



SC Farm Bureau
Ag in the Classroom
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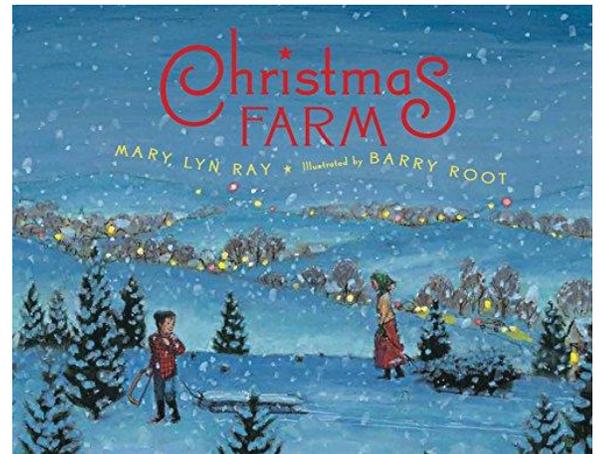


December 2019 Book of the Month

Christmas Farm

By: Mary Lyn Ray

When Wilma decides her garden needs a new beginning, she gathers string, scissors, shovels, sixty-two dozen balsam seedlings, and Parker, her five-year-old neighbor. Year after year, Wilma and Parker nurture their trees, keeping careful count of how many they plant, how many perish, and how many grow to become fine, full Christmas trees. ¹ This story helps illustrate the dedication and time required by growers and farmers to grow Christmas trees. It celebrates determination, growth and nature, and special friendships. ²



Did You Know? (Ag Facts) ^{2 - 3}

- South Carolina Christmas tree farmers grow several different varieties of tree including (but not limited to) Leyland Cypress, Carolina Sapphire, Blue Ice Cypress, Eastern Red Cedar, Virginia Pine, White Pine, and Murray Cypress.
- The most popular species of Christmas tree in North America is the Frasier Fir. Because they require cool summer weather and higher altitudes, they do not grow in SC. Our neighbors to the north (NC) are second in the nation for Frasier Fir production.
- If treated properly after use, Christmas trees can have a negative carbon footprint. This means they absorb more carbon than their production and transportation produces.

Discussion Questions

- Why did Wilma want to start a tree farm?
- What are some obstacles Wilma faced?
- What is Wilma like? What is Parker like? How do their differences make them good partners?

Lesson Plans Available Online at

scfb.org/book-of-the-month

Grade Level(s): K-5

Purpose: Through the topic of Christmas trees, students will explore math concepts (addition, multiplication) and learn how these real trees are beneficial to the environment.

Vocabulary:

- **conifer:** a tree that bears cones and evergreen needlelike or scalelike leaves
- **propagation:** the process of starting new plants from seed or plant/stem tissue
- **nursery:** a greenhouse or area where plants are started as seeds or seedlings and grown to a larger size
- **seedling:** a plant that has been successfully propagated and has formed leaves, stems and roots
- **transplanted:** uprooted and planted elsewhere
- **finishing:** growing a plant to its full growth or maturity before harvest or sale
- **harvest:** the time and process which crops or plants are gathered
- **baling:** trees are placed in a machine that ties them in twine so they are easier to ship

Background Agricultural Connections

Christmas Tree Farming

Real Christmas trees are grown on farms just like any other agricultural crop. It takes 6-10 years for a farmer to grow a Christmas tree. Christmas trees are grown in most states. Oregon, Michigan, North Carolina, Pennsylvania, Wisconsin, and New York rank highest in production. Visit the [Interactive Map](#) to see where your state ranks. Depending on your location, real Christmas trees can be obtained from natural forests where tree harvesting is allowed, directly from a local Christmas tree farm, or from local retail stores who market trees originally obtained from Christmas tree farms across the country.

Science Behind the Christmas Tree

Traditional Christmas trees in the United States can be one of several varieties of **conifers** including fir, pine, spruce, cypress, or cedar. Each of these tree varieties have unique colors, sizes, shapes, and needles. Below is information on each tree variety sourced from the National Christmas Tree Association: ⁴

- **WHITE PINE:** The largest pine in the U.S., the white pine has soft, flexible needles and is bluish-green in color. Needles are 2½ - 5 inches long. White pines have good needle retention, but have little aroma. They aren't recommended for heavy ornaments.
- **WHITE SPRUCE:** The white spruce is excellent for ornaments; its short, stiff needles are ½ to ¾ in. long and have a blunt tip. They are bluish-green - green in color, but have a bad aroma when needles are crushed. They have excellent foliage color and have a good, natural shape. The needle retention is better in a white spruce than it is among other spruces.
- **FRASER FIR:** The Fraser fir branches turn slightly upward. They have good form and needle-retention. They are dark blue-green in color. They have a pleasant scent, and excellent shipping characteristics as well.
- **COLORADO BLUE SPRUCE:** Often used for stuffing pine-pillows, these sharp needles are 1 to 1 ½ in. in length. This species is bluish-gray in color. Needles have an unpleasant odor when crushed. This Christmas Tree has good symmetrical form and an attractive blue foliage. It also has good needle retention.

- **CONCOLOR FIR:** These small, narrow needles are around 1 to 1½ in. in length and occur in rows. They have good foliage color, good needle retention, and a pleasing shape and aroma.
- **DOUGLAS-FIR:** These soft needles are dark green to blue green in color and are approximately 1 to 1 ½ in. in length. Douglas-fir needles radiate in all directions from the branch. When crushed, these needles have a sweet fragrance. They are one of the top major Christmas tree species in the U.S.
- **BALSAM FIR:** These needles are ¾ to 1½ in. in length and last a very long time. This tree has a dark-green appearance and retains its pleasing fragrance throughout the Christmas season.
- **SCOTCH PINE:** Approximately 1 in. in length, these needles don't even fall when they're dry, providing excellent needle retention. The color is a bright green. A common Christmas tree in the U.S., the scotch pine has an excellent survival rate, is easy to replant, has great keepability and will remain fresh throughout the holiday season.
- **NOBLE FIR:** These needles turn upward, exposing the lower branches. Known for its beauty, the noble fir has a long keepability, and its stiff branches make it a good tree for heavy ornaments, as well as providing excellent greenery for wreaths and garland.
- **LEYLAND CYPRESS:** The most popular Christmas tree in the southeast, the Leyland cypress is dark green-gray in color and has very little aroma. Because it is not in the pine or fir family, it does not produce sap, so those with an allergy to sap can still enjoy a Leyland as their Christmas Tree.
- **VIRGINIA PINE:** These branches are stout and woody and respond very well to trimming. The tree is small to medium in size and its foliage becomes extremely dense. Aside from being a good nesting site for woodpeckers, the Virginia pine continues to be one of the more popular Christmas tree in the south

Life Cycle of Christmas Trees ²

- **Step 1 – Propagation:** the process of starting new plants from seed, or plant stem/tissue. Most trees begin their life in a **nursery** (a greenhouse or area where plants are started as seeds or seedlings and grown to a larger size; the trees are propagated). Seedlings are grown from cuttings off a mature tree with favorable traits, or grown from seeds gathered from mature trees.
- **Step 2 – Seedling:** a plant that has been successfully propagated and has formed leaves, stems and roots. After several years, the tree seedlings are ready to be moved out of the nursery into beds where they can grow without competition from larger trees. The trees will stay in the beds until they are large enough to be **transplanted** (uprooted and planted elsewhere) into fields.
- **Step 3 – Finishing:** growing a plant to its full growth or maturity before harvest or sale. Trees are transplanted directly into the ground. They will continue to grow for 7-8 years in the field. As they grow, the farmer will spend time and effort in shaping them. After the trees reach several feet in height, they are sheared (or cut/shaped) for the first time.
- **Step 4 – Harvest:** the time and process which crops or plants are gathered. At harvest time, growers identify finished trees by placing a ribbon on them. The ribbons are color coded with each height being assigned a different color. Often a whole field is not ready for sale in any one year. It often takes two to four years before a field is cleared and ready for new trees to be planted. The tagged trees are cut and then bundled during a process called **baling**. During the baling process, the trees are placed in a machine that ties them in twine so they are easier to ship. The baled trees are placed on trucks and shipped to retail lots all across the state and country.

Christmas Farm Numbers and Estimations ²

Materials:

- *Christmas Farm* by Mary Lyn Ray

Procedures:

1. Start by reading the book, *Christmas Farm* to students. Tell them that as you read it, they should pay attention to all of the numbers in the story.
2. The book provides great, real-life examples of calculating dozens, as well as dealing with large numbers. For instance, Wilma starts with 62 dozen trees. Talk about a dozen and ask your students to calculate the total number of trees. However, each year some of the trees are lost to mice, moose, snow and ice, but a great many remain.
3. Ask your students to calculate how many were lost each year. Depending on the age of the students, they could use a pencil and paper, or work on their mental math skills.
4. After reading the story, talk about the growth of trees. Calculate their height in feet after each year of growth (there's a chart given at the back of the book which gives height in inches).
5. Try to determine the best number of seedlings to start with if you want to have 700 to sell once they reach maturity. This is a great, open-ended discussion because it requires estimating and has no "right" answer. This also provides insight to how farmers think because there is no way to know how many trees will be lost each year, so how do you determine how many seedlings to buy at the start? The possibilities for math discussions are endless!

Real or Artificial? ⁵

(LOWER ELEMENTARY)

Materials:

- Shel Silverstein's poem, *Peckin'*
 - This poem can be read from the book *A Light in the Attic* or accessed online through a Google search
- Poster paper, 3' x 5-6'
- Paint for Christmas tree
- Art paper for students
- Art materials for student projects—very flexible (see activity directions), could be crayons, colored pencils, markers, and/or natural items like dried seeds, bits of cones, etc.

Procedures:

1. Read Shel Silverstein's poem, *Peckin'*, to your students. The poem offers a funny look at a not-so-funny notion, that artificial trees offer none of the life-giving functions and values of real trees. Some questions you might ponder with your students:
 - Why does the poet think that the bird pecking on the plastic tree is the saddest thing he's ever seen?
 - What's so sad about it?

- What do woodpeckers get from real trees? (*Food (insects), nesting sites (woodpeckers make holes that they and many other animals nest in), and oxygen to breath. Plus, seeds that grow new trees that will support the great-great-great-off spring of today's wood peckers.*)
2. Make a big (life-size if possible) poster of a Christmas tree. Use a big sheet of poster paper. You can have students draw and paint the Christmas tree if time allows, or you can paint it and have it ready to go for the activity.
 3. Have your students brainstorm together all of the living and non-living parts of their world (specific animals, people, plants, soil, air, water, fungus, insects, etc) that benefit from a real Christmas tree—before it's cut, after it's cut, after it dies, and after it decays and becomes part of the soil.
 4. Give each student a small (for example, 6"x6") piece of paper on which to illustrate one of these living or non-living elements, with whatever artistic materials you'd like them to use. This could simply be traditional art materials like crayons, paint, cut-out paper, and so on, or it could be natural materials that they gather, like dried seeds, bits of cones, pebbles and so on, that they glue onto the paper.
 5. Have them attach their creations to the Christmas tree, so that it is decorated with the community of life it supports.

(UPPER ELEMENTARY)

Materials:

- *Real or Artificial?* activity sheet, 1 per student

Procedures:

1. Introduce this activity by discussing how every day we make choices that have both direct and indirect impacts on our personal lives, our communities, and the world around us. For example: Should I buy bread baked at the local bakery or commercial bread from the supermarket? Should I carry that bread home in a plastic or paper bag, or in a reusable cloth bag brought from home? Should I hang my wet laundry on a drying rack or put it in an electric dryer? Though we don't often take the time to carefully list and weigh the pros and cons of these choices, it can be eye-opening to do so. What real differences do our choices make?
2. Tell the students that today they'll be considering the question of real versus artificial Christmas trees. According to the National Christmas Tree Association, in the United States in 2012, people bought roughly 24.5 million real conifers and 10.9 million artificial Christmas trees. Which kind is better? What are the costs and benefits, the pros and cons, of each?
3. Remind your students that "better" is a subjective term. Better for what? In this activity, they'll be considering the question in terms of whether it is better for:
 - a. The air we breathe
 - b. The water we drink
 - c. The soil
 - d. Local farmers
 - e. Plants and wildlife
 - f. My community
 - g. Myself
 - h. My family

4. Give each of your students a copy of the blank *Real or Artificial?* activity sheet.
5. Have them complete the activity sheet on their own or in small groups, either through in-class or take-home research. Then have them discuss their findings as a whole class, and encourage respectful debate.
6. When the discussion is complete, ask students to decide, based on their overall findings, whether they think real or artificial trees are a better choice for people looking to purchase a Christmas tree. See the attached Teacher's Key for the *Real or Artificial?* activity sheet for more details.
7. Have each student develop an advertisement poster for real or artificial Christmas trees, coming up with a slogan, marketing pitch, and price point. Have them present their posters to the class. When all have been presented, discuss the most effective strategies and pitches.

Nutrient Cycling⁵

Materials:

- Access to the [National Christmas Tree Association Website](#)

Procedures:

1. Communities across the country are practicing innovative ways to recycle and reuse Christmas trees. Look at the [National Christmas Tree Association website](#) with your students and read together about more than a dozen great ways to recycle and reuse Christmas trees, from fortifying sand dunes to creating fish habitat in ponds and rivers.
2. Make inquiries with your town or city hall to find out what programs your community has in place to recycle or reuse Christmas trees.
3. Share and discuss these existing strategies with your students.
4. Have your students work in small groups to develop a proposal for a new and different way to utilize discarded Christmas trees in your town. Their proposal should describe the project's vision and rationale for your particular community. It should also consider the opportunities and constraints involved of implementing the program in terms of economics, labor, logistics, environmental concerns, and so on.
5. Have students present their project proposals to their classmates.

Extension Activities:

- View the 360 video [ExplOregon Agriculture - Christmas Tree Harvest](#) to learn more about how Christmas trees are grown and harvested. This video is best viewed using a virtual reality (VR) viewing device, but can also be viewed on a computer, smart phone, or tablet without a VR viewer. VR viewers are available for purchase at [agclassroomstore.com](#).
- *The Tree Book*, by Gina Ingoglia, is a good resource with information on buds, bark, seeds, leaves, fruit, photosynthesis, characteristics of conifers and deciduous trees, and more.
- Conduct the activity, Growing Up Evergreen, to teach students how conifers grow from cone to maturity.
- Conduct the Value-adding on a Christmas Tree Farm activity.
- Visit the [Teacher's Corner](#) on the National Christmas Tree Association website for more activities and information.
- View the [Christmas Tree Farm](#) video to visit the largest Christmas tree farm in the world and learn how to tell the difference between the three main types of Christmas trees.

Suggested Companion Resources:

- [Growing Up Evergreen \(Activity\)](#)
- [Value-adding on a Christmas Tree Farm \(Activity\)](#)
- [VR Viewer \(Kit\)](#)
- [360 Agriculture — Virtual Reality \(Multimedia\)](#)

Sources/Credits:

1. Ray, Mary Lyn. *Christmas Farm*. Sandpiper, 2008.
2. NC Ag in the Classroom
3. South Carolina Christmas Tree Association
4. National Christmas Tree Association
5. Christmas Tree Farmers Association of New York

Suggested SC Standards Met:

English/Language Arts:

- K.RL.5.1 With guidance and support, ask and answer who, what, when, where, why, and how questions about a text; refer to key details to make inferences and draw conclusions in texts heard or read.
- K.RL.5.2 With guidance and support, ask and answer questions to make predictions using prior knowledge, pictures, illustrations, title, and information about author and illustrator.
- K.RL.6.1 Describe the relationship between illustrations and the text.
- K.RL.7.1 With guidance and support, retell a familiar text; identify beginning, middle, and end in a text heard or read.
- K.RL.7.2 Read or listen closely to compare familiar texts.
- K.RL.8.1 With guidance and support, read or listen closely to: a. describe characters and their actions; b. compare characters' experiences to those of the reader; c. describe setting; d. identify the problem and solution; and e. identify the cause of an event.
- 1.RL.5.1 Ask and answer who, what, when, where, why, and how questions to demonstrate understanding of a text; use key details to make inferences and draw conclusions in texts heard or read.
- 1.RL.5.2 Make predictions using prior knowledge, pictures, illustrations, title, and information about author and illustrator.
- 1.RL.6.1 Describe the relationship between the illustrations and the characters, setting, or events.
- 2.RL.5.1 Ask and answer literal and inferential questions to demonstrate understanding of a text; use specific details to make inferences and draw conclusions in texts heard or read.
- 2.RL.5.2 Make predictions before and during reading; confirm or modify thinking.
- 2.RL.8 Analyze characters, settings, events, and ideas as they develop and interact within a particular context.
- 3.RL.5.1 Ask and answer literal and inferential questions to determine meaning; refer explicitly to the text to support inferences and conclusions.
- 3.RL.8 Analyze characters, settings, events, and ideas as they develop and interact within a particular context.
- 4.RL.5.1 Ask and answer inferential questions to analyze meaning beyond the text; refer to details and examples within a text to support inferences and conclusions.
- 4.RL.6.1 Determine the development of a theme within a text; summarize using key details.
- 4.RL.8 Analyze characters, settings, events, and ideas as they develop and interact within a particular context.
- 5.RL.5.1 Quote accurately to analyze the meaning of and beyond the text to support inferences and conclusions.
- 5.RL.6.1 Determine and analyze the development of a theme within a text; summarize using key details.
- 5.RL.8 Analyze characters, settings, events, and ideas as they develop and interact within a particular context.

Science:

- K.L.2 The student will demonstrate an understanding of organisms found in the environment and how these organisms depend on the environment to meet those needs.

- 1.L.5 The student will demonstrate an understanding of how the structures of plants help them survive and grow in their environments.
- 3.L.5: The student will demonstrate an understanding of how the characteristics and changes in environments and habitats affect the diversity of organisms.
- 4.L.5: The student will demonstrate an understanding of how the structural characteristics and traits of plants and animals allow them to survive, grow, and reproduce.
- 5.L.4: The student will demonstrate an understanding of relationships among biotic and abiotic factors within terrestrial and aquatic ecosystems.

Social Studies (2020):

- K.E.3 Explain why people have jobs, and describe the economic benefits for self and community.
- 1.E.1 Compare goods and services in the school, community, and state
- 1.E.3 Research and describe how goods and services differ in rural, suburban, and urban areas in South Carolina.
- 2.E.4 Interpret data to show how geographic location and available resources impact economic decision-making.
- 3.2.2.ER Identify and analyze the ways people interact with the physical environment in different regions of the state, the country, and the world.

Math:

- 2.NSBT.1 Understand place value through 999
- 2.NSBT.7 Add and subtract through 999 using concrete models, drawings, and symbols which convey strategies connected to place value understanding.
- 2.ATO.4 Use repeated addition to find the total number of objects arranged in a rectangular array with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.
- 2.MDA.1 Select and use appropriate tools (e.g., rulers, yardsticks, meter sticks, measuring tapes) to measure the length of an object.
- 2.MDA.3 Estimate and measure length/distance in customary units (i.e., inch, foot, yard) and metric units (i.e., centimeter, meter).
- 3.NSBT.2 Add and subtract whole numbers fluently to 1,000 using knowledge of place value and properties of operations
- 3.ATO.1 Use concrete objects, drawings and symbols to represent multiplication facts of two single-digit whole numbers and explain the relationship between the factors (i.e., 0 – 10) and the product.
- 3.ATO.3 Solve real-world problems involving equal groups, area/array, and number line models using basic multiplication and related division facts. Represent the problem situation using an equation with a symbol for the unknown.
- 4.NSBT.4 Fluently add and subtract multi-digit whole numbers using strategies to include a standard algorithm.
- 4.ATO.2 Solve real-world problems using multiplication (product unknown) and division (group size unknown, number of groups unknown).
- 4.MDA.2 Solve real-world problems involving distance/length, intervals of time within 12 hours, liquid volume, mass, and money using the four operations.
- 5.NSBT.5 Fluently multiply multi-digit whole numbers using strategies to include a standard algorithm.

Real or Artificial?

Name _____

What are the impacts of buying a real Christmas tree versus an artificial tree? Filling out the chart below will help you weigh the pros and cons of each.

How might the choice of purchasing a real or artificial tree affect the following parts of your life, your environment, and your community?	<i>purchasing a real Christmas tree (grown at a local Christmas tree farm)</i>	<i>purchasing an artificial Christmas tree (purchased at a store)</i>
<i>Local wildlife</i> (Red-tailed hawk, red cross-bill, song sparrow, garter snake, meadow vole, and much more)		
<i>Healthy soil</i>		
<i>Clean water</i> (local streams, ponds, etc)		
<i>Clean air</i>		
<i>Local farmers</i>		
<i>My community</i>		
<i>My family</i>		
<i>My wallet</i>		

Real or Artificial?

How might the choice of purchasing a real or artificial tree affect the following parts of your life, your environment, and your community?	purchasing a real Christmas tree (grown at a local Christmas tree farm)	purchasing an artificial Christmas tree (purchased at a store)
Local wildlife (Red-tailed hawk, red cross-bill, song sparrow, garter snake, meadow vole, and much more)	<i>The habitat at a Christmas tree farm supports many wildlife species that thrive in open, "early successional" habitat (habitat dominated by young trees and shrubs). Animals will feed, rest, hide, and nest in the conifers. After Christmas, the tree can continue to benefit wildlife—if ground into mulch, it provides habitat for insects and nurtures new plant growth; if placed in a stream, it can create protective habitat for fish, etc.</i>	No benefit to local wildlife.
Healthy soil	<i>A real Christmas tree benefits soil in several ways. At the tree farm, tree roots anchor the soil in place and fallen needles add organic material to the soil. Often, Christmas trees are grown on soils that could not support other crops. When chipped, the real tree can be used as mulch or composted, stabilizing soil to prevent erosion and producing new soil & nutrients.</i>	No benefit to soil health. Artificial trees are not biodegradable. When they break or get old and worn, they linger indefinitely in landfills or produce air pollution when incinerated.
Clean water (local streams, ponds, etc)	<i>Trees absorb carbon dioxide from the atmosphere to produce sugar, through the process of photosynthesis. In this process, they also produce oxygen. So not only do they reduce greenhouse gases responsible for climate change, but they also produce oxygen that we and all other animals need to breathe. Young trees are particularly vigorous photosynthesizers. One acre of Christmas trees produces the daily oxygen requirement for 18 people. Trees also remove dust and pollen from the air (their leaves catch particulates, somewhat like your furnace filter). Trees with year-round leaves, like Christmas trees, do this throughout the year.</i>	<i>Fossil fuels are used to produce the plastic used to make most artificial trees. PVC is the most common material used in modern artificial trees, and the production of PVC releases dioxin, a cancer-causing pollutant. Fossil fuels are burned to manufacture other materials (like metal) used in making artificial trees. Fossil fuels are also burned to transport the artificial trees (some are made in the USA; most are made in Asia—more than 7,000 miles away from New York State).</i>
Clean air	<i>Two key causes of water pollution are soil erosion and urban run-off. Well-managed farms conserve fertile soil and clean water in our communities. On a well-managed farm, vegetated buffers separate farm fields from streams, ponds, and other surface water, which helps filter out pollutants. On Christmas tree farms, soil is particularly stable as compared with annual farm crops, so soil disturbance is minimized. Also, by keeping land in agricultural use, rather than development, Christmas tree farms help reduce the addition of impervious surfaces (driveways, roofs, sidewalks, etc) that add to urban run-off. Some Christmas tree farms use synthetic insecticides and herbicides when growing trees; others do not."</i>	No benefit to clean water. Air pollution caused by production and transportation of artificial trees contributes to water pollution through acid precipitation.
Local farmers	<i>Christmas trees provide a winter cash crop for farmers, and help to diversify their source of income. When farmers get paid more for their products by selling locally, they are less likely to sell their farmland for development. When you buy locally grown products, you help preserve the agricultural landscape.</i>	No benefit to local farmers.
My community	<i>Buying locally keeps money circulating locally. There are about 15,000 commercial Christmas tree growers in the U.S. (more than 850 in NY alone), and over 100,000 people employed full or part-time in the industry.</i>	<i>If the artificial tree is purchased at a local store, then there is a benefit to the local store owner. If the tree is purchased on-line, there is no benefit to the local community.</i>
My family	<i>Going out to buy or cut down a Christmas tree at a local tree farm with friends or family builds relationships and is fun. A real tree makes the home smell great (many conifer species). Fallen needles can be swept up to make scented pillows (and after Christmas, the tree's needles can be removed to make scented pillows).</i>	No fallen needles to clean up. No watering needed. The plastic material used to make many Christmas trees, typically PVC, can be a potential source of lead contamination, particularly as the tree ages.
My wallet	<i>Encourage students to compare the financial costs of real versus artificial trees, both up-front and long-term.</i>	<i>High up-front cost. Maintenance or replacement cost depends on quality of initial product. Many website sources estimate that artificial trees last 5-10 years.</i>