Common Roots
Maple Syrup

Introduction

As we embark on this maple journey, we invite you to engage in our mindfulness activities that remind us to be observant of our surroundings. We provide a choice of activities and techniques that remind us to look, listen, and reflect. Maple trees and the sweet goodness they offer, creates a community where people can come together to enjoy the first harvest of late winter and the promise of spring. The mystery of how maple trees gift us sap is one that has been expressed through a multitude of cultural lenses. Though these might differ depending on time and place, each carries a unique wisdom that sweetens our appreciation for the wild tonic of the Sap Moon that signals to the Abenaki to harvest the first wild food of spring.

This lesson is full of maple mystery and traditions. We provide a few recipe ideas suited for all age levels and touch upon no-waste techniques that preserve precious resources. Take a deep dive into the health and wellness benefits of using maple syrup, a mineral-rich sugar, to add some healthier flavor to recipes. Root into maple yoga, mindfully exchange your breath with the trees, discover the teachings brought to us by nature neighbors large and small. Share a story about how Squirrel finds maple sustenance, and lives into the winter hush of frozen potential in the quiet of the maple forest. Then we time travel through maple technology, deeply engaging with biodiversity by observing and journaling. We also meet with urban landscape community members who connect with neighbors by creating maple syrup connections one tree at a time. During the season of the Sap Moon, we hope that you can share with others what you may experience through your adventures and perhaps bring them along on a maple journey.

Maple Veggie Fritters

Ingredients

-½ cup squash (butternut) or carrots, grated
-1 chia seed "egg"—1 tsp chia seeds and 3 tsp water
-1 tsp maple syrup (plus more for drizzle on top to serve)
-1 heaping tsp corn flour (an Abenaki food gift)
-Pinch of cinnamon
-Pinch of salt (Abenaki received salt by trade with coastal tribes)
-Olive oil, for frying in the pan (bear fat was traditional indigenous fat)

Supplies

Peeler
Grater
Measuring spoons and cups
Frying pan or induction burner
Small and medium size bowls
Spatula
Water

Directions

Prepare

1) Peel squash; organic carrot skin holds beneficial nutrients and needs no peeling. Grate squash or carrot along the large holes of the grater. Measure out ½ cup into your mixing bowl.
2) Make your chia seed egg by combining in a small bowl seeds and water. Let the mixture rest for 3–5 minutes as it thickens to an "egg" consistency.
3) To the grated squash or carrots add the corn flour, cinnamon, and salt. (Show the corn kernels, salt, and cinnamon stick in their original form.)
To determine whether the chia egg is ready, observe the "jelly-like" texture. Add this and the maple syrup to the squash mixture and stir to combine.
Form the squash or carrot mixture into small, thin patties.
4) Heat olive oil in a pan over medium heat (number 3 on induction burner). As you gently tilt the pan, observe whether the oil ripples like water. If so it is ready to receive the patties.
5) Gently place patties into the pan of hot oil at the point farthest away from you. That will prevent any oil from splattering on you. Fry patties until crispy and golden brown, about 3 minutes on each side.
6) Serve with a drizzle of warm maple syrup.
7) Mindfully take a few deep breaths. Observe, smell, and taste. How would you describe your experience?

Banana Oat Pancakes with Maple Syrup

Ingredients

-1 ripe banana
-2 eggs*
-¼ cup oats (whole, rolled, or steel-cut)
-Pinch of salt
-Pinch of cinnamon
-Coconut oil or butter
-Maple Syrup for drizzling

Supplies

-Measuring spoons and cups
-Frying pan or induction burner
-Small or medium-sized bowl
-Spatula

Directions

Prepare

1) Mash the banana and combine all ingredients until you have a smooth consistency.
2) Set a skillet to medium heat and apply the coconut oil or butter to coat the pan.
3) Apply about a palm-size portion of the batter to the pan. Cook for about 2 minutes on one side, or until solid enough to flip. Use a spatula to flip the pancake and cook for about 30 seconds to 1 minute.
4) Serve with maple syrup, or add peanut butter or almond butter for added healthy fats and extra protein

Notes and Substitutions

*Feel free to add fruit, chocolate chips, or walnuts to pair with the pancakes, and get creative with spices. Nutmeg could pair very well with the cinnamon. Instead of eggs, you could substitute 2 tablespoons of chia seeds covered in water and allow to congeal for about 5 minutes. Enjoy this fiber-rich and sugar-balanced recipe. Toddlers also love this recipe as a yummy breakfast or snack.

No Waste!

No Waste: Using Every Last Drop!

We have learned all about how long it takes to make maple syrup. We know that it takes forty gallons of sap for one gallon of syrup, or forty drops of sap to make one single syrup drop. It takes lots of work from the trees to create this sap—it took the sunshine from the summer before, then waited a whole fall and winter before harvesting the sap. It also required a lot of work by those who tapped the trees, harvested the sap, and spent days that lasted into the starry nights boiling the sap. Wow, all of that time and effort goes into even a single drop!

Those last few drops, or the last bit that coats the bottle, can be hard to get out. Here's an idea for appreciating every last bit of tree sweetness.

Put hot water inside the bottle. Shake the water around until the syrup and water have combined to make a sweetened water. Add lemon juice for a taste of sour. Now you have created your own take on maple lemonade! Drink it warmed on cold days or chilled as a refreshing treat on hot days.

Zero Waste: Ways to Reuse Maple Syrup Packaging

We know the importance of minimizing food (and syrup!) waste. One aspect of product reuse that may be easy to overlook is the plastic jugs our syrup comes in. It can be difficult to avoid plastic consumption; however, there are many ways we can use the containers maple syrup is packaged in. Here are some fun ways!

1. Use your jugs as watering cans! This is a simple way to reuse your empty jugs to replenish your garden or houseplants.
2. Use them as storage for dry foods such as grains, rice, or beans.

3. Jugs make great handmade musical instruments! This can be a fun activity for children. Partially fill up jugs with beans to make a percussion instrument, or explore blowing into the jugs as if they were a woodwind. The possibilities for exploration are endless!
4. Make a bird feeder! Here is a link to a step-by-step tutorial by ThriftyFun.
5. There are so many other possibilities! For a longer list, check out this blog post for more options.

Health and Wellness

Gentle Movements: Maple Yoga

https://www.kidsyogastories.com/yoga-for-spring/

Here is a wonderful yoga activity for the classroom to get students moving. By walking them through various aspects of the sugar mapling process, they are able to deepen their understanding.

1. **Sun:** Standing tall, hands above your head, reach up toward the sun to feel its warmth as it begins to warm the earth in the spring.

2. **Bird:** Lower your hands to your chest, palms together. Shift your weight to your left foot and slowly lift your right leg straight out behind you, bending at the hips. Here you can leave your palms together at your chest or extend your arms out to your sides. Pretend you are a bird soaring high above the trees!

3. As we fly above the trees, we spot a sugar maple! Lower your foot down as we land on the ground.

4. **Tree:** Bring your hands back up to your chest, palms together. Feel your weight evenly in your feet. Spread your roots firmly into the soil so a strong spring breeze won't uproot you. Slowly spread your branches upward, making a place for the bird to rest. Now move your weight to your right foot and slowly bend your left knee to lift your foot off the floor. You can balance here on one foot or bend your knee more to lift the sole of your foot to your inner right thigh. See how long you can balance in tree pose!

5. **Flowing sap:** Lower your foot back down to the ground. Take a deep breath and feel the sap moving upward, filling our tree trunks and arm branches still reaching up high.

(Sap flows up vs. down during early spring to feed the branches and buds, then down in summer.)

6. **Tap the tree:** Tap your foot three times, tap tap tap, as the sugarmaker taps your tree trunk. Now reach out your arms in front of your tree trunk. Make the shape of a sap bucket being hung on the tap. Bend your knees and lower your body to a squatting position to catch the sap as it begins to flow.

7. **Patiently waiting for our sap to boil:** Kneeling on the ground (or sitting in your chair), raise your right arm and reach over your head to the left to stretch the side of your torso. Do the same to the other side as we wait for our sap to boil. Rub the palms of your hands together to generate warmth as the sap heats up in the sugarhouse—do this for a while to portray how long it takes to boil the sap down. End with hands at your heart in gratitude for this sweet springtime gift. W*hat do you think the sap will turn into?*

Let's Talk About Maple!

Maple syrup is such a sugar sweet gift from the forests and is the first wild food of spring. Maple trees only grow in a few parts of the world, and we're lucky enough in Vermont to have them! Harvesting sugar maple forests gives us an opportunity to cook down the sap into delicious syrup every spring. It is a great way for communities to celebrate the end of winter and better understand and experience the craft and dedication of Vermont's sugar makers who collect it.

The sweet taste of maple syrup, sought after all over the world, comes from the sugary sap mixture that feeds the trees when spring comes a'knocking. This watery fluid is what helps the maple trees, fresh from their cold winter (hibernation, much like what bears do), grow their leaves! And just like the sap feeds the trees, it can feed us too! What's so great about it is that unlike processed white sugar, maple syrup has more than just sugar in it; it has soil medicine in it!

This soil medicine comes in the form of what we call minerals. Have you heard the word "mineral" before? Do you know a common mineral we often eat? It comes in the form of

miniature rock crystals that help build our bodies the way minerals build up statues and mountains—big and strong.

The mineral is salt, and it is found in the sea. Have you ever gotten a little seawater in your mouth? It tastes salty, right? Well that is salt, a mineral. Maple syrup has many minerals in it too, which are good for our growing bodies and even support the growth of our teeth and the bones that grow taller with us as we grow. They also help build and support the muscles we use to play, run, ski, and skate, as well as help us learn, think, and remember.

Processed sugar, or white sugar, is made of one simple ingredient; all it contains is sugar and nothing else that can help us grow taller, play, think, and remember. Maple syrup on the other hand has plenty of little things in it. Remember what they are called? Minerals!

This is why when given the choice, the healthier sweetener to consider is maple syrup. When you buy local maple syrup you are supporting the local food providers like Farmer Fae, who grows the food for our farm-to-school lessons. Maple sugar makers farm the forest. If you can get out and meet your local maple forest farmer, you might enjoy their many stories about generations of family sugaring seasons while spending some time getting warm by the fire, bathing by the aroma and steam rising out of the evaporator in the sugar house, and snacking on sweet maple medicine goodness.

Zooming In On Maple

Salt is a medicine that is found in the sea. Crazy, right? Salt is a mineral. Minerals are small rock crystals that help build our bodies the way they build up statues and mountains—full of strength. Have you ever gotten a little seawater in your mouth? It tastes salty, right? Like the sea, maple syrup has minerals too—not salt but other minerals.

When we eat salt it is no longer in seawater. The process for turning seawater into salt requires separating this mineral from the water by letting the water evaporate. Removing the water from salt can be done in the sun, because sunlight can build up to a high level of heat.

The same process works with maple syrup. Maple syrup is made from watery tree sap. As it starts warming up and the maple trees (which are only found in a few places in the world,

Vermont being one!) are just coming out of the winter, they make themselves food from a mixture of water, sugar, and minerals. Maple syrup is created by evaporating the water out of the tree sap until only sugar and minerals remain, just like when water evaporates from seawater and salt is left over. There is so much water in maple syrup that it takes about forty gallons, or buckets, of sap to make just one gallon of maple syrup.

When sap is cooked down even further, the newly freed syrup crystallizes into the maple sugar crystal candy we find all over Vermont.

Okay, so we've got the idea of what minerals are; now picture the roots of the maple tree digging deep down into the soil. Those roots are where all of the sugar is stored, right? And what else do roots do for plants? They pull water in from the soil, right? But water is not all they pull from the soil; they take up minerals as well! Here are three minerals found in the crystal medicine that maple syrup contains.

Calcium helps our bones grow strong and our muscles work hard.

Manganese is very important because it helps us learn and remember.

Magnesium provides very important support for almost every reaction in our bodies.

Very powerful soil medicine, eh? Just remember that even though manganese and magnesium sound similar, they are actually different! Yet they both play just as important of a role in our bodies.

Isn't it wonderful that something can taste SO good AND be so good for you? These minerals are only needed in teeeeny tiny amounts in our bodies, which is why we don't just call them minerals but "trace minerals." We only need a trace amount to be healthy. Just like the small amount in maple syrup! So get outside, go to a sugar house where they make this delicious and nutritious treat, and enjoy a teeeeeny bit of maple syrup!

Processed sugar, or white sugar, is made of one simple ingredient: it contains sugar and nothing else that could provide a health benefit. Maple syrup on the other hand has plenty of wellness minerals in it. Whereas white sugar contains zero minerals, maple syrup contains calcium, manganese, and magnesium! This is why when given the choice, a healthier one to consider is maple syrup. Not only this but when you buy real local maple syrup, you are supporting the local sugar makers who farm the forest!

Soil Medicine

Minerals are naturally occurring inorganic solids that help build up our bodies. Our bones are made of minerals, Minerals are found in maple syrup.

There is so much water in maple syrup that it takes about forty buckets (about a gallon) of sap to make just one gallon of maple syrup. By removing the water, the minerals make up a higher proportion of the wellness benefits in syrup.

Tree sap is created and stored in the roots of the maple trees until it is time to re-enliven the trees during spring. The water added to this stored sap is drawn from the rich soil, and the sugar is stored from when the tree had leaves and was photosynthesizing to make tree sugar energy called carbohydrates. Minerals are also drawn from the soil at this time. These minerals—calcium, manganese, and magnesium—make maple syrup a better choice than almost any other sweetener.

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calcium, manganese, and magnesium! If the opportunity is available to you, the healthier sweetener to choose is maple syrup. When you buy real local maple syrup, you are also supporting the local forest farmers, sugar makers, and the economy!

Forest Bathing: A Mindful Practice

The wintertime is often associated with a lack of life in nature and staying inside to avoid the cold. Winter in Vermont is exhilarating, however, and can be the perfect time to take time to oneself outdoors and practice mindfulness in nature. Let's take a nature walk and use this time to celebrate this beautiful season, as well as ourselves.

Forest Bathing is a practice developed in Japan that is meant to connect people with nature, as submerging oneself in it has restorative properties. It began as a program developed by the Japanese Ministry of Agriculture, Forestry, and Fisheries in the 1980s. *Shinrin-yoku*, which translates to "forest bath," is the idea of disconnecting from the stressful antics of everyday life and taking the forest in through our senses. It is not for fitness or a competition. The objective is to focus on the present and away from distractions of everyday life.

Let's begin. Leave your phone and camera at home. Find a familiar path in the woods. Begin to walk aimlessly. There is no final destination or route you have to take. Let your intuition and curiosity guide you. The key to this practice is to take in the environment in all five senses and pause each time a sensory experience is explored.

Let's first start with sight. Upon wandering on this path, what do you see? In the distance you may see a forest thick with trunks and maybe snow on the bare branches. The ground may have leaves peeping out of the snow or show the tracks of the people and animals that have wandered through the forest before you. Look up. Is the sky clear of clouds, showing a vibrant blue atmosphere, or is it white, full of clouds getting ready for the next snow?

Next, let's focus on what we hear. The crunch of the snow, the rustle of branches in the wind. Are there animals or people nearby making noise? Maybe everything is still. Maybe the only thing you hear are your footsteps and breathing.

Now let's see what is felt. Is the cool, crisp air tickling your cheeks? Perhaps sunlight sneaking through the canopy warming your skin? Reach out and touch the bark of a tree. Feel the rough

ridges. Feel all sides of the tree bark. What do you notice? Now try touching a branch and notice the contrast in texture. Do you feel like giving that tree a hug? Go right ahead.

What do you smell? Although photosynthesis is not abundant this time of year, the air is still fresh. Smell the crisp air, taking deep and mindful breaths.

Lastly, taste. Maybe you will come across some maple sap buckets and can experience a drop of nature's first wild food tonic straight from the tree! Another option for this sense is to bring tea or another beverage to accompany and warm you up. You could bring the maple lemon beverage mentioned in the No Waste! section. Or bring a thermos of hot boiling water and make a beverage right in the forest cafe. Find a handful of white pine needles and a handful of bright green soft spruce tips. Make certain you can accurately identify these trees. Steep them for fifteen minutes or more. This is another way to taste the forest straight from the trees!

Soak in the experience like you are bathing in the sensations. The only goal is to remain present. You are your own guide on this excursion—do what gives you tranquility. According to some research, the amygdala slows down when we are in the forest. The amygdala is a central nucleus in the brain that is crucial in processing stress and reacting to danger. Those with healthier amygdalas are more able to cope with stress. Research has shown that people who live in cities are more susceptible to anxiety disorders than those who live in close proximity to forests or the countryside.

Can you do this as a practice? Your first forest bath may not have a significant impact on you. However, if you consistently do it multiple times, you will begin to notice the serenity it brings you. To start out, you might set a goal to forest bathe five times. You might discover that after five times you can't wait to get back to the embrace of the trees!

Is All Sugar The Same?

Maple syrup is unique to all other added sugars in that it contains vitamins and minerals like potassium, calcium, iron, zinc, and magnesium in greater concentrations than other sugar additives. Of course things like brown and white sugar are staples in the home and play essential roles in baking, preserving jams and jellies, and allowing bread to rise, among many other uses. By now it is accepted that too much of anything is not great for your body, and choosing sugar can be tricky, especially because it is already in so much of what we eat. When we do make choices about consuming

sugar—adding it to coffee or tea, for example—we can think about using maple syrup instead. It not only tastes great but offers multiple benefits over other sweeteners.

One of the promising characteristics of maple syrup is that it has a lower glycemic index, which suggests it will not cause as high of a blood sugar spike compared to other sweeteners. This might be useful when choosing between sweeteners, especially if someone is at risk of or diagnosed with gestational diabetes. Managing blood sugar can be tricky, especially in terms of having highs and lows. A potential solution to avoiding these spikes would be to add maple syrup to foods high in fiber. Perhaps you like oatmeal in the morning, or chopped apples with cinnamon, or maybe making banana oat pancakes, but you want to add a little something extra. When paired with foods containing fiber, maple syrup not only offsets the spike in blood sugar but also adds a sweet maple taste, and a little bit goes a long way.

Maple syrup also contains antioxidants that work in our body to prevent certain processes that may make us more susceptible to cancers or increase blood pressure. If you have a family history of cancer or may be at risk of high blood pressure during pregnancy, it could be helpful to include at least one of the many other foods containing antioxidants into your diet. Foods with higher concentration of antioxidants include nuts, berries, whole grains, and colorful veggies (e.g., sweet potato, kale, carrots). There are vitamins, minerals, and antioxidants in so much of what we consume, especially when we eat foods in combination with one another. Some great examples of healthy combos containing maple syrup are roasted veggies with a maple glaze, maple baked beans, and maple vinaigrette dressing.

Maple Making Life a Little Sweeter

When choosing sweeteners to include in your diet, there are many to select from. Maple contains beneficial vitamins and minerals that provide various benefits and aid basic bodily functions. Calcium aids in bone health, iron and zinc support the immune system, and magnesium supports well-managed blood pressure, can soothe migraines, and may play a role in reducing anxiety according to some studies. The vitamin and mineral content makes maple syrup unique in that it causes slightly less of an intense spike of your blood sugar. Sugar is in baked goods, sweets, and treats, but it is also found in fruit and vegetables or is added to foods that we ferment, like sourdough bread. When baking, we typically use sweeteners like brown sugar and white cane sugar. We also tend to add sweeteners to our coffees, teas, and homemade jams and jellies. While sweeteners in moderation are perfectly fine, diabetics or others managing their blood sugar

who want a little sweetness can go for the gift from their local forest and enjoy just a bit of maple syrup.

Not only does maple syrup taste great, it offers several health benefits. Maple syrup contains vitamins and minerals as well as antioxidants that regulate certain systems in your body. The antioxidant properties work to prevent diseases like cancer, but they can also aid in maintaining blood pressure. If any of these are concerns or are part of your family history, you might benefit from the many foods containing antioxidants, including nuts, berries, whole grains, and an array of colorful vegetables like carrots, sweet potatoes, and kale. If you look down at a plate of various colors, this is a good indicator that the food is nutrient rich. Fruits and vegetables develop coloring and textures based on if they grow above or below ground, how much water they need, and how their outer layer naturally protects them. For example, many foods growing underground, like carrots, or foods that have a thick layer like apples, are good indicators of high fiber content. The skins of apples are also packed with nutrients that assist the immune system and support bone health! Fruit also contains a lot of water; oranges or clementines, for example, are packed with water but also contain small fibrous parts. Regularly incorporating even one of these food types into your diet will provide some of the antioxidants that your body can utilize to maintain overall health and well-being.

There are a plethora of food options that incorporate maple syrup and contain various vitamins, minerals, and/or antioxidants. Two of the simpler recipes would be roasted root vegetables with a maple glaze or some maple baked beans. The amount of maple and cinnamon can be modified to fit your personal taste. Feel free to experiment and perhaps surprise yourself!

Mindfulness in Nature: A Weekly Observation Exercise

We don't need an expansive sugar bush, forest, or other environment to engage in an intimate relationship with the natural world. Just one tree in our yard or along a city street can provide a first step into a long relationship that transforms us and our planet. Find that tree or shrub. Make a daily visitation or a weekly one. Just be quiet and observe.

Name your nature friend and address it that way each time you meet. Tie a ribbon on one branch if you want to really focus your attention. Notice every subtle change. Use a journal to record your inner sensations and outer observations. Discover how you can tend to it regularly and spread some love: exchange your breath with it, provide a blanket of leaf mulch around its

base, or feed it compost tea. Bring it water when it has been dry. Paint a heart on its bark or hang hearts from its branches. Offer an underplanting of clover to attract pollinators, add nutrients to the soil, and open up the root area.

Rest in its shade to read or snack, give it a hug, climb into its canopy to escape the heat and busyness of the day. Soon you might find that you recognize your nature friend's relatives in other environments, that you want to pause and share a moment of appreciation, that you want to learn more about your friend and understand that world. That your nature friend has your heart—and that you have your friend's heart at the front of your attention, even when you are not together.

Growing Forests

Journey with the Sugar Maple Tree

When you think of Vermont, what do you think of? Maybe the beautiful green mountains or apple picking in the fall. What about maple syrup? The delicious sticky stuff that goes perfectly on

pancakes, waffles, oatmeal, in a creemee—the list goes on. Did you know that something this tasty actually comes from the sap of trees? Forests all over New England provide millions of gallons of maple syrup each year. Vermont alone makes *two million* gallons a year!

Let's take an imaginary yearlong journey into the sugar maple forest.

***Winter*:** It's winter and snow covers the ground. The sugar makers are getting ready for the sugaring season. They are chopping wood to use for their fires, checking to make sure their trees are healthy, and monitoring the weather so they know when it's warm enough to tap. The sugar maple trees look barren without any leaves, but there is plenty of life. Last summer the leaves made enough extra tree sugar, and it is now stored away in the root cellar. The trees are full of a substance called "sap." Sap is the stored energy the tree made to get through the winter. The energy was collected by green leaves during the summertime, when temperatures were high and the hours of sunlight were long. The sugar maple absorbed energy from the sun and turned it into sugars. These sugars, mixing now with melted snow water or rain sucked up by the roots, create the sap that flows throughout the tree. When a part of the tree needs energy, sap comes to the rescue! In the coldest parts of the winter, the sap is not moving through the tree. Sugar makers are ready yet must wait patiently until the temperatures are high enough for the sap to flow.

Spring: It's officially springtime when the spring Equinox arrives. Birds are already chirping and the days are getting longer even before the Equinox. Grasses and dead leaves are peeking out from the snow. We won't need our heavy winter jackets and snow boots. We need mud boots! Even trees need to prepare for spring. Food made from last year's mature leaves is not the right food for baby leaves. Spring snowmelt moves into the thawing soil and is mixed in the tree root cellar and added to last year's mature sap. Now is the time when the sugar makers do the most work. Late February to early March is time for collecting sap. Buckets need to be washed, the wood pile made ready, and the sugar maker decides which trees they will be drilling. They drill a tiny hole into the trunk of the tree and place a tool called a spile in that hole. The sap is running up the tree now to bring needed food to the tiny leaves encased in buds. Sap pressure pushes up and out of the spile. All of the stored tree sugars made during the growing seasons are now released into the sugar maker's bucket. Sugar makers collect some of this baby leaf sap and boil it down. Don't worry—there is plenty for the young leaves! Sap is part water and part sugar. By boiling the sap, it changes the water into steam, which then evaporates. What remains is the sugar we love—maple syrup.

Summer: Now it's summertime! Imagine you're walking through a sugar maple forest. You hear the breeze blowing through the leaves. The breeze opens the tree canopy full of leaves, and warm sunshine splashes across your cheek. The leaves are in a gathering mode, collecting and absorbing sunlight. This is the time of the year when all that energy is collected! Green leaves soak in the energy of the sun. This is part of a process called photosynthesis, which is basically what happens in a "leaf kitchen." Sunshine makes the sugar maple leaves turn green as the leaves make enough food to pass nutrients across all the leafy branches and even down to the roots.

Now imagine you're looking at your feet. You notice the roots of the tree peeking out of the soil. Beneath the soil, there are many more roots. They are gathering water and mineral nutrients from the soil so the tree can grow healthy and larger. This summer, the tree must gather all of the sunlight, water, and soil nutrients needed to grow leaves. Some of these nutrients will be stored in the sap so the tree will remain strong throughout the winter when the tree stops making food. When the tree leaves create more food than needed for its leaves, a watery substance called sap gets stored in the root cellar and used for energy next spring.

Fall: Hmmm, do you feel that cool chill in the autumn breeze? The days are getting shorter. There is less sunlight falling on the leaves. In the summer, the leaves were green, using sunlight to create energy and color. As there is less and less sunlight for them to harness, the green on the leaves fades and beautiful new shades of color appear—oranges to golden yellows. Vermont is famous for its beautiful fall season when maple sugar tree leaves turn gold and orange. When the leaves turn color, that's how you know the leaves are going to fall to the ground soon—maybe that's why we call this part of the year "fall!"

Although the leaves are no longer attached to the branches of the tree, they are still very helpful to the forest. The nutrients and energy that are stored in the leaf are still there when it falls to the ground. Eventually, these leaves will decompose, and compost, and return nutrients back to the soil and into the roots of the trees.

Imaginary Walkabout

Let's imagine we are taking a walk through a sugar maple forest. These forests are located in the northeast region of America and southern parts of Canada and can be found right here in Vermont!

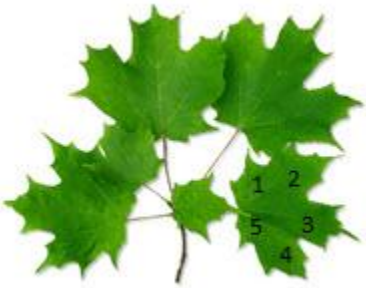
First let's look at the sugar maple leaf. In the spring and summer, they are green due to sunlight energy they use to make their own energy called tree sugar. When the days get shorter and the weather gets colder, the leaves are getting less energy from the sun. This causes the green color to fade, revealing this golden yellow or orange
shade. Does anyone remember all the leaves changing color this past fall?

https://fineartamerica.com/featured/sugar-maple-leaf-2-photopoint-art.html

Calling All Maple Investigators!

Can you help us identify maple leaves?

Depending on the season the color can be a good clue. In late winter when the sugaring season begins, you would have to look on the ground for fallen brown leaves. Maple trees in general will change color in the fall. In the summer and spring they are a green shade, darker on the top of the leaf and lighter on the side that faces the ground when on the branch.



Next, we can look at how they're shaped! The leaf is segmented into five "lobes." Lobes are the parts that stick out. Can you count the different lobes? There are three main ones and two that stick out the sides.

https://www.wikihow.com/Identify-Sugar-Maple-Trees

These lobes have spikey "teeth" on the edges. Can we see the spikey parts of each lobe? The unique shape of the leaves of a sugar maple make the tree easy to identify. Look at the area between the lobes. Do you see a "U" shape? That's the second letter in "sugar maple." Other maple trees have slightly different leaves. See if you can find any other maple leaves from a different variety and compare the distinctions.

https://www.flickr.com/photos/evelynfitzgerald/4171384377

Now let's zoom out and look at the bark. The bark of a sugar maple is dark with furrowed ridges.

https://www.michigan.gov/dnr/0,4570,7-350-79135_79218_79615_85483---,00.html

Here is a sugar maple twig. In the winter, when there are no leaves to identify, you can look for a twig like this to find a sugar maple! Twigs will have pointed buds and appear to have a tight scale pattern. The buds below the end bud are opposite each other. The bark on the buds will be a range of brown shades but always shiny and smooth in texture. What do you think you would find inside a bud case?

Here is what a sugar maple looks like in the fall. You might have seen one by your house, on a nature walk, or in a park. They are all around Vermont!

https://www.pinterest.nz/pin/479281585337965718/?amp_client_id=CLIENT_ID(_)&mweb_unauth_id=&simplified=true

Digging Deeper: Growing Forests

A Maple Journal

Locate a natural site nearby that you can visit daily over the course of three or four weeks. It can be in the forest, near your classroom, by the school garden, at the wilder edges of the school property, or at home. It can be amazing to observe even one branch with buds. Tie a ribbon on it to make sure you can readily identify it among those your friends have chosen to observe.

Make or bring a journal. Record the changes you observe:

* at the ground level
* temperatures in the air
* on the trunks of trees
* at the soil layer
* in the sky

Include movements of animals, flocking of birds, songs of spring, shadows cast at different hours of the day. Depending on the habitat you are observing, you might also add to your observations other details that you note in your home habitat if it is similar.
https://fineartamerica.com/featured/sugar-maple-leaf-2-photopoint-art.html

Create a calendar of the events leading up to the sugaring season's beginning and its end. (Hints: Canada geese flock north, snow fleas bounce on snow, robins flock and peck for worms, peepers sing in the nearby melted ponds, squirrels chew bark off maple branches, coltsfoot blooms, red maple trees bud out, no need for winter clothing, weather patterns, mud, mud, mud, etc.)

Learning from Nature: How Squirrel Taught Me about Maple's Goodness

The sun was shining, and Sister Squirrel woke as the warm rays took away the chill of the night. She fluffed her tail and peered out of her leafy nest cradled in the branch of the Old Tree. She chirped a greeting to the sun beaming down on her soft silvery coat. She was still resting and enjoying the morning air when bird songs began to echo into the waking day. Robin and Titmouse were discussing where to find something good to eat now that the snows had softened the waking spring earth. Both were happy that spring was here at last.

Squirrel stretched the sleep out of her limbs and felt a rumbling in her belly. It was time to go find some of the chewy autumn acorns she had buried so long ago beneath the leafy forest floor! She leapt out of her cozy nest and flung herself from branch to branch. The birds chirped and cheered her on—such an acrobat of the forest was she!

Spring was in the air, yet the branches were still bare—not a green leaf was to be seen. Squirrel began scratching and turning over little patches of brown soggy leaves. Sniff sniff sniff . . . did she smell a nutty acorn she was hoping to eat for breakfast? Sniff sniff sniff.

Hmmm. Something out of the ordinary caught Squirrel's eye. There were the usual mossy pillows here and there. And there stood the tree family reaching their branches across the forest—stretching upward so high that they nearly touched the blue morning sky filled with fluffy clouds. Beams of light from the sun wove between each tree like ribbons of brightness that made the forest look like a place of great magic. Sister Squirrel continued to sniff and push and prod away the softening earth, until lo and behold she plucked out a tasty nut made by her favorite acorn-making trees, the Great Oaks. Crickety crack! In no time Sister Squirrel opened the delicious treasure box with her teeth and nibbled out the tasty pulp. This went on and on—until her belly stopped rumbling at last.

“This would be a fine time to explore the nature neighborhood,” thought Sister Squirrel. So off she went enjoying her tree flying acrobatics, flinging over the branches. Soon she came to the edge of the Great Oak forest where she stopped to look across at the neighboring farm. The sun was barely risen in the sky, so it was hardly bright yet. Squirrel scrunched her eyes and peered out. What were those mysterious sounds? Could it be that spring had called all the birds from the south and they filled the treetops? Squirrel scrunched her eyes again and listened, for she thought she had just woken up from her long winter nap. How could spring have come so fast? She crept a little closer on her quiet feet. Wonderful sounds were not coming from the treetops. They came from the barnyard. Little babies called for their mothers and mothers called back. A barn was no place for a squirrel, so Squirrel carefully crept away far past the symphony of young lambs and cows and chicks.

Sister Squirrel hurried until she finally arrived at the sheltering thickness of a neighboring forest. It was filled with trees quite different from the Great Oaks she loved so well. She was thirsty from all this scurrying and looked about for a clean puddle of freshly melted snow. The forest floor was nearly bare of its winter blanket. Soft mossy emerald pillows greeted her and felt comforting beneath her feet. Yet she could not find any snow puddle to ease her thirst. She scampered up a great tree to look for one out into the distance. No puddles there. “The Great Oak forest would surely have some snow puddles,” she thought. She looked out to see how to find her way home. It was far and her thirst was great, but her tummy was rumbling again after all her adventures. “I will just settle down for a short while to chew on some bark until I get home.” So Squirrel started to nibble a bit here and there. The tree bark was old and hard and dry as a bone. Not much to ease her thirst and certainly not as rewarding as an acorn, not even as tasty as an old one that had been buried all winter long. Squirrel leapt to taste another tree when—crickety crack! The branch she landed on bent beneath her weight! She clung on for dear life as she dangled suspended way above the ground. Squirrel held fast with her little paws. When the branch stopped shaking, she began to pull herself safely upward toward the

elbow of the branch where it was fastened to the trunk of the tree. As Squirrel carefully clung on, she felt a drip drip dripping beneath her paws. This was no time to get wet and slip off the dangling branch! So Squirrel started to carefully lick her paws clean as she climbed slowly higher. Mmmm, such a tasty delight. Squirrel did not seem to mind the drippy mess after all. Actually she turned back and enjoyed the drip drip drippiness on the branch. Her tongue did not stop moving as she circled round the skinny branch, round and round and round and round, until she had gathered up each yummy drop. “This is such a sweet forest!” smiled Squirrel. “Different from the Great Oak forest of home.”

Squirrel did not know what to make of it, but she was ready to get home in time for a nap in the safety of her leafy nest. When she finally found her way back home to the Great Oak forest she climbed into the crunchy softness of her dry leafy bed. As she began dozing off to sleep, she began reliving the adventures of her magical day. “What were all those songs in the barnyard and the meadow? And what was that delicious drip drip drippiness?” She curled her tail around herself like a blanket as she wondered and drifted off to sleep.

Squirrel returned to the forest each day after waking. When she returned on a very cold day she noticed where she had chewed off chunks of bark on the warm day before, frozen icicles now clung to the branch. These icy delights were deliciously and refreshingly sweet to lick. When she returned on warmer days, what do you suppose she found? The sweet waters drip, drip, dripped onto the blanket of leaves and made a song as they watered the forest floor. If Squirrel waited below with her mouth open she could try to catch sweet drips on her tongue. Some days she was rained on by the drips and had to lick her furry coat clean of the sticky sweetness. But most of all she enjoyed dangling from the branch where she had chewed away the bark and did her acrobatics while sipping away at the waters of the forest.

Now it’s your turn to get out and wander a forest if you want to share in the delights revealed through Sister Squirrel’s tradition of supping the first wild food of the season.

Photos by JoAnne Denne

Ants are Soil and Forest Heroes!

When you think about ants, what are your impressions? Share a time that you had an experience with an ant or ants. Write down all the impressions shared by the group and talk about what you might have discovered about ants.

Now here is something that might surprise you about ants! Did you know that ants play the most important role in the forest? The ants tunnel into fallen trees, leaves, and beneath the earth into the decomposing world below. Ants help the decomposing process by delivering a bodily fluid into the materials being broken down. This bodily fluid even prevents molds and mildews from forming!

Ants breathe in what the forest exhales and the forest breathes in what the ants exhale. Does this sound like when we breathe out we benefit the forest? And that we benefit when the forest cleans the air for us? Wow.

The ants are stewards of the forest ecosystem and in their tunneling they turn and aerate the soils and decompose forest trees and leaves. This aids in the decomposition process that generates a cycle of life out of what is dying away.

Talk about your impressions about ants once again. What have you discovered about ant attitudes?

Looking Ahead to Photosynthesis in the Spring

We know that we get energy from eating food. We know that plants create their own energy from the sun. How do they do that? Let's take a look at how the sugar maple creates energy from sunlight.

Green plants perform a process called photosynthesis to convert sunlight, the carbon dioxide we breathe out, and water into energy and oxygen. In other words, plants use the energy from the sun to create food for themselves.

Have you ever wondered why most leaves and other plants are green? Well that's because they have a substance called chlorophyll. Chlorophyll is the part of the leaf that absorbs sunlight and begins the process of photosynthesis. The captured sunlight combines with water gathered by the roots and carbon dioxide taken from the air to create sugars and oxygen. The oxygen is released back into the atmosphere, while the plant holds on to the sugars. Some of the sugars are used immediately, while some are saved for later.

The sugars created in the sugar maple are called sap. When the hours of the day are long, the sugar maple is using sunlight and water to create as much sap (tree sugar) as it can. When the seasons change and sunlight is reduced, such as when sugar maple leaves are no longer green, the excess sap is stored and used by the tree as reserved energy. The trunk and branches of the tree have straw-like structures inside. They are called xylem (zai-luhm) and phloem (fl0w-em). Can you say that? When a part of the tree needs more energy, the xylem and phloem push the sap to the area in need.

Ants: Soil Heroes

Can it be possible that one of the tiniest creatures is one of the most important in the maple sugar bush? What do you think is the tiniest creature in a forest?

Ants play a significant role by tunneling underneath tree roots into the "black gold" soil formed by broken-down leaves decomposing for years and years before you were born. A substance exuded from a tiny ant's body actually prevents this deep underworld of rot and dampness from becoming moldy or full of mildew! Have you even smelled or examined a handful of forest earth? The scent is crisp and fresh just like the winter air. Enjoy a handful of the ant world's handwork the next time you are in a sugar bush after the earth has warmed at the end of the sugaring season. You will be amazed that this soil does not look the same as that of your backyard or school grounds. Give thanks to the ant world, mighty makers of life, and perhaps you will step lightly around an ant the next time you come across one.

The Sugar Bush That Mothers Us

Crunching across the leaf litter in a maple forest in early spring is a delightful way to explore the ecological wonders that reside within it. Today we are going to explore the majesty and wonder of the maple forest—a place with which we Vermonters and people of the northeastern United States and Canada are very familiar. It is a

significant source of pleasure, discovery, food, timber, tourism, and ecological importance that has been protected and enjoyed for generations, beginning with the original inhabitants, the Abenaki.

Some evidence of the interdependent community will be hidden, others revealed—acorns, wildflowers, walnuts, pine cones, moths, owls, woodpeckers, ants, beetles, mushrooms, moss, lichen, vernal pools, wild ramps, fiddleheads, snakes, bees, chipmunk, squirrel, skunk, mouse, bear, deer, porcupine, ticks, and more . . . all are sheltering as a community in this powerfully dynamic habitat.

During our forest rambling we might come across some very old mother trees. Mother trees are known to provide sustenance to the younger generation, actually delivering nutrients through their root system! Mother trees care for the more vulnerable trees. In some ways we might liken this to a mother and infant relationship. A community of maple trees mingles with various other species—perhaps birch, beech, oak, and pine. A fascinating recent discovery tells us that tree species support other species—not just their own! (See the Bibliography for more about this.) That means that maple, birch, beech, and pine could all "give away" and tend to each other. Food sharing and information sharing, such as when an insect or disease is entering the habitat, is communicated through a sophisticated underground mycelium network that stretches for miles and miles. The maple forest gives away life in a myriad of forms, serving innumerable invisible creatures entwined in hundreds of miles of forest root system and even ascending up into the forest canopy. No matter how hidden or distant, each forest organism is at work servicing the other in an integrated, harmonious exchange of resources.

Let's look at different ways the sugar maple supports other organisms. We already know that humans, when gifted with tree sap, make maple syrup. That is just the beginning! Sugar maple forests also provide food and shelter for many other creatures that live within them. These trees provide food and shelter for mammals and insects and are essential in the breeding of many birds. Let's look at some examples of how sugar maples interact with other wildlife.

The white-tailed deer consumes the leaves and twigs of the sugar maple in the winter. In the state of New York, it is estimated that sugar maple consists of 25-50% of their diet! Can you think of a time when you saw deer tracks in the snow? They may have been left by a white-tailed deer on its way to its next meal.

There are only ten tree species that the porcupine eats, and the sugar maple is one of them! The sugar maple also provides between 25-50% of the porcupine's diet. They mostly eat the bark and upper stems of the tree. Porcupines are amazing tree climbers and can very quickly ascend and perch in the branches to escape a predator.

Moose and snowshoe hares munch on the foliage and twigs of the sugar maple, while red squirrels, gray squirrels, and chipmunks consume the leaves, seeds, buds, and twigs. Do you remember the story that suggests the Abenaki people might have discovered maple sap by observing squirrels chewing on maple twigs? Look for it in the Resource section located in the Bibliography.

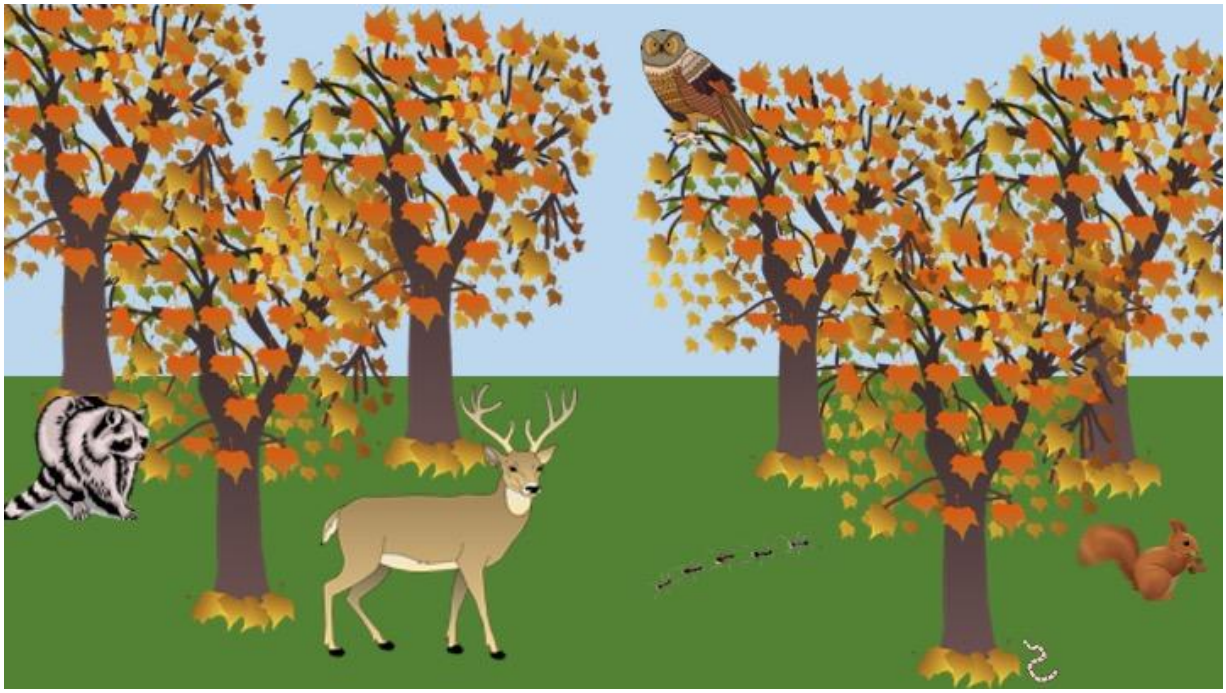
The American goldfinch eats the seeds, buds, and flowers of the sugar maple, while the black-capped chickadee relies on the sugar maple for a cavity in which to build a nest. For several species, including mourning warbler, brown creeper, and hairy woodpecker, the sugar maple is the desired tree to forage for insects. Some birds also use the twigs for their nests. Next time you see a sugar maple, see if you can find a bird resting on its branches. Does it look like it is foraging for insects? Eating seeds? What about building a nest?

Biodiversity In The Sugar Bush

The sugar bush is home to many different organisms aside from sugar maples! What animals do you think you might come across while exploring a sugar maple forest?

You might see a squirrel or bird hopping from branch to branch. Possibly a raccoon or white-tailed deer wandering around the forest floor. If you look down, you will possibly see ants or maybe even an earthworm. These species, all very different, have one major thing in common: they rely on the existence of each other in order to

survive! Looking at this graphic, how might the organisms shown help each other survive?



By Anna Brown

Let's start in the soil. A strong sugar maple begins as a tiny seed and relies on sunshine, water, and healthy soil in order to grow big. Earthworms, which fall under the classification of decomposers, live in the soil. When leaves fall off a tree, or a plant or animal dies, the worms break down those once living organisms. They break them down into nutrients that plants, such as the sugar maple, use to grow. Worms also are food for many birds. In the graphic below, you can see an earthworm and one of its predators, the owl!

Owls, along with many other birds (more information in "Birds of the Sugar Bush" section), rely on eating insects like the earthworm for food. They also rely on the sugar maple for a variety of reasons. Some eat buds and the bark of the trees. Some build homes in their branches.

Squirrels also use the trees of the sugar maple for many things. They jump from branch to branch to avoid predators, eat maple tree seeds, and use twigs and leaves for building nests.

Lastly, we have raccoons. These clever creatures are also found in the sugar bush. They sometimes live in hollowed-out trees, where they create a den for shelter. Raccoons eat a wide variety of foods; they will eat small mammals like birds, insects, fruits, wild grains, and even dead animals.

Can you think of any other ways the organisms of the sugar bush help each other? Sugar maple forests, just like every other ecosystem, have many living things that rely on each other. These communities of plants, animals, fungi, etc., keep each other in balance to thrive. Now we know that while the sugar maple is the star of the sugar bush, there are many other key players that keep the forest functioning!

Ages 8-12

Biodiversity In The Sugar Bush: The Birds Of The Bush

Here are some birds you might find in the sugar bush. In order, they are the black-throated blue warbler, the wood thrush, the scarlet tanager, and the eastern wood-pewee.

https://ny.audubon.org/conservation/bird-friendly-maple

Humans aren't the only ones who depend on sugar bushes. We need them for maple sap, while other living things need them for different functions. These birds, along with many other species, depend on the sugar bush for space to breed, nest, and obtain food. When managing a sugar bush, it is important to keep creatures that live in these forests in mind.

There are a few key characteristics when analyzing if a sugar bush is a bird-friendly habitat. It is important that there is a diversity of tree species and ages. Biodiversity is a measure of the variety of life in a particular ecosystem or area. The higher the level of biodiversity, the higher the resilience of the forest. We want lots of trees, both young and old, so that the forest is able to handle natural disturbances and so a variety of animals can get what they need.

Complex structural diversity is also important. A forest that is fit to support various types of life will have tall trees creating a vast canopy, while also plenty of shrubs, saplings, and vegetation covering the forest floor. Different animals need different things. A bird might need branches

high in the sky, while a deer might need shrubs it can reach, and worms in the soil need vegetation growing out of the soil.

A strong sugar bush also has areas animals can use for shelter. Whether standing dead trees or large trees with cavities, it is important for smaller animals to have areas they can use to protect themselves from the elements.

Pictured to the right is a hermit thrush, the official state bird of Vermont!

https://www.allaboutbirds.org/guide/Hermit_Thrush/id

Sugar maple is the tree behind the sweetness of maple syrup, but it has a wider array of benefits for people, including lumber and scrap wood for musical instruments and bowling pins. Its range covers most of the eastern United States and Canada, making it a common urban and suburban species. And because of its dominant presence in forests, the species harbors numerous insects (native and invasive), squirrels, and cavity-nesting birds.

Here is a link to the Cornell Lab of Ornithology's "All About Birds" website. This resource is an online bird guide that helps identify many species native to North America, as well as lets us hear bird sounds and learn about their history. See what birds you can find that are native to Vermont!

Why Ants are the Backbone of Forests

Did you know that ants play a most important role in the forest?

They provide the formic acid that is the sole source of life to thrive and reproduce itself through the setting of seed. Formic acid can be considered a "mother acid" that supports an entire food chain. In the forest the ants tunnel into fallen trees and leaves and beneath the earth into the decomposing world below. Since they create more formic acid than they need, they deliver their venom of formic acid into the decomposing materials and help steer that process in a most beneficial way, even preventing molds and mildews from forming.

What happens when forests are overharvested and disappear? We lose the service of these insects. Not only do we lose those trees that were sequestering carbon but we suffer from an absence of the mother acid distributed by the ant world through the atmosphere that would additionally have supported distant forest ecosystems. Our world's rainforests are home to a large share of ants. They contribute a great part of the volume of atmosphere enhanced with mother acids, and the rains and moisture that move with our weather patterns deliver this across the globe.

Discuss how this information might have changed your impressions about ants.

Climate Change's Effect on the Maple Process

Maple syrup is an important part of northeastern state culture and economies. The tradition of tapping and boiling down sugar maple tree sap is one that precedes the creation of US state territories. Today, as the global temperature increases, sugar maple forests are experiencing significant ecological change that will pose a threat to this beloved practice.

Sugar maple sap is collected after a freeze-thaw process that occurs between late February and mid March. As temperatures rise, this freeze-thaw activity is occurring earlier and earlier in the year. For the southernmost sugaring areas, this process might not even occur if temperatures never reach below freezing. Some ecologists anticipate sugar maples will migrate north and establish themselves in a more suitable climate. However, soil composition and regional fungi may prohibit these trees from flourishing. The bottom line is that the population of sugar maples available for sap harvesting is diminishing.

There is also concern over the health of sugar maple trees in an increasing climate temperature. Reduced snowpack may lead to decreased tree shoot growth and root stability.

Deepening Our Common Roots

A Maple Citizen Action Group

Organize a citizen action group to do research, educate, and protect the sugar bush.
How can we nurture healthy maple forests and assure future generations that they too will receive the gifts of the sugar bush? What individual action can be done to spread awareness of this issue? How can we convey the importance of maintaining a stable climate for future generations?

The Tree That Made Vermont: From Maple Sap to Syrup

Vermont makes more maple syrup than any state in the whole country and ships it all over, sharing the sweetness of our home with others who live _____ (invite answers about where relatives live).

What do we already know about maple syrup? Maple syrup comes from sugar maple trees. The sap that we collect for syrup is used by the tree to transport specialized tree sugars, nutrients (minerals), and water. Tree sugar is made in the leaves through the absorption of sunshine, water, and carbon dioxide. When combined, these components result in energy, sugar, and the release of oxygen! The sap that is created is brought down to anywhere the tree needs energy (to create seeds, to bud leaves, or to store in its roots for winter). That sap is flowing through the tree's body when the days are warm (around 40-45 degrees Fahrenheit) and the nights are cold (below freezing), and when we put a hole into the tree, the sap drips out. We collect the sap and boil it down (in sugarhouses or outdoors at home). Sap is made of water and sugar made by leaves through a process called photosynthesis. When sap boils, the water separates and evaporates as steam, leaving behind just the sugary part, which is now sticky and sweeter.

Trees: A Breathing Partnership

When you take a breath of air, your body is breathing in oxygen. When you breathe out, you exhale carbon dioxide. Human beings and animals rely on plants to live. Without organisms

performing photosynthesis, which is plants converting sunlight and carbon dioxide into energy and oxygen, we would have no oxygen to take in. Next time you see a tree, shrub, or even grass, think about how it is helping you, and everyone else, receive fresh air. It's an amazing reciprocal process! Plants take in the carbon dioxide we need to expel and release oxygen we need to breathe in.

Next time you are outdoors, perhaps you could practice some mindful breathing near a tree. Do you feel any difference when doing this practice with awareness?

https://shop.arborday.org/sugar-maple

Practicing Reciprocity: A Maple Exchange

How do maple trees provide for us? Maple trees care for us in many ways, feeding us sweet nutrients and providing the firewood to keep warm and to cook our meals. Maple's canopy provides beauty and shade and attracts birds who sweetly sing. Maple wood is hard and can be made into spoons, spatulas, fine furniture, and floors.

What can we do to care for maple trees? We can make compost tea from our school compost pile and water the maples underneath the expansive dripline of their tree canopy.

To do this, you will need a large kitchen or trash receptacle. Here are the steps:

* Find a place to locate the receptacle where it can steep in the sunshine.
* Fill it with water and let it sit in the sun or simply release any chlorine overnight.
* Add a gallon of fine decomposed compost to the receptacle.
* Let the compost steep for a couple of weeks.
* Apply the tea and compost solution from the outer dripline of the tree to its trunk.

* Spend some time reflecting on this practice of caretaking, sometimes called stewardship or an act of reciprocity.

What else can you do throughout the year to provide care for the trees that give you what you need?

Reconnecting With The Earth

It is hard to care about things or ideas that we have no connection to. It can be easy to forget how significant something is when you feel detached from it. One of the most profound experiences many experience is that "ah-ha" moment when they finally connect with some aspect of nature. Maybe that moment comes after seeing the ocean for the first time, being alone in the forest and embracing the natural world, walking through the sugar bush as the aroma of the sugarhouse wafts through the air, or taking the time to acknowledge the songs of the birds that serenade your neighborhood forest. Whatever sparks this connection has the potential to start something amazing. Having a connection to nature can develop a feeling of responsibility to protect it. We witness human practices altering the homes of essential ecosystems every day. It is easy to be passive as the natural world is facing new challenges on a larger scale. If every human experienced a strong connection to nature rather than a distant one, might we all become environmentally active? How might this change our climate and our human condition? It's never too late to step up instead of standing by!

One Tree, One Tap, One Community

The maple syrup harvest is a time for celebration, family, and the gathering of the community. Back in the fall of 2020, a few UVM graduates and their friends were brainstorming about what they could do to gather the community together safely. After brainstorming they thought, why not share our love and knowledge of the forest with the rest of Burlington? This group of Vermonters took what they knew about collecting maple syrup and put an urban twist on it by identifying maple trees around Burlington. They found there were trees that may have never been tapped before on Battery Street and at the Lakeview Cemetery, and they began to spread the word. The team was surprised to hear from so many community members who wanted to learn more about how to tap maple trees in their own backyard and who wanted to volunteer to help! Anyone interested was able to pick up a bucket and tap from the group, which became known as Tap O.N.E.

"Let's make Burlington a bit more wild again!"

What's Next For Tap O.N.E.?

Who knew? One tree is all it takes to bring a group of people together to make our connection with the land and with other people. The team at Tap O.N.E. created a name that encompases this revolutionary idea that people only need to tap one tree, whether it's in your backyard or in a park in downtown Burlington. You don't need an entire sugar forest, just one tree and a group of people coming together to feed the community. It only takes one tree to provide a home for critters, to root the ground in place, to act as shade on a hot day, to protect us from the high winds coming off Lake Champlain.

The trees also bring people together, and what Tap O.N.E. would like to spread is a love for the trees and perhaps a desire to give back! As we have taken from the trees, we too have an opportunity to provide our gratitude toward the tree for giving us many gifts. The community members of Tap O.N.E., hope to make Burlington a bit more wild again by introducing native plants and pollinators to the area around the trees. They would like to create a circle around each tree that lets people know it's a maple, acts as protection, and prevents the leaves from blowing away as easily so they can act as fertilizer. This will all be made possible in collaboration with the Burlington Parks Department, which will support Tap O.N.E. to begin this project in the fall. Look around this coming year for new growth in Burlington, and take the opportunity to learn about the native plants in the area so that you can bring some wild to your own home.

This Is Your Call to Action

Challenge yourself and others to get out into nature more. Pay attention to the birds in the sky. Appreciate the shade of a tree. Take note of the smell of fresh vegetation. Make an effort to find what part of nature you feel connected to. If you already have that protective feeling over the natural world, encourage a friend or family member to find their relationship with it. With respect, positivity, and openness, we can connect people to the ecosystem and promote environmental activism.

Cultural and Historical Background

Maple Syrup! An Essential Food In Vermont's Culture

The process of collecting sap and boiling it down into syrup has been a tradition for many years and brings Vermonters together for a sense of community. Did you know that the first sugar makers were the Abenaki (Ah ben' a kee' is the Algonquian pronunciation) mothers, grandmothers and children? Their living knowledge became a sacred tradition passed down through word of mouth, even today. Today, neighbors, friends, and family all gather in the sugar bush tapping and hauling buckets full of sap to sugarhouses, tasting the sweet gift from the maple trees, and taking turns keeping the fire stoked. Even draft horses continue to play an important role in the sap-gathering traditions. This process has changed a lot over the years (sap is often collected by pumps these days, and fires are stoked by gas), but the end result is always the sweet taste of Vermont.

Sugar maple trees are native Vermonters (they've been here before this place was called "Vermont"). Abenaki people, also native to this place, named our state Ndakinna before we changed it to Vermont and likely learned to seek sugar maple's sap by noticing the squirrels eat it. As settlers from Europe joined the Vermont community, they were taught about harvesting the gift from the sugar maples by the Abenaki people.

The Abenaki name for tree sap is **"wskidakuam"** (pronounced whs' kee dah'koo uahm). Can you say that?

"Zinzibuckwut" is the Algonquian word the New York tribes use. *Can you say that?*

Technology in Sugaring Through the Ages
The First Sugarers: The Abenaki

Maple syrup has been created by humans in Vermont before this land was called Vermont! Long ago, before Europeans had colonized this state, the Abenaki people discovered the potential of a sugar maple tree's sap. The women were the sap harvesters. A tomahawk was used to cut a V shape into the bark of the sugar maple. A bark or wooden spile was wedged at the bottom of the cut to serve as a channel. Sap would then flow into birch baskets that were created by folding a simple reusable bark vessel. These paper thin birch container baskets were placed at the bottom of the tree for collection. When the sap containers were full they were left to freeze. The sap container would be opened and the ice removed. The remaining tree sap would then be poured into a clay pot and placed near or over a fire. The sap would slowly boil away until thick syrup was made.

https://vermonthistoryexplorer.org/vermont-state-tree#gallery

Remembering Where Maple Syrup Making Began

When we imagine sugar makers, the image in our minds (and on the logo of many syrup bottles) is a lumberjack wearing tall boots, in a red flannel, with a log cabin in the background. What is missing, however, is the origin story behind the first sugar makers of Vermont. Someone who is able to provide counsel on maple syrup's history as it relates to native tradition is Alexander Cotnoir, a citizen of the Nulhegan Band of the Coosuk Abenaki Nation. Alexander wrote an article that provides a voice for Vermont's Indigenous Abenaki people, who were the first to perfect maple sugaring before teaching Europeans how to replicate the process. The Abenaki people are a Native American Algonquian-speaking people who live in Canada, Vermont, New Hampshire, and upstate New York. They are also referred to as Wabanaki. With the influx of European nations into the US, a lot of their stories and traditions became lost, but people like Alexander are reviving those stories.

"Native American women

were the leaders of the operation."

Traditionally the Abenaki followed a "multi-step process for collecting and condensing sugar maple sap into sweeteners" that was passed down orally, through generations. Eventually, when their system was documented, it was discovered that women ran the maple syrup operation of collecting and boiling. Women were the "leaders of the operation . . . they ran the sugarbushes, made and repaired the baskets, and boiled the sap" (Cotnoir, 2021). They would collect the sap through a wooden spile that would drip down into a clay or woven birch bark basket, called a maskwaijo. While sap would run, the basket was actually left to freeze and the frozen ice at the top would be chipped away so that minimal water would be in the sap before the boiling process began. The sugar makers would pour the sap into clay pots that were placed on top of coals or hung above a fire to boil. But the process did not stop there!

Sugar makers would pour the syrup into different pots as it started to thicken, and most would actually make maple sugar, because preserving syrup was a bit more difficult. They used maple sugar to season meats, fruits, and vegetables, or if they made syrup, or mkwakbaga (red water) as the Abenaki would refer to it, they would consume it shortly after the harvest. Today, native peoples are still using similar methods, as the maple sugaring process is tried and true. Although methods have slightly changed, Alexander reminds us that "sugaring still functions as a time for our community members to gather and connect with the woods and one another." We owe this tradition and gathering practice to the Abenaki people, who have shared with us their extensive knowledge of the forest. Harvesting maple syrup is much more than a simple commodity; it brings people together to celebrate our connection to the land.

European Colonizers

When the Europeans came to the land of the Abenaki, they learned many of the Natives' customs. This included the process of sugar making! Instead of using a wedge, they drilled holes with augers.

https://commons.wikimedia.org/wiki/File:Une_érablière_(1872)_par_Allan_Edson.jpg

Then they would insert wooden spouts into those holes and hang buckets from the spouts to collect the sap. To carry large buckets of sap, they used draft animals to carry the sap back to the sugar shack, where it would then be boiled down into syrup.

The 1800s

There was significant technological development in the 1800s for maple syrup making. In 1850, large flat metal pans became available, which allowed more sap to be boiled over the fire at once. In the late 1800s, two-pan evaporators were introduced, which decreased the duration of the evaporation process even more.

The 1900s

In the 1900s, plastic bags replaced buckets, tractors replaced draft animals, and producers would occasionally use motor-powered tappers and metal tubing systems. Filtration systems were also introduced to create a purer product. Also, the options for sources of heat for boiling increased. Now, sugar makers could choose between oil, natural gas, propane, and steam as opposed to only using wood.

JoAnne Dennee

The Modern Era

Technological advances in sugar making were abundant throughout the 20th century. By the 1970s, vacuum pumps became available to move sap through plastic tubing systems from the trees to the sugar shack. Reverse osmosis also became popular to remove water from the sap before boiling occured. Containers became larger to increase sap-holding capacity and efficiency, and pre-heaters were invented to reduce heat loss.


https://www.nytimes.com/slideshow/2013/03/31/us/20130331-SYRUP/s/20130331-SYRUP-slide-UVOV.html

As we can see, humans have made many adjustments to the original ways of the Abenaki people. Technological advancement increased efficiency tremendously, yet there are fewer natural products used in the process. How might the flavor be changed? How are worn materials disposed of? How do different sugaring fuels impact the environment? What packaging is preferred when considering environmental factors? When we enjoy syrup made with modern-day technology and processes and look back to the original methods that made this delicacy such a cultural staple, what are our questions and what are our appreciations for this tradition?

Gratitude for Trees: Mindful Breathing

There is power in taking a deep breath. Mindful breathing, which means focusing on one's inhaling and exhaling, can be used as a strategy to reduce anxiety, sadness, or anger. These emotions can significantly impact our ability to pay attention or make decisions. Taking a moment to detach from what is causing these thoughts and focusing on the present can improve one's mental state significantly. It is an act that can be as simple as taking a deep breath in for three counts and letting a breath out for four. You can set an intention, such as to decrease heart rate or relieve stress, or it can just be done as part of a daily practice of mindfulness. With practice comes effectiveness. By taking a moment every day, or even every week, to unwind and focus on breathing, it will become easier and easier to tap into this state.

https://www.nytimes.com/slideshow/2013/03/31/us/20130331-SYRUP/s/20130331-SYRUP-slide-UVOV.html

One could think about the magic that is our role in the web of life. Isn't it amazing that what we breathe in, oxygen, is produced by the plants around us? Whether from the trees in a national park, a shrub in a front yard, or a houseplant, these organisms are giving us an essential component to life. Even more fascinating, this process is an *exchange* between us (and all animals) and plants! Plants rely on animals to exhale carbon dioxide, a gas that has no use to us but is essential in plants performing photosynthesis. There is a cycle of us breathing in the oxygen released by the plants and the plants taking in the carbon dioxide we breathe out. When breathing mindfully, see if there is a plant in eyesight. Thinking about this amazing interdependence is humbling as well as grounding. We are just one piece in this large web of life.

Additional Resources

This resource provides an additional video with stories from Abenaki tribal members. https://abenakitribe.org/maple-syrup

References

Health and Wellness:

Kühn, Simone, et al. "In Search of Features That Constitute an 'Enriched Environment' in Humans: Associations between Geographical Properties and Brain Structure." *Nature News*, Nature Publishing Group, 20 Sept. 2017, www.nature.com/articles/s41598-017-12046-7

Li, Q. (2018, May 1). *'Forest Bathing' Is Great for Your Health. Here's How to Do It.* Time. https://time.com/5259602/japanese-forest-bathing/

Mindful Breathing (Greater Good in Action). (n.d.). Greater Good in Action. https://ggia.berkeley.edu/practice/mindful_breathing

Zero Waste:

Maggie. “Milk Jug Bird Feeder.” *ThriftyFun*, 5 Oct. 2007, www.thriftyfun.com/tf/Craft_Projects/Garden_and_Yard/Bird_Feeders/Milk-Jug-Bird-Feeder.html .

Digging Deeper:

A collaborative conservation project that aims to sweeten sugarbush habitat for songbirds. (2020, May 29). Audubon New York. https://ny.audubon.org/conservation/bird-friendly-maple

“Raccoon.” *Raccoon | Vermont Fish & Wildlife Department*, 2021, vtfishandwildlife.com/learn-more/vermont-critters/mammals/raccoon.

“Sugar Maple: Acer Saccharum.” *UWL Website*, 2010, bioweb.uwlax.edu/bio203/2010/schoenfu_aman/interactions.htm.

Zabel, I. (2020, March 13). *Sugar Maples and Climate Change*. Paleontological Research Institution. https://www.priweb.org/science-education-programs-and-resources/sugar-maples-and-climate-change

Growing Forests:

Curriculum - Seasons of Maple. (2017, June 26). Massachusetts Maple Producers Association. https://www.massmaple.org/curriculum-seasons-maple/

Sugar Maple Leaf 2 by Bj S. (n.d.). Fine Art America. Retrieved June 1, 2021, from https://fineartamerica.com/featured/sugar-maple-leaf-2-photopoint-art.html

Dennee, JoAnne. “How Squirrel Taught Me about Maple’s Goodness.” (2021)

Shaw, M.F et al. Photo-tautomerization of acetaldehyde as a photochemical source of formic acid in the troposphere (2018) Nature Communications

Tap Tree. (2017, August 23). Tap My Trees - Maple Sugaring for the Hobbyist - Maple Syrup Products. https://tapmytrees.com/tap-tree/

(129) Pinterest. (n.d.). Pinterest. Retrieved June 8, 2021, from https://www.pinterest.nz/pin/479281585337965718/?amp_client_id=CLIENT_ID(_)&mweb_unauth_id=&simplified=true

Trees of the Adirondacks: Sugar Maple | Acer saccharum. (n.d.). Adirondacks Forever Wild. https://wildadirondacks.org/trees-of-the-adirondacks-sugar-maple-acer-saccharum-Marshall.html

Tuchman, Alex. Formic Acid: The Gift of the Stinging Insects Part 1 and Part 2, Stella Natura 2021

wikiHow. (2020, October 8). *How to Identify Sugar Maple Trees*. https://www.wikihow.com/Identify-Sugar-Maple-Trees

The Hidden Life of Trees by Peter Wohlleben, Greystone Books 2015

greening), V. (Latin for. (2009). Acer saccharum—Sugar Maple summer leaves [Photo]. https://www.flickr.com/photos/evelynfitzgerald/4171384377/

"How do I Tap a Maple Tree?" https://www.youtube.com/watch?v=o6B_5Qz_gpc

Jonathan. "24 Practical Uses for Plastic Jugs." *BottleStore.com Blog*, blog.bottlestore.com/24-practical-uses-for-plastic-jugs/.

"Online Bird Guide, Bird ID Help, Life History, Bird Sounds from Cornell." *All About Birds*, The Cornell Lab, www.allaboutbirds.org/news/?__hstc=161696355.a6ed218f0cb05d8d171a62e0c24ea3c7.1618869946942.1618869946942.1618869946942.1&__hssc=161696355.1.1618869946942&__hsfp=2628098124#/_ga=2.198897386.45054802.1618869946-1892451708.1618869946.

Deepening Our Common Roots:

Sugar Maple. (n.d.). Arbor Day Foundation. Retrieved June 1, 2021, from https://shop.arborday.org/sugar-maple

Poleman, M. (2021, April 6) Personal Interview.

Identifying a Maple Tree – Tap O.N.E. (n.d.). Retrieved April 12, 2021, from https://tapone.org/?page_id=116

Cultural and Historical Background:

The History of Maple Syrup. (2020, June 4). Maple Valley Cooperative. https://maplevalleysyrup.coop/the-history-of-maple-syrup/

Sugaring in Wabanahkik (Land of the Dawn). (2021, March 15). Audubon Vermont. https://vt.audubon.org/news/sugaring-wabanahkik-land-dawn

Sugar Maple. (n.d.). Vermont History Explorer. Retrieved June 1, 2021, from https://vermonthistoryexplorer.org/https://vermonthistoryexplorer.org/vermont-state-tree

Edson, A. (1872). Français: « Une érablière » par Allan Edson, gravure tirée de L'opinion publique, Vol. 3, no. 20, pp. 234 (16 mai 1872). L'opinion publique (périodique publié à Montréal de 1870 à 1883), Vol. 3, no. 20, pp. 234. https://commons.wikimedia.org/wiki/File:Une_%C3%A9rabli%C3%A8re_(1872)_par_Allan_Edson.jpg

Maple Syrup Takes Turn Toward Technology. (2013, March 30). The New York Times. https://www.nytimes.com/slideshow/2013/03/31/us/20130331-SYRUP.html

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