

Spring Branches: Pruning and Cut Branch Study

Grade(s): 5-8	Topic: Branches, Buds, Hands-On Stewardship	Season: Late Winter / Early Spring, before buds have started to open on orchard trees
<p>Timing: 60 minutes, including 5 minute introduction, 10 minute interactive pruning introduction, 5 minute outdoor pruning demo, 20 minutes of pruning, 15 minutes setting up the Cut Branch Study indoors and 5 minutes concluding</p> <p>Follow-Up: Revisiting the Cut Branch Study at least once a week over the next 3 weeks</p>		
<p>Objectives:</p> <ul style="list-style-type: none"> • Students can explain different scenarios in which a branch should be pruned and develop pruning and safety skills through hands-on experience. • Students can distinguish between a dead and live branch . • Students start an in-class cut branch experiment to learn about how branches need sugar and water in spring in order for their buds to open and for flowers and leaves to appear, and students hypothesize about how their branches will change over time. 		
<p>Materials:</p> <ul style="list-style-type: none"> • 4 Large containers (pint yogurt containers or 16 oz jars work well) • Small container of sugar and spoon • Hand pruners (one pair for each adult) • Container of Isopropyl (91%) alcohol for cleaning hand pruners • Rags to clean hand pruners • <i>Winter Scavenger Hunt, Branch Observation or Bud Scavenger Hunt</i> worksheets • <i>Cut Branch Study</i> worksheets • Pruning Instructions • Branch and Bud Vocabulary Sheet 		
<p>Prep Needed:</p> <ul style="list-style-type: none"> • Look over the orchard trees to get an idea about what branches need pruning. Think about the height of the branches and make sure the students can reach them. • Review Pruning Instructions Guide • Decide what handout or other activity you would like half the class to do outside while the other half prunes • Prepare sugar water solution. 1 – 2 Tbs sugar : 1 quart (4 cups) Water • Label each of 4 jars with “sugar water” “water” “water (no branch)” and “no water” 		
<p>Degree of need for extra teacher or parent helper? High</p>		
<p>Journal Prompt: How can you tell if a tree is alive in the winter?</p>		
<p>Lesson Sequence:</p> <p>Reactivate Prior Knowledge / Intro (5 minutes)</p> <p>Pass around one dead branch for students to look at and one newly pruned branch. Explain that today we are going to focus on tree branches. What is a branch? What does it carry inside of it (water from the roots, sugar from the leaves)? Where are branches on trees? What do they connect?</p> <p>What are the differences between these two branches? How can you tell that one is alive</p>		

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and one is not? Dead branches often have crumbling bark and buds and are not flexible. Sometimes it is difficult to discern living branches from dead ones, but living branches have intact bark, are supple, and have buds.

Why Prune? (10 minutes)

"Today, we'll be helping the orchard trees by pruning them. Pruning means that we carefully cut off branches that need to be cut. The time when trees are in the sleeping state is the perfect time to prune, just like people are put to sleep for an operation. "Why might we need to cut off some tree branches?"

Act out the following reasons to prune as a class:

Ragged/Dead Limb Scenario:

Kids crouch down low to the ground, being tree seeds. Seeds/children "grow" slowly up, sprouting branches and leaves, becoming big trees swaying in the wind, until a strong gale causes branches to snap off or hang half-on and half-off. Each student acts out having a hanging-off, injured branch or two. "How would it feel to have a branch hanging half-on and half-off?" (It would hurt.)

"Who's had a bad cut? What can happen to your cut if you don't clean it off and cover it with a band-aid?" (It could get infected and cause trouble to your whole body). "It's the same for a tree with a broken branch; pests and diseases could infect the tree. So we prune off broken and dead branches.

Crossed Branch Scenario:

Children cross and rub their arms hard against each other, and notice that their skin begins to hurt. When tree branches rub against each other, the trees' "skin" or bark will hurt, too. We prune off branches that are crossing each other, to avoid damage to the bark.

Branches Pointing Straight Up in the Air Scenario:

Kids act out being "straight up" branches by making their bodies as skinny as possible and pointing their arms and hands as uncomfortably vertical as possible. They understand how these branches have a hard time bearing fruit. Fruit trees need to have an open "vase" type shape, not a long, skinny shape.

Explain outdoor plan:

While half of the students prune, the other half of the class will be observing a branch and a bud or doing a scavenger hunt (teachers' choice). The other half will come with you and prune some tree branches that are dead, broken, rubbing or growing straight up. Then we will switch."

Outdoor Pruning Demo for Whole Class (5 minutes)

Stress tool safety! Show students how to use the flat side of the pruners against the branch that will be left on the tree. Show the children how to lock the pruners closed when they are not using them.

Some Pruning/Safety Guidelines:

1. Always pass the pruners to a person with the lock closed.
2. Explain that cuts should be after a branch collar or bud and explain that the next bud down will be the one to shoot out. Make sure that the pruners can easily cut the

branch chosen.

3. *Do not attempt to cut a branch that is too thick.* It must be thinner than your thumb.
4. Remember to clean the pruners in between cuts on different trees with the rubbing alcohol and clean them when the class is finished.

Pruning Branches in the Orchard (10 minutes for each half of class / 20 minutes total)

This lesson is best split between 2 adult supervisors. You will be working with half of the class at one time. The other half of the class will be with another adult (parent volunteer, para, etc.) , finding a living branch on an orchard tree and making an observational drawing.

Each student selects a branch that they think needs pruning. Each student explains to the group why that particular branch is in need of pruning. Have them demonstrate the body motion that accompanies that reason that they learned earlier in class. Only let them make the actual cut if they can handle it. If you do not trust a student to participate in the cutting, just have them select the branch, say why and then you can cut it. Pass the pruners between one student and the next. Supervise each cut. Have the children take turns using the pruners, one at a time. This way the whole group watches and you can make sure the children, trees and equipment are safe. **Make sure to clean the pruners with Isopropyl alcohol for 2 minutes if you transition to a different tree.**

Collect the branches that the students cut – allowing the children to do so creates problems. (These problems are the obvious ones that occur with children and sticks. It also feeds the already present desire to cut off big branches.)

Cut Branch Study (15 minutes)

Take 4 cut branches with buds indoors with the students have containers set up beforehand

Cut Branch Study

Objective:

- To learn the role of water and sugar (energy) in the growth of plants, particularly fruit trees.
- To develop skills experiment design and execution: prediction (creating a hypothesis) observation (data collection), and the need for controls (variables).

Procedure:

You have set up pruned fruit tree branches in 3 containers in your classroom and 1 container with only water. Of the three containers with buds, one container is filled with water, another with sugar water, and the third is empty. The branches will begin the same series of growth steps that the buds outdoors are going through, but more rapidly due to warmer temperatures indoors. (This suggests a side experiment: you could ask the students why they think the growth is more rapid. They could test the temperature hypothesis by placing some cut branches outdoors). A fourth container of only water is provided as a control to compare evaporation with transpiration (the drawing up of water into the branch and evaporation through the leaves). Be sure to mark on the jars the initial height of the water, so that water loss can be measured!

Assemble the jars containing the class' cut branches in front of the room for all to see. What has happened so far to the branches which you pruned off the trees and placed in these

jars? Are any of the buds changing or opening up? Which branches are doing well and why?

By being indoors cut off from the rest of their tree, what are these cut branches not going to be able to get? Have everybody wiggle their toes. "What part of the tree is sort of like its toes and feet, helping the tree to stay anchored and steady in the soil? (the ROOTS!) What does a tree suck up from the soil with its roots? (water and also nutrients from the soil). Can our cut branch get nutrients if it's cut off from the tree? (No). And without enough nutrients, will the buds on the cut branches be able to make fruit or stay alive? (No).

Observe the branches one or two times each week as changes occur, for about three weeks. (Note that because the branches aren't attached to roots as on a complete tree, the new growth will not be sustained.) After each week passes, have students draw and describe the branches in each container as a way of observing changes. Use the attached sheets to record student observations.

Discussion Questions:

1) *Which branches grew the fastest? Which had the most leaves or flowers? Why?*

The branches in sugar water may grow more. The extra carbohydrates in the sugar water should give these branches extra energy, having a noticeable effect on growth.

2) *Do fruits form on any of the branches?*

Compare/contrast with outside, where pollination and root nourishment happen. Indoors, the branches are not connected to roots, so they cannot take up nutrients. Without insects to pollinate the flowers, they cannot produce fruit and seeds.

Conclusion (5 minutes)

Review what students learned about branches and pruning, and what they think will happen next week with the Cut Branch Study.

Vocabulary

Branch
Bud
Dormant
Prune
Supple

Vocabulario

Capullo
Durmiente
Flexible
Podar
Rama

Extensions / Homework Ideas:

- Compare the orchard tree buds with those of other trees. How are they similar or different? Which ones flower first? Why?
- Look at the internet to find photographs of bud development over time to demonstrate to students how a bud forms into a fruit.