

# Future Generations University

## Adding Farm Value to Appalachia's Riparian Buffers: Preserving Existing Sycamore Trees

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## Introduction

While maple syrup is internationally famous, it is not the only tappable sap producing tree. The American sycamore (*Plantanus occidentalis*) is a diffuse porous hardwood that produces a sugary sap that can be turned into syrup. Sycamores go through the same process in early spring as maples to get ready for the next growth season. This internal process creates the positive pressure that pushes sweet sap out of the tree and into collection systems such as buckets or sap bags. With a different flavor profile and price point, sycamore syrup production can be a viable commercial product derived from your riparian buffer zone.

Vegetated riparian zones provide essential ecosystem services, such as erosion control, stream bank stabilization, water pollution mitigation, flood control, and critical wildlife habitat (Gregory et al. 1991). However, regulations protecting these streamside regions are often looked at as a loss for farmers and woodland owners. These typically established protected zones prohibit clearing for crops or pasture, limit timber harvesting, and, at times, place restrictions on livestock grazing. A dominant species of many riparian areas is American sycamore (*Platanus occidentallis*); it is often referred to as a “trash species” because of the low timber value (Wells & Schmidtling 2003).

Historically, while farmers up north tapped maple trees for sugar, Appalachian farmers tapped sycamores in addition to their maples. As a diffuse porous hardwood, sycamore trees pressurize xylem in the spring, and when tapped, exude a sweet sap (Rechlin 2016). Just as the maple syrup industry is a mainstay of many farm economies of the north, sycamore syrup production could become an important source of farm incomes within its more southerly range, extending through Pennsylvania, Delaware, Maryland, and West Virginia (McAlpine & Applefield 1973). West Virginia alone, has 9.6 million sycamore trees of tappable size, and these four states combined have 13.4 million trees (USDA Forest Service 2021).

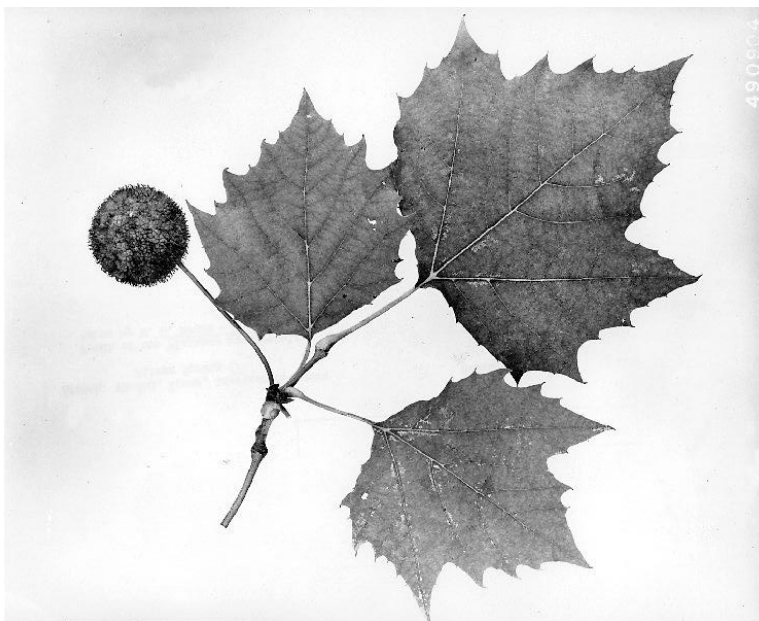


Figure 1 Sycamore leaf and syncarp (multiple fruit) of elongated achenes (dry fruit consisting of a seed with a dry husk). (Photo credit: W.D. Brush, USDA PLANTS 2023)

## Plant Culture

### Cultivation and Propagation

#### *Lifecycle and Ecosystem Value*

*Platanus occidentalis* is a relatively long-lived tree, with many of the largest trees being over 100 years old and often growing to a height of 70 to 100 feet tall, with trunks upwards of 4 feet in diameter. Modern champion sycamores are known to have trunks over 5 feet in diameter. In some of the oldest specimens, the heartwood rots out and the hollowed trunks serve as dens, nests, and shelter for a number of important native animal species including black bears, opossums, bats, wood ducks, and other cavity dwelling bird species (Mitchell 2023). Additionally, sycamore seeds, of which about 100 are found on each fruit—balls or “syncarps” seen persisting on sycamores through the winter—are a valuable late-winter food source for native finch species (Dirr 1975, Missouri Department of Conservation 2023).

#### *Propagating*

Trees can be grown from natural seed or transplants as well as stump and root sprouting; larger sprouts can be produced from dormant season cutting (Nesom 2008).



Figure 2 Sycamores are easily identified, even in winter, because of their broad crowns with unique crooked, white upper branches. (Photo Credit: Mykola Swarnyk, [Creative Commons Copyright 3.0 Unported, unchanged](#))

## Care

### Soil and Sunlight Requirements

American sycamore is naturally an early colonizer of disturbed sites and does well in rehabilitating and revegetating saturated soils including flood damaged riparian zones (Nesom 2008). It is primarily a species of valley bottomlands and is most often found in wet, rich alluvial soils or gravel bars, but also

regularly occurs on creekbanks and lower slopes in headwater areas (Nesom 2008, Missouri Department of Conservation 2023). Mature trees can tolerate weeks of being inundated with water, and seedlings can survive complete submersion as long as the water is aerated (Nesom 2008). Sycamore seedlings do need direct sunlight for early growth and good establishment. In fertile, riparian soils with enough sun, seedlings may achieve 10 feet of growth in their first year (Nesom 2008).

### **Diseases and Pests**

The sycamore lace bug *Corythucha ciliata* is an aphid-like insect which lives on the underside of sycamore leaves (Missouri Department of Conservation 2023). Typically, the damage caused is only aesthetic, though affected trees have been known to drop all of their leaves during drought or cases of severe infestations but they usually recover in following years (Missouri Department of Conservation 2023). Additionally, sycamore are susceptible to anthracnose, caused by a fungus and specific to sycamore trees. In addition to leaf damage in the spring, sycamores may show bud, shoot, and twig blight; however, the fungus is suppressed in summer conditions and new growth occurs (Iowa State University 2023). Rarely is the use of fungicide warranted because the damage caused by the anthracnose is typically minimal, and adequate and timely coverage is very difficult (Iowa State University 2023).

## Sap Collection and Syrup Production

### Harvest

Scientifically, the process occurring in the sycamore and maple are similar, however there are key practical differences in how sap is collected and sycamore syrup is made.

### *Tapping*

Currently, best practice in sycamore syrup production is to follow the maple syrup tapping guidelines. Tap trees at least ten inches in diameter—about the size of a dinner plate—once. For any tree over eighteen inches in diameter or larger—if you cannot touch your fingers together when you reach around the tree—tap it twice. Tap trees at a height between your hip to your shoulder and drill two inches deep. Lightly tap your spout into the new hole until it stops moving and is firmly stuck in the hole. The spout should have approximately a quarter to a half inch of the barrel stuck in the tree.

**Note:** Make sure you are using the right size drill bit for your tap. The most common taps currently used are 5/16-inch though the older-style 7/16-inch taps are still available from manufacturers.

### *Collection System*

In maple syrup, tubing and vacuum systems are used by large producers to collect more sap than they could in the classic bucket system. Vacuum is not a necessity for most maple producers but is often used to enhance production. In sycamore production, adding vacuum produces the most consistent sap flow. Though there are some accounts and videos of people collecting sycamore sap without vacuum and tubing, the Future Generations University research team has been unable to replicate these results.

One possible collection system is 3/16ths tubing with an auxiliary diaphragm pump. In this system, 3/16ths tubing is strung throughout the sycamore sugar bush. Each line of 3/16ths has 20-30 trees on it and is either directly connected to the diaphragm pump or to a small manifold. The diaphragm pumps used in Future Generations field trials are Shurflo pumps. The pump can be put on a temperature controller, so it turns on when it is above 40 degrees, and turns back off when temperature drops below freezing. This pump will help move sap through a tubing system and create some vacuum (10-15 inHg).

### *Reverse Osmosis*

Reverse osmosis (RO) is the process of using pressure to push water molecules through a semipermeable membrane, leaving concentrated solution on one side of the membrane and pure water on the other. In maple syrup production, reverse osmosis is used to concentrate sugar and remove water before evaporation. Sycamore sap has less sugar present than maple sap, making reverse osmosis a crucial part of commercial production. Unlike walnut sap—which contains a pectin-like goo which can readily clog an RO—there have been no reports of sycamore sap interfering with RO function or membrane health. Because those currently making sycamore syrup have been producing at a smaller scale, most of the ROs used so far have been backyard to hobby sized.

### *Evaporating*

There is no significant difference in boiling sycamore syrup and maple syrup. You can use all the same equipment and finish to 66-68% Brix. The main issue encountered in sycamore syrup production is the lack of volume which causes producers to hold on to raw sap or RO concentrate longer than they should. The delay can cause sap to sour which results in sour syrup.

Some possible solutions for this are having cold storage either in a refrigerator or cold basement or having a small/ downsized evaporator to better fit the daily amount of sap. One efficient, small-volume evaporator is a rocket stove, which can be made from a 55-gallon steel barrel and sheet steel. Plans for manufacturing the specific stove used by Future Generations University are available under the Group and Operations Studies section of <https://www.future.edu/syrup-resources/>

#### *Filtering and Bottling:*

Sycamore syrup does not pose any significant challenge to filtering or bottling. Following the best practices for maple syrup, hot filter sycamore syrup through a cone filter, vacuum filter, or filter press to remove any sugar sands. Heat syrup to between 180° and 190°F. Pour the hot syrup into your desired bottles, and once capped, flip the bottles to their lids for a few minutes to allow the tops to sanitize. Once filtered, do not heat your syrup above 190°F to avoid any more sugar sands precipitating out. Remember to batch code any syrup you make. This will allow for traceability for all products.

#### **Market Potential and Sales Information**

Currently, there is not a developed commercial market for sycamore syrup. However, it is piggybacking off the developing alternative syrups market created by walnut and birch syrups. The best estimate for bulk sycamore price is \$200-\$250/gallon. However, the university has seen walnut syrup, which is priced similarly in bulk, sell for upwards of \$700/gallon in small bottles at retail.

When trying to sell an unknown and unique product, the seller must educate the consumers. Small bottles, plenty of free samples, and information on what is sycamore syrup will be crucial. Two possible products are syrup straws and blended syrups. Using the same technology as honey producers, syrup producers can create syrup straws. For alternative syrup producers, this is a way to sell small amounts of their syrup for people to try or allow people to try your syrup in situations where open container samples are not appropriate. If you have multiple types of syrup, either species or infused maple syrup, selling straws in a bundle can give customers a way to try all your syrups without you having to walk them through a tasting, and could be a fun option for a fair or festival.

Because alternative species syrup sells for such a premium, some consumers prefer to buy smaller quantities or blended syrup. Blended syrups refer to any alternative species syrup blended with maple syrup. This provides two benefits: it can tone down the flavor of an alternative species syrup and make it more usable to the average consumer, and mixing the two syrups raises the price of the maple syrup while creating a more affordable alternative syrup product than just straight sycamore syrup. Most producers use a mix of approximately 20% alternative syrup and 80% maple syrup, but you may use whatever ratio tastes the way you would like.

#### *The Flavor*

Because sycamore syrup is a new product to hit the market, there has yet to be a full flavor study of sycamore syrup. Sycamore syrup is anecdotally described as having butterscotch overtones and as reminiscent to sorghum molasses.

## Additional Uses

### Lumber

Sycamore is a fast-growing tree that is classified as a hardwood species. It is often monetized as a pulpwood, however, it has a high specialty-use value that is often disregarded in the timber industry. Historically, it has been used for a myriad of finished products including but not limited to barber poles, butcher blocks, furniture, cabinetry, buttons, veneer, and interior trim (Mitchell 2023). The dense, interlocked grain can cause significant warping when it is plainsawn or flat sawn (Cassens 2007). When harvested timber is handled properly and the logs are milled as quartersawn lumber, it is still prized by cabinet and furniture makers because of the interesting pattern formed by the interlocked and spiraling grain (Cassens 2007), see Figure 3. The wood is also classified as intermediate to good for turning and boring (Cassens 2007). Additionally, the graining makes it very difficult to split and therefore continues to be used in the manufacture of butcher blocks (Missouri Department of Conservation 2023). As riparian buffer protection is the intent, it is not recommended to seek out timbering the sycamores in that area of a farm, however, if a particular tree is in decline, it may make sense to have it cut and custom milled (quartersawn) and then allow the stump to remain in place serving as protective streambank infrastructure, and it will likely sprout new shoots.



*Figure 3 – Photo plates demonstrating different cuts of sycamore lumber. The uppermost image is a transverse cut, demonstrating the growth rings and the color change between heartwood and sapwood. The middle image is radial section cut which demonstrates the visual aesthetic of quartersawn sycamore lumber. The bottom image is a tangential section, demonstrating a plain-sawn board. (Image credit: Romeyn Beck Hough, Hough and Hough 1888)*

## **Traditional Medicine**

Various parts of the sycamore tree were used as traditional medicine by Native peoples of the eastern and midwestern United States including the Cherokee, Creek, Delaware, Iroquois, and the Meskwaki. Traditional medicine was mostly in the form of infusions or decoctions made from inner bark and occasionally from roots for respiratory illnesses including coughs/colds and tuberculosis, urinary tract infection, dermatological rashes, and infections, and as a gastrointestinal aid (Native American Ethnobotany 2023). While none of the previously listed uses have been adequately studied to clinically prove efficacy, in the modern/western medicine sense, there is published scientific evidence that at least one compound from sycamore leaves is effective in treating MRSA. Methicillin-resistant *Staphylococcus aureus* (MRSA) is a serious pathogen. As its name suggests, it is resistant to many commonly used antibiotics and there is an increasing presence of MRSA-related infections. There is an emerging need for alternative, effective antibiotic therapies (Ibrahim 2009). The antimicrobial evaluation of extracts from different parts of the sycamore tree demonstrated four metabolites in the extract from sycamore leaves are nontoxic, highly active, and selective against MRSA (Ibrahim 2009). With this in mind, sycamore's use in traditional ethnobotany to treat a myriad of bacterial infections may be truly effective.

## **Human Connections**

### **Curious Historic Uses**

Historically—prior to widespread European settlement of the eastern US—it was not unheard of to find sycamores that were over ten feet in diameter, with one of the largest ever documented being 47 feet in circumference, nearly 15 feet in diameter (Missouri Department of Conservation 2023). Native Americans and French traders were known to have made dugout canoes from the already hollow trunks; they were typically 20 to 30 feet long, but there is record of one canoe being 65 feet in length (Mitchell 2023)! Pioneers also found that they could use the hollow standing trees to shelter livestock—even animals as large as cows and horses (Missouri Department of Conservation 2023). The hollowed trunk cavities of these especially large specimens were sometimes used as temporary shelter by settlers until their log homes were complete (Mitchell 2023). During the French and Indian War in what is now West Virginia, a pair of brothers deserted the British Garrison at Fort Pitt and by 1764 had found themselves along the Buckhannon River (now in Upshur County, WV) and took up residence in a large sycamore tree (Gilchrist 2023). They lived there until the fall of 1767, and their residence became known as the “Pringle Tree” (Gilchrist 2023). In the 1970s, Pringle Tree Park was created as a memorial to the men and their home (Straley 2018).

### **Sycamore Seed Moon Shot**

“In 1971, the astronauts of Apollo XIV took seeds of the Sycamore tree (and other tree species) to the Moon and back. Astronaut Stuart Roosa, a former smoke jumper for the U.S. Forest Service, was asked by the USFS to take these seeds on his mission. Although the seeds did not land upon the Moon, they remained with Roosa while he orbited around the Moon. After the seeds returned home, they were sown at [two] USFS stations” (Mitchell 2023). Seeds from tree species in the eastern US, including sycamore seeds, were sent to the station in Gulfport, Mississippi in 1972 (Williams 2024). Many of the trees grown from these seeds survived. During the celebration of America's Bicentennial in 1976, moon tree



seedlings were transplanted in school, universities, government facilities, parks and other public locations throughout the country (Mitchell 2023). Sycamore saplings grown from seeds of these ‘moon trees’ are still available through select tree nurseries.

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