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FOR EXCELLENCE IN MIAMI-DADE PUBLIC SCHOOLS

2017-2018

Ideas with IMPACT

idea packet

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Presented by: Eduardo Recinos

erecinos@educationfund.org

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e-mail: elau@educationfund.org
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Goals and Objectives

Big Idea 17: Interdependence

SC.4.L.17.1 Compare the seasonal changes in Florida plants and animals to those in other regions of the country.
Cognitive Complexity: Moderate

Big Idea 16: Heredity and Reproduction

SC.4.L.16.2 Explain that although characteristics of plants and animals are inherited, some characteristics can be affected by the environment.
Cognitive Complexity: High
SC.4.L.16.3 Recognize that animals behaviors may be shaped by heredity and learning.
Cognitive Complexity: High
SC.4.L.17.4 Recognize ways plants and animals, including humans, can impact the environment. Cognitive Complexity: High

Big Idea 1: The Practice of Science

SC.4.N.1.1 Raise questions about the natural world, investigate them in teams through free explorations, and generate appropriate explanations based on those explorations.
Cognitive Complexity: High
SC.4.N.1.2 Compare the observations made by different groups using multiple tools and seek reasons to explain the differences across groups. Cognitive Complexity: High

Big Idea 2: The Characteristics of Scientific Knowledge

SC.4.N.2.1 Explain that science focuses solely on the natural world.
Cognitive Complexity: Moderate
LACC.4.W.3.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.
LACC.4.SL.1.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.
MACC.4.MD.1.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table.

MACC.4.MD.2.4 Make a line plot to display a data set of measurements in fractions of a

unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. For example, from a line plot find and interpret the difference

Course Overview

The project is designed to be aligned with the Miami-Dade County Public Schools pacing guide for Grade 4 Science, Topic XII: Interdependence - Seasonal Changes in Florida's Plants and Animals. It takes 13 days to complete.

This is a cross curricular project that can be modified to include all grade levels. Students learn science, language arts and mathematics by designing and creating a food forest.

Students take on the challenge of planting edible crops while balancing them with a natural habitat. Through observation, they learn about the human impact on the environment. Through action, they learn about the value of land restoration and preservation of natural habitat. They do this by learning about native and invasive species. They also plant some native species in their food forest.

Students are introduced to the concepts of instinct, learned behavior and adaptations. They do research and set up habitat for birds based on their behavior and adaptations. They also set up composting and recycling bins to affect learned behavior by people. The interaction of organisms is also covered in this project. Students learn about competition and learn how to share resources and live side by side with nature.

Lesson Plans

Vocabulary:

adaptation, inherited, trait, characteristic, learned behavior, heredity, species, hibernation, migration, ecosystem, environment, competition, interaction, balance, resources, recycle, environmental factors, plant characteristics, human impact, pollution

Day 1

Materials: clipboards, writing paper, pens

Procedure:

Science
Discuss the interactions of organisms and the way they relate to the interactions of people.
Discuss the Interactions of people with animals and plants. Give examples of:
1. Competition
2. Sharing resources
3. Helping each other
4. Living side by side
5. Causing harm

Take students on a tour of the site for the future food forest and have them point out and create a list of examples of how people and animals interact with the space they see.

Points of discussion can include:

Was the land cleared of trees for construction?
Is there a lot of habitat to support wildlife?
What animals and plants are present?
Divide students into five groups and assign a type of interaction for each group.
Have each group find an example of the type of interaction that they were assigned in the future site of the food forest.

Language Arts
The student categorizes the examples of the different types of interactions between people, animals, and plants into the five main types by creating a chart.

Day 2

Materials: cardboard, mulch, wheelbarrow, plastic milk crates

Procedure:

Science
Introduce the concept of renewable resources by visiting the website for Recycling and Composting and opening the Composting Office as a class activity with the students.
Discuss reusing cardboard as mulch to prepare the food forest by using layers of cardboard,compost, and mulch to build healthy soil.
Prepare the site for planting by using the mulch layering technique.

Language Arts
Watch Nova video, “Decomposers”
Have students take notes on how decomposers create topsoil.
Students write an explanation of how soil is created and cite evidence from the video.

Day 3

Materials: a variety of Florida native plants

Procedure:

Science
Discuss Florida native plants and invasive species
Introduce students to a selection of native plants.
Demonstrate how to plant a tree or bush.
Have students space out plants along the perimeter of the food forest making sure to leave room for entrances.

Language Arts
Students explore these four resources:
1. Help Protect Florida’s Natural Areas from Non-Native Invasive Plants
2. List and Description of Florida’s Animals and Plants
3. Description of Plants and Animals of the Everglades
4. Forest Trees of Florida website and conduct research to find out about the characteristics that allow you to identify the plants.
Have students write a description of a native plant with identifying characteristics using evidence from the website.

Day 4

Materials: a variety of Florida native plants, shovels, pickaxe (for teacher), mulch

Procedure:

Science
Discuss the concept of competition for resources
Show the Discovery video, Monkeys Compete for Figs
Discuss human land use expansion and how we compete with animals for resources.
Students plant native plants along the edges of the food forest to provide some resources for native wildlife.

Mathematics
Students measure the dimensions of the food forest using a trundle wheel or tape measure.
Students draw a scale map of the site on graph paper.

Day 5

Materials: rope or cord, ground stakes, hammer, clipboards with paper, Optional: anemometer

Procedure:

Science
Discuss the environmental factors that can affect plant and animal characteristics.
The food forest area is divided into quarters with rope and stakes.
Have them identify the direction and amount of sunlight and wind for different areas.
Divide students into groups and have students study the land for areas that may flood or be exposed to strong winds.
Suggestion:
Use an anemometer with students to measure wind speed and direction.
Search for high and low points to know where water might gather.
Look for exposed areas that might be vulnerable to wind.
Students record their results and take notes

Language Arts
Reading passage “Can a Plant Live Anywhere?”
Divide students into groups to discuss the passage and come up with a list of environmental factors that have an effect on plant growth.

Day 6
Materials: list of food forest pants, variety of edible food forest plants

Procedure:

Science
Discuss plant adaptations and the environmental factors that affect their growth characteristics
Distribute a list of food forest plants with descriptions of growth characteristics and adaptations to shade or drought.
Take students to the site and have them place the plants in the quadrants where they will grow best.
Then arrange plants so that they are getting the right amount of light and space.

Mathematics
Have students create a line plot based on growth characteristics.
Have students compare the height of their plants on the line plot to the maximum growth size on the label and subtract to provide the difference in size.

Day 7
Materials: variety of food forest trees, shovels, pickaxe (for teacher), mulch

Procedure:

Science
Discuss forest restoration by humans and how it is an example of
1. reclamation
2. preservation
Discuss how planting trees can help restore the environment and reclaim land for wildlife.
Demonstrate how to plant a tree.
Help students dig holes and have students plant canopy trees in the food forest
Language Arts
Watch Discovery video, “Preserving and Protecting Habitats”
Students take notes on how to preserve habitats.
Students are divided into groups to discuss ways that a food forest preserves habitat.
Each group presents one example to the class.

Day 8
Materials: variety of edible food forest bushes and ground covers, shovels, pickaxe (for teacher), mulch

Procedure:

Science
Discuss the harmful effects of humans on soil pollution and erosion.
Discuss how groundcovers, and borders are an effective way to retain and build healthy soil.
Plant bushes for edges and borders and add ground covers.

Day 9
Materials: bird baths, shovels

Procedure:

Science
Discuss instincts and inherited behavior
Have students watch the Discovery video: What are Instincts?
Discuss how birds use bird baths as an instinct.
Place bird baths in the food forest by dividing students into teams and having each team perform a task while the rest observe and take notes.

Mathematics
Count the different species of birds that visit the bird bath.
Create a line plot using the final count

Day 10
Materials: bird houses, necessary hardware to hang or install birdhouses

Procedure:

Science
Watch Discovery video, “Adaptations: Features that Help Animals Survive”
Discuss bird adaptations and what they need for protection and survival
Demonstrate how to install a birdhouse
students select the best areas for birdhouses and install them by dividing students into teams and having each team perform a task while the rest observe and take notes.

Day 11
Materials: three bins with lids, picnic supplies: chairs, tables or trays and blankets, healthy snacks

Procedure:

Science
Discuss restoration by humans by recycling
Set up a picnic area near the food forest with a recycling bin, compost bin and a trash can
Students have a picnic and learn how to categorize waste into different containers.

Day 12
Materials: used coffee grounds, small buckets or containers for students

Procedure:

Science
Discuss Learned behavior
Students visit the website: Inherited vs. Learned Behavior and take the assessment
Discuss examples of learned behaviors for people
Discuss how composting is an examples of learned behavior for people
Students spread coffee grounds around the plants.

Day 13
Materials: rain barrel, concrete blocks or other method of elevating rain barrel

Procedure:
Science
Discuss harmful effects from humans on the environment
1. Polluted water
2. Ocean pollution
Students locate sources of water for the food forest and make a list
Students locate the best place for a rain barrel and set-up a rain barrel.

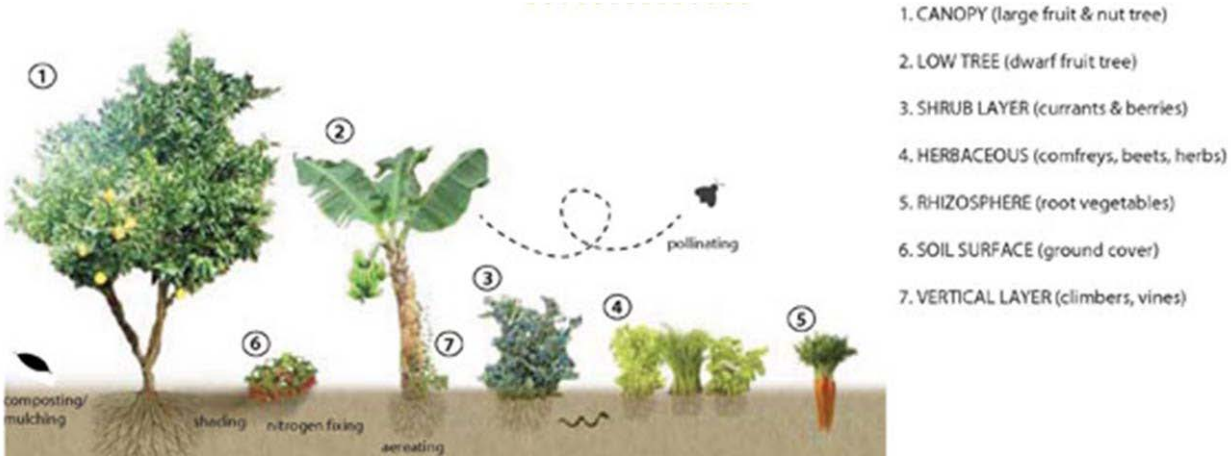
Language Arts
Take students through a walk of the school site and grounds. Tell them to focus on sources of pollution.
Students take notes during the tour
Students read ebook “Populations and Pollution”
Students categorize a list of sources of pollution by creating a chart.

Create a Shaded Food Forest

A food forest is a low maintenance, agricultural system that mimics a natural forest ecosystem. It takes advantage of the natural fertility, variety, and abundance of a forest.

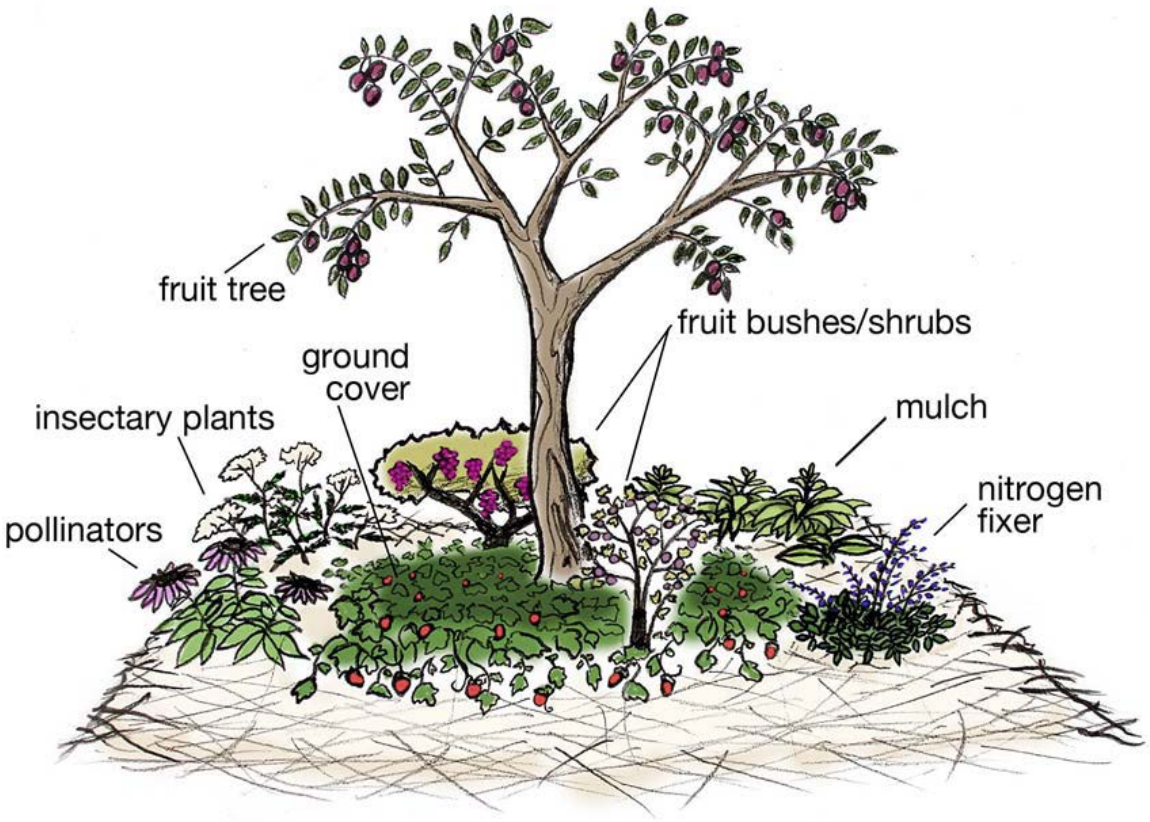
Layers of a Food Forest

A food forest is comprised of five to seven layers of plants. This increases the number of crops that can grow in a given space.



Plant Communities

Plants are grouped based on their functions and requirements.



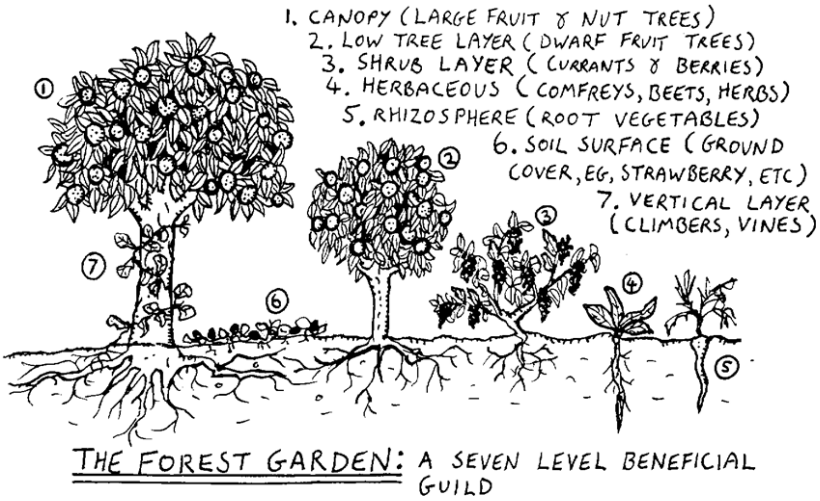
Examples of plant functions:

1. Living mulch / ground cover
2. Pollinator attractor
3. Pest repellant
4. Nitrogen fixer
5. Edible
6. Shade
7. Fuel / Lumber

Steps to Make a Food Forest

1. Creative Design
Look for patterns in nature for inspiration to shape your garden. Spirals, branching systems, and curves are a good starting point. Make sure you can reach all the areas of your garden

2. Plan your Plant Communities
Choose a plant for each layer. Remember to think of it in terms of plant functions and requirements. Make a list of plants and functions.



3. Prepare the Space

Mow area and cover with cardboard. Then cover with a three inch layer of compost and a one foot layer of mulch.

4. Mark Planting Areas and Position Plants

5. Dig holes for trees
Break through the cardboard. Soil can be placed inside the hole.

6. Plant Trees and Shrubs
Plant at least 25% Nitrogen fixing plants.
They will improve your soil.

7. Plant Smaller Plants
Dig through the mulch and cardboard and fill the hole with healthy soil. This creates a soil pocket for smaller plants to grow in.

8. Create Edge, Borders, and Paths
Try to use natural materials to make borders. Mulched paths lined with groundcover plants and border plants are easy to maintain.

Maintaining the Food Forest

Say “goodbye” to sowing, tilling, weeding, and watering. Say “hello” to harvesting and mulching.The better you plan your food forest, the less maintenance it will need.

1. Harvest

A frequent harvest makes room for plants to grow and allows light to reach lower plants.

2. Mulch

- Ground cover plants and edge plants stop weeds
- Use ground cover plants and wood chips to replace grass
- Mulch inside of garden beds with dried leaves and fresh clippings.

Fresh clippings provide mulch and fertilizer.

Perennial peanut never has to be mowed and fixes nitrogen.

Chives form a border to keep out weeds.

Resources

Plant Nurseries:

Going Bananas -
Tropical Plant Nursery
24401 SW 197 Ave
Miami, FL 33031
www.going-bananas@bellsouth.net
email: goingbananas@bellsouth.net
phone: (305)247-0397

Richard Lyon's Nursery -
Rare & Unusual Tropical
Trees & Plants
20200 SW 134th Ave
Miami, FL 33177
www.richardlyonsnursery.com
phone: (305) 251-6293

Flamingo Road Nursery -
Plants, Pottery, Plant Care,
Garden Furniture
1655 S Flamingo Rd
Davie, FL 33325
www.flamingoroadnursery.com
Phone: (954) 476-7878

Miracle Fruit Farms -
Highest Quality Miracle Fruit
16300 SW 184th St, Miami, FL 33187
website: www.miraclefruitfarm.com
phone: (786)220-4135

Pine Island Nursery -
Finest Quality Fruit Trees
16300 SW 184 St, Miami, FL 33187
website: www.tropicalfruitnursery.com
Phone: (305) 233-5501

Little River Cooperative- Local
Perennials

www.littlerivercooperative.com
Online Catalogs:

Bountiful Gardens - Heirloom, Untreated, Open Pollinated Seeds
www.bountifulgardens.org

Eden Organic Nursery Services Seeds - Organic, Heirloom Seeds
www.eonseeds.com

Molokai Seed Company -
Mass Spectrum Botanicals - Rare Live Seeds and Plants
www.massspectrumbotainicals.com

Baker Creek Heirloom Seeds - Rare, Non-GMO Seeds
www.rareseeds.com

Sustainable Agriculture
www.molokaiseedcompany.com

Free Mulch
Banyan Tree Service - Delivered Free
Village of Palmetto Bay, FL 33157
Phone: (305) 667-0073

Books:
Gaia's Garden by Toby Hemenway
Text Book: Scott Foresman pp. 26-33, 73-83, 105-131, 40, 104

Contacts

Zarron Brown “The Worm Whisperer” - Compost Presentations, Worm Bin Installations
zbrown1906@hotmail.com

Terri Stephen - The Ladybug Project, Florida Master Gardener
terrisephen@mac.com

Tiffany Noe- author of Forager: A Subjective Guide to Miami's Edible Plants
Garden help, Food forest perennials
www.plantmatter.net; mango@plantmatter.net

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All Miami-Dade County public school teachers, media specialists, counselors or assistant principals may request funds to implement any project idea, teaching strategy or project from the 2017 Idea EXPO workshops and/or curriculum ideas profiled annually in the ***Ideas with IMPACT*** catalogs from 1990 to the current year, 2017-18. Most catalogs can be viewed on The Education Fund's website at educationfund.org under the heading, "Publications."

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To apply, you must contact the teacher who developed the idea before submitting your application. Contact can be made by attending a workshop given by the disseminator, communicating via email or telephone, by visiting the disseminator in their classroom, or by having the disseminator visit your classroom.

Project funds are to be spent within the current school year or an extension may be requested. An expense report with receipts is required by Friday, June 1, 2018.

APPLICATION DEADLINE: December 13, 2017

Apply online at educationfund.org

For more information, contact:

Edwina Lau, Program Director
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elau@educationfund.org

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