

Fruit Gardens

Explore fruit from farm to table and learn how it can be grown at school!

Gardening Connection:

Compare & contrast locally produced vs. commercially produced fruits. Test garden soil for pH and nutrients. Grow seasonal fruit and preserve foods for use throughout the year.

Time

Required:

2 - 50 minute class periods plus garden growth time

Grade Level:

EDUCATOR NOTE:

Kansas State University Research and Extension publications adequately provide info on how to grow a wide variety of Kansas fruit plants like strawberries, blueberries and more. K-State Research and Extensions publication "Planning Your Fruit Garden" <http://www.ksre.ksu.edu/library/hort2/mf352.pdf> has great how-to's to get started.

OBJECTIVES

Students will be able to:

1. Explain how fruit travels from farm to table
2. Analyze a soil sample for pH and nutrient levels
3. Research fruits that can be grown in a school garden and prepare fruit beds

BACKGROUND

Fruit plants can be grown in a school garden but may require a great deal of soil preparation. Taking adequate samples of the planting site and making necessary amendments will increase fruit production. It is important to explain to students that some fruit plants require a great deal of time to grow before they will produce. In fact, for many fruit bushes like blueberries, raspberries, blackberries, 3-5 years of growth prior to fruit production will allow the bush to establish roots and a healthy plant. To allow for this, remove any flowers that appear during this growth time. Students that help plant the bushes are unlikely to reap any benefits, but classroom discussions over planting a legacy can take place.

The foods purchased in grocery stores travel an average of 1,300 miles from farm to plate. Shipping food long distances burns large amounts of fuels and can require additional packaging, which can end up in local landfills. Producing or buying food locally cuts down on these environmental costs.

MATERIALS

- World or USA map
- 2 sets of fruit picture cut-outs (orange, banana, lemon, apple, cherry, etc) (each set printed in a different color)
- Tape
- Soil Testing supplies
- Garden tools & fruit plants

Subjects

Geography
Math
Science

Vocabulary

pH - A figure expressing the acidity or alkalinity of a solution on a logarithmic scale on which 7 is neutral, lower values are more acid, and higher values more alkaline.

Project Connections

KSGC - Soil and Slope
PLT - Soil Stories
Resource-Go-Around
Pass the Plants Please

PROCEDURES

Engage

Hang a large map of the world in the classroom. Cut out pictures of different types of fruit and place pieces of tape on the backs. Students will take turns placing the fruit on the map to predict what state or country is our main supplier of the fruits they enjoy.

Explore

According to the USDA <http://www.ers.usda.gov/publications/fts/2009/FTS336.pdf#page=28> the following states are the largest fruit producers:

Fruit	Leading State	2 nd	3 rd	Top Importer
Grapefruit	Florida	Texas	California	
Orange	Florida	California	Texas	
Lemons	California	Hawaii	Arizona	Mexico
Tangerine	Florida	California	Hawaii	Mexico
Limes	Hawaii	California	Florida	Mexico
Apples	Washington	California	Pennsylvania	
Peaches	California	So. Carolina	Georgia	
Plums/Prunes	California	Oregon	Washington	
Cherries	Washington	California	Oregon	
Grapes	California	New York	Oregon	
Strawberries	California	Florida	Oregon	
Bananas				Costa Rico/Panama
Blueberries	Maine	Michigan	New Jersey	Canada
Cranberries	Wisconsin	Massachusetts	New Jersey	Canada
Pears	Washington	California	Oregon	Argentina

Using the chart, students will mark the map with a different-colored set of fruit cut-outs in order to compare their predictions with the correct answers. Using maps or an internet map site (such as googlemaps or mapquest), students will calculate how far their favorite fruits need to travel between the producing state and the school.

Explain

Analyze the results of the map activity by leading the students to discuss why certain fruits mainly come from certain locations. What led you to choose the locations for the fruits in the first round? What about the correct locations would make it such a successful producer and exporter? Discuss what is necessary for us to have a year-round supply of produce. How can we have strawberries in December? Try to guide the discussion toward more than just how warm the weather is, but other conditions to make growing and exporting more successful, such as the type and quality of soil, or how accessible the area is for exporting. Discuss if it is possible to grow those fruits in Kansas and if so, why they are not typically produced.

Conclusions to help the students reach:

- If exporters pick produce when it is ripe, it will probably be too ripe when they arrive locally.
- The further the produce travels, the more impact it has had on the environment and the more expensive it is due to transportation costs.

- Growing conditions to be altered to produce fruit off-season.
- To keep plants from spoiling in long travels, methods are often used to preserve the fruit: usually refrigeration, canning, and/or using preservatives. This affects the taste and texture of the fruit.
- To get the highest quality food at the cheapest price, we can grow produce ourselves in the school garden to avoid the costs of transportation and the problems of getting the optimum ripeness
- However, we can't grow whatever we want, whenever we want, wherever we want. We can enjoy fruits seasonally, as each different fruit ripens under our local conditions. Surplus produce can be preserved and stored to eat at different times throughout the year.

Math Extension

- Call a local gas station to find the price per gallon for diesel fuel
- According to fairtran.com (a site that calculates shipping costs for transporters) the average semi-truck gets 6 miles per gallon (could be less due to weight, wind, road grade)
- Use the mileage calculations from the Explore section to figure costs of transportation between top fruit producing state and the school building

Example:

How much gas money is needed to ship a semi truck full of Georgia peaches to Kansas?

Mapquest research: Search Atlanta, GA to Salina, KS shows approximately 1000 miles

Gas Station research: Call to local gas station prices diesel fuel at approximately \$4.00/gallon

Fairtran research: Average semi-truck gets 6 miles per gallon of diesel fuel

1000 miles between fruit producer and school/6 miles per gallon = 166.66 gallons used

166.66 gallons x \$4.00/gallon = \$666.64 in gas for a truckload of peaches to travel from Georgia to Kansas

Elaborate

Plant a variety of fruits in your school garden! Resources for successfully growing fruits are available from a number of publications. The county Research and Extension agriculture or horticulture agent can be useful for getting started. A number of their publications are available online at <http://www.hfrr.ksu.edu/p.aspx?tabid=282>. Most helpful would be to start with "Planning Your Fruit Garden." Direct links for specific fruits are located below in the related readings section.

Soil Testing

The proper soil pH is essential to the success of many fruit crops. Many Kansas soils will need to be amended to produce fruits such as blueberries. Your county's Extension agent can assist with soil testing in your school garden, and a chemistry lesson for students can be incorporated using the tips below:

- Teach or review the pH scale
- The extension agent for your county can take a detailed soil sample inexpensively detailing not just pH but also any nutrients lacking in the soil
- The most common range of soil pH is 4-8 and optimal availability of nutrients is 6.5-7.
- Blueberries require a more acidic soil 4.6-5.2
- Soil can be amended if soils are too acidic or too basic
 - Increasing acidic soil – add lime
 - Decreasing basic soil – add iron or aluminum sulphates, urea, decayed vegetable matter, compost, pine needles, peat moss

Elementary – Students collect soil from proposed fruit planting spot

- Place two tablespoons of soil into each of two jars
- Pour ¼ cup apple cider vinegar into one jar
- Mix 1/8 cup baking soda and 1/8 cup water and pour into the other jar
- If the soil is acidic, the jar with baking soda will fizz
- If the soil is alkaline, the jar with the vinegar will fizz
- If neither jar fizzes, the soil has a neutral pH

Middle Level

- Rapitest company sells a very inexpensive soil testing kit that uses capsules and a color chart to test soil pH and nutrient deficiencies found in the soil
- Test the school garden soil, but also have students bring samples from their yards and chart how the soil around the county differs.

High School

- Use a high technology pH probe and have students conduct tests
- Monitor after different climate events – rain, snow, drought

Evaluate

Students will show what they know by creating videos and/or podcasts for growing different varieties of fruit. Items to be included in the project include:

- Steps for growing assigned fruit
- Soil amendments necessary
- Cost comparative to store bought item
- Benefits (a review) of eating seasonal, locally grown food

Extension Ideas

- Can, preserve or process fruit to show how it can be eaten off season.
- Hold a debate over sustainable gardening practices and the pros and cons of eating a seasonal diet
- Look at the nutritional benefits of the fruits we eat:
<http://www.ksagclassroom.org/classroom/lesson/download/2010%20Ag%20Wise/Fruit%20Fact%20Sheet.pdf>
- Take math calculations a step further by calculating carbon emissions for the journeys of the fruits students mapped.

Resources:

Food Miles: A Simple Metaphor to Contrast Local and Global Food Systems

http://www.leopold.iastate.edu/pubs/staff/files/local_foods_HEN0604.pdf

How far do your fruits and vegetables travel?

http://www.leopold.iastate.edu/pubs/other/files/food_chart.pdf

Growing Strawberries – KSU Publication

<http://www.ksre.ksu.edu/library/hort2/mf598.pdf>

Growing Raspberries and Blackberries – KSU Publication

<http://www.ksre.ksu.edu/library/hort2/mf720.pdf>

Growing Grapes – K-State Research & Extension

<http://www.ksre.ksu.edu/library/hort2/mf635.pdf>

Growing Blueberries – K-State Research & Extension

<http://www.hfrr.ksu.edu/doc3091.ashx>

Lawrence Fruit Tree Project

<http://lawrencefruittreeproject.wordpress.com/fruit-tree-possibilities/>