



Discover

Christmas Trees!

Curriculum Packet for grades K-8



Produced by the Christmas Tree Farmers Association of New York



New York Agriculture in the Classroom is excited to share the *Discover Christmas Trees!* curriculum, activities, and learning extensions. The Christmas Tree Farmers Association of NY has worked diligently to develop a comprehensive and creative curriculum to educate your students about this important industry in our state.

Contextualize your ELA, mathematics, social studies, science, and economics curriculum by teaching through the lens of agriculture and Christmas trees. Be inspired by both the experiential learning activities and the impressive history of these iconic conifers that impact our lives more than just one season a year.

Katie S. Bigness

Coordinator, New York Agriculture in the Classroom

www.agclassroom.org/ny

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Welcome Teachers, and Thank You!

Dear New York State teachers,

Thank you for taking the time to explore our *Discover Christmas Trees* curriculum packet. The lessons in this packet will introduce your students in grades K-8 to many important aspects of conifer trees and Christmas tree growing in New York State.

Our curriculum materials offer both in-class and outdoor investigations of conifers. Through these multi-disciplinary lessons, your students will increase their ecological literacy and their understanding of the landscape in which they live. They'll learn the historical context for decorating with evergreens at the darkest time of year—a tradition that long pre-dates the religious celebration of Christmas.

Your students will also learn about part of New York State's agricultural economy—Christmas tree farming. They'll explore the important ecological role that conifer trees play in the region's web of life, and they'll ponder the pros and cons of utilizing living Christmas trees as opposed to artificial ones.

In short, these lessons will connect your students with the landscape, history, economy, wildlife, plants, and people in their region. The lessons will challenge them and encourage their creativity, problem-solving skills, research abilities, and much more. Each grade-appropriate lesson plan is linked to New York State Learning Standards and to Core Curriculum Standards. We hope you and your students find these lessons useful, engaging, and inspiring.

Many Christmas tree farms welcome school groups. Check our website to locate a tree farm near you.

Sincerely,



Mary Jeanne Packer
Executive Director
Christmas Tree Farmers Association of New York
www.chistmastreesny.org

This curriculum is published in memory of long-time Christmas tree farmer and educator Otilie "Otti" O'Neill.

Lesson 1. History of the Christmas Tree

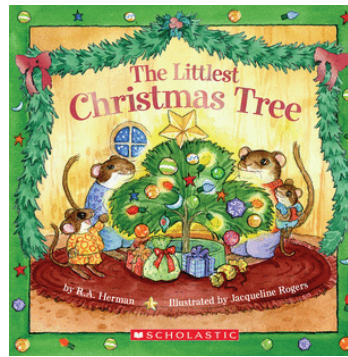
Centuries-old symbol of life and hope

Description:

Students learn about the long history of using evergreen trees and branches as a symbol of hope and life in wintertime by listening to and discussing the lyrics to the traditional song, *O Tannenbaum*.

Setting the Stage:

1. Begin by asking students to describe what the world around them is like in winter time. They may come up with words like cold, dark, snowy, icy, dead, quiet, nothing growing, etc. With younger students (K-2), read aloud the story, *The Littlest Christmas Tree*, which introduces the lyrics to the historic song, "Oh Christmas Tree."
2. Share with them some of the history you gleaned from *History of the Christmas Tree*, namely that people have, for centuries, seen the Christmas tree as a symbol of life and hope during this cold, dark, seemingly lifeless time of year—a reminder that spring will come again.
3. Note that another good way to lift your spirits at any time of year is by singing and making music, and that musicians have written many pieces of music to celebrate the hopeful qualities of evergreen trees. In Germany, these songs date back to the 1500s, including the well-known *O Tannenbaum*, written by Ernst Anschütz in 1824. Your students may have heard of its English version, *O Christmas Tree*. The German word, *Tannenbaum*, translates into English as "fir tree" (*die Tanne*) or Christmas tree (*der Weihnachtsbaum*).



Activity Directions:

1. Listen to *O Tannenbaum*, sung by the Vienna Boys Choir, available on YouTube
2. Read the literal English translation aloud to your students and discuss together the following questions:
 - a. Why does the poet describe the Christmas tree's branches as "loyal"?
 - b. The lyricist, Ernst Anschütz, says that the Christmas tree, with its evergreen branches, gives him hope. Why might this be so?
 - c. What is the lesson that the poet thinks the Christmas tree can teach him?
3. Older students can learn about the evolution of the Christmas tree in world history by watching the video *The Christmas Tree*, produced by The History Channel (www.history.com).



Grade Level:

K-4

NYS Learning Standards:

ELA 1, 2, 3: Listening and Reading

Core Curriculum Standards:

RL.K-4.1, RL.K.10

Time:

45-60 minutes

Materials:

- *The Littlest Christmas Tree*, by R.A. Herman.
- Background reading for teachers: *History of the Christmas Tree* (accompanying worksheet)
- Recording of *O Tannenbaum*, sung by the Vienna Boys Choir.
- Worksheet with original German *O Tannenbaum* lyrics and three different English translations.

**Grade level:**

5-8

NYS Learning Standards:

ELA 1, 2, 3: Listening and Reading

ELA 4: Speaking and Writing

SS 2 World History

Art 3: Responding to and Analyzing Works of Art

Music 1: Creating, Performing, & Participating

Core Curriculum Standards:

RI.5-8.1, W.5-8.2, SL.5-7.1, SL.5-8.2, SL.5.3, SL.5-8.5, RH.6-8.2

Time:

45-60 minutes in-class, plus homework

Materials:• *History of the Christmas Tree* (accompanying worksheet)• Recording of *O Tannenbaum*, sung by the Vienna Boys Choir.• *O Tannenbaum* worksheet, with original German *O Tannenbaum* lyrics and three different English translations.

Lesson 1. History of the Christmas Tree

Centuries-old symbol of life and hope

Description:

Students learn about the long history of using evergreen trees and branches as a symbol of hope and life in wintertime. They will listen to and explore the translated lyrics to the traditional song, *O Tannenbaum*, and will write their own translation set to music of their choice.

Setting the Stage:

1. Begin by asking students where they think the tradition of cutting and decorating evergreen trees in December comes from. Chances are, most will associate the tradition with the Christian holiday of Christmas.
2. Have them read the *History of the Christmas Tree* worksheet and discuss the highlights of it together. When did the tradition of cutting evergreen trees and boughs begin? With what seasonal event does it coincide? How did the tradition manifest in different cultures? In what country did the Christmas tree tradition as we now know it begin? Who is credited with popularizing the tradition?
3. Note that German musicians have celebrated the steadfast qualities of evergreen trees in song since the 1500s, including the well-known *O Tannenbaum*, written by Ernst Anschütz in 1824. The German word, *Tannenbaum*, translates into English as “fir tree” (*die Tanne*) or Christmas tree (*der Weihnachtsbaum*).

Activity Directions:

1. Play *O Tannenbaum*, sung by the Vienna Boys Choir, available on YouTube, for your students, and have them read the literal English translation of the German lyrics.
2. Discuss how the ideas reflect the centuries-old connection between evergreens and themes of eternity, hope, and renewal.
3. Then have them read the two English variations of those literally translated lyrics, adapted to rhyme and fit the melody of the German tune.
4. Ask your students to write their own version of the song, incorporating the basic ideas from the original song into a tune of their choosing (could be rap, rock, bluegrass, country, etc). Encourage them to work in small groups. They should provide a recording (or a link to a recording) of the original song (unless it's universally known, like America the Beautiful). Big extra credit awarded for in-class performance and musical instrument accompaniment!

Additional Resources:

Students can also learn about the evolution of the Christmas tree in world history by watching the video *The Christmas Tree*, produced by The History Channel (www.history.com).

History of the Christmas Tree

(from www.history.com)

Long before the advent of Christianity, plants and trees that remained green all year had a special meaning for people in the winter. Just as people today decorate their homes during the festive season with pine, spruce, and fir trees, ancient peoples hung evergreen boughs over their doors and windows. In many countries it was believed that evergreens would keep away witches, ghosts, evil spirits, and illness.

In the Northern hemisphere, the shortest day and longest night of the year falls on December 21 or December 22 and is called the winter solstice. Many ancient people believed that the sun was a god and that winter came every year because the sun god had become sick and weak. They celebrated the solstice because it meant that at last the sun god would begin to get well. Evergreen boughs reminded them of all the green plants that would grow again when the sun god was strong and summer would return.

The ancient Egyptians worshipped a god called Ra, who had the head of a hawk and wore the sun as a blazing disk in his crown. At the solstice, when Ra began to recover from the illness, the Egyptians filled their homes with green palm rushes which symbolized for them the triumph of life over death.

Early Romans marked the solstice with a feast called the Saturnalia in honor of Saturn, the god of agriculture. The Romans knew that the solstice meant that soon farms and orchards would be green and fruitful. To mark the occasion, they decorated their homes and temples with evergreen boughs. In Northern Europe the mysterious Druids, the priests of the ancient Celts, also decorated their temples with evergreen boughs as a symbol of everlasting life. The fierce Vikings in Scandinavia thought that evergreens were the special plant of the sun god, Balder.

Germany is credited with starting the Christmas tree tradition as we now know it in the 16th century when devout Christians brought decorated trees into their homes. Some built Christmas pyramids of wood and decorated them with evergreens and candles. It is a widely held belief that Martin Luther, the 16th-century Protestant reformer, first added lighted candles to a tree. Walking toward his home one winter evening, composing a sermon, he was awed by the brilliance of stars twinkling amidst evergreens. To recapture the scene for his family, he erected a tree in the main room and wired its branches with lighted candles.



Most 19th-century Americans found Christmas trees an oddity. The first record of one being on display was in the 1830s by the German settlers of Pennsylvania, although trees had been a tradition in many German homes much earlier. The Pennsylvania German settlements had community trees as early as 1747. But, as late as the 1840s Christmas trees were seen as pagan symbols and not accepted by most Americans.

It is not surprising that, like many other festive Christmas customs, the tree was adopted so late in America. To the New England Puritans, Christmas was sacred. The pilgrims's

second governor, William Bradford, wrote that he tried hard to stamp out "pagan mockery" of the observance, penalizing any frivolity. The influential Oliver Cromwell preached against "the heathen traditions" of Christmas carols, decorated trees, and any joyful expression that desecrated "that sacred event." In 1659, the General Court of Massachusetts enacted a law making any observance of December 25 (other than a church service) a penal offense; people were fined for hanging decorations. That stern solemnity continued until the 19th century, when the influx of German and Irish immigrants undermined the Puritan legacy.

In 1846, the popular royals, Queen Victoria and her German Prince, Albert, were sketched in the *Illustrated London News* standing with their children around a Christmas tree. Unlike the previous royal family, Victoria was very popular with her subjects, and what was done at court immediately became fashionable—not only in Britain, but with fashion-conscious East Coast American Society. The Christmas tree had arrived.

By the 1890s Christmas ornaments were arriving from Germany and Christmas tree popularity was on the rise around the U.S. It was noted that Europeans used small trees about four feet in height, while Americans liked their Christmas trees to reach from floor to ceiling.

The early 20th century saw Americans decorating their trees mainly with homemade ornaments, while the German-American sect continued to use apples, nuts, and marzipan cookies. Popcorn joined in after being dyed bright colors and interlaced with berries and nuts. Electricity brought about Christmas lights, making it possible for Christmas trees to glow for days on end. With this, Christmas trees began to appear in town squares across the country and having a Christmas tree in the home became an American tradition.

O Tannenbaum

O Tannenbaum

Original German Lyrics
By Ernst Anschütz, 1824

O Tannenbaum, o Tannenbaum,
wie treu sind deine Blätter!
Du grünst nicht nur
zur Sommerzeit,
Nein auch im Winter, wenn es schneit.
O Tannenbaum, o Tannenbaum,
wie treu sind deine Blätter!

O Tannenbaum, o Tannenbaum!
Du kannst mir sehr gefallen!
Wie oft hat nicht zur Weihnachtszeit
Ein Baum von dir mich hoch erfreut!
O Tannenbaum, o Tannenbaum!
Du kannst mir sehr gefallen!

O Tannenbaum, o Tannenbaum!
Dein Kleid will mich
was lehren:
Die Hoffnung und Beständigkeit
Gibt Trost und Kraft
zu jeder Zeit.
O Tannenbaum, o Tannenbaum!
Das soll dein Kleid
mich lehren.

O Christmas Tree

Literal English translation
By Ernst Anschütz, 1824

O Christmas tree, o Christmas tree
How loyal are your leaves/needles!
You're green not only
in the summertime,
No, also in winter when it snows.
O Christmas tree, o Christmas tree
How loyal are your leaves/needles!

O Christmas tree, o Christmas tree
You can please me very much!
How often has not at Christmastime
A tree like you given me such joy!
O Christmas tree, o Christmas tree,
You can please me very much!

O Christmas tree, o Christmas tree
Your dress wants to
teach me something:
Your hope and durability
Provide comfort and strength
at any time.
O Christmas tree, o Christmas tree,
That's what your dress should
teach me.

Two versions of traditional English lyrics (adapted to rhyme and fit the melody)

O Christmas Tree

O Christmas tree, O Christmas tree,
How lovely are your branches!
In beauty green will always grow
Through summer sun and winter snow.
O Christmas tree, O Christmas tree,
How lovely are your branches!

O Christmas Tree, O Christmas tree,
You are the tree most loved!
How often you give us delight
In brightly shining Christmas light!
O Christmas Tree, O Christmas tree,
You are the tree most loved!

O Christmas Tree, O Christmas tree,
Your beauty green will teach me
That hope and love will ever be
The way to joy and peace for me.
O Christmas Tree, O Christmas tree,
Your beauty green will teach me.

O Christmas Tree

O Christmas tree, O Christmas tree,
How steadfast are your branches!
Your boughs are green in summer's clime
And through the snows of wintertime.
O Christmas tree, O Christmas tree,
How steadfast are your branches!

O Christmas tree, O Christmas tree,
What happiness befalls me when oft
at joyous Christmas-time
Your form inspires my song and rhyme.
O Christmas tree, O Christmas tree,
What happiness befalls me.

O Christmas tree, O Christmas tree,
Your boughs can teach a lesson
That constant faith and hope sublime
Lend strength and comfort through all time.
O Christmas tree, O Christmas tree,
Your boughs can teach a lesson.

Lesson 2. Getting a Sense of Conifers

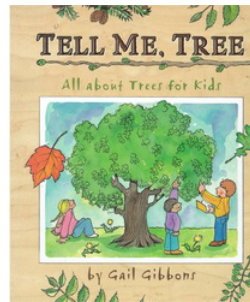
Why Christmas trees look and feel the way they do

Description:

Students will learn about the two main ways trees survive the winter in cold climates—by losing their leaves and going dormant, or by having thin, waxy leaves (needles), a conical shape, and other adaptations for winter life.

Setting the Stage:

1. Talk with your students about what it must be like to live outside all the time in winter, exposed to cold and snow and ice. How do animals adapt to winter? What about plants?
2. Ask your students how trees in winter are different to trees in summer. What do trees do to survive the cold and snow and ice of winter? Chances are, they'll say they lose their leaves. That's right, but only for some trees.
3. Encourage them to think about other trees they know. Many trees are "evergreens" and keep their leaves all year long. These kinds of trees have some very different characteristics than deciduous trees (trees that lose their leaves).



Activity Directions:

1. Read *Tell Me, Tree*, by Gail Gibbons, to your students. This picture book offers an excellent introduction to trees—their parts (buds, bark, seeds, leaves, fruit), functions (how they grow, photosynthesis), characteristics of conifers and deciduous trees, and more.
2. Show students the pictures of a deciduous tree and a coniferous tree and ask them to name some of the traits of each kind of tree. This will help them incorporate the information you shared with them in *Tell me, Tree*.
3. Have your students cut out different shapes from green construction paper (circle, square, triangle, rectangle), and ask your students which shape might work best for a tree living in a climate that gets lots of snow, and why.
4. Have them draw and color a picture of a conifer in winter, along with the animals that might find food and shelter in the tree.



Grade level:

K-2

NYS Learning Standards:

MST 1: Analysis, Inquiry, and Design;

Scientific Inquiry

ELA 1: Listening and Reading

Art 2: Knowing & Using Arts Materials & Resources

Core Curriculum Standards:

RL.K-2.1

Time:

60 minutes

Materials:

- Drawing or poster of a deciduous tree and a coniferous tree.
- *Tell me, Tree*, by Gail Gibbons
- Green construction paper
- Scissors for students
- White paper for drawing
- Crayons or colored pencils

**Grade level:**

2-4

NYS Learning Standards:

MST 1: Analysis, Inquiry, and Design;

Scientific Inquiry

MST 4: The Living Environment

MST 7: Interdisciplinary Problem Solving

ELA 1: Reading

Art 2: Knowing & Using Arts Materials & Resources

Core Curriculum Standards:

RL.2-4.1, RI.2-4.1, RI.2-4.3, RI.2-4.7

Time:

60 minutes

Materials:

- *Conifer Class* webpage, which describes the differences between conifers and deciduous trees at a 3rd-5th grade level, <http://www.realtrees4kids.org/threefive/conifers.htm>
- *Design a Winter-proof Conifer* worksheet

Lesson 2. Getting a Sense of Conifers

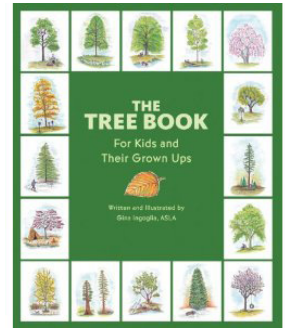
Why Christmas trees look and feel the way they do

Description:

Students will learn about the two main adaptations trees have for surviving the dark, frozen months of winter—losing their leaves (deciduous trees) or utilizing tiny, waxy, needle-like evergreen leaves (conifers). They will brainstorm adaptations that might help a conifer survive the winter.

Setting the Stage:

Begin by asking your students how trees survive the dark, dry, cold months of winter. Every fall, many of New York's trees—like maples and oaks—lose their leaves and stand bare all winter long. But conifers are far different. Except for a very few species—like the American larch, which loses all its needles in fall like a deciduous tree—conifers keep most of their leaves throughout the year and stay green throughout the cold winter months.

**Activity Directions:**

1. Read through the *Conifer Class* webpage with your students. By the end of the page, they'll know some key differences among the various kinds of trees that grow in New York State. The trees we cut for Christmas trees are conifers (their seeds develop in cones), evergreen, and needle-leaved.
2. Scientists have studied conifers to learn about how their features help them survive the winter. Your students can ponder this on their own by completing the *Design a Winter-proof Conifer* worksheet.

Additional Resources:

The *Tree Book*, by Gina Ingoglia, is a good resource for this age group, with information on buds, bark, seeds, leaves, fruit, photosynthesis, characteristics of conifers and deciduous trees, and more.

Design a Winter-proof Conifer

Name _____

If you were going to come up with the best possible winter-proof design for a conifer, what would it look like?

1. What's the best shape for your tree? What shape will allow the most sunshine to reach its leaves?
What shape will shed snow the best?

2. What would be the best shape, size, and texture for the leaves of your tree when it's cold, snowy, icy, and windy?

3. What other features would your tree have to survive the long, dark, cold, snowy winter?

4. Draw and describe the key features of your winter-proof conifer below.

**Grade level:**

5-8

NYS Learning Standards:

MST 1: Analysis, Inquiry, & Design

MST 4: The Living Environment

MST 7: Interdisciplinary Problem Solving

ELA 1: Reading

Core Curriculum Standards:

RI.6-8.1, RI.6-8.2, RI.6-8.7

Time:

60 minutes

Materials:

- *It's Only Natural: Conifers Built to Survive the Winter*, by Mary Holland published by the Harvard Press (www.harvardpress.com).

- *The World of Northern Evergreens*, by E.C. Pielou. This book is so good you'll want to have a copy in the classroom, but the first several pages (including pages 3-7, which discuss the advantages of being evergreen) are viewable on Google Books.

- *The Advantages of Being a Conifer* worksheet

- *The Advantages of Being a Conifer* worksheet—Teacher's Page

Lesson 2. Getting a Sense of Conifers

Why Christmas trees look and feel the way they do

Description:

Students will learn about the many amazing adaptations conifers have for surviving the long, cold, snowy, icy winter months. They will utilize research materials to help them answer questions about how these adaptations facilitate survival.

Setting the Stage:

Conifers have many amazing characteristics that help them survive and thrive in a tremendous variety of climates around the world—from coastal rain forests to the frigid northern reaches of Siberia.

Have your students read *It's Only Natural: Conifers Built to Survive the Winter*, by Mary Holland, together in class (either print out or project the short article on the classroom screen).

Activity Description:

1. Have students complete the worksheet, *The Advantages of Being a Conifer* with the help of Mary Holland's article and *The World of Northern Evergreens*.
2. Review their answers together (you'll find suggested answers on the Teacher's Page version of the worksheet).

Surviving Winter • The Advantages of Being a Conifer

Name _____

Conifers have many amazing characteristics that help them survive and thrive in a tremendous variety of climates around the world—from coastal rain forests to the frigid northern reaches of Siberia. Answer the questions below about conifer adaptations.

1. Most conifers are evergreen, meaning they keep most of their leaves year-round. How might this help them survive?
2. Conifer leaves are shaped like needles (or sometimes are like tiny scales, as for cedars and junipers). What advantage does this give them in winter?
3. Conifer needles remain on the tree for several years before falling off. How is this a helpful adaptation, particularly on sites with poor soil?
4. Conifer needles are shiny and waxy. How are these qualities useful in a wintery climate?
5. Conifers have very small pores in their leaves, compared with the pores in deciduous leaves, and these pores close more tightly than those on deciduous trees. What advantage does this give them?
6. In winter, water flows out of conifer cells and into the spaces in between the cells. How does this help them survive below-freezing temperatures?
7. Most young conifers and many mature conifers are conical in shape. Why is this a helpful trait in a winter climate?
8. The branches of many conifers attach to the trunk at an obtuse angle (meaning they point toward the ground). How might this help them survive the winter?
9. Conifer wood is very flexible and is made up of longer fibers than deciduous wood. Why is this a useful winter adaptation?
10. Many conifers produce a thick and sticky resin, that oozes out when the tree is wounded (it's what gives many conifers their distinctive aromas). How does this resin help a conifer survive?

Surviving Winter • The Advantages of Being a Conifer

1. Most conifers are evergreen, meaning that they keep most of their leaves year-round. How might this help them survive?
Having green leaves year-round allows evergreens to photosynthesize whenever the weather is warm enough. This allows them to take advantage of warm spells in spring and fall (or, in warmer climates like the Pacific Northwest, throughout the winter).
2. Conifer leaves are shaped like needles (or sometimes are like tiny scales, as for cedars and junipers). How might this help them survive?
Having small, needle- or scale-shaped leaves allows conifers to conserve water, which helps them survive summer and winter drought.
3. Conifer needles remain on the tree for several years before falling off. How does this help them survive, particularly on sites with poor soil?
Growing a new set of leaves each year takes a huge amount of energy and resources. By keeping their needles for several years, conifers save energy and nutrients and can live in poor soil that many deciduous trees, which need a great amount of nutrients to grow their annual crop of leaves, could not survive in.
4. Conifer needles are shiny and waxy. How might this help them survive?
The smooth, shiny surface encourages snow to slide off, helping to prevent snow build-up and branch breakage. A waxy coating helps conserve water in the leaves.
5. Conifers have very small pores in their leaves, compared with the pores in deciduous leaves, and these pores close more tightly than those on deciduous trees. How might this help them survive?
Small, tightly closing pores help conifer needles conserve water.
6. In winter, water flows out of conifer cells and into the spaces in between the cells. How does this help them survive below-freezing temperatures?
When cells freeze, they can rupture and die. But in a conifer there are many small, empty spaces around the plant cells. By sending fluid from within the cells out into these extracellular spaces, the cells themselves avoid freezing. The extracellular spaces can freeze without damaging the cells.
7. Most young conifers and many mature conifers are conical in shape. How might this help them survive?
The conical shape helps conifers shed snow easily and allows each branch to receive direct sunlight.
8. The branches of many conifers attach to the trunk at an obtuse angle (meaning they point toward the ground). How might this help them survive the winter?
Many conifers grow in areas that receive a lot of snow in winter. If the branches slope downwards, they are more likely to shed the snow easily without breaking.
9. Conifer wood is very flexible and is made up of longer fibers than deciduous wood. How might this help them survive the winter?
Flexible wood is well-adapted to withstand the heavy weight of snow and ice.
10. Many conifers produce a distinctly scented resin, secreted when the tree is wounded. How does this help a conifer survive?
When insects bore holes into a conifer or a branch breaks off during a storm, the tree secretes a gummy resin that fills hole or creates a coating over the ragged break. This scab-like resin helps protect the tree against further damage.

Lesson 3. Pines, Spruces, Firs, and More

How to identify conifers

Description:

Understanding the similarities and differences among living organisms is a key part of understanding the natural world and developing science literacy. In this activity, students will learn to notice differences among conifer trees and differentiate among pines, spruces, and firs.

Setting the Stage:

1. Show your students a picture of a fir or spruce tree and ask them what it is. Chances are, they'll call it a pine tree (You'd be amazed how many children's books do the same!). In New York State, there are dozens of species of evergreen trees (both native and introduced), and only a handful of those are actually pines. Welcome to the world of conifers—of fir, spruce, juniper, cedar, cypress, larch, pine, and more!
2. Introduce your students to a simple, handy, alliterative phrase they can use to differentiate among conifer types. "Pine needles come in packets. Spruce needles are square. Fir needles are flat and friendly." Or an even quicker way to remember it: "Pines come in packets, spruces are square, firs are flat and friendly."

This phrase relates to the shared characteristics of trees in each of these three main groupings of conifers. Pines share the characteristic that their needles grow in packets or bundles (called "fascicles"). Spruce needles are square in cross-section, so when you roll one in your fingers, you'll notice the bump-bump-bump of the squared sides. Fir needles are flat, and when you grab a fir branch, it's soft to the touch, not prickly like pines and spruces.

This phrase over-simplifies the real-life story of diversity in the forest, since, for instance, there are conifer species like Eastern hemlock that have flat needles but aren't firs, but it's a great starting point.

Activity Directions:

1. Have students sit together in pairs, and give each pair a clipping of pine, spruce, and fir. Talk through the process of noticing the needle packets on the pine twig, the square needles on the spruce twig, and the flat, soft (not prickly) needles of the fir.
2. You may only have time and resources for the in-class portion of this activity, but if you can, take your students to a nearby Christmas tree farm where all the conifers are just the right height for kids to touch and study, and where you can carry out a number of the activities described in this curriculum packet.
3. As you explore the farm, or your school yard, have students identify each different tree species you encounter as pine, spruce, or fir. Collect a few, small twig clippings (with the tree farmer's permission, of course!) of the conifers your students discover, and have them create a display poster back in the classroom. How many different kinds of conifers did they find?

To go a little further. You can introduce the idea of the dichotomous key as a tool for honing in on the identification of plants and animals through a very fun kids' game, *Guess Who?* (created by Hasbro), designed for ages 6 and up.



Grade level:

K-2

NYS Learning Standards:

MST 4: The Living Environment

MST 6 Models

Core Curriculum Standards:

RL.K-2.1

Time:

30 minutes in class, plus optional field trip

Materials:

- Picture of a fir or spruce tree
- Clippings from a pine, spruce, and fir tree—enough for students to work in pairs to identify them.
- You will not need a tree key for this activity, but if you would like to have one for your own reference, then a very good, simple one is *Tree Finder: A Manual for the Identification of Trees by their Leaves*, by May Theilgaard Watts.

**Grade level:**

3-8

NYS Learning Standards:

MST 4: The Living Environment

MST 6 Models

Core Curriculum Standards:

RST.6-8.3, RST.6-8.7

Time:

field trip (Activities listed in this lesson should take 60 minutes, but this lesson can be combined with others in this guide). For shorter field study, students can observe and identify conifers on school grounds.

Materials:

- Dichotomous key. *Tree Finder: A Manual for the Identification of Trees by their Leaves*, by May Theilgaard Watts, is a great one. It includes many of the conifer species that you're likely to see on a Christmas tree farm (both natives and non-natives).

- Ruler (If you use the *Tree Finder* guide, the back cover includes a 5.5" ruler)

Identifying Conifers handout copies for students.

Lesson 3. Pines, Spruces, Firs, and More

How to identify conifers

Description:

Understanding the similarities and differences among living organisms is a key part of understanding the natural world and developing science literacy. In this activity, students will learn to identify a variety of conifer species using a dichotomous key.

Setting the Stage:

1. Show your students a picture of a fir or spruce tree and ask them what it is. Chances are, they'll call it a pine tree. Yet in New York State alone, there are dozens of species of evergreens (both native and introduced), and only a handful of those are actually pines. Welcome to the world of conifers!
2. Introduce your students to a simple, handy, alliterative phrase they can use to differentiate among conifer types. "Pine needles come in packets. Spruce needles are square. Fir needles are flat and friendly." Or an even quicker way to remember it: "Pines come in packets, spruces are square, firs are flat and friendly." This phrase over-simplifies the real-life story of diversity in the forest, since, for instance, there are conifer species like Eastern hemlock that have flat needles but aren't firs, but it's a great starting point.

Some of the conifer species grown on New York State Christmas tree farms:

<i>Balsam fir</i>	<i>Fraser fir</i>	<i>White (Concolor) fir</i>	<i>Douglas-fir</i>	<i>Colorado blue spruce</i>
<i>White spruce</i>	<i>Norway spruce</i>	<i>Scotch pine</i>	<i>Eastern white pine</i>	<i>Austrian pine</i>
<i>Red pine</i>	<i>Black Hill spruce</i>	<i>Canaan fir</i>	<i>Nordmann fir</i>	<i>Meyer spruce</i>
<i>Serbian spruce</i>	<i>Grand fir</i>	<i>Korean fir</i>	<i>Red cedar</i>	

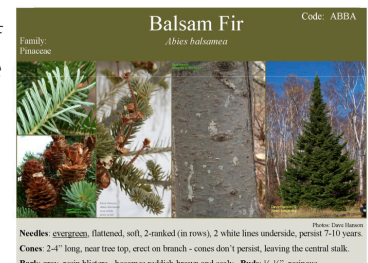
Activity Directions:

1. Take your students out in the field to identify conifers. Chances are you'll need to go farther afield than your school grounds. Consider a trip to a local Christmas tree farm, where you can carry out a number of the activities described in this curriculum packet, including tree identification.
2. Have students work in small groups to identify as many different species of conifers as possible during their site visit, using the tally sheet on page 17.
3. Ask the Christmas tree farmer to explain his or her reasons for growing the particular conifer species found on this farm. What are the advantages and disadvantages of each? What challenges does each species offer, from planting through harvest?

Additional Resources:

1. *The World of Northern Evergreens*, by E.C. Pielou, introduces the ten genera that make up the northern conifers, followed by an engaging discussion of the species that comprise these genera.
2. There are several good dichotomous key for conifers on-line, including:
 - The Interactive Tree Identification Key produced by Iowa State University, provides an easy picture-based key.
 - NYS-DEC's website has a simple key to native conifers of NYS (it is less useful for identifying Christmas trees, since many are not native).

3. The Internet is chock-full of helpful conifer identification resources, like this Balsam Fir ID card, part of a set of downloadable cards from the University of Minnesota.



Identifying Conifers

Name _____

Use the table below to tally and identify the species of conifers you encounter during your field studies.

characteristics of the conifer <i>What are the needles, bark and cone like?</i>	sketch of a branch tip <i>(and cone if available)</i>	possible genus and species <i>name, as well as common name</i>

**Grade level:**

K-2

NYS Learning Standards:

MST 4: The Living Environment

ELA 1, 2: Listening and Reading

Art 2: Knowing & Using Arts
Materials & Resources**Core Curriculum Standards**

RL.K-2.1

Time:

60 minutes

Materials:

- *Where Would I be in an Evergreen Tree?* by Jennifer Blomgren
- Conifer cones, enough for one per student. You should be able to find these in your local woods, if snow is not covering the ground. Or check with your local Christmas tree farms, where you may be able to purchase locally grown ones.
- String
- Peanut butter
- Black oil sunflower seeds

Lesson 4. Growing Up Evergreen

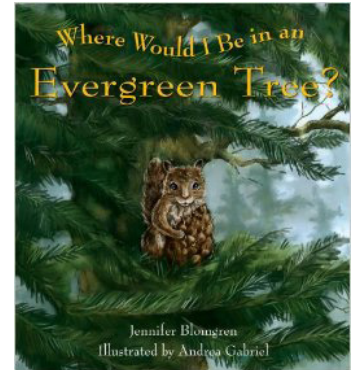
The life of a Christmas tree

Description:

Students will explore how evergreen trees grow from cone to maturity and will use a cone to create a bird feeder.

Setting the Stage:

1. Ask your students what kind of tree they think is the biggest on earth. What about the tallest? The oldest? If they guessed conifers all three times, they're right! (giant sequoia, coastal redwood, and bristlecone pine old, in that order. Amazingly, all three grow in the United States.)
2. How do these remarkable trees grow from a tiny seed to a full-grown, often massive, conifer? What happens to them after they get old and die? Over their lifetimes, many animals depend on them for food and shelter—what kinds of animals?

**Activity Directions:**

1. Read *Where Would I be in an Evergreen Tree?* by Jennifer Blomgren, to your students. This beautifully illustrated book tells the story of the life cycle of a conifer and the variety of plants and animals that the evergreen supports through its existence. In poetic form, the book tells how a conifer makes and spreads seeds, how those small seeds take root and grow into some of the biggest living organisms on earth. Christmas trees are young conifers, mostly less than ten years old. Yet some conifers can live to be more than 5000 years old! Though the story is set in the Pacific Northwest, the message is universal.
2. Where do those amazing conifers begin? Get enough conifer cones for each of your students to have one. The pine cones we find on the forest floor have already done their job—they've dropped and scattered their seeds.
3. Explore with your students where the cone stored its seeds and how carefully it protected them behind its scales. Then use the cone to make a gift for wildlife. Tie a loop of string to each cone. Have students smear peanut butter (or heat-softened lard, if peanut allergies are a concern—messy but effective!) on their pine cones, then roll them in black oil sunflower seeds. Hang the cones on the branches of a tree (outside the classroom window if possible) to share with wildlife.

Lesson 4. Growing Up Evergreen

The life of a Christmas tree

Description:

Students will learn how conifers reproduce and grow by visiting a local Christmas tree farm. They will then choose a particular species of conifer to research and document its life cycle.

Setting the Stage:

1. Ask your students how many Christmas trees they think are harvested on Christmas tree farms in the United States each year. 25-30 million! To maintain a steady supply of Christmas trees, tree farms must plant trees each year, and their farm will likely have trees ranging from seedlings through 10-12 (or more) years of age.
2. Where do tree farms get their seedlings? From a seedling supplier—a tree nursery. The State of New York runs a tree nursery in Saratoga Springs, with a fascinating history and an important present-day mission. The Nursery currently grows over 50 species of native trees shrubs and vines, many of which are not offered by commercial nurseries. It sells more than 1.2 million seedlings annually. Customers buy stock for a wide range of uses including reforestation, site restoration, wetland and riparian buffer planting, watershed protection, wildlife habitat, and Christmas tree production.

Activity Directions:

1. **Before you visit the Christmas Tree Farm:**
Have your students watch the NY Department of Environmental Conservation's 11-minute video about the Saratoga tree nursery, www.dec.ny.gov/dectv/dectv144.html. The video describes the process of extracting conifer seeds and growing the seedlings that Christmas tree farms use, and it talks about the importance of utilizing local seed stock to assure hardiness. You can also share a written history of the nursery with them. It's available at www.dec.ny.gov/animals/61187.html, and a list of the conifer species sold at the Saratoga Tree Nursery is available at www.dec.ny.gov/animals/75799.html.
2. **At the Christmas Tree Farm:**
Ask the tree farmer to show your students the developmental stages of the young conifers, from seedlings up through mature Christmas trees (which are actually very young conifers in the big picture of a conifer's life cycle.) Have students study stumps of harvested trees to determine how old the trees were when cut.
3. **After the field trip:**
Have each student choose a particular conifer species to investigate. Each species has its own amazing variation on the life cycle story (Lodgepole and Jack pines, for example, have serotinous cones that rely on the heat from a forest fire to open). Have them research their tree's life cycle and create a poster or other visual display of the life cycle of their conifer.



Grade level:

3-8

NYS Learning Standards:

CDOS 3 Managing Information
MST 1 Scientific Inquiry
MST 4: The Living Environment
MST 7 Strategies (presenting reports)
ELA 1: Listening, Reading, Writing
SS 1: History of the United States & New York

Core Curriculum Standards:

RI.3-8.7

Time:

60 minutes

Materials:

- NY Department of Environmental Conservation's 11-minute video about the Saratoga tree nursery, www.dec.ny.gov/dectv/dectv144.html.
- Written history of the nursery at www.dec.ny.gov/animals/61187.html.

**Grade level:**

K-2

NYS Learning Standards:

MST 4: The Living Environment

ELA 1, 2: Listening and Reading

Art 2: Knowing & Using Arts
Materials & Resources**Core Curriculum Standards:**

RL.K-4.1, RL.K.10

Time:

60 minutes

Materials:

- Shel Silverstein's poem, *Peckin'* (see resources below).
- 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.

Lesson 5. Real or Artificial Christmas Trees?

Exploring the impacts of our choices

Description:

Students will consider the benefits of real conifers—for people, wildlife, soil, plants, and so on.

Setting the Stage:

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:

1. 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?
2. 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 breathe. Plus, seeds that grow new trees that will support the great-great-great-offspring of today's woodpeckers.

Activity Directions:

1. Make a big poster of a Christmas tree, life-size if possible (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.)
2. Have your students brainstorm together all of the living and non-living parts of their world (animals [specific kinds], people, plants, soil, air, water, fungus, insects, etc) that benefit from a real Christmas tree—before it's cut, after it's cut, and after it dies, and after it decays and becomes part of the soil.
3. 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).
4. Have them attach their creations to the Christmas tree, so that it is decorated with the community of life it supports.

Additional Resources:

1. *Peckin'*, from *A Light in the Attic*, by Shel Silverstein. Harper & Row, 1981.
2. To read *Peckin'* on-line, visit <http://www.angelfire.com/ne/katzmagik/silverstein.html>. The page also features many of Silverstein's other poems.
3. For an audio clip of Shel Silverstein reading *Peckin'*, <http://www.rhapsody.com/artist/shel-silverstein/album/a-light-in-the-attic/track/peckin>.

Lesson 5. Real or Artificial Christmas Trees?

Exploring the impacts of our choices

Description:

Students will contemplate and articulate the pros and cons of real versus artificial Christmas trees and will engage in an in-class discussion based on their findings.

Setting the Stage:

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 them 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:
 - The air we breathe
 - The water we drink
 - The soil
 - Plants and wildlife
 - Myself
 - My family
 - Local farmers
 - My community

Activity Directions:

1. Give each of your students a copy of the blank *Real or Artificial?* worksheet.
2. Have them complete the worksheet 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.
3. 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.
4. 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.



Grade level:

3-8

NYS Learning Standards:

CDOS 3 Managing Information
MST 1 Scientific Inquiry
MST 4: The Living Environment
ELA 1: Listening and Reading
ELA 3 Reading and Speaking

Core Curriculum Standards:

SL.3-8.1, SL.3-8.4, RI.5-8.6, RI.5-8.8, RST.6-8.1, RST.6-8.2, RST.6-8.7

Time:

Materials:

- *Real or Artificial?* worksheet
- On-line resources that address the real-versus-artificial Christmas tree debate, for example:
 - Kansas State Cooperative Extension discusses the environmental pros and cons of real and artificial trees in an online article, *Artificial Christmas Trees Not Eco-Friendly*, www.ksre.ksu.edu/news/story/Christmas_trees120508.aspx.
 - Smithsonian magazine's website includes a 2007 article, *Making Your Holiday Tree Eco-Friendly*, www.smithsonianmag.com/science-nature/dreaming-of-a-green-christmas-8557020/?c=y&page=1.
 - A 2013 USA Today story compares real and artificial trees, *Which Christmas tree is greener, real or artificial?* www.usatoday.com/story/news/nation/2013/12/14/real-versus-fake-christmas-tree/4001897/.

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>
Local wildlife (Red-tailed hawk, red cross-bill, song sparrow, garter snake, meadow vole, and much more)		
Healthy soil		
Clean water (local streams, ponds, etc)		
Clean air		
Local farmers		
My community		
My family		
My wallet		

Real or Artificial?

<p>How might the choice of purchasing a real or artificial tree affect the following parts of your life, your environment, and your community?</p>	<p>purchasing a real Christmas tree (grown at a local Christmas tree farm)</p>	<p>purchasing an artificial Christmas tree (purchased at a store)</p>
<p>Local wildlife (Red-tailed hawk, red cross-bill, song sparrow, garter snake, meadow vole, and much more)</p>	<p><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></p>	<p><i>No benefit to local wildlife.</i></p>
<p>Healthy soil</p>	<p><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></p>	<p><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.</i></p>
<p>Clean water (local streams, ponds, etc)</p>	<p><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></p>	<p><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></p>
<p>Clean air</p>	<p><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></p>	<p><i>No benefit to clean water. Air pollution caused by production and transportation of artificial trees contributes to water pollution through acid precipitation.</i></p>
<p>Local farmers</p>	<p><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></p>	<p><i>No benefit to local farmers.</i></p>
<p>My community</p>	<p><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></p>	<p><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></p>
<p>My family</p>	<p><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></p>	<p><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.</i></p>
<p>My wallet</p>	<p><i>Encourage students to compare the financial costs of real versus artificial trees, both up-front and long-term.</i></p>	<p><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></p>

**Grade level:**

K-6

NYS Learning Standards:

MST 4: The Living Environment

Art 2: Knowing and Using Art Materials

Core Curriculum Standards:

K-6.OA.1

Time:

90-120 minutes (time will vary depending on sewing method)

Materials:

- Balsam fir trees (post-Christmas discards) or cut branches (if doing this project at another time of year)
- Fabric (have students bring in recycled fabric from used clothing). They will need two 5" x 5" squares per pillow.
- Sewing machine (if you are going to sew the pillows) or needles and thread (if you are going to have students sew all or part of the pillows).
- Optional decorations for pillows (buttons, etc.)

Lesson 6. Value-adding on a Christmas Tree Farm

Christmas trees, plus a whole lot more

Description:

Students will learn how to add value to Christmas trees by making scented pillows from balsam fir needles, either for gifts or as a fundraiser for your classroom. Older students can also calculate the potential income from selling their value-added projects.

**Setting the Stage:**

1. Ask your students what they think is sold at a Christmas tree farm. Christmas trees! Yes, but often a whole lot more. It's not easy making a living as a farmer, and farmers can earn more income by "adding value" to their Christmas trees. What might they make and sell? Many farms sell garlands and wreaths made from conifer boughs. Some sell scented pillows made from balsam fir, a deliciously fragrant conifer.
2. Tell your students that they're going to put the value-adding idea into action by making balsam fir sachet pillows. You can undertake this project with your students at any time of year, but it's an especially good activity after Christmas—it's a great way to use the needles of discarded Christmas trees.
3. If you plan to do this project after Christmas, put the word out in your school community that you'd be interested in having 4 or 5 balsam fir Christmas trees brought to school and stored in a convenient place on the school grounds. If you'd like to do this project at a different time of year, gather balsam branches and let them dry out for a few weeks.

Activity Directions:

1. Lay the trees or cut branches on a large tarp and have students help pull the needles from the branches. Have each student gather 1 to 1½ cups of needles—that will be enough to create a small pillow. If they are enthusiastic and you have plenty of trees, they can harvest more needles and make additional pillows as a classroom fundraiser. This is a nice way to practice the value-adding concept—start with your farm product (the Christmas tree) and make something beautiful and useful from it to generate additional income.
2. To make the pillows truly recycled and maximize the value-adding, utilize recycled fabric for the pillow covers. Have your students bring in fabric from old shirts, blue jeans, etc. Each pillow will require two 5" x 5" squares (to create a finished pillow of about 4 inches.)
3. Sew the two pieces of pillow fabric together, with right sides facing each other. You can sew the squares together with a sewing machine, if time is limited. Sew with a 5/8" seam, leaving a 2" opening on one side. Turn the pillow right side out and you're ready to stuff. Or have the kids sew the pillows by hand.
4. Use a piece of paper curled into a funnel shape to pour the needles into the pillow.
5. Sew closed and decorate outside with buttons or other notions, if desired.
6. Have students research on the Internet the going rate for balsam pillows. How many pillows would their class be able to create from a single Christmas tree? What additional value-added income could they generate through balsam pillow making, if they use all recycled materials to fabricate them?

Lesson 6. Value-adding on a Christmas Tree Farm

Christmas trees, plus a whole lot more

Description:

Students will design their own Christmas tree farm, either as a stand-alone business or as part of a family farm that produces a range of other products.

Setting the Stage:

What does it take to be a successful family farmer? Hard work, creativity, careful planning, marketing know-how, and—of course—good land. Many family farmers produce a wide variety of products on their land, to diversify their sources of income and spread that income over the year. A family farmer might tap maple trees in spring, grow fresh vegetables in summer, harvest apples and pumpkins in fall, and raise Christmas trees for sale in winter.

Farmers can increase the income they generate from these seasonal crops by “adding value” to them. What does that look like? In spring they might produce not only maple syrup, but also maple candy, maple butter, and maple sugar. They might create and sell gift boxes that team their maple products with pancake mix, or create specialty foods like maple barbecue sauce or maple-coated cashews. In summer, they can sell their fresh produce at their farm stand. They might also turn that produce into value-added products—jams, pickles, pies. In fall, fresh apples are just one part of an orchard’s potential yield. Apple cider, apple butter, pies, cider doughnuts—these products and many more can add tremendous value to those fresh apples. The possibilities for creating new and diverse markets that connect local customers with local harvest are vast.

The same is true of selling Christmas trees. Whether the farm is purely a Christmas tree farm or Christmas trees are just one of many year-round crops the farm produces, farmers often seek to diversify their winter offerings and add value to their Christmas tree crop. What might they sell? Some farmers harvest boughs and make wreaths, garlands, and balsam pillows. Some offer hayrides or sleigh rides to bring customers to and from the Christmas tree fields. Some sell root-wrapped, living trees that customers can decorate for the holidays, then plant outdoors in springtime. Some offer food and drinks, for free or for sale. Some sell Christmas-tree-related items, like ornaments and tree stands.

Activity Directions:

1. Tell your students that they are going to work in small groups (2-3 students per group) to design their own Christmas tree farm. A good way for them to start is to look at existing Christmas tree farms in New York State. Have them look over the Christmas Tree Farmers Association of New York website (www.christmastreesny.org). Many of the farms have their own websites, where students can see the variety of products the farms sell. They may also glean some helpful information from the Cornell University publication, *Starting a Christmas Tree Farm in NY*.
2. Next, students should brainstorm the elements that would make their farm successful, by their standards. They might consider such questions as:
 - Where will we create this farm?
 - Do we already own the land or do we have to purchase it? (If we have to purchase it, that expense should be figured into the economic balance sheet for the farm plan.)
 - What level of income will define economic success for us, and in what time frame?
 - What products should we grow and produce through value-adding?
 - How will we market those products, and to whom?
 - How will we manage the farm so as to make it as environmentally friendly as possible? (How will we maintain or improve the health of the soil, water, air, and native plants and wildlife? How can we limit the farm’s carbon footprint?)
 - Who will do the farm work? If we plan to hire outside help, how will we pay them?
 - What non-monetary benefits do we hope the farm will generate (personal satisfaction, community-building, etc.)?
 - How can we structure the farm to create those benefits?
3. Students should then work together to develop a farm plan to present to the class. Their presentation should include as many visual aids as possible—map of the proposed farm, details of products they plan to produce and market, a business plan that identifies economic opportunities and constraints, projected income, environmental impacts, personal quality of life, community benefits, and so on.
4. Have students share their farm plans with the rest of the class in an 8-10-minute presentation.



Grade level:

5-8

NYS Learning Standards:

MST 4: The Living Environment

MST 6: Models

MST 7 Strategies (presenting reports)

ELA 1: Listening and Reading

ELA 3 Listening & Speaking

SS 4: Economics

Core Curriculum Standards:

RI.5-8.1, RI.5-8.3, RI.5-8.9. SL.5-8.4, SL.5-8.5

Time:

60 minutes in-class, plus homework

Materials:

Starting a Christmas Tree Farm in NY. This handout by Cornell University Cooperative Extension gives basic instructions on getting started in the Christmas tree-growing business. <http://ccechenango99.squarespace.com/storage/hortnr/forestry/Starting%20a%20Christmas%20Tree%20Farm.pdf>.

**Grade level:**

K-2

NYS Learning Standards:

MST 4: The Living Environment

ELA 1, 2, 3 Listening & Speaking

Core Curriculum Standards:

RL.K-4.1, RL.K-2.10, RI.K-2.9, RI.K-2.10

Time:

60 minutes, plus tree planting time

Materials:

- *Christmas Farm*, by Mary Lyn Ray
- *Christmas Tree Farm*, by Sandra Jordan (If you can get both books, do so. One is fiction, the other non-fiction, so it provides an opportunity for you to compare these two writing styles.)
- 1-minute video narrated by a young boy whose family owns a NY Christmas tree farm, www.hurdfamilyfarm.com/christmas-trees.php
- Conifer seedling (s) to plant at school. (In this activity, students will vote on the species they'd like to plant, so don't buy it ahead of time.)
- Permission from your school or other community-owned property in town for your students to plant one or more conifers.

Lesson 7. A Four-season Job

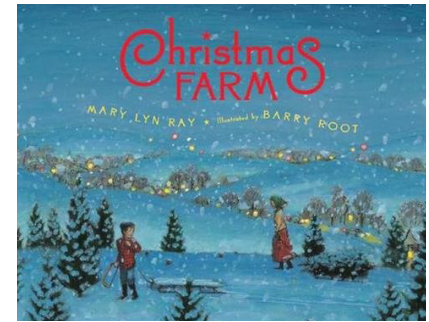
Caring for Christmas Trees

Description:

Students will learn about the many year-round tasks involved in caring for Christmas trees and running a Christmas tree farm. Then they'll plant one or more conifers on their school grounds.

Setting the Stage:

1. Ask your students when they think Christmas tree farmers are busy working on their farm. Though December is the big sales month on a Christmas tree farm, caring for Christmas trees is a year-round job.
2. What work do your students think is involved in growing and selling Christmas trees?



Spring is the time to test and prepare the soil and carefully plant the seedlings.

In spring and early summer, tree farmers shear the older trees, to promote bushier growth and the classic conical shape.

Throughout the warm-weather months, they watch for insects and disease, and treat them as needed. In New York State, older trees rarely need watering, but seedlings might need irrigation during summer dry spells.

Throughout the growing season, farmers mow and/or use herbicides to keep down grass and weeds between and under the trees, which compete for nutrients and can kill the lower branches of the trees.

In fall, farmers who plan to sell living conifers (which customers can plant after Christmas) dig up those trees and wrap their roots in burlap.

In late November, Christmas tree harvest begins.

Activity Directions:

1. Introduce your students to the year-round work involved in raising Christmas trees by reading them two great picture books. The first, *Christmas Farm*, is a fictional story by Mary Lyn Ray. This beautiful and engaging book tells the story of Wilma, who plants a Christmas tree farm—sixty-two dozen balsam fir seedlings, to be exact—with the help of Parker, her five-year-old neighbor. Year after year, Wilma and Parker carefully nurture the trees, weeding and trimming and keeping careful count of how many survive each year. Finally, the year comes when the trees are cut and sold, and the cycle begins again. The final page of the book offers a well-written background history of Christmas trees.
2. The second picture book is the *Christmas Tree Farm*, by Sandra Jordan. This non-fiction book tells, in words and photos, the true story of Janice and Leo Clark, who own a Christmas tree farm in Rhode Island and describes how they tend the trees throughout the year.
3. Have students watch the one-minute video narrated by a young boy whose family owns the Hurd Family Farm in New York State.
4. If your students completed Lesson 3, they are now familiar with the differences among pines, spruces, and firs. Have them vote on the kind of tree they'd like to grow. Once they choose the general type (pine, spruce, or fir), you can order a local species of that type (If they would like to plant a pine, there are five native species to choose from. If a fir, there's just one species—the balsam fir—and so on.). You'll find a listing of native tree species for New York State at www.treesforme.com/new_york.html.
5. Have your students learn all they can about the species you order, to figure out how tall and wide they will grow, how much sunshine they like, and so on. Choose your site accordingly and have the students carefully plant the seedling(s) per nursery instructions.

Lesson 7. A Four-season Job

Caring for Christmas Trees

Description:

Students will learn how many natural factors Christmas tree farmers need to address to grow picture-perfect trees. They will research and present their findings about a particular natural event (insect, disease, wind, ice, fire) that impacts the health and appearance of conifers.

Setting the Stage:

1. What are the characteristics of a picture-perfect Christmas tree? Conical, bushy, fully green, symmetrical. On a Christmas tree farm, farmers put a great deal of time and effort into nurturing these qualities. It takes a lot of work because natural elements—like fire, wind, snow, ice, insects, and diseases—tend to shape the tree differently.
2. White pine weevils, for instance, kill the terminal shoot (top of the main stem) of white pines, which causes one or more side branches to grow upwards and assume the role of terminal shoot, greatly changing the shape of the tree. Perpetual high winds can cause “Krummholz”—the deformation and stunting of conifers. And that’s just for starters—the list of natural elements that can damage conifers and reduce the economic value of Christmas trees is extensive!

Activity Directions:

1. Have each student pick an insect, disease, or other natural event (wind, ice, fire) and research its effect on conifers. These effects may be dramatically different for different conifer species. If your student chooses a complex element like fire, which has vastly different effects on different species, you might suggest that they limit their research to just one species (for instance, researching how jack pines are shaped by fire).
2. Then have students create a 5-minute presentation on their findings. Encourage them to create visual aids that will illustrate their findings.
3. Have students share their presentations with their classmates.



Help your students learn about how Christmas tree farmers make decisions on reducing pests through Integrated Pest Management (IPM). Remind students that pesticides are chemicals and must be used carefully. While pesticides are used to eliminate pests, they should not always be the first choice for treatment. The New York State IPM Program and Cornell University have prepared an excellent teacher’s guide - Learning About IPM, part of the Sciences of Life Explorations: Through Agriculture series. This is available to download from the NYS IPM website www.nysipm.cornell.edu



Grade level:

3-8

NYS Learning Standards:

MST 4: The Living Environment

MST 6: Models

MST 7 Strategies (presenting reports)

ELA 1: Reading

ELA 3 Listening & Speaking

Core Curriculum Standards:

RL.3-5.2, RL.6-8.7, RI.3-5.2, RI.6-8.7, RST6-8.1, RST6-8.8

Time:

15 minute introduction, homework, 5-minute presentation per student

Materials:

- Students can make use of library books and on-line resources to research their topics.

**Grade level:**

K-2

NYS Learning Standards:

MST 4: The Living Environment

ELA 1, 3 Listening & Speaking

Art 1: Creating & Participating in Arts: Theatre

Core Curriculum Standards:

RI.K-2.2

Time:

45-60 minutes, if doing activity 2a; two 45-60 minute classes, if doing activity 2b (allowing for two rehearsals of the tree cycle play before performing)

Materials:

• *The Life Cycle of a Tree*, by Bobbie Kalman

Lesson 8. Nutrient Cycling

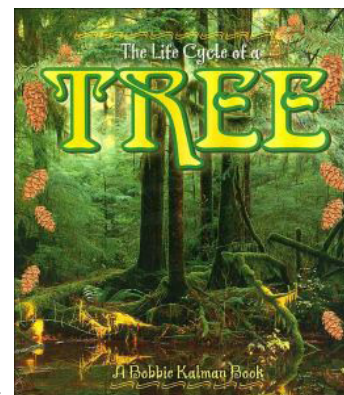
New Life from Old Christmas trees

Description:

Students will learn about the life cycle of conifers from seedling to mature tree to snag to dead log and back to humus. They will act out this process, either individually or as a group.

Setting the Stage:

1. Talk with your students about how trees go through many different phases Christmas trees, and conifers in general, support a tremendous diversity of plant and animal life while they are alive. In the natural world, they continue to provide food and shelter to many species long after they die, whether as standing snag, fallen log, or decaying humus.
2. What about the 25-30 million Christmas trees that are cut each year to decorate people's homes? In years past, these might have ended up in a landfill, their valuable resources wasted and the nutrient cycle broken. But times have changed, and communities across the country are coming up with innovative ways to reuse and recycle Christmas trees.

**Activity Directions:**

1. Read *The Life Cycle of a Tree*, by Bobbie Kalman, to your students. This engaging book describes and illustrates how a tree evolves from seed to seedling to tree to humus, including such processes as pollination, how trees grow, and so on.
2. Have students act out the cycling of a tree from seed to seedling to mature, seed-producing tree to snag to fallen log to humus that nurtures new seeds.
 - a. Have younger students act out the process individually, as you guide them through it. "First you're a little pine seed, buried by a squirrel in the soil... Now, with the help of the rain, you begin to stretch a tiny root down and a tiny stem up... The seasons pass and the years pass, and you slowly grow into a tall pine tree... After a hundred years of growing, you stop growing taller, but keep growing slowly wider... After 250 years, a big windstorm comes and blows hard through your branches... One super-big gust pushes you over, and you topple to the ground. You lie there for another hundred years, slowly softening and decaying... Eventually, your mighty trunk becomes part of the soil, ready to nurture new trees..." You can add infinite variations to this simple visualization, including animals that might live in and around the tree, other natural events that might occur, different ways for the tree to die and return to the soil, etc.
 - b. Older students can work together to act out the cycling of a tree. Brainstorm with them the many players involved in the process. (In addition to seeds, growing tree, and soil, there are a host of wildlife species connected to the tree at every stage of its growth, death, and decay.) If you have a parent helper or classroom aide, you can divide your student group in half and have each group develop a play about the tree cycle process. After they have practiced, have each group act out their play for the other half of the class.

Lesson 8. Nutrient Cycling

New Life from Old Christmas trees

Description:

Students will brainstorm and develop ideas for innovative ways to recycle or reuse Christmas trees in their community.

Setting the Stage:

Communities across the country are practicing innovative ways to recycle and reuse Christmas trees. Take a 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.



Activity Directions:

1. Make inquiries with your town or city hall to find out what programs your community has in place to recycle or reuse Christmas trees.
2. Share and discuss these existing strategies with your students.
3. Have your students work in small groups to develop a proposal for a new way 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.
4. Have students present their project proposals to their classmates.



Grade level:

3-8

NYS Learning Standards:

MST 1 Analysis, Inquiry, and Design

MST 4: The Living Environment

ELA 1, 3: Reading

Core Curriculum Standards:

RI.3-8.2, RI.3-5.7, IR.6-8.7

Time:

60 minutes

Materials:

The National Christmas Tree Association website offers a webpage with descriptions of many community initiatives to reuse and recycle Christmas trees, www.realchristmastrees.org/dnn/AllAboutTrees/Howto-Recycle.aspx.



Additional Resources:

1. Christmas Tree Farmers Association of New York, www.christmastreesny.org.
2. National Christmas Tree Association. Their "Real Trees 4 Kids" curriculum nicely complements the materials we've presented in this curriculum packet, www.realtrees4kids.org.

Bibliography

Christmas Farm, by Mary Lyn Ray. HMH Books for Young Readers, 2008. (Grades K-2)

Christmas Tree Farm, by Sandra Jordan. Orchard Books, 1993. (Grades K-2)

Tell Me, Tree, by Gail Gibbons (Grades K-2)

The Life Cycle of a Tree, by Bobbie Kalman (Grades K-2)

The Tree Book, by Gina Ingoglia (Grades 3-5)

The World of Northern Evergreens, by E.C. Pielou. (Grades 6-adult)

Tree Finder: A Manual for the Identification of Trees by their Leaves, by May Theilgaard Watts. Nature Study Guild Publishers, 1991.

Where Would I be in an Evergreen Tree? by Jennifer Blomgren. Sasquatch Books, 2011. (Grades K-2)



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