Pollination Empowerment: Student Led Garden Design

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&
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State Arboretum of Virginia, University of Virginia
Blandy’s Mission:
To increase understanding of the natural environment through research and education
State Arboretum of Virginia Education Program

Our program mission: To stimulate scientific exploration, discovery, & stewardship of our natural world by fostering a learning community among preK-12 students, educators, & scientists
The Challenge:

- How can we facilitate STUDENT-LED garden planning, design, and planting?
The 4th grade garden site at their school
6 7' x 5' triangular raised beds

This project was funded through a grant from the Chesapeake Bay Trust, award # 13246
4th graders research & plan a pollination garden

How much space does one plant need?
### What garden plants are good for pollinators?

#### Plants for pollinators information

<table>
<thead>
<tr>
<th>Common:</th>
<th>Scientific (genus and species, just like my last and first name)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Golden Groundsel</td>
<td>Packera aurea</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Height it can grow to:</th>
<th>Width (spread) it can grow to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-12 inches</td>
<td>18-24 inches</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pollinators that like this plant:</th>
</tr>
</thead>
<tbody>
<tr>
<td>native bees</td>
</tr>
</tbody>
</table>

- [ ] Butterflies
- [ ] Bees
- [ ] Moths
- [ ] Hummingbirds
- [ ] Other types:

<table>
<thead>
<tr>
<th>Flower Color:</th>
<th>Bloom time:</th>
</tr>
</thead>
<tbody>
<tr>
<td>yellow</td>
<td>Late spring to early summer</td>
</tr>
</tbody>
</table>

Is there any other interesting information about this plant that you learned?

Incredibly showy spring bloom

Why I think this would be a good plant for our school pollinator garden:

Vigorous growth allows for great erosion control
The sides of the real garden plot are 7 feet long by 5 feet wide.
Let’s design a garden!
Supporting Activities

https://blandy.virginia.edu/content/ed-programs-activities-and-lessons

What Plants are Good for Pollinators?

**Goal:** Students use online & printed materials to help select the native plants for their schoolyard pollination gardens.
What Plant Where?

**Goal:** Students explore & observe native plants for attributes (height, width, flower color, leaf shape, and habitat) that should be considered when choosing plants for a native plant garden. Students understand that a diversity of plant types is important for a native plant garden.
Pollination Station

Goal: As Pollination Scientists, students investigate plant & pollinator interactions. What plants do pollinators & other organisms visit the most? Data was used to choose plants for the school pollination garden based on pollinator diversity.

<table>
<thead>
<tr>
<th>Pollination Station: Flower Pollinators</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Student Names</strong></td>
</tr>
<tr>
<td>Record Plant Name from label</td>
</tr>
<tr>
<td>Observe a cluster of flowers for 30 seconds. Count the number of all animal visitors you see on the flower.</td>
</tr>
<tr>
<td>Observe the same cluster of flowers for one minute. Count the different types of visitors [ex. Big bumblebee, red butterfly, stink bug.] You are not counting each organism but type.</td>
</tr>
<tr>
<td>Choose one insect visiting the flower you are observing and observe it for one minute.</td>
</tr>
<tr>
<td>What is the organism doing? Is the animal getting nectar or pollen? (circle one) Nectar Pollen</td>
</tr>
<tr>
<td>Doing something else?</td>
</tr>
<tr>
<td>Do you see pollen on the animal? Yes No</td>
</tr>
<tr>
<td>Where is the pollen located?</td>
</tr>
<tr>
<td>Describe any evidence that pollen is being moved from the flower.</td>
</tr>
</tbody>
</table>
Insect Adaptations

**Goal:** Students explore ways that insects collect pollen & compare mouthparts to determine if an insect collects pollen or nectar. What are some adaptations that insects have that help them to feed on different foods & from different parts of plants?
Pollination Garden Research, Design & Planting Activities: Alignment with NGSS 3-Dimensional Learning

### Scientific & Engineering Practices

1. Asking Questions & Defining Problems  
2. Developing & Using Models  
3. Planning & Carrying Out Investigations  
4. Analyzing & Interpreting Data  
5. Using Mathematics & Computational Thinking  
6. Constructing Explanations & Designing Solutions  
7. Engaging in Argument from Evidence  
8. Obtaining, Evaluating, & Communicating Information

### Cross-cutting Concepts

- Patterns
- Scale, Proportion, & Quantity
- Structure & Function

### Disciplinary Core Ideas

**Life Sciences**

- LS1. A Structure & Function
- LS1. B Growth & Development of Organisms
- LS2.A Interdependent Relationships in Ecosystems
- LS4.D Biodiversity & Humans

**Engineering, Technology, & the Applications of Science**  

- ETS1.A Defining & Delimiting and Engineering Problem
- ETS1.B Developing Possible Solutions
- ETS1.C Optimizing the Design Solution
- ETS2.A Interdependence of Science Engineering, & Technology
Virginia Science Standards of Learning

Science & Engineering Practices:

- Asking questions & Defining Problems
- Planning & Conducting investigations
- Interpreting, analyzing, & evaluating data
- Constructing & critiquing conclusions & explanations
- Developing & Using Models
- Obtaining, evaluating, & communicating information
Scaling up
5th Grade Riparian Buffer

This project was funded through a grant from the NOAA Chesapeake Bay B-WET Program, award # NA18NMF45703152
Your class will be planning one section (or part) of the riparian buffer garden. The section you get to design is 15 feet long and 15 feet wide.

What is the area of your section?

Each square on the grid is one foot long and one foot wide. For your design, consider how much space the different plants will need when they are fully grown.

Your school is way up here
7th grade pollination garden

This project was funded through a grant from the NOAA Chesapeake Bay B-WET Program, award # NA18NMF45703152
Creating a scale model your pollination garden

Cut out disc indicating the appropriate diameter of your mature plants. Use the color paper to match the color flower that it produces. Each VI "box = 1 ft. Use this scale for determining the size of your discs. Label each disc with the species of plant and its height. Arrange your discs on the map of our garden plot below. Consider the following as you play with the arrangement:

- Are colors distributed in a visually appealing way?
- Do you have taller plants in the back and shorter plants in the front?

When you are satisfied with your arrangement, you may glue your discs down and submit your plan to your teacher. Put your name on THE BACK. We will be voting on our favorite garden plan! The finalist from each class will be submitted to your 7th grade teachers for final voting!

J-WMS Native Plant Garden “Wish List”
Garden size 18’ x 18’ (estimate)
Most plants will be in 1 quart pots (4.75’’)

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Attracts</th>
<th>Bloom color</th>
<th>Bloom time</th>
<th>Mature Height</th>
<th>Mature Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Butterfly weed</td>
<td>Asclepias tuberosa</td>
<td>Monarch butterfly</td>
<td>Orange</td>
<td>May-Sept</td>
<td>1.5-3 feet</td>
<td>1.5-3 feet</td>
</tr>
<tr>
<td>Wild Geranium</td>
<td>Geranium maculatum</td>
<td>Native bees</td>
<td>Purple</td>
<td>April-June</td>
<td>2 feet</td>
<td>18 in</td>
</tr>
<tr>
<td>Whorled Coreopsis</td>
<td>Coreopsis verticillata</td>
<td>&quot;Creme Brulee&quot;</td>
<td>Yellow</td>
<td>May-Aug</td>
<td>2 ft</td>
<td>2 ft</td>
</tr>
<tr>
<td>Woodland sunflower</td>
<td>Helianthus divaricatus</td>
<td>Native bees</td>
<td>Yellow</td>
<td>Aug-Oct</td>
<td>2-6 ft</td>
<td>1-3 ft</td>
</tr>
<tr>
<td>Scarlet beebalm</td>
<td>Monarda didyma</td>
<td>Hummingbird, butterflies, bees</td>
<td>Red</td>
<td>July-Sept</td>
<td>4 ft</td>
<td>3 ft</td>
</tr>
<tr>
<td>Golden</td>
<td>Packera</td>
<td>Butterflies</td>
<td>Yellow</td>
<td>March-May</td>
<td>1-2 ft</td>
<td>1-1.5 ft</td>
</tr>
</tbody>
</table>

Designing your pollination garden

- Your garden should include a minimum of 5 different species of NATIVE plants
- Should have a variety of colors/textures/heights for visual appeal
- Your garden should attract a minimum of 3 different species of pollinators. Fill in the following chart.

<table>
<thead>
<tr>
<th>Common name</th>
<th>Flower Color</th>
<th>Pollinator(s)</th>
<th>Mature Height</th>
<th>Mature Diameter</th>
<th>Environmental requirements</th>
<th>(sun/water/soil)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Butterfly weed</td>
<td>Orange</td>
<td>Wasp</td>
<td>4.5 ft</td>
<td>8.4 ft</td>
<td>fast growing soil</td>
<td>full sun</td>
</tr>
<tr>
<td>Blue Indigo</td>
<td>Blue</td>
<td>Bees, hummingbird</td>
<td>24-36 in</td>
<td>12-24 in</td>
<td>Sun exposure, full sun</td>
<td>moist soil</td>
</tr>
<tr>
<td>Daisies</td>
<td>Yellow</td>
<td>Bees</td>
<td>6-9 ft</td>
<td>6-12 ft</td>
<td>full sun/pollard shade</td>
<td>sandy soil</td>
</tr>
<tr>
<td>Christmas fern</td>
<td>Green</td>
<td>Hummingbird</td>
<td>1.5-2 ft</td>
<td>1.5 ft</td>
<td>moist soil</td>
<td>full shade</td>
</tr>
<tr>
<td>Ragweed</td>
<td>Yellow</td>
<td>Butterflies</td>
<td>1.2 ft</td>
<td>1.1-1.5 ft</td>
<td>well drained</td>
<td>full sun/minimal soil</td>
</tr>
</tbody>
</table>

(1 inch per week for most)
Measuring, laying stone, & planting
Student Centered Garden Design & Planting

- Provide **learning opportunities** so that students understand:
  - Plant-insect/bird adaptations (structures & functions)
  - Importance of planting native plants
  - Size of various plants at maturity (height & width)

- Have students, along with teachers & administrators, **identify the area** to be planted (location & size). Get approval from the facilities manager, too.

- Provide resources for students to **research plants** to include in their garden. (It’s helpful to narrow the potential choices to plants that are adapted to the planting site & that you know you can purchase. Be sure to provide plenty of plants from which to choose.)

- **Make a scaled grid** for the garden site (for younger kids). Middle & high school students can use graph paper & determine their own scale.

- For elementary students, it is helpful to **create circles** scaled to the garden design grid that represent the color & width of the plants at maturity. These are used to design the garden. Older students can use colored pencils to design their gardens.

- **Test the design** outside using circles cut from newspaper to represent the full width of the plant at maturity & PVC pipe (or sticks) cut to the height of the plants at maturity. Students replicate their design in the garden using the circles & PVC & adjust, as needed, before planting.

- **Plant** the garden!!!
We grow scientists at Blandy!
Thank you!
We'd love to have you Contact Us!!!

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Blandy Education Conference Materials:
https://blandy.virginia.edu/content/ed-conference-information-and-resources