



Eliza Lawrence
School Gardens Coordinator
Regional Environmental Council

ELIZA@RECWORCESTER.ORG

Erin Severens
5th Grade Math/Science Teacher
Worcester Public Schools



SEVERNSE@WORCESTERSCHOOLS.NET



Regional Environmental Council



Our mission is to bring people together to create a just food system and to build healthy, sustainable, and equitable communities in Worcester, MA and beyond.

YouthGROW



Farmer's Markets



UGROW



The goal of the REC School Gardens Program is to increase access to and use of garden spaces and garden related education for students, educators, and families.





We provide direct resources such as building beds and providing plants, compost, and tools, and offer in and out of classroom workshops, field trips, and after school clubs



School Gardens

- Work with all of the Worcester Head Starts
- Also maintain educational gardens at Girls Inc., EcoTarium programs, and other locations that aren't specifically at schools, but used with kids
- Most schools struggle with summer maintenance, and also we needed to change varieties of things we offered to be less summer focused.



WNPI

Worcester Native Plant Initiative



Why Pollinators? Why Native? Why Schools?



- What have we learned over the years?
 - Our summers are unpredictable, and schools are empty
 - Pollinators, but specifically native pollinators are often drought or rot resistant, have deeper roots, don't need as much maintenance
 - Expanding what we consider food, or planting something for both us and the pollinators
 - Attracting more pollinators to help with our veggie garden
 - Habitat and Life Cycle
 - Climate Resilient gardening in small spaces

What are native plants?





What are invasive plants?





Garlic Mustard

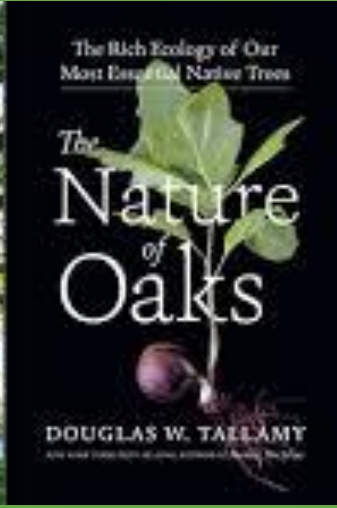


Coevolution of Plants and Insects



Insect Specialists





Native oak trees support
over 500 species of
caterpillars

Ginkgo, a commonly planted
landscape tree from Asia, hosts
only 5 species of caterpillars



One brood of
chickadees
requires
6,000-9,000
caterpillars before
it leaves the nest





Dr. Gegear

- pollen sources enable bees to make more bees
- nectar sources provide fuel for adult bees and butterflies to be active
- host plants give caterpillars (larval stage of butterflies) something to eat



POLLINATORS AND PLANTS

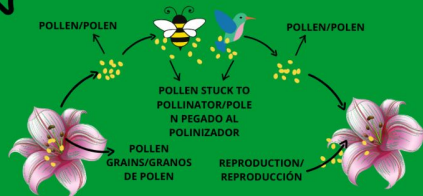


POLINIZADORES Y PLANTAS

POLLINATION IS THE PROCESS THAT ALLOWS PLANTS TO REPRODUCE. THIS HAPPENS WHEN POLLEN IS TRANSFERRED FROM ONE PLANT TO ANOTHER BY WIND, RAIN, OR POLLINATOR SPECIES SUCH AS BEES, BATS, HUMMINGBIRDS, MOTHS, AND BUTTERFLIES. POLLINATOR GARDENS ARE PLANTED TO ATTRACT POLLINATOR SPECIES BY PROVIDING FOOD AND SHELTER. HAVING POLLINATORS NEAR YOUR GARDEN HELPS TO INCREASE YOUR GARDEN'S PRODUCTIVITY.

≧FUN FACT!≦

THE SHAPE AND COLOR OF A FLOWER WILL CHANGE WHICH POLLINATORS WILL VISIT!



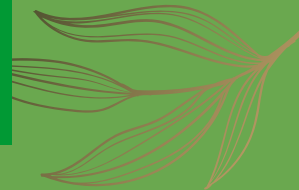
LA POLINIZACIÓN ES EL PROCESO QUE PERMITE QUE LAS PLANTAS SE REPRODUZCAN. ESTO OCURRE CUANDO EL POLEN ES TRANSFERIDO DE UNA PLANTA A OTRA POR EL VIENTO, LA LLUVIA O ESPECIES POLINIZADORAS COMO ABEJAS, MURCIÉLAGOS, COLIBRÍES, POLILLAS Y MARIPOSAS. LOS JARDINES POLINIZADORES SE PLANTAN PARA ATRAER A LAS ESPECIES POLINIZADORAS PROPORCIONÁNDOLES ALIMENTO Y REFUGIO. TENER POLINIZADORES CERCA DE SU JARDÍN AYUDA A AUMENTAR LA PRODUCTIVIDAD DEL MISMO.

≧¡DATO CURIOSO!≦

LA FORMA Y EL COLOR DE UNA FLOR CAMBIARÁN QUÉ POLINIZADORES LA VISITARÁN.



REGIONAL ENVIRONMENTAL COUNCIL
www.recworchester.org



Designing a Pollinator Garden with your Students



- Incorporate Native Plants (Native vs. Non Native)
- Something for the animals, and something for the humans
- When do our plants bloom? April to October
- Color and Shape of plants
- Where is the garden going? What are the conditions?
- Latin Name vs. Cultivars

Common Name	Latin Name
False Indigo	Baptisia australis
Butterfly Milkweed	Asclepias tuberosa
Cardinal Flower	Lobelia cardinalis
Yarrow	Achillea millefolium
Purple Coneflower (NOT NATIVE TO MA but fun in garden)	Echinacea Purpurea
Purple Milkweed	Asclepias purpurascens
Anise Hyssop	Agastache foeniculum
Wild Bergamot	Monarda fistulosa
Broad Leaved Mountain Mint	Pycnanthemum muticum
New England Aster	Symphotrichum novae-angliae

- Note: Coneflower isn't native, but we like the look of it. In some of our gardens where we have raised beds this is also where we add things like sage, thyme, rhubarb and other perennial herbs that also might not be native.

*We try and do lemon balm and mint in containers

Sowing Seeds with Students

- Good winter activity
- Seed Eggs vs. Milk Jug method
- Cold stratification period



Sowing Seeds with Students



Goddard School of Science and Technology Worcester, Massachusetts



Title	% of School
High Needs	92.8
English Learners	46.4
First Language Not English	67.4
Low Income	82.6
Students with Disabilities	19.8

Pollinator Gardens in the Science Classroom: *Alignment with State STE Standards*

“The standards are outcomes, or goals, that reflect what a student should know and be able to do. They do not dictate a manner or methods of teaching. The standards are written in a way that expresses the concept and skills to be achieved and demonstrated by students, but leaves curricular and instructional decisions to districts, schools, and teachers.” - 2016 MA STE Frameworks

- **Physical Science** - Rocks/soil/ erosion
- **Life Science** - life cycles/ seed germination, decomposition
- **Earth and Human Activity** - Monitoring weather/USDA zone data
- **Engineering and Design** - Design compost bins/ garden beds/ build prototypes



Science and Engineering Practices

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in an argument from evidence
8. Obtaining, evaluating, and communicating information

See Appendix I for additional information

Grade 3: Earth and Space Sciences

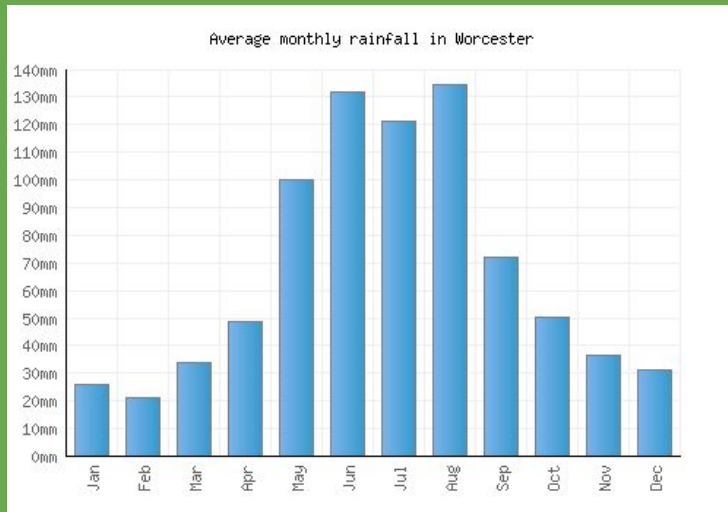
3-ESS

ESS2. Earth's Systems

3-ESS2-1. Use graphs and tables of local weather data to describe and predict typical weather during a particular season in an area.

Clarification Statements:

- Examples of weather data could include temperature, amount and type of precipitation (e.g., rain, snow), wind direction, and wind speed.
- Graphical displays should focus on pictographs and bar graphs.



- Make daily or weekly visits to the garden and collect data
- Rainfall
- Temperature
- Soil temperature
- Germination rates
- Plant Growth
- Make age appropriate graphs and data tables

LS1. From Molecules to Organisms: Structures and Processes

3-LS1-1. Use simple graphical representations to show that different types of organisms have unique and diverse life cycles. Describe that all organisms have birth, growth, reproduction, and death in common but there are a variety of ways in which these happen.

Clarification Statements:

- Examples can include different ways plants and animals begin (e.g., sprout from a seed, born from an egg), grow (e.g., increase in size and weight, produce a new part), reproduce (e.g., develop seeds, root runners, mate and lay eggs that hatch), and die (e.g., length of life).
- Plant life cycles should focus on those of flowering plants.
- Describing variation in organism life cycles should focus on comparisons of the general stages of each, not specifics.

- Start seeds inside in the winter - follow them through germination and flowering (winter sowing workshop)
- Develop pollinator gardens - native plant gardens and observe pollinator behavior and hopefully butterfly and moth life cycles
- Compost and decomposers complete the life cycle understanding



Math Curriculum Alignment



Measurement and Data:

- Calculate the cubic volume of soil/ compost
- Calculate perimeter, area and volume of garden beds
- Gather all kinds of data and make grade level appropriate graphs and data tables.





Participating in authentic experiences gives students context for being able to apply academic concepts.

- Word problems with grade level specific content based on experiences in the garden (Bringing the garden in)
- Solving problems on site with knowledge gained in the classroom. (Bringing the classroom out)

Multi-Language Learners



- Working in the garden aligns with WIDA goals for multimodality learning.
- Building a garden together bridges cultural divides.
- Students make connections to prior experiences
- Hands on learning allows for application of content knowledge.

Multimodality, the use of multiple means of communication, is an essential way for all students to access and engage in the content areas. In addition to the use of spoken and written language, students also communicate through gestures, facial expressions, images, equations, maps, symbols, diagrams, charts, videos, graphs, computer-mediated content, and other means.



Thanks!

Eliza Lawrence
Erin Severens

