

Thomas Jefferson's Useful Plants

Objective

Students will read about Thomas Jefferson's efforts to find plants that would grow well in the new country. Students will

- Taste and research unfamiliar fruits and vegetables
- Learn about Jefferson's instructions to Lewis and Clark and follow some of his instructions to explore a defined local area.
- Experience successes and failures by growing a variety of plants from seed.
- Discuss the pros and cons of introducing new plants to an ecosystem.

Background

"The greatest service which can be rendered any country is to add a useful plant to its culture." -Thomas Jefferson

Thomas Jefferson gave us the Declaration of Independence but he was also passionate about developing a strong and innovative agriculture in the new nation. He searched high and low for new food plants that would flourish in American gardens and on American farms. On a trip to Lombardy, Italy, he even filled his pockets with rice—risking arrest for smuggling—so he could carry it home and try it out in South Carolina. It did not thrive. Jefferson believed agriculture was the "surest road to affluence and best preservative of morals."

Thomas Jefferson was a dedicated gardener and farmer, and his interest in agriculture is evident in much of his writing. His home, "Monticello," included vegetable gardens, flower gardens, orchards, vineyards, grain fields, and ornamental landscapes.

Tended by elderly slaves under Jefferson's supervision, the garden served as both a source of food for Jefferson's family and a laboratory where Jefferson experimented with 330 varieties of more than 70 species of vegetables from around the world. Plants in the garden included squash and broccoli imported from Italy; beans and corn collected by the Lewis and Clark expedition, figs from France, and peppers from Mexico. The English pea was his favorite vegetable.

He had a *Garden Book* in which he kept detailed notes on his turnips, lettuce, artichokes, tomatoes, eggplants and squash. He recorded when each variety was sown, when it was mulched and how, when the first leaves or fruits appeared, when they came to the table and which varieties were tastiest. His *Garden Book* provided a model of the scientific method at work, written at a time when American horticulture was in its infancy. He applied his analytical mind to gardening, writing that "I am curious to select one or two of the best species or variety of every garden vegetable, and to reject all others."

Some of the varieties that Jefferson cultivated at Monticello have been passed down as heirloom vegetables, and people still plant them in their backyard gardens. Overall, he had about 5,000 acres of farmland, planted mostly in wheat and other grains.

Oklahoma Academic Standards

GRADE 5

Speaking and Listening:

R.1,2,3; W.1,2. Critical

Reading and Writing:

R.1,2,6; W.1,2,3.

Vocabulary: R.1,3,5.

Research: R.1,2,3;

W.1,2,3,4. Multimodal:

W.1,2

American History: 3.6; 5.3

Ecosystems: LS2-1,2

Materials

variety of seeds

planting medium

garden soil

small pots, egg cartons,
plastic cup and assorted
other containers to serve as
planters

Background Sources: “Attending My Farm,” Monticello website: <https://www.monticello.org/site/jefferson/attending-to-my-farm>. Baron, Robert C, editor, *The Garden and Farm Books of Thomas Jefferson*, Fulcrum, 1987. Hatch, Peter J, *A Rich Spot of Earth: Thomas Jefferson’s Revolutionary Garden at Monticello*, Yale, 2012. Hatch, Peter, “Garden Weeds in the Age of Jefferson,” *Twinleaf*, Thomas Jefferson Foundation, January, 2006, <https://www.monticello.org/sites/default/files/inline-pdfs/weeds.pdf> . Jolly, Nicole Cotroneo, “Thomas Jefferson’s Farming Failures,” *Modern Farmer*, October 24, 2013, <http://modernfarmer.com/2013/10/thomas-jeffersons-farming-failures/>. Wulf, Andrea, *Founding Gardeners: The Revolutionary Generation, Nature, and the Shaping of the American Nation*, Knopf, 2011.

Procedures

1. Read and discuss background and vocabulary.
2. Thomas Jefferson thought introducing new plants to the nation was one of the most important things he could do. Introduce some new fruits and vegetables to your class.
 - Bring an assortment of unusual fruits and vegetables to the class. Divide students into groups and provide samples of each of the fruits and vegetables.
 - Provide copies of the “Try Something New” worksheet included with this lesson.
 - Students will write their responses on the worksheet.
 - Students will discuss their responses in groups and then as a class.
3. Students will each select one of the new fruits or vegetables for research and use the “Research Something New” worksheet to find basic information about the selected fruit or vegetable.
 - Students will formulate their own viable research questions to find further information about the fruit or vegetable.
 - Students will record and organize information from various print and/or digital sources.
 - Students will determine the relevance and reliability of the information gathered.
 - Students will write research papers independently.
 - Students will summarize and present information in a report.
4. While Thomas Jefferson was president, he sent Meriwether Lewis and William Clark on an expedition to follow the Missouri River in search of a water route across North America and to explore the uncharted West. He wrote explicit instructions telling them what information he wanted them to bring back. His instructions were that they should **observe, collect, document** and **classify** what they encountered. This included the native people they would meet, animals, plants, etc.
 - Students will pretend they are explorers on the Lewis and Clark expedition, exploring your own surroundings as if they had never been there and reporting back to people who have never seen them.
 - Students will use the “Exploration Journal” included with this lesson and follow Jefferson’s instructions to Lewis and Clark —observe, collect, document, classify. Students will take careful notes for a week of all they see on the playground, in their classroom, at home, in their neighborhood, etc. Students will also collect items, as appropriate. Students may also use sketches and/or photographs in their documentation.
 - Students will write a narrative report to share with the class, using the information they have collected, photos, collected items, etc.
5. Not all of Thomas Jefferson’s plant experiments were successful. Failure is as much a part of gardening and agriculture as is success. The crop ledger in Jefferson’s *Garden Book* is littered with the words “failed,” “failed nearly” and “killed by bug.” His failures did not discourage him, though.
 - “I have always thought that if in the experiments to introduce or to communicate new plants, one species in an hundred is found useful and succeeds, the ninety nine found otherwise are more than paid for.”
 - Divide students into groups. Provide each group with a variety of seeds to plant and materials for planting — pots, egg cartons, plastic cups, potting media, garden soil, etc.
 - Provide copies of the Scientific Method Format included with this lesson. Students will use the format

to keep careful records of the conditions in which the seeds are planted—type of soil, amount of sunlight, frequency of watering, etc.

—At the end of one month students will compare their results.

—Students will determine the ratios of failures to successes and graph the results in their groups and as a class.

6. Provide copies of the Reading Page, “Thomas Jefferson’s Useful Plants” for students to read and discuss.
 - Students will answer the questions included with the Reading Page.
 - Students will brainstorm a list of questions they have about introduced species. Ask: What are you curious about? What would you like to know more about?
 - Students will use the questions as a basis for developing their own research questions about introduced and invasive plants. Students will research and write papers based on their questions.
7. Gardeners in Jefferson’s time did not have much trouble with species introduced from other countries. Most of the plants they considered weeds were native. Today the situation has flipped. Only 15 percent of our worst weeds are North American natives. The majority originated in Europe or Asia. Although most of the plants Jefferson grew have proved to be useful, a few are now considered invasive in some parts of the country. Two surprising examples of vegetables he grew that are now considered invasive in some parts of Oklahoma are lettuce and asparagus. Lettuce was one of Jefferson’s favorite vegetables, and he insisted on having it available year round. Most of us would consider it a useful plant, since we eat large quantities of it in salads. It is listed as invasive in one county in Oklahoma, however. That means in some areas the plants were allowed to bolt, or grow to maturity so that they developed seeds. Much like dandelion seeds, lettuce seeds grow on fluffy heads that are easily carried by the wind and deposited in places where they do not belong.
 - Students will select one of the plants from the following list of plants grown in Jefferson’s garden that are now considered invasive in some part of Oklahoma. Students will research the plant to find its country of origin, photos and where it is considered invasive in Oklahoma (The University of Georgia site listed below is a good source for finding invasive species in Oklahoma.) Students will prepare reports to present to the class using a variety of media, photos, etc.

Some of the plants Jefferson grew in his garden that are now listed as invasive in some parts of Oklahoma.

cornflower (*Centaurea cyanus*)—native to Europe

salsify (*Tragopogon dubius*)—native to Europe and Asia

common four-o-clock (*Mirabilis jalapa*)—native to Peru

everlasting peavine (*Lathyrus latifolius*)—native to Europe

paper mulberry (*Broussonetia papyrifera*)—native to Asia

Osage orange (*Maclura pomifera*)—native to North America

eastern redcedar (*Juniperus virginiana*)—native to North America

asparagus (*Asparagus officinalis*)—native to Europe, Africa, and Asia

European red raspberry (*Rubus idaeus*)—native to Europe and Asia

sour cherry (*Prunus cerasus*)—native to Europe and Asia

lettuce (*Lactuca sativa*)—native to the Mediterranean region

pear (*Pyrus communis*)—native to Europe and Asia

Source: Baron, Robert C, editor, *The Garden and Farm Books of Thomas Jefferson*, Fulcrum, 1987. University of Georgia Center for Invasive Species and Ecosystem Health, Early Detection & Distribution Mapping System: <https://www.eddmaps.org/tools/recordsbysubject.cfm>

Vocabulary

affluence— the state of having much money and expensive things

agriculture— the science, art, or practice of cultivating the soil, producing crops, and raising livestock and in varying degrees the preparation and marketing of the resulting products

analytical— of, relating to, or skilled in the careful study of something

benefit— something that does good to a person or thing

biodiversity— biological variety in an environment as indicated by numbers of different species of plants and animals

cultivate— to prepare land for the raising of crops

ecosystem— a system made up of a community of living things interacting with their environment especially under natural conditions

exotic— introduced from another country

extinction— the state of no longer existing

expedition— a journey undertaken for a specific purpose

exploit— to get value or use from

flourish— to grow well

genetically— of, relating to inherited traits and variation of organisms

heirloom— a variety of plant that has originated under cultivation and that has survived for several generations usually due to the efforts of private individuals

horticulture— the science and art of growing fruits, vegetables, flowers, or ornamental plants

hybridize— to produce or cause to produce an offspring of parents with different genes especially when of different races, breeds, species, or genera

innovative— introducing or using new ideas or methods

invasive— tending to spread prolifically and undesirably or harmfully.

morals— ways of behaving

landscape— the land that can be seen in one glance

mulch— a protective covering (as of sawdust, compost, or paper) spread or left on the ground to reduce evaporation, maintain even soil temperature, prevent erosion, control weeds, enrich the soil, or keep fruit (as strawberries) clean

native— living or growing naturally in a particular region

negative— not helpful

originate— to come into existence

ornamental— serving to add beauty

out-compete— displace (another species) in the competition for space, food, or other resources

passionate— showing or affected by strong feeling

preservative—having the power to keep or save from injury, loss, or ruin

render— to furnish or give to another

smuggling— taking, bringing or introducing secretly and unlawfully especially to avoid paying taxes

sown— seed planted for growth especially by scattering

species— a group of similar living things that ranks below the genus in scientific classification and is made up of individuals able to produce offspring with one another

thrive—to grow vigorously

variety— any of various groups of plants or animals ranking below a species

weeds— plants that tend to grow thickly where they are not wanted and choke out more desirable plants

Name _____

Try Something New

Name of new thing:

Fruit or vegetable? (circle one)

Have you ever tried one of these?

If so, did you like it?

What does it look like? Describe in words first, then draw.

What does it smell like?

How does it taste?

Texture

Flavor (sweet? sour? bland?)

After taste (pleasant? unpleasant)

Would you try this again? Why or why not?

Name _____

Research Something New

Name of new thing:

Fruit or vegetable? (circle one)

Country or region of origin

Where does it grow now?

What does it need to grow?

soil type

temperature range

number of growing days

Will grow in Oklahoma?

How is it usually served? Find a recipe.

What else do you want to know? (Research question)

Exploration Journal

While Thomas Jefferson was president, he sent Meriwether Lewis and William Clark on an expedition to follow the Missouri River in search of a water route across North America and to explore the uncharted West. He wrote detailed instructions telling them what information he wanted them to bring back. His basic instructions were that they should **observe**, **collect**, **document** and **classify** what they encountered. This included the native people they would meet, animals, plants, weather, etc.

1. Pretend you are an explorer on the Lewis and Clark expedition, exploring your own surroundings as if they had never been there and reporting back to people who have never seen them.
2. Follow Jefferson's instructions to Lewis and Clark —observe, collect, document, classify—and take careful notes for a week of all you see in the assigned area (school playground, classroom, at home, your neighborhood, etc.)
3. Use your notes to write a narrative report to share with the class.

Area you are exploring:

Observe.

Collect. Pick up samples of plants, rocks, etc. (Take photos or sketch if collecting samples is not practical.)

Document. Keep records of your observations, including photographs and sketches.

Classify. Place your observations and items you have collected into categories. (e.g., people, plants, weather, etc.)

Scientific Method Format

Not all of Thomas Jefferson's plant experiments were successful. Failure is as much a part of gardening and agriculture as is success. The crop ledger in Jefferson's *Garden Book* is littered with the words "failed," "failed nearly" and "killed by bug." His failures did not discourage him, though.

"I have always thought that if in the experiments to introduce or to communicate new plants, one species in an hundred is found useful and succeeds, the ninety nine found otherwise are more than paid for."

Title of Experiment or Study:

I. Research Question: What do you want to learn or find out?

II. Forming the Hypothesis:

What is known about the subject or problem, and what is a prediction for what will happen?

III. Experimenting: (Set up procedures)

This should include: materials used; dates of the experimental study; variables, both dependent and independent (constant and experimental); how and what was done to set up the experiment; fair testing procedures.

IV. Observations:

Includes the records, graphs, data collected during the study.

V. Interpreting the Data:

Does the data support/defend the hypothesis?

VI. Drawing Conclusions:

Justify the data collected with concluding statements about what has been learned. Discuss any problems or concerns. Use other studies to support the conclusion. Give alternative ideas for testing the hypothesis.

Oklahoma Ag in the Classroom is a program of the Oklahoma Cooperative Extension Service, the Oklahoma Department of Agriculture, Food and Forestry and the Oklahoma State Department of Education.

Introduced Plants: More Harm than Good?

Thomas Jefferson was passionate about introducing “useful plants” to the new nation. His garden contained plants collected from around the world. Some came from friends at home and overseas and some he collected himself while he was traveling in Europe. He planted some of the seeds he collected in his own gardens, but he also passed seeds along to friends and neighbors, family members, and to some of the leading plantmen of the early 19th Century. Many of the vegetables grown at Monticello were rare for their time — asparagus bean, sea kale, rutabaga, lima beans, okra, potato pumpkins, winter melons, cayenne pepper, black salsify, sesame, eggplant. Even tomatoes were considered exotic during Jefferson’s time. He served them in his home and encouraged people to try them, even though some considered them dangerous.

Jefferson is admired for introducing new plants, but today we know that some introduced plants can have a negative effect on an ecosystem. Introduced species can become pests, bullies, and weeds. This was not so much a concern in Jefferson’s time because gardens back then were mostly free from insect pests, disease and weeds introduced from other parts of the globe. Early Americans had weeds in their gardens, but they were not as much a threat to ecological and horticulture harmony as invasive plants are today.

Introduced species are species that have been introduced into areas outside their natural ranges. Throughout history, 50,000 nonnative species have been introduced into North America. Many of these species, such as wheat, rice and peaches, were introduced as sources of food. Introduced species — plant and animal— provide more than 98 percent of the food we eat today.

In Jefferson’s time the most troublesome weeds were native. Today it is plants introduced from other parts of the world that cause most problems. Only 15 percent of our worst weeds are North American natives. The majority originated in Europe or Asia. Humans have always carried species from one region to another and between continents, but the development of rapid means of transportation has greatly increased the frequency of such introductions.

For an introduced species to be considered invasive, the negative effects must outweigh any benefits. Introduced species that become invasive are a threat to biodiversity. Almost half the species in the US that are at risk of extinction are negatively impacted by invasive species. Invasive species threaten biodiversity in several ways.

- They out-compete native species for food and natural resources.
- They may hybridize with local species so that within a few generations, few if any genetically pure native individuals remain.
- They may exploit a resource that native species cannot use, which allows them to take hold in the new environment.

Comprehension Questions

1. What is the author’s purpose and point of view?
2. How did the author structure this passage? (description, compare/contrast, sequential, problem/solution, cause/effect)
3. Summarize this passage. What is the main idea? What are the supporting details?
4. For an introduced species to be considered invasive, the negative effects must outweigh any benefits. What are some negative effects of introduced plants? What are some positive effects of introduced plants?
5. Discuss: Was Jefferson wrong to introduce new species? What would we eat if plants like wheat, rice and peaches had not been introduced? Write an argument for or against introducing new plants.
6. Research: What is your favorite fruit or vegetable? Find out if it is native to North America or introduced. Did Jefferson grow it in his garden? (See list provided on the Jefferson Page.)