



# In These Woods

**Cornell Cooperative Extension**  
**Columbia and Greene Counties**

Issue Five: 2023

# Agroforestry

Agroforestry is an effective strategy in adapting to market and climate conditions while utilizing acreage not well-suited for more traditional practices. It can also be a great activity for personal food production and multi-use land stewardship.

The practices explored in this issue are primarily focused on forest farming. These opportunities are equally accessible to professionals, woodland owners and hobbyists alike. Agroforestry is scalable, approachable and supporting of diverse stewardship priorities.

## 2023 Issues:

*Issue 2 - Understanding Forest Ecology*

*Issue 3 - Woodland Enhancements*

*Issue 4 - Wildlife & Recreation*

### **Issue 5 - Agroforestry**

*Issue 6 - Timber Management*

*Issue 7 - Invasive Species*

*Issue 8 - Protecting Your Forest Assets*

*Issue 9 - Conclusion*

## About Us

The mission of Cooperative Extension is to enable people to improve their lives and communities through partnerships that put experience and research knowledge to work. Extension staff and trained volunteers deliver education programs, conduct applied research, and encourage community collaborations. Our educators connect people with the information they need on topics such as commercial and consumer agriculture; nutrition and health; youth and families; finances; energy efficiency; economic and community development; and sustainable natural resources. Our ability to match university resources with community needs helps us play a vital role in the lives of individuals, families, businesses, and communities in our region.

You can learn more about the programs and services we provide on our website. You can also contact us directly to help overcome a challenge, share stories and gather tools to help you achieve your goals. Below is the contact information for our two offices. We look forward to hearing from you.

### **Acra** (Greene County)

Agroforestry Resource Center  
6055 Route 23  
Acra, New York 12405  
(518) 622-9820

### **Hudson** (Columbia County)

Extension Education Center  
479 Route 66  
Hudson, New York 12534  
(518) 828-3346

*In These Woods Woodland Stewardship Series is a collaboration among Cornell Cooperative Extension of Columbia & Greene Counties, New York City DEP, USDA Forest Service, and the Watershed Agricultural Council's Forestry Program*

## CCE Columbia & Greene's Agroforestry Resource Center



Cornell Cooperative Extension's Agroforestry Resource Center (ARC) was established in 2003 to help sustain the vast, privately-held forest resources in the Hudson Valley, Catskill Mountains and surrounding region. It is home to the Agriculture and Natural Resources team who focus on regional education and outreach in all woodland and working landscape subject areas.

Agroforestry is defined as the combination of agriculture and forestry practices that create integrated, productive and sustainable land-use systems. These practices can include ginseng, mushrooms, maple and other high-value products.

Through a variety of programs and partnerships, CCE offers land stewards economically viable and ecologically sustainable practices to help preserve and manage woodlands. The ARC includes a diverse and talented group of natural resource educators, an interactive indoor space and a 142-acre model forest that supports an outdoor "laboratory" for demonstration, research and hands-on workshops.

To learn more about the Agroforestry Resource Center, visit:  
[Agroforestry Resource Center](#)

# Siuslaw Model Forest

Siuslaw (Sy-use-luh) Model Forest is our 142-acre living classroom. It's one of our greatest educational resources and sits right across the street from the Agroforestry Resource Center in Acra. Our Natural Resources team and its partners manage this diverse property for all to experience. It's home to innovative demonstration sites, habitat, trails, and real-world examples of woodland stewardship principles and best management practices.



## Siuslaw as a Model

In 2007, Siuslaw was designated a NYC Department of Environmental Protection Model Forest. Siuslaw is one of four model forests in the region that all demonstrate the importance of sustainable land stewardship, forest health and water quality protection through education.

Today, Cornell Cooperative Extension hosts many public education programs in the forest and partners with researchers, ecological monitors, and other institutions and organizations like SUNY ESF and the Watershed Agricultural Council's Forestry Program to bring these resources to the community.

The Siuslaw Model Forest is open to the public during our regular business hours (8:30-4:00 Mon-Fri). There are miles of trails for non-motorized recreation and many interpretive signs that educate around best management practices and activities you can bring home to your woods.

### **Agroforestry**

Check out our tree and understory crop demonstrations, along with the shiitake and oyster mushroom laying yard - great inspiration for your backyard or small commercial operation.

### **Timber Stand Improvement (TSI)**

See the different stages of growth and practices employed to restore habitat or thin dense stands of trees to encourage healthy forest conditions.

### **Best Management Practices (BMP)**

Walk the woods roads and learn about open topped culverts, broad based dips, water bars and other techniques for preventing erosion and protecting water.

### **Enhancements**

There are bird nesting boxes, pollinator houses, American chestnut restoration planting, habitat thinnings and plenty of tree identification markers to keep you learning!

# Introduction to Agroforestry



Agroforestry is the intentional combination of agriculture and forestry practices to create productive and sustainable systems. In other words, farming and forestry are combined to create a healthier, more productive system that results in economic benefit while retaining actual forest.

Agroforestry capitalizes on the benefits realized when trees and shrubs are deliberately integrated with crops and livestock. This biological interaction supports unique production opportunities and can increase sustainable food sourcing on underutilized acreage.

When used appropriately, agroforestry technologies help attain sustainable land-use systems in many ways:

- Provide protection for valuable topsoil, livestock, crops, and both aquatic and terrestrial wildlife
- Increase productivity of agricultural and horticultural crops
- Reduce inputs of energy (physical, chemical, or biological) and chemicals
- Increase water-use efficiency of plants and animals
- Improve water quality
- Diversify local economies
- Enhance biodiversity and landscape diversity, and ultimately, the quality of life for people.

## Agroforestry and Climate Change

As the climate continues to shift, agroforestry is increasingly seen as a critical solution for farms and forested landscapes both in adapting to changes as well as mitigating impacts that further negative effects on our climate. The USDA Forest Service has published a report: *Agroforestry: Enhancing Resiliency in U.S. Agricultural Landscapes Under Changing Conditions* based upon a national scientific assessment of agroforestry. With contributions from more than 50 experts from the United States, Canada, and Mexico, this report presents the first-ever synthesis on agroforestry as a mechanism for improving the resiliency of agricultural lands under climate change.

## Agroforestry is rooted in Indigenous Knowledge

While the word “agroforestry” was coined in the 1970s, many of the practices and knowledge has long been practiced around the world. While both indigenous and non-indigenous practitioners have developed agroforestry systems, often the focus is on more recent work and indigenous contributions are overlooked. Cultural sensitivity and recognition of these deep roots is important to understanding the long-term perspective needed to successfully implement agroforestry across landscapes. Some resources for further reading:

- [US Forest Service Agroforestry Notes: Indigenous Traditional Ecological Knowledge in Agroforestry](#)
- [Some Ecological Aspects of Northeastern American Indian Agroforestry Practices](#)

## Agroforestry Practices

The USDA National Agroforestry Center distinguishes five core practices that are all suited for temperate regions. They can be implemented directly or overlapped with compatible stewardship. The limiting factors are often due to local conditions such as past and present land use, topography and climate.

### Forest Farming

Forest Farming is the intentional manipulation, integration and management of woodlands under a forest canopy to produce non-timber products. This practice has been widely adopted in NYS and includes products such as maple, mushrooms, and herbs such as the iconic American Ginseng. Forest farming requires a sustainable natural resource management perspective because the forest must remain healthy and intact to optimize production.



Non-timber specialty products like goldenseal can be cultivated beneath a tree canopy. (Photo by Katie Trozzo)

### Silvopasture

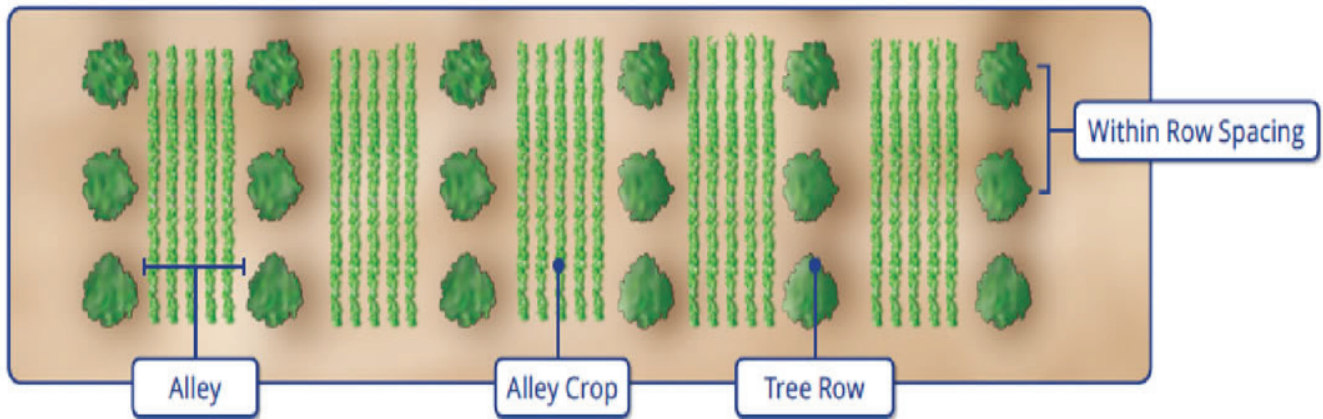
Silvopasturing combines timber, livestock and forage production on the same land. Trees provide long term returns while livestock generate an annual income. This practice offers its own unique challenges and requires a deep level of understanding of both livestock and silviculture in order to be successful.



Black Angus cattle graze through drought prone, sandy soil pastures with oak trees successfully mitigating many of those impacts.

## Alley Cropping

Alley Cropping- Growing an annual or perennial crop simultaneously in the alley ways between rows of a long term tree crop. The agricultural crop generates annual income while the longer-term tree crop matures. Animals can also be incorporated into this system on a rotational or seasonal basis.



Common terminology used when discussing alley cropping systems are alley, alley crop, tree row, and within row spacing. (USDA National Agroforestry Center Illustration)

## Windbreaks or Hedgerows

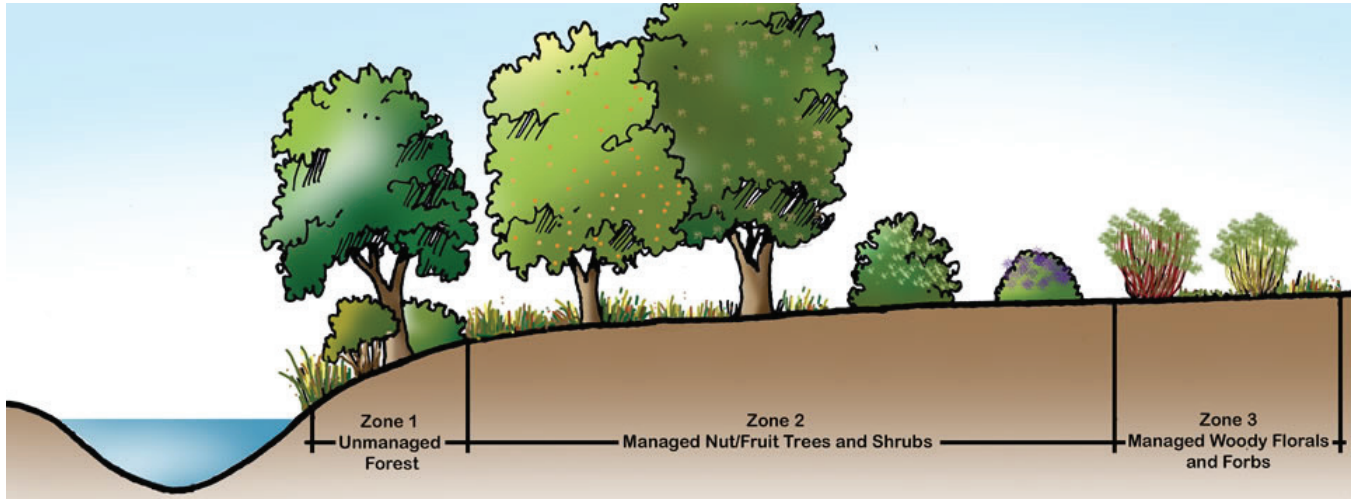
This practice became popular in the US following the Great Dust Bowl. Farmers came to realize that vast open fields can be vulnerable to high winds which can desiccate crops and cause soil loss. We learned that trees or shrubs can be planted in single or multiple rows to redirect or modify the wind. These plants will protect your crops and the environment.



Adding specialty products to a windbreak can provide an additional source of income for landowners. (USDA National Agroforestry Center photo and caption)

## Riparian Forest Buffers

RFB's are natural or planted woodlands adjacent to water bodies. They are designed with trees, shrubs, and grasses to protect water resources from potential pollution. In many cases, the plants grown in these buffers are multifunctional. In addition to protecting our waterways, plants can be chosen that are in some other way useful to the grower.



Although riparian forest buffers are often designed primarily for water quality benefits, these practices can also include woody species that provide products such as nuts, fruit, and decorative woody florals. (USDA National Agroforestry Center illustration)

## Agroforestry at Cornell Cooperative Extension

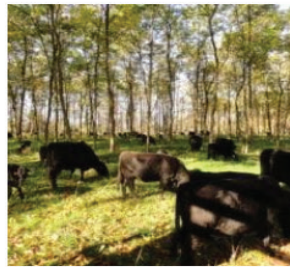
In response to increasing interest in agroforestry over the years, Cornell has created an extension program work team and a number of tools and resources to help woodlot owners start farming their forests. Each category below has videos, guides, and websites to help, along with the contact information of key individuals in the Cornell community you can reach out to get more information.



Woodland Mushrooms



Maple Syrup



Silvopasture



Ginseng



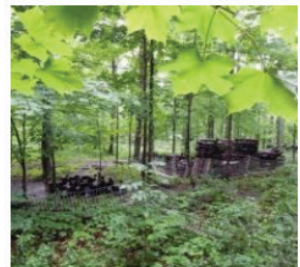
Forestry



Nut Production



Research & Education Sites



News and Updates



# Assessing Agroforestry Potential

It's easy to get excited by an idea and carried away before thinking through all the details. When it comes to agroforestry, considering the characteristics of the landscape and your property is crucial for success. This planning is important for a variety of reasons, but always leads back to the simple reality that forest ecosystems are very slow to change, especially when compared to the seasonal transitions of a farm field.

Implementing a successful agroforestry practice begins with matching the practice to the land as it exists. Significantly altering a landscape to meet production needs is often cost prohibitive, time consuming and potentially harmful. Some manipulations can be made as part of sustainable forest management plan designed to support your agroforestry goals, but these usually support the ecosystem as opposed to changing it altogether.

A simple example is that maple production will not be possible without maple trees. It's no secret that building a sugar bush from scratch would require sizeable investment and a lot of patience to reach productive maturity. It's possible to favor these species in your thinning and even plant new trees, but again, forests take time. Another example is American Ginseng. This species requires specific conditions and landscape features to successfully grow. If these needs are not met, the crop will either fail or not grow with the necessary vigor to meet harvest expectations.

It is for these reasons that we urge all of you who may be considering to adopt an agroforestry practice to take a step back and assess what your land might have (or not have!) to offer. Finding a practice that suits you and the land will be a much more enjoyable endeavor as opposed to trying to force something that may just not work.



These assessments can happen in a variety of ways. Here is an example of a process you could go through and some resources that might help you along the way. Much of this process can be done using on-line tools and will leave you with a solid understanding of what your land could support.

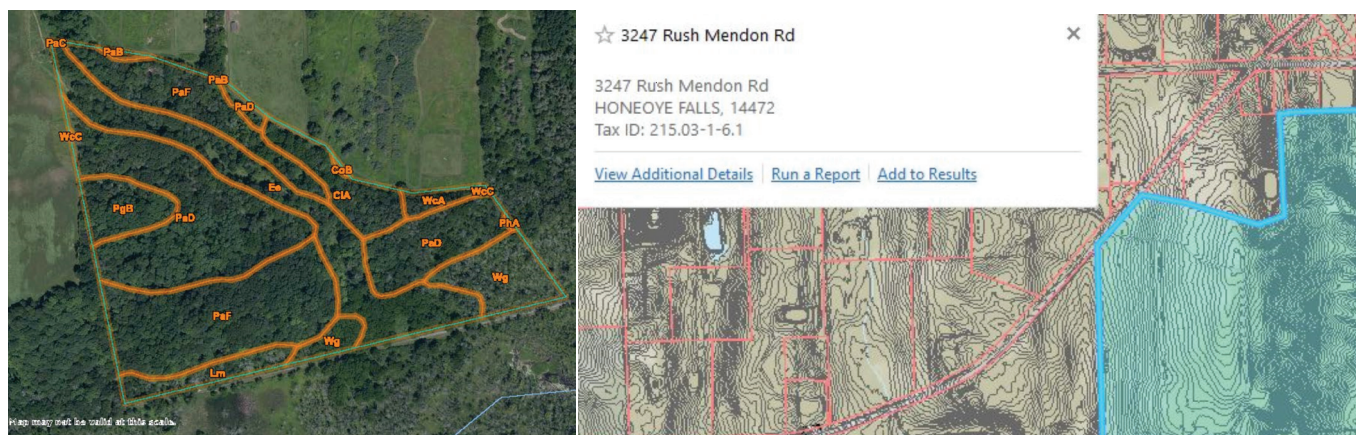
Understand the history of your land. Knowing what came before you and realizing how your forest came to be can be really helpful when making decisions about where it will go next. Look for stonewalls to tell you if your land was pasture. Observe the size and species of some of the trees. Think back to previous article on forest succession to determine which stage your woods is at. Look for remnants of systems that may be in place by past residents of your land.

## Study Maps or Create Your Own

Online maps offer tons of information and are accessible by just a few clicks of the mouse. In general, online maps can be used to view the topography of your land so you can identify steep slopes or different directions your slopes are facing. Online maps can also help you locate streams, wet areas, groups of different types of trees and more.

- Google Earth is a tool that allows you to see your land from an aerial view. You can also go back in time using the 'historical imagery function' to view your land over the past few decades and throughout the seasons.
- County Web Mappers vary by region but can be another helpful tool with many built-in features.
- The local county soil and water conservation district can also provide you with aerial maps along with other information about your property.
- Soil survey maps are another important mapping tool that allows you to click on your parcel and receive a report with information on the soil types and their characteristics

Creating your own maps can be a really helpful process that allows you to integrate site specific or regional specific information into one place in order to create a decision making tool. Some categories to include could be climate, access points, water resources, vegetation and wildlife, or existing building and infrastructure.



## Assessment Tools for Agroforestry

Some agroforestry specific assessment tools already exist and are ready to be used by you!

- Plant Shoe is a digital forest farming tool that will evaluate your lands' potential to grow understory crops like Black Cohosh, Bloodroot, Goldenseal and Ramps. <https://plantshoe.org/PlantShoe/>
- Ginseng Visual Site Assessment is a tool created by Bob Beyfuss to score your woods potential to support a ginseng crop. See the article on Ginseng to learn more.
- Assessing the Commercial Potential of a Site for Maple Sap Collection helps a woodland owner determine whether or not they would have enough taps for a commercial operation. See the article of Maple to learn more.

As you continue on reading about the specifics of different agroforestry practices in the northeast, I encourage you to get excited about them but to then perhaps temper that excitement with the realities of what the land you love has to offer and can support.

# Growing Edible Woodland Mushrooms

While you might come across one of 10,000 fruiting mushrooms in the eastern forest, only a handful can be reliably cultivated. These are the decomposing fungi that can be grown on logs, stumps, woodchips, and in vegetable production beds. These species often include:

- Shiitake (*Lentinula edodes*)
- Oyster (*Pleurotus ostreatus*)
- Lions Mane (*Hericium* spp.)
- Red Wine Cap (*Stropharia Rugosa-annulata*)
- Almond Agaricus (*Agaricus subrufescens*)
- Nameko (*Pholiota nameko*).



Oyster (*Pleurotus ostreatus*)



Lions Mane (*Hericium* spp.)



Red Wine Cap (*Stropharia Rugosa-annulata*)

Each mushroom has its own preferred species of wood and method for successful cultivation. ONLY log shiitake can be reliably cultivated outdoors as a commercial crop, though other species can offer supplemental income when they fruit. Reliable fruiting of other species for commercial sales is most often done in indoor cultivation systems.

These species can also be cultivated on a small scale as an experiment or perennial good source for personal use. Inoculated logs, stumps and woody materials have a small footprint and a low impact on your woods.

Mushroom Species	Shiitake	Oyster	Lions Mane	Wine Cap	Almond Agaricus	Nameko
Wood Species	Oak, Sugar Maple, Beech, Birch, Chesnut, Sweet Gum, others	Poplar, Tulip Poplar, Willow, Box Elder	Beech, Sugar Maple	Mixed hardwood chips	Mature Compost	Black Cherry, Sugar Maple
Preferred Methods	Bolts	Totems	Totems	Beds	Beds	Bolts

## Shiitake Mushrooms

Shiitake mushrooms are among the oldest of all agricultural crops with cultivation dating back to several thousand years in parts of China, Korea, and Japan. Cultivation in North America was popularized in the 1980s. It was and has remained the most economically viable outdoor method for mushroom cultivation.

### Commercial Potential

Research gathered by Cornell Small Farms Specialty Mushroom Outdoor Production indicates that, over three seasons, a 1,000 log operation would cost \$4,740 to establish and would yield 1,040 pounds of mushrooms annually when properly managed. This could generate \$12,480 of income each year. This rate can be perpetually sustained from year four onward and would qualify a producer for agricultural exemption in New York State.

### Recreational

Shiitake cultivation is a great activity on any scale. Almost anyone can manage an inoculated shiitake log for personal use. The space requirements are minimal as are the tools necessary to generate a seasonal crop.

Both websites at [Cornell Small Farms](#) and [My Woodlot](#) have compiled all of the resources you will need to be successful.

### Woodland Mushroom Cultivation at the Siuslaw Model Forest

At the Agroforestry Resource Center, we value our model forest for its ability to demonstrate actions other woodland owners could adopt. The shiitake laying yard is our favorite forest farming activity to highlight because it is an easy one for landowners to do on their own with just a couple logs or a couple hundred, your choice! At our site, we use a naturally cool and shady area in the woods, along a stream to grow shiitakes on logs called bolts. We force the bolts to fruit by soaking them in the stream during the summer.



Mushroom Laying Yard



Shiitake bolts resting and older fruiting



Harvesting for class

See this practice in action! Visit our center, tour the Siuslaw Model Forest or join us for a class to see and learn how to grow mushrooms and woodland herbs in your woods.

# Conservation through Agroforestry

By Tracey Testo, Program Manager & Agroforestry Subject Educator. Agroforestry Resource Center. Acra, NY.

Much like anything else, I have found that there are many reasons that motivate people to practice agroforestry. Here at our extension offices, we most commonly talk with landowners and farmers interested in forest farming. This includes crops such as Sugar Maple trees for syrup, mushrooms grown on logs and herbs that grow in the understory. With any farming endeavor, profit is a consideration on some level for nearly everyone. But with agroforestry, there is more to it than that. This type of engagement with the land requires you to work with it, or fight against it. And to work with the land, to match a crop or type of production to the right habitat and place, seems to be another main motivator when people consider agroforestry.

In staying true to indigenous culture and the original practitioners of agroforestry, forest farming means caring for the woods and the environment around them first. Stewarding them to a state of health that will then give the woods the capacity and the strength to be productive with food and medicine for our benefits. This mindset that exists among forest farmers and those interested in it offers a real opportunity toward the conservation of some species that we all, including the forest, depend on.

American Ginseng has become the poster child of forest farming for many reasons. The roots fetch a high price which makes it a very appealing crop. So appealing that it was over-harvested to near extinction from its native range and has been the focus of conservational minded regulatory action in an effort to prevent the loss of this plant.

Read on to learn more about ginseng, discover how it is being protected and consider trying your hand at growing it.

## American Ginseng

American Ginseng is an herbaceous plant native to the woodlands of the Appalachian Mountain range. It is typically found in the wild in mixed hardwoods with rich soils on North to Northeast facing slopes. In New York, it can be

found growing with a community of plants in the understory with Sugar Maple as a preferred tree in the canopy.

This perennial plant is short in stature, usually staying under two feet in height. It will emerge from the soil in May and begin to die back to the ground in September. Ginseng does not reach maturity until it averages 10 years in age. Once it is mature, the plant will begin to flower and then produce seed that ripen around August. All parts of the plant are medicinal, but the root is usually harvested for traditional Chinese medicine.

Ginseng has been harvested for centuries for its medicinal properties, but its high value and slow growth led to widespread over-harvesting putting the wild population at risk. To ensure this plant remained healthy and wild across our landscape, NYS adopted conservation-minded regulations in 1987 that allow wild ginseng to be grown, stewarded and harvested while protecting a portion of the plants wild population.



## Cultivation Methods

### Field Crop

This is the most common way American ginseng is grown in the US. It is grown under artificial shade in fields and yields a crop in approximately 3-4 years. Wisconsin and Canada are the leading growers of cultivated ginseng, where it is a large cash crop grown with many inputs and alterations to the surrounding environment.



### Woods Cultivated

Grown in the forest where the soil has been mounded up to increase the yield of the crop. Amendments are usually involved to alter the soil chemistry and meet the needs of the plant. Most woods-grown ginseng is grown organically, and reaches 6-8 years old.



### Wild simulated

This practice focuses on conservation through production and can provide producers, stewards or land-owners a diversified and sustainable revenue source. This endeavor requires in-depth knowledge of production and regulations as sale and land leases are often central components to this approach. Wild simulated ginseng is usually indistinguishable from wild ginseng and often fetches a similar price.



## Regulation versus Conservation, or both?

Three main regulations are implemented in New York State to protect American Ginseng in the wild. A harvesting season, a minimum harvest age and written landowner permission. These are enforced by the NYS Department of Environmental Conservation and are in place to protect and not hinder cultivation of this plant. Understanding the benefits of these regulations can help you become a better steward!

### Season

- Regulation: Wild ginseng may be collected only between September 1st and November 30th of any year.
- Conservational Benefit: Ginseng berries are ripe by September 1st. This ensure that the seeds in those berries are mature and ready to go into the ground to expand the plants population.

### Maturity

- Regulation: Wild plants may be collected only if they are at least five years old. Age is determined by counting stem scars. No plant with green, unripe fruit and immature seeds may be collected. All seeds from collected wild ginseng plants must be planted immediately within 50 feet of that plant.
- Conservational Benefit: Plants younger than 5 years of age generally do not produce seeds. Ginseng does not propagate by roots in the wild. New plants can only develop from the seeds of other, mature plants. If a mature plant is found and harvested, the requirement of planting its mature seeds close by allows for the potential for new plants to grow and for that population to remain.

### Landowner Permission

- Regulation: Ginseng can only be harvested on private property by the landowner or with written permission of the landowner. No ginseng can be harvested from state lands, unless the harvested has received a permit. Permits are only issued for research.
- Conservational Benefits: Requiring land ownership or written permission ensures that a harvester is not digging from someone else's patch. Ginseng stewards invest a great deal of time and money into a patch. Harvesting only from private lands allows for population on state land to grow. As a very slow growing plant, it will take years or decades for these populations to rebound and remain.

## Sale of Wild Ginseng:

Beyond the regulations for harvesting, American Ginseng sale is also regulated and federally protected in Appendix II of the Convention on International Trade of Endangered Species of Wild Fauna and Flora (CITES). For those interested in the sale of ginseng for profit, another set of regulations must be understood to ensure you are not in violation of this international agreement.

To learn more about selling ginseng, visit the DEC website at <https://www.dec.ny.gov/animals/7130.html>

## General Conservation Practices

When scouting for or harvesting wild ginseng, there are simple techniques that can increase your success while preserving the population and ecological health of New York's upland woods...

Do...	Don't...
Study the plant and conditions before harvesting. Learn to identify, age and assess the surrounding environment.	Contribute to unsustainable harvesting by digging before assessing the environment, plant and surrounding population.
Identify private lands and contact landowners with suitable conditions for scouting.	Trespass without landowner permission.
Scout for wild ginseng patches throughout the year and take note of population size and ages of wild plants	Dig the first plant you see. It might be the only one in that population. If you remove it, ginseng will no longer be found in that area.
Seek written permission from landowners before you dig	Hunt ginseng on state land
Check the age of wild plants by counting scars on the neck of the root just below the soil	Take a plant that hasn't produced ripe berries
Sow mature seeds near the wild plant you found them on	Bring mature seeds home to your garden beds
Re-assess population each year before harvesting	Over-harvest each year limiting sustainable population growth
Follow regulations and best practices for sale, distribution, or commercial wild-simulated production	Sell or distribute wild ginseng illegally

### Wild Simulated Ginseng at Siuslaw Model Forest:

Along with woodland mushroom, our team also uses the Siuslaw Model Forest to demonstrate other small-scale forest farming demonstrations like understory crops.. We use these "living classrooms" to educate on myriad topics that support healthy forests, ecosystem services (clean water) and productive systems.

While we don't manage american ginseng for production, we do encourage this native species so that we can show landowners, producers and the general public how to implement this agroforestry practice on their lands.



The CCE Team conducting a site assessment of a hardwood stand to identify and rate the features necessary to establish or expand an American Ginseng population.



The CCE Team planting a ginseng test plot based on the assessment. Test plots are a helpful step to determine potential success before undertaking a larger planting.



# An Introduction to Maple



Maple sugaring is nothing new. There is evidence of its practice in the St. Lawrence River and Great Lakes regions before the 17th century. It spread to the area we now call the Hudson Valley in the late 1600s where sugaring became a very important part of native life among the Munsee and Mahican communities, the original inhabitants of this land. In fact, in those native languages, the words for sugar and syrup were borrowed from the Dutch and English.

Following European settlement, maple production became the primary source of sweetener since cane sugar was difficult to obtain. Almost every farm had a sugar operation by the early 1800s, collecting sap with wooden or metal taps and buckets. The sap was then boiled down into syrup in kettles over the fire.

Sap is mostly water. The Sugar Maple (*Acer saccharum*) gets its name because of its high sugar content – about 2%. You can tap many other tree species, but the sugar content is often lower meaning you need more sap to make the same amount of syrup. Syrup is made by evaporating or boiling most of the water off. Once the sap hits 219 degrees, you have syrup! A common ratio is 40:1, or 40 gallons of sap for 1 gallon of syrup. A healthy maple can yield 15-20 gallons of sap every season and most trees can be tapped every year, some for centuries.

As with any crop, advancements have been made to increase efficiency. The first being the invention of an evaporator which greatly reduces the amount of time it takes to boil. Then came tubing systems that rely on gravity or a vacuum to collect the sap rather than using buckets. Today, the use of reverse osmosis to separate the sugars and nutrients from the water in the sap prior to boiling the concentrate in an evaporator has allowed for experimentation with other more dilute tree saps such as walnut, butternut, box elder, birch, sycamore, hop hornbeam and beech. The resulting syrups offer a variety of flavors and uses in some culinary circles.



A tree tapping demonstration at the Siuslaw Model Forest in Acra, NY shows students how to modern and traditional tools.

## The Sugar Bush

When it comes to the sugar bush (a term used to describe an area of woods with Sugar Maple Trees), careful forest management can be employed with the goals of healthy trees and high yields of sap. Tending to a forest in this way has been compared to growing a 100-year-old garden. Trees are thinned so the ones remaining are well spaced and receive adequate sunlight. Diseases and damaged trees are removed to prevent the spread of infection. The forest floor is managed to reduce competition from invasive species while creating space for natives to thrive.



In this way, maple producers can be thought of as farmers in the woods. Maple production, along with a few other practices, truly is a combination of both farming and forestry. In what might seem like a gray area, are opportunities to implement a practice that has multiple benefits. Growing and tapping maple trees, for example, has the economic benefits from sap and the ecological benefits that are provided by trees. These two examples of multiple benefits from one practice is just scratching the surface. A sugar bush provides many other opportunities to integrate practices. Maple wood from thinned trees can be repurposed to grow shiitake mushrooms. The forest floor can support native, valuable perennial herbs such as ginseng and goldenseal.

## Maple Products

Innovation in and around maple is happening all the time. In New York State, The Cornell Maple Program is leading the way in research around production systems as well as applications and uses for maple such as maple sports gel, vinegar, or sodas!

Syrup color and flavor can range from light and subtle to dark and bold. The light ambers usually comes from early-season sap. The dark ambers come later and brings out that bold flavor. These differences are a result of tree physiology, weather, variation in organic compounds, and a fascinating microbial process. A pancake go-to is a medium amber – not too light, not too bold. When a syrup has excellent flavor and chemistry, many producers will make candies and creams. These confections involve heating syrup to high temperatures increasing the sugar concentration so they crystalize in their new form. You can try making your own candy at home!



# Foraging with Fruit & Nut Trees

Woodland owners and visitors have access to many native and non-native/non-invasive species that produce edible fruits and nuts. Establishing these as part of a reforestation or agroforestry practice provide myriad benefits to your woods, wildlife and production plan. For many, though, it may be easier to encourage existing species that produce fruits and nuts by limiting competition, releasing through pruning and providing a more managed environment. Foster what's there can be cheaper and lot less labor intensive if you're just starting out.

## Common Fruits

Blackberry, Black Cherry, Serviceberry, Currant, Elderberry, Chokeberry, Raspberry, Blueberry, Staghorn Sumac, Strawberry, Crabapple, Wild Apple

### Uses:

Some of the at-home uses include flavoring meals, garnishing salads, or serving the fruits to birds. Some forest plants and trees contain high amounts of nutrients. Forest fruits and berries can be marketed only if they are cleaned and packaged properly. To keep this project going for the long term, plant new trees and shrubs every year and only harvest a small amount, even when they are abundant.

### Other Considerations:

If supporting wildlife is your goal, the foraging rate should be noticeable and harvest rate minimal so you can provide a vibrant habitat using these species. On the other hand if production is your goal, wildlife can be a direct cause of yield reduction. Predation from small & large mammals, birds and insects can result in a catastrophic impact. Other considerations are genetics, health, weather and climate, site conditions and access.

## Common Nuts

Hickory Nut, Butternut, Beachnut, Walnut, Chestnut, Acorn, Hazelnut, Pine Cone

### Uses:

Collect pinecones, acorns, hickory nuts, beechnuts, and hazelnuts from the forest floor. Can be used for attracting and feeding wildlife, propagating new trees, rustic decoration projects, medicinal purposes, processing or grinding into recipes, .

### Other Considerations:

All uses require accurate identification of the tree or shrub. As an income-producing project, cones and seeds can be packaged into edible mixes for wildlife, baked into retail goods containing natural products, planted as trees for sale, or marketing to crafters. Supply is important, so you should re-plant species to continue production, and plan to manage your timber to favor nut- and cone-producing trees. Problems with this forest activity include over harvesting, insect larvae appearing in the nuts, and preserving nuts.



# Reforestation and Planting Trees

The successful establishment or re-establishment of woody plants to a natural site requires careful planning and preparation. Species and site selection are critically important to the entire process and often require the assistance of local experts. Moisture conditions, soil texture, competing species, wildlife constraints, slope and exposure are just a few of the site characteristics which need to be evaluated before deciding which plants to establish.

## Site Preparation:

Land preparation is essential for a successful planting. If grass or brush occupy the site, the entire area to be planted should be mowed before planting. After mowing, each row to be planted should be plowed or disked back to expose the soil and remove vegetation. Seedlings must be planted in soil, not the sod layer. At a minimum, preparation requires scalping the sod around each planting hole to expose mineral soil. Herbicides can be used to remove competing vegetation, however contact your Cornell Cooperative Extension or a professional forester for assistance, and always follow label instructions. Investigate pesticide use of agricultural fields before planting. Seedlings will not tolerate some herbicides which can persist in the soil for several years after application.

## Tree Planting:

If you have a large number of seedlings to plant (more than 5,000 or so) it may be easier to purchase, rent, or contract for a planting machine rather than to plant by hand. The machine digs planting furrows at the desired depth and automatically fills the furrow behind the seedlings. If hand-planting makes sense then follow this process:

1. Carry seedlings in a bucket of water; take only enough seedlings with you to last the length of a row. The remaining seedlings should be left in a cool, shady location.
2. Prepare a hole large enough to contain the root system using a grub hoe, shovel, flat spade, or planting bar.
3. Place the seedling in the hole; if need be, prune the longer roots to about six (6) inches. Make sure all the roots are buried and the seedling is standing straight. Plant the seedling at the same depth as it grew at the nursery. Make sure roots are pointed downward (i.e. not "J" rooted).
4. Firmly pack the soil around the roots using the heel of your shoe. This will eliminate any air pockets that may cause the roots to dry out and kill the seedling.

The most common cause of seedling mortality is mowing. Mark your plantings with signs and stake the rows. If appropriate, prevent damage from livestock by constructing a fence around the plantation. For information on watering, mulching, weeding, fertilization, and pruning contact Cornell Cooperative Extension or your county Soil and Water Conservation Districts.



# Six Key Principles for a Successful Silvopasture

By Steve Gabriel. Cornell Small Farms, June 2018.

Within the practice of agroforestry, or mixing trees with agricultural production, the concept of silvopasture has some of the broadest appeal. Many farms already work with livestock, and making good use of forested land for multiple yields is highly beneficial to the farmer.

Whether you choose to graze sheep in a Christmas tree farm, move cows through a walnut plantation, or graze chickens through an apple orchard, several key principles apply. In reading about silvopasture, you will see again and again that that system is not just “throwing animals” into the woods, or planting some trees in the pasture. There must be thought, planning, and intention as the farmer designs the system. This article outlines six of the key considerations for getting started in Silvopasture.

## 1. Silvopasture can be established in existing woodlands, or trees can be brought into pasture

One of the nice aspects to silvopasture is that one can establish a system on almost any type of land. Of course, establishing it in existing forest is a very different process in many ways than bringing the trees into open pasture. The only land types we might consider avoiding silvopasture are sensitive areas such as wetlands and healthy, maturing hardwood forests that might be best left to their own process of succession.

If starting with forest, the farmer needs to change the ecology (i.e. thin a bunch of trees) to support the establishment of forages, which include grasses, legumes, forbs, and shrubs and trees meant as fodder for livestock. Trees could also produce fruits and nuts for foraging, such as chestnuts or persimmons, which animals could harvest once they fall to the ground.



Sheep graze a Honey Locust Silvopasture at the Virginia Tech research farm. Photo courtesy of Gabriel Pent.

In the pasture, the goal is to add trees without blocking too much light from hitting the ground, which could suppress forage growth. Trees can be planted in rows, clusters, or evenly spaced in an orchard-like planting. Fast growing species such as locust, alder, willow, and poplar offer an advantage because they can quickly grow above browse height, which allows for faster integration with grazing management.

In any case, a balance has to be struck so that all parts of the system are optimized. Remarkably, research has shown that some pasture grasses actually perform better under partial shade. Less surprising is that animals also do better, benefiting from the cooling effects of shade, especially in the hot summer months.

The original article was published for Cornell Small Farms and can be found here: [Cornell Small Farms: 6 Key Principles for a Successful Silvopasture](#)

## 2. Animals are matched to land type and stage of succession

It's critically important from the outset that the appropriate animal is chosen for a given site in order to reduce the potential of inflicting damage to the landscape. Animals are incredible at what they do, but it cannot be overstated that they have just as much potential to do good as they do harm. Some of the potential risks include:

### **Cows:**

Excessive stocking/duration with their weight could damage soil, tree roots, and cause erosion, also prone to easily destroy young trees.

### **Pigs:**

Could root and trample desired vegetation and make a moonscape of your woods or pasture in a very short amount of time.

### **Sheep & Goats:**

Depending on forage type could overgraze the landscape and/or strip the bark off young trees, killing them.

### **Poultry:**

Could scratch or root down to bare soil and damage roots and plantings.

Animals can do a lot of good, or a lot of harm. You can see from the above list that most of the problems can be avoided by doing proper assessment of the land and engaging with the animals to ensure they are moved before doing harm.

In addition to choosing the right type of animal for the system, careful selection of the specific breed is an essential task. Some breeds are able to utilize a wider range of forage and conditions, whereas others are not as willing to be as flexible. Often, farmers can have success "training" animals to be better browsers on a range of forage, if they are not accustomed to seeking it out.

## 3. Animals are always on a rotation

This principle is implied above, and proper rotation of animals has been shown to have a myriad of benefits to a farm. Moving animals allows for a given paddock to rest and recover, which is critical to maximizing forage quantity and quality. Moving animals is good for them, as well, as they have reduced exposure to disease and are receiving the highest quality food possible.

This aspect of silvopasture is NON-NEGOTIABLE, and is often the biggest hurdle for adopting the practice, especially by grazers who have been practicing continuous grazing (leaving animals in one large paddock) for some time. Regardless, it is the universal opinion of silvopasture advocates that animals should not be placed in tree-based systems if they will not be managed through rotational grazing.



Sheep at the authors farm grazing a paddock with planted Willow and Black Locust. Photo by Steve Gabriel

#### 4. Trees should match the soil type and microclimate and have multiple functions

One could arguably plant trees for the sole purpose of shading their livestock, but why not aim a bit higher? There are so many choices in the temperate climate for trees that will do well in even the worst of soils that provide not only shade but a number of other possible yields. Of course, the yields will depend on how the trees are managed, and are easier to “control” when establishing a silvopasture in open field conditions versus an existing forest.

The goals of the farmer or landowner also come into play, as there is not use planting apple trees, for instance, if there isn't a desire to harvest apples. Some farmers want to establish the lowest maintenance trees possible. Some want a yield of fruit in 3 – 5 years or of nuts in 5 – 10. And some are happy to plant timber species and wait 50 or more years to harvest. A few of our favorite silvopasture species include:

##### **Black Locust (*Robinia pseudoacacia*)**

is hardy, resilient, and produces some of the most rot resistant wood in the temperate climate while also offering high-protein fodder for animals with essentially the same nutrition as alfalfa.

##### **Willow (*Salix* spp.)**

are a huge genera of trees that are highly adaptable and produce condensed tannins that have been shown to reduce some parasite loads in grazing sheep

##### **Mulberry (*Morus* spp.)**

are fast growing, highly productive, and very palatable for all grazing animals, including mono-gastric (single stomach) pigs and poultry.

##### **Poplars (*Populus* spp.)**

offers one of the most valuable fodder and shade species that can be quickly established in a silvopasture.

#### 5. Forage and fodder should be diverse and support a resilient food supply for animals

One of the largest opportunities in silvopasture is the creation of a wide range of ecotypes, which can support a wider range of grasses, forbs, herbaceous plants, and trees for animal feed. This gives animals a more diverse and healthy diet that is not only nutritious, but potentially medicinal. In essence, the design of a diverse silvopasture offers animals a habitat that might resemble their “original” experience grazing in the wild.

Angus grazing a Black Locust and Walnut plantation at Angus Glen Farm, run by Schuyler County extension educator Brett Chedzoy.



Farming has oversimplified animals experience of seeking food; in some operations the animals only visit the feed bin for grain or hay. This not only offers a limited diet in terms of nutrition, but starves the animals of needing to exercise their innate characteristics for seeking out food in the landscape.

In addition to supporting overall health and well being of the animals through diverse forage, this focus provides an economic incentive for the farmer. More diverse feeds should reduce the feed bill and also provide food in lean times, as tree-based systems can often buffer better against long-term drought and even excessive rain. Since grasses grow on a bell curve, they often “peak” in early summer and production is lower in July and August – unless the forages are shaded and can thus sustain better quality for a longer period of time.

Careful matching of forage to these micro-environments is the challenge. For example, for most silvopasture in the eastern US, cool-season grasses are utilized, as they excel in part sun environments. Warm season grasses are best for overly sunny or dry areas, or warmer climates. The trees effectively help keep the optimal conditions for the cool season grasses throughout the summer months. This, coupled with the careful selection of trees that leaf out at various times and provide a range of shade conditions, can optimize production.

For instance, Black Locust is a great silvopasture species as it leafs out late in the spring and when fully leafed out casts a mild shade, allowing the space underneath to be cool and somewhat shady, but not to the point where grasses would be stressed for light.

6. The system is optimized to stack inputs and outputs in both space and time

The beauty in silvopasture systems is not in the parts, but the complex whole that is created by these systems. Yet, with complexity comes a challenge in management – this is indeed why agriculture in the US and other industrialized nations has been on a trend for more straight rows, single species monoculture, and rationed feeds. It’s easier to do the math. But the benefits of creating a more complex ecology outweigh the perhaps more difficult time it takes to design, establish, and manage such a system.

Being patient is key. Few of us are raised in a culture where we understand a more natural way of farming. Many are interested in the concept of a more complex ecology, yet find themselves overwhelmed and frustrated as they try to comprehend and understand things. It’s wise then, to start small and slow, especially if you are new to one or more of the two main aspects of this practice (grazing and forestry).

Draw upon the knowledge of others, and recognize you are in for a lifetime of learning. Get the foundations of grazing right from the start, then bring in the forestry aspects. The content of the book, along with the case studies of farms actively practicing silvopasture, will help paint a picture of how this can be done.



Steve is an Extension Specialist focused on specialty mushroom production and agroforestry. Throughout his career, Steve has taught thousands of people about the ways farming and forestry can be combined to both benefit the ecology and economies of small farms. He is also a farmer, author, hiker, and musician.



## Special Species Highlight: Pawpaw (*Asimina triloba*)

This CCE Columbia & Greene publication of Grow, Manage, Harvest can be found on MyWoodlot along with many other helpful agroforestry and woodland stewardship resources.



Food & Wine DB Beyer Getty Images

### Introduction to Pawpaws

*Asimina triloba*, the pawpaw, is often referred to as America's forgotten or lost fruit. This native woodland dwelling shrub has a range spanning nearly all eastern states and a rich history with deep ties to our country's culture. The story of the pawpaw is that of a true underdog with missed opportunities for the fruit to rise in popularity. For many reasons and circumstances, this fruit remains relatively unknown to the mainstream markets, but is gaining ground with the local food movement as well as with an increased emphasis on planting natives. Get ahead of this trend and consider introducing a native, edible plant to your woodland!

## General Characteristics

Pawpaws are small deciduous trees that are hardy in Zones 5 to 8 and usually grow 15 to 20 feet tall (up to 40 feet under ideal conditions). They are attractive, with large, showy leaves and a pyramidal shape. Sometimes suckers form creating a paw-paw thicket.

Pawpaw flowers are maroon and inconspicuous, about 1.5 inches across, and appear in late May before the leaves expand. Depending on pollination, trees bear clusters of one to 6 fruit. The fruits are usually 4 to 6 inches long with thin green skin and whitish flesh.

Two unrelated Pawpaws are required for successful pollination. Hand pollination can increase fruiting, because bees show little interest in flowers. Flies can pollinate pawpaw flowers, so some growers hang pieces of rotting meat from the plants to attract them.

When ripe, fruits turn yellowish-black, resembling over-ripe bananas in looks, texture and somewhat in flavor. The flesh is rich and sweet with a custard consistency, very distinctive flavor, and many dark brown seeds about the size of lima beans. Fruits ripen from mid-September until frost. They are very perishable and considered too fragile for commercial handling. While usually eaten fresh, there are many culinary applications for this fruit.



## Growing Pawpaws

This relatively easy to grow plant does not require much once it gets started. Not much but years of patience, with an average of 8 years from seedling to fruit. In the meantime, while one waits to reap the fruits of their labor, the beauty and ecological benefits of this shrub can be enjoyed.

Pawpaws, in their natural habitat are found under the canopy of a woodland, usually in rich bottom-land soils near streams or rivers. When planting, try to choose a site that mimics the plants natural habitat. Rich, well-draining soils with a pH between 5.5 and 7 is preferred.

Seedlings benefit greatly by protection of shade as the young leaves are quite sensitive to direct sun. Once they have reached a few years in age, removing the shade and exposing the plant to full sun will result in much more robust fruit crop. A grower than has a few options to meet this need. If the pawpaw is grown in a container for the first few years, the habitat can be adjusted by moving the plant. If the grower prefers to plant directly in the ground, the forest canopy can be simulated with shade cloth placed over the plant. Or, get creative by using a fence, structure, or other plants that will cast shade on the plant for its first few years. Once it has grown to a height that will surpass the shade, the plant will be hardy enough to receive full sun.

If you have decided to grow Pawpaws, you have a few options to get started- begin with a seed, consider grafting or purchase a plant from a nursery.

## Seed

Seeds can be sown in the fall to over-winter outdoors or can be stratified by exposing to cold temperature (32-40 degrees) for 90 to 120 days. This can be done by packing the seed in moist, not soaking wet, media in a bag and placed in the refrigerator through the winter months. Seed should never be allowed to dry out. After the stratification (exposure to cold) period is complete, the seeds can be planted in the ground or in containers. Since the seed coat is very thick, scarification is recommended to break the coat and speed up germination. Scarifying the pawpaw seed can be done a few ways. Soaking the seed overnight in water, creating a small cut in the seed coat with a knife or wrapping the seed in moist towels are all options to speed up germination. This is highly recommended in NYS due to our short growing season. Speeding up germination will allow for increased time to grow a seedling that will be healthy enough to survive the coming winter months.

If sowing seeds into containers, use deep pots or tubes to allow for healthy roots. As the winter approaches, these seedlings will need to be protected. They can be left in pots and put in the ground with a pot in pot nursery technique or placed in a sheltered area packed with straw or some other insulating material. Transplanting in the fall from pot to ground is not recommended for Pawpaws. The seedlings can be grown out in their containers for a few seasons or transplanted to their permanent location in the spring. This seedling can be allowed to mature and express its genes or the grower can choose to graft a cutting onto that seedling for more predictable fruit.

## Grafting

Very much like apples, and many other tree fruits, Pawpaws grown from seed do not exhibit the same traits as the tree the seed was collected from. As mentioned, two unrelated Pawpaws are required for pollinations and these mixed traits are unpredictably expressed as the seedling matures. Plant breeders have been developing cultivated varieties (cultivar) for decades - breeding for traits such as flavor, seed size, shelf life and time of ripening. If you buy a pawpaw seedling from a nursery, chances are it is a grafted tree. This means that a plant was grown from seed to serve as a root stock and then a cutting was taken from a desirable cultivar and was grafted onto that seedling. This explains why the price of a pawpaw from a nursery can seem expensive. Decades of plant breeding could have gone into that one cutting attached to the rootstock. If you have access to mature Pawpaws, a grower can make their own grafted tree by following these steps.

### Year 1

- Enjoy pawpaw fruit in the fall!
- Collect seeds from that fruit.
- Stratify the seed overwinter (follow instructions above)

### Year 2

- Grow out as container stock
- During the next fall, sample pawpaw fruit. Make note of your favorite tree.
  - Overwinter your container stock

### Year 3

- In late February or March, visit your favorite tree and collect branches.
- The size of the branches should match the size of the growth on your container stock.
  - Wrap the cutting(s) up and keep in the refrigerator until early spring
- In the spring, and active growing begins on your seedling(s), attach your cuttings with a graft.

*Do not let any buds below the graft grow as they will have unknown characteristics from the seed.*

## Purchasing Seedlings

As mentioned, Pawpaws can be purchased from a nursery, generally as a grafted tree about 2-3 years in age. This is quite appealing considering the up to 8 year wait from seed to fruit. The nursery will likely provide a buyer with planting and care recommendations. Varieties for different growing zones are usually available. If growing in NYS, be sure to choose a cold hardy option.

## Management & Care

When planting your Pawpaws, space the trees 5 to 8 feet apart. This plant has very few pests and diseases, but like any plant, spacing too closely will reduce airflow and can increase the likelihood of fungal or bacterial pathogens. If the trees are spaced too far apart (more than 8 feet) this will increase the need to hand pollinate as wind will be less dependable.

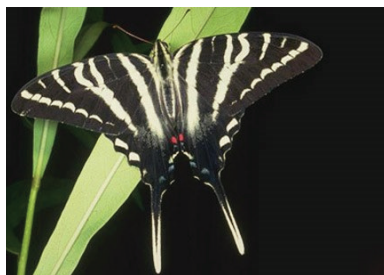
In the wild, Pawpaws will form thickets from suckers. Increased vegetative growth will result in reduced fruit production. This can be avoided with annual pruning in the winter. As a tree can reach up to 40 feet tall in ideal conditions, a grower may want to consider pruning the tree to keep the fruit in reach.

Deer rarely browse this plant so fencing is usually not necessary. Other mammals and most insects tend to avoid browsing on the Pawpaw as well. The tree is high in annonaceae acetogenins which function as a natural deterrent to most pests. This quality makes the tree an ideal candidate for organic production.

Picture: Young pawpaw tree. Photo by Department of Horticulture, Cornell University.



## Ecological Benefits



As a native plant, the Pawpaw has evolved with our local ecosystem and because of that, is in harmony with our flora and fauna. Plants which are non-native have the potential to serve as competition. This plant can provide habitat to many insects but is particularly valuable to the Zebra Swallowtail butterfly as it is the only species that serves as a larval host. This relationship is comparable to that of Monarchs and Milkweed. The excess fruit of this plant (if there is any) is a great food source for mammals

## Harvesting

The fruit will ripen between September and your areas first frost. Ripening time can vary from plant to plant and from season to season. Some varieties of Pawpaws will have visual cues such as a shift in the color of the skin. For the most part, giving the fruit a gentle squeeze, feeling for a little give, is the best test to determine ripeness. If the fruit is harvest too soon, it will never reach its full potential of ripeness. Waiting too long will result in the fruit dropping from the tree and becoming bruised by its impact of the ground. This will considerably reduce the fruits already short shelf life. Once you have harvested your Pawpaws and they are at peak ripeness, they can be kept in the refrigerator for a week or to extend their shelf life.



Pictures: (Above) Jerry F. Butler, University of Florida. (Right) Tracey Testo, CCE Columbia & Greene.

## Culinary Uses

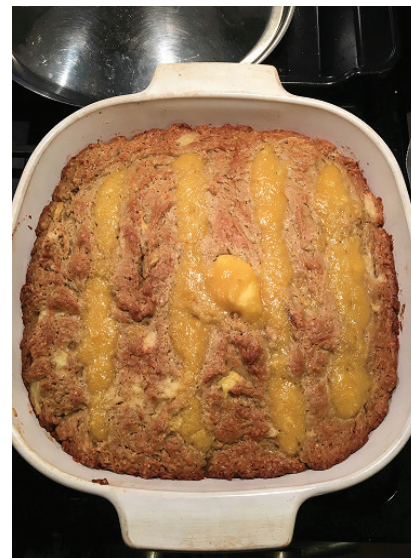
Arguably the best way to eat a pawpaw is with a spoon. Cut the ripe fruit open and enjoy, using care to eat around the seeds (which do have an element of toxicity). The seeds are large and easy to avoid. The culinary applications of this fruit are endless. Some of the most common uses are making a jam to spread on...anything, creating Pawpaw smoothies, and perhaps the most well-known use of making Pawpaw ice cream. Other more creative uses include Pawpaw beer, salsa, or bread. To preserve the harvest, the pulp of the fruit can be processed and frozen to enjoy later.



Processing Pawpaws. Photo by Tracey Testo, CCE Columbia Greene



Pawpaw butter. Photo by Tracey Testo, CCE Columbia Greene



Pawpaw butter. Photo by Tracey Testo, CCE Columbia Greene

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For more information, please visit: [www.ccecolumbiagreene.org](http://www.ccecolumbiagreene.org)

Or contact us at the Agroforestry Resource Center  
6055 NY 23, Acra, New York 12405 (518) 622-9820

To read the original article and review other pawpaw and agroforestry resources, visit:  
<https://mywoodlot.com/item/learn-about-growing-pawpaws>

# USDA National Agroforestry Center: Working Trees

The USDA National Agroforestry Center manages a large collection of agroforestry-related tools and information sources for those who want to learn, discover, teach others, and share. This wide range of general, technical, and research publications are available for download free of charge. Print copies of selected publications are also available upon request. The Working Trees series includes detailed brochures as well as information sheets. Here are just a few of the resources you can use to implement agroforestry practices in your woods!

Click here to see the complete list: [USDA National Agroforestry Center Resources](#)

# Working Trees

## Info

### Why add edible and floral plants to riparian forest buffers?

Multifunctional riparian forest buffers (MRFBs) offer the opportunity to produce perennial crops of native fruits and nuts, as well as floral trees and shrubs.

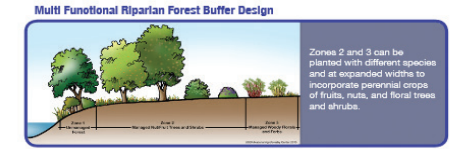
These products can be harvested and sold at retail or wholesale markets, and used at home. This information sheet provides examples of how these plants can be added to riparian forest buffers in the Appalachian region. As their name implies, MRFBs have a wide range of functions. They filter runoff and keep stream banks stable, helping to improve water quality by reducing the amount of nutrients and sediment that flows into waterways. They also shade the water, providing habitat for some cold water-dependent fish species. MRFBs provide habitat for wildlife, including pollinators, and can act as wildlife corridors, providing cover and food sources. Providing habitat for beneficial insects may reduce the need for pesticides, which may have an additional environmental benefit.



Elderberries can be a component of multifunctional riparian forest buffers. (Photo credit: Katie Commander/Virginia Tech)

Multifunctional buffers also have social benefits. By providing water quality, MRFBs contribute to safe, clean drinking water for all that live downstream. Increased wildlife habitat means more opportunities for people to enjoy the outdoors through hunting, fishing, bird watching, and water sports. Riparian buffers planted with a rich diversity of native fruits, nuts, and florals offer the grower a special connection with local traditions, culture, and folklore. Pawpaws, for example, are rarely found on supermarket shelves, but have long been a delicacy. Older fans of pawpaws may buy them at farmers markets to savor a taste from their youth, while those new to pawpaws might further their appreciation of the land where they grow wild. American persimmon, when tasted at peak ripeness in the late fall or early winter, has an unparalleled flavor and is a traditional holiday treat. Serviceberry, also known as sarvis, Saskatoon, or juneberry, has an underappreciated blueberry-like fruit, and everyone loves the clouds of white flowers born in early spring. Native fruits, nuts, and florals are a part of what makes a region unique. Each region has its own set of native fruits, nuts, and florals with potential to be incorporated into MRFBs.

Elderberries can be a component of multifunctional riparian forest buffers. (Photo credit: Katie Commander/Virginia Tech)



### Edibles and florals harvested from multifunctional riparian forest buffers\*

Pawpaw	Persimmon	Elderberry
		
<b>Market Opportunities</b> With a tropical flavor, custard texture and high nutrient content, America's forgotten fruit can be eaten fresh or made into desserts.	<b>Market Opportunities</b> The "Fruit of the Gods," sweet persimmon can be sold fresh or made into pudding, jam, dried fruit and even beer.	<b>Market Opportunities</b> Coined "Nature's Medicine Chest" for its immune boosting properties, elderberries can be made into syrup, cough drops, juice, wine, jam and food coloring.
<b>Average Prices</b> Fresh fruit: \$2/lb wholesale \$3+/lb retail Frozen pulp: \$6/lb retail Jam: \$6/oz jar retail	<b>Average Prices</b> Fresh fruit: \$2.75/lb retail Frozen pulp: \$3+/lb retail Dried fruit: \$11+/lb retail	<b>Average Prices</b> Juice: \$15-\$17/11oz jar Syrup: \$18/4oz jar retail Wine: \$10-\$13/bottle retail Cough drops: \$2.50/16 retail
Hazelnut	Woody Florals	Black Walnut
		
<b>Market Opportunities</b> A great source of fiber and 'good' fats, hazelnuts can be sold in shell or shelled and made into flour, oandies, butters and oils.	<b>Market Opportunities</b> Woody florals, such as pussy willow, timber and yellow twig dogwood, can be coppiced every 2-3 years and sold to the floral industry or used in crafts.	<b>Market Opportunities</b> This multi-use tree produces valuable timber and heart-healthy nuts sold in shell or shelled.
<b>Average Prices</b> In shell: \$3/lb wholesale Shelled: \$6.90 retail Oil: \$8.90/lb jar retail	<b>Average Prices</b> Cuttings: \$0.37-0.45/ft stem retail Wreaths: \$45-60 retail	<b>Average Prices</b> In shell: \$9.25/lb retail Shelled: \$12/lb retail

\*Prices can vary considerably by season and local markets.

APALACHIAN sustainable DEVELOPMENT

Forest Resources & Environmental Conservation

USDA National Agroforestry Center

Contact: USDA National Agroforestry Center, 402-437-9178 ext. 4211; fax: 402-437-9113; 1349 N. 15th St., Lincoln, Nebraska 68502-0022. [usa.nat.usda.gov](#)

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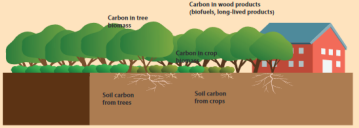
# Working Trees

## Info

### How can agroforestry increase carbon sequestration?



The tree and shrub components of agroforestry practices contribute to carbon sequestration by using carbon dioxide for photosynthesis and storing carbon above ground in tree trunks and branches, in wood products, and in soil. This carbon can stay in the tree or soil for a long time. If the tree is harvested for wood products, the carbon remains sequestered for the life of the product, such as in building or furniture. Additionally, agroforestry systems can also produce fuel, reduce other greenhouse gas emissions, and sequester carbon.



Here are some strategies for how these agroforestry practices can be designed to maximize carbon sequestration on agricultural land:

- Alley cropping:** In addition to rows of trees, other perennial crops can be intercropped in the alleys, increasing the overall land-use efficiency and carbon sequestration capacity.
- Silvopasture:** Choosing agroforestry systems that add trees to pasture generally sequesters more carbon than creating trees to create silvopasture.
- Windbreaks:** Adding additional rows to a windbreak design, selecting species that grow biomass quickly, or selecting species that are used in wood products can further the carbon sequestration potential of a windbreak system.

To enhance carbon sequestration potential of current or future agroforestry practices, land managers and technical assistance providers can use existing tools. These tools include COMET-Forest and COMET-Fields, which allow the user to generate reports that estimate carbon change and production per acre based on different management choices for a field or farm. Agroforestry practices provide important ways to increase carbon sequestration while also providing other production and conservation benefits. This carbon sequestration is a good option for farmers and land managers interested in increasing carbon sequestration while diversifying their operations.

For more information on climate change, visit [www.fsa.usda.gov/topics/climate-change.php](http://www.fsa.usda.gov/topics/climate-change.php)

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# Working Trees

## Agroforestry Working Trees for Communities

### Info

#### What are agroforestry's income opportunities?

Agroforestry is an approach to land use that incorporates trees and shrubs into agricultural systems and allows for the production of crops and/or livestock from the same piece of land. It offers ways to take advantage of profitable product markets and, at the same time, help improve the land and the environment.

Look at the fields, woods, streams and fence rows around a farm or ranch. Are any of these areas under utilized? There are many opportunities for farmers and ranchers to introduce agroforestry practices on their land, which may open up new income possibilities while adding conservation benefits. Get started by taking a look at our land.

Does your farm or ranch have... **unhabilitated farmlands and livestock areas, fence lines or degraded woodlands?**

**Income Opportunities:** Wood for lumber, specialty forest products, food

**Agroforestry Practice:** windbreak

Mulch or woodchips are often in produce marketable products like hybrid poplar, wood, saw, maple, cherry, blackberries and woody floral products. Expenses can be sold as Christmas trees, bought for seasonal floral products or in landscaping plants, while adding color to farms and providing protection for hives and other wildlife.

Does your farm or ranch have... **neglected or under utilized woodlands?**

**Income Opportunities:** Wood for crops, timber, specialty forest products, food

**Agroforestry Practice:** forest farming

Wood-product markets can potentially produce high quality lumber, firewood and valuable specialty forest products like maple syrup. The store may be another income generating option from habitat or landscape plantations where there are markets.

Does your farm or ranch have... **marginally productive fields?**

**Income Opportunities:** Wood for lumber, fuel, saw and many other crops

**Agroforestry Practice:** alley cropping

Blackberries, chokeberries, elderberries, cherries, hazelnuts, and many other low growth perennial crops include high quality products. Possible tree crops include walnuts, hickory nut plants, dogwood, and many other woody plants. These systems will produce valuable products while protecting the land.

# Working Trees

## Info

### What is silvopasture?

**Silvopasture** is the deliberate integration of trees and grazing livestock operations on the same land. These systems are intentionally managed for both forest products and forage. This managed silvopasture system provides multiple benefits, including improved soil health, increased carbon sequestration, and enhanced grazing systems that enjoy short grazing periods which maximize vegetation growth and forest Silvopasture.

**Agroforestry Working Trees for Wildlife**

Working Trees provide habitat and contribute to the social and economic well-being of landowners and community residents.

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# Agroforestry Resources

## General Agroforestry

[Cornell Small Farms Program](#)  
[USDA National Agroforestry Center](#)  
[MyWoodlot](#)

## Forest Farming

[CCE Columbia & Greene County Agroforestry Resource Center](#)

## Maple

[CCE: Getting Started with Small-Scale Maple Production](#)

[Cornell Maple Program: Maple Syrup Production Beginner's Notebook](#)

[Cornell Maple Program: Sugarbush Management Notebook](#)

## Silvopasturing

[Silvopasturing in the Northeast:  
An Introduction to Opportunities and Strategies for Integrating Livestock in Private Woodlands](#)

[ForestConnect: Evaluating the Potential of a Site for Silvopasture Development](#)

## Multifunctional Riparian Buffers

[USDA Working Trees: Why add edible and floral plants to riparian forest buffers?](#)

[Penn State Extension: Multifunctional Riparian Forest Buffers - more than just trees](#)

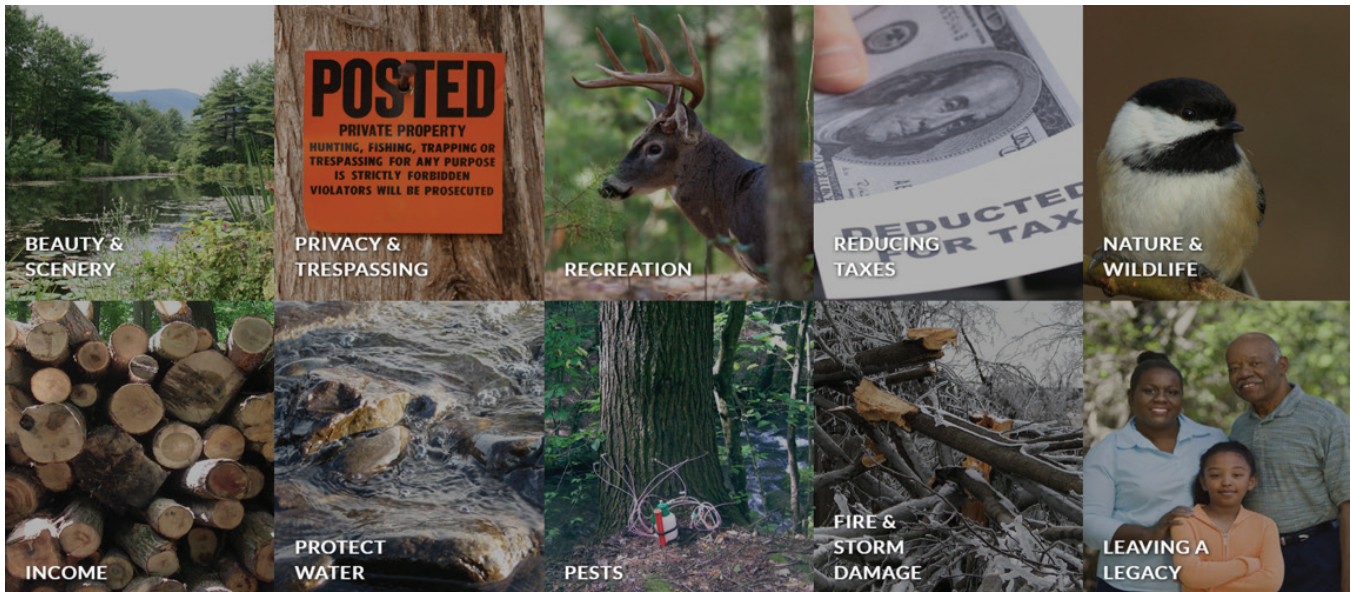
## Alley Cropping

USDA National Agroforestry Center  
[Alley Cropping: An Agroforestry Practice](#)

## Windbreaks

USDA National Agroforestry Center  
[Windbreaks: Resources and Case Studies](#)

# Resource Collections



## MyWoodlot

As highlighted above, MyWoodlot offers a wide selection of resources on woodlands. There are activities and blogs from professionals and other landowners that highlight projects and ideas that you can actually implement. The activities broadly include beauty and scenery, privacy and trespassing, recreation, reducing taxes, nature and wildlife, income, protecting water, pest, fire and storm damage, and leaving a legacy.

Create your MyWoodlot profile for free to save and organize activities and resources that match your goals. Follow the link below to begin exploring all these resources and keep up to date with new activities that are added weekly!

[Visit MyWoodlot](#)

## ForestConnect

A Cornell University resource to connect woodland users to the knowledge and resource needed to ensure sustainable production and ecological function on private woodlands. The site houses information for woodland stewards, educational resources and offers countless webinars on a wide variety of woodland topics.

[Visit ForestConnect](#)

## CCE Columbia & Greene

Visit our site to find resources and more information on upcoming events. Our Natural Resources Team is also ready to support you in all your woodland stewardship goals. Please reach out if you're looking for specific information, have questions about your woods, or need assistance in determining next steps.



# Woodland Owner Networks

## Women Owning Woods

We are a group of women landowners and natural resource professionals from the Catskills and the Hudson Valley region of New York. We've organized this group of professionals and landowners as a way to foster learning experiences and discussions about forest property. Details about gatherings will be sent out via email in our eNewsletter. To subscribe to that list you can email [wow@nycwatershed.org](mailto:wow@nycwatershed.org) to join.

Follow us on Facebook to stay connected, share your stories, and learn from your peers.

[Find WOW on Facebook](#)

## Master Forest Owner Volunteers

The Master Forest Owner (MFO) program provides private woodland owners of New York State with the information and encouragement necessary to manage their forest holdings wisely. Since its inception in 1991, MFOs of Cornell Cooperative Extension have helped over 1,000 landowners. The term "Master" Forest Owner implies education as in "School-Master". Experienced and highly motivated volunteer MFOs are available statewide, ready to assist neighbor woodland owners with the information needed to start managing their woodlands, through free site visits to landowners properties. The training volunteers receive complements their experience as forest owners.

[Learn more about the MFO Program](#)

## Catskill Forest Association

The Association was formed for the purpose of promoting knowledge and understanding of forest ecology and economics; to promote long-term forest management; to educate the public and enhance the economy of the Catskill region; to demonstrate economically feasible and environmentally sound forest practices; to serve as a source of information about forest management; to serve private landowner rights; and to identify and manage private forest lands dedicated to the demonstration and practices of high standards of forestry.

[Learn more about the CFA](#)

## New York Forest Owners Association (NYFOA)

The mission of the New York Forest Owners Association (NYFOA) is to promote sustainable forestry practices and stewardship on privately owned woodlands in New York State.

[Learn more or join NYFOA](#)

# Cornell Cooperative Extension Columbia and Greene Counties

Agroforestry Resource Center  
6055 Route 23  
Acra, New York 12405

Postage

## Connect

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Email: [columbiagreene@cornell.edu](mailto:columbiagreene@cornell.edu)

Phone: 518-622-9820

 @CCECColumbiaGreene

 @ccecgc

## Mission

Cornell Cooperative Extension Columbia and Greene Counties puts knowledge to work in pursuit of economic vitality, ecological sustainability, and social well-being. We bring local experience and research-based solutions together, helping Columbia and Greene County families and communities thrive in our rapidly changing world.

CCE Columbia and Greene Counties is a registered 501(c)(3) nonprofit.

Cornell Cooperative Extension is an employer and educator recognized for valuing AA/EEO, Protected Veterans, and Individuals with Disabilities and provides equal program and employment opportunities.

