, which grow in flood plains, species that grow along rivers (i.e., riparian), and drought/flood tolerant prairie species. Plants suited for a rain garden 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 Rain Garden Species” below for more details.

To begin the process of species selection, identify your rain garden site features (sun shade, soil type, etc). Then determine what plant characteristics will fit your site and needs. Review the following criteria and identify the criteria that fit your site characteristics and goals for your project. There are several resources available to help you choose appropriate plants. For instance, use the “Rain Garden Species List” from “Rain Garden Curricular Sampler,” nursery catalogs, plant field guides or regional Web-based, native rain garden plant lists to select species. List those potential species on the rain garden species selection form. You may need to adjust the number of

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species in your mix depending upon your budget, availability, and size of your rain garden. As a general rule, try to have a new flower come into bloom every week during the growing season — about 30 wildflowers plus grasses/sedges. Other suitable plant types include ferns, rushes, shrubs and trees. Herbaceous plant species are planted one foot apart; trees and shrubs are spaced according to their ultimate size (see below for more information about spacing).

Criteria for Selecting Rain Garden Species

Necessary criteria for every rain garden:

1. **Sunlight availability:** The amount of sunlight an area receives determines the types of plants that will survive those light conditions so that they will 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 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 receive 3 to 6 hours of sun per day. Savanna and some prairie and woodland species grow well in partial shade.
- **Shade** – Areas of shade receive less than 3 hours of direct sun. Woodland groundlayer species grow in this environment.

Trees and shrub species follow the same guidelines. Most species lists will identify a plant's sun/shade requirements.

2. **Grass/sedge to forb (wildflower) ratio:** The proportion of species for a reasonable mix of grass/sedge and forb species that mimics the natural structure and character of a native prairie rain garden can be anywhere between 30% and 60% grass. Aesthetically, grass species, including sedges and other grass-like species, define the visual character or essence of the prairie. Ecologically, grasses provide structural support for forbs, hold the soil with their fibrous root systems, and provide food and cover for wildlife. Forbs provide visual interest, food for wildlife on a continual basis, and enhance diversity. The ratio of grass/sedge to wildflowers in a woodland tends towards less grass-like species and more wildflowers with some ferns.

3. **Phenology:** One of the best known and most dramatic sequences in a rain garden involves flowers blooming from mid-April through October. During the growing season approximately one new plant blooms each week. 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. When choosing species, particularly in sunny areas, select plants for a continuous bloom.

4. **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 rain

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gardens 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 species are less than four feet; tall species are greater than four feet.

Additional Criteria:

1. 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.
2. 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 butterflies and birds. Wildlife in the schoolyard adds life, beauty, discovery, and educational opportunities. Planning and proper plant selection will increase the number and variety of butterflies and birds attracted to a planting. A diversity of flying and crawling insects are attracted to flowers. Grazing insects such as grasshoppers, leafhoppers, and butterfly larvae feed primarily on the leaves of grasses and forbs. These insects form the base of the food web, especially for birds. Birds also feed on highly nutritious seeds produced by native plants. Tall and short grasses and trees and shrubs provide cover and nesting. Woody plants provide wind protection for butterflies and hummingbirds that seek nectar on prairie flowers.
3. Species desired for lessons, activities and research: A rain garden offers many hands-on learning activities and inquiry-based opportunities. You may select plants Native Americans used for food and medicinal uses or plants that illustrate plant adaptations. Consider species that have a variety of seed types to learn about seed dispersal mechanisms or to test seed germination methods. Also pick plants that awaken your senses and curiosity with fragrances, textures, shapes and sounds. Additionally, a rain garden provides a context to learn about storm water impacts and solutions in the local watershed.
4. Species blooming during the school year: Many species bloom during the summer months when students are on vacation. To make sure students experience plants in bloom during the school year, increase the number of species that bloom in the spring and fall months.
5. Species that are aggressive: Some plants can be overly aggressive either through vegetative reproduction or seed. These species, such as sunflowers, switch grass, common goldenrod, and cupplant often form large masses. Species with this type of growth habit are appropriate for large sites but may become too overpowering in smaller plantings.
6. Plant sources and indigenous species: Choose plants native to your region. Native plants are well adapted to your specific climate and soils and do not require winter protection or fertilizer. They also work more effectively infiltrating water on account of their long root systems.

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Activity Description

Select Species

1. As a group, review the rain garden site characteristics and identify criteria that fit your rain garden site and goals for your project. Fill out the rain garden species selection criteria worksheet.
2. Divide into teams. Each team may be responsible for choosing species within a bloom period such as April/May, June, July, August, September/October and a team to select grasses and other grass-like species or trees and shrubs, if desired. You will find that some species choices will overlap.
3. Next have each team select 4 to 5 potential rain garden species using “Rain Garden Species List,” nursery catalogs, plant field guides, and Web-based regional native rain garden plant lists.
4. Re-group; go into the round and share out as teams the species chosen and why.
5. Compile all species selected on a master species selection form.

Develop a Species List

1. Review master species list and make adjustments, if needed.
2. Begin to determine quantities for each species. First divide the grasses/sedges from the wildflowers. Use the criteria for your grass/sedge to wildflower ratio to calculate how many plants you need for each group. The total number of herbaceous plants needed equals the number of square feet of the rain garden. It is possible to space the plants wider to about 1.5 square feet per plant. If you are adding trees and shrubs, use the following spacing guidelines to determine quantities:
 - a. Trees: 10 to 20 feet apart.
 - b. Large to medium shrubs: 6 to 8 feet apart.
 - c. Small shrubs: 3 to 5 feet apart.
3. Assign quantities to each species. For design purposes, order wildflowers in groups of three, five, or more. Order shrubs in quantities of one, three or more. Avoid ordering plants in twos; planting in pairs causes the eyes to jump back and forth between the two plants. Order enough grass-like species to fill the required number needed.
4. The next step is determining the budget for the species selected. See Earth Partnership activity, “Balancing the Budget, 5-2.”

Extensions

- Research plants selected using the Earth Partnership activity “Up Close and Personal, 5-12.”
- Make posters of plants selected.
- Create your own version of Earth Partnership activity, “A Prairie Year, 5-1” using the species selected.

Additional Resources

- Brown, Lauren. (1979). *Grasses: An identification guide*. New York, NY: Houghton Mifflin Co.
- Brown, Lauren. (1976). *Weeds in winter*. New York, NY: W. W. Norton & Company, Inc.

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- Cochrane, T.S., Elliot, K., Lipke, C.S. (2006). *Prairie plants of the University of Wisconsin-Madison Arboretum*. Madison, WI.
- Courtenay, Booth & Zimmerman, James H. (1992). *Wildflowers and weeds: A field guide in full color*. New York, NY: Simon & Schuster. (Out of print, but worth a search)
- Currah, R. & Van Dyk, M. (1983). *Prairie wildflowers: An illustrated manual of species suitable for cultivation and grassland restoration*. Friends of the Devonian Botanic Gardens-University of Alberta, Edmonton.
- Fassett, Norman C. (1951). *Grasses of Wisconsin*. Madison, WI: Regents of the University of Wisconsin, (Recommended for high school level)
- Kindscher, Kelly. (1987). *Edible wild plants of the prairie*. Lawrence, KS: University Press of Kansas.
- Kindscher, Kelly. (1992). *Medicinal wild plants of the prairie*. Lawrence, KS: University Press of Kansas.
- Kirt, Russell R. (1989). *Prairie plants of Northern Illinois: Identification and ecology*. Champaign, IL: Stipes Publishing Company.
- Kirt, Russell R. (1995). *Prairie plants of the Midwest: Identification and ecology*. Champaign, IL: Stipes Publishing Company.
- Mirk, Walter. (1997). *An introduction to the tall grass prairie of the Upper Midwest*. The Prairie Enthusiasts, c/o Gary Eldred, 4192 Sleepy Hollow Trail, Boscobel, WI 53805.
- Newcomb, Lawrence. (1977). *Newcomb's wildflower guide*. Boston, MA: Little, Brown & Co.
- Runkel, Sylvan T. and Roosa, Dean M. (1989). *Wildflowers of the tallgrass prairie: The Upper Midwest*. Ames, IA: Iowa State University Press.

Web sites

- Wisconsin Department of Natural Resources. Wisconsin native plants for rain gardens. <http://www.dnr.state.wi.us/org/water/wm/nps/rg/plants/PlantListing.htm>
- Wisconsin Department of Natural Resources. Wisconsin native plants for shady rain gardens. <http://www.dnr.state.wi.us/org/water/wm/nps/rg/plants/shady/shady.htm>

Assessments

- Explain why it is important to match species to the site conditions.
- Choose three criteria and explain why you think they are important for selecting plant species for your rain garden.
- Outline reasons why the species selected are appropriate for your rain garden.

Rain Garden Species Selection Criteria Worksheet

Location: _____ Size: _____ (sq ft)

Environmental Conditions:

Circle the site characteristics that describe your site.

Soil Type: Sand Silt/Loam Clay

Percent Slope: less than 4% 5% - 7% 8% - 12%

Light: Full sun Partial shade Shade

Species Characteristics

Necessary Criteria: Determine your specifications for criteria based on site conditions.

Number of plants needed (1 plant/square foot): _____

Ecosystem type (Habitat): Prairie (sun) Savanna (part sun) Woodland (shade)

Plant types: (circle all that apply.)

Grasses Sedges Wildflowers Ferns Shrubs Trees Other _____

Height: Minimum height: _____ Maximum height: _____

Phenology (time of bloom):

_____ % Spring (April – May), _____ % Early Summer (June),

_____ % Summer (July), _____ % Late Summer (August),

_____ % Fall (September – October)

Additional Criteria: Identify criteria that fit your project goals such as flower color, texture, fragrance, wildlife value, etc.
