

SUSTAINABLE AGRICULTURE SOLUTIONS FOR APPALACHIA:

MULBERRY AGROFORESTRY



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WHY DO WE NEED SUSTAINABLE AGRICULTURE?

“A nation that destroys its soils destroys itself. Forests are the lungs of our land, purifying the air and giving fresh strength to our people.”

-Franklin Delano Roosevelt

The leading causes of soil loss worldwide are industrial agriculture and deforestation. Both tilling and clearing the land expose it to rapid soil erosion resulting from heavy rains and winds. By continuing our current land use strategies, the Food and Agriculture Organization (FAO) of the United Nations estimates that we will run out of topsoil in the next 60 years.¹ At the same time the FAO estimates that by 2050 we must increase agriculture production by 70% to feed a growing population.²

With increasing demand for food worldwide, even Appalachian hillsides will have to pull their weight. We can exacerbate the problem by clear-cutting then plowing our hills to make way for erosive intensive annual agriculture, or we can try to create a regionally adapted, sustainable agriculture system.

ENTER AGROFORESTRY

Agroforestry is broadly defined as agriculture that deliberately incorporates trees and other woody perennials into productive farm systems. Trees provide many benefits including anchoring soils to the landscape with their roots, protecting the ground with their canopies and leaf fall, sequestering carbon, producing oxygen, and fostering biodiversity, among other benefits. When planting a tree, the soil is disturbed once and then requires no degrading annual tillage. Instead, growing trees builds soils and increases soil organic matter over time.³

Agroforestry revitalizes degraded landscapes, economies, and communities around the world, and the same could be true for Appalachia.⁴ Our hills want to grow trees, and only by unceasing labor can we hold them back. Instead let's let them go, guide their growth to our benefit, and plan for a regional tree-based agriculture. With such guidance from landowners and farmers, the Appalachian forests of the future can be highly productive agriculture systems.

Appalachia is rich with native fruit and nut trees that could provide the basis for our food system and for a thriving renewable natural resource based economy. Hickory nuts are more flavorful than pecans, and improved black walnut cultivars are available with large nuts and thin shells. Integration Acres⁵ in Albany, Ohio is already the world's largest pawpaw processor. Why not also make Appalachia the world's largest producer of native persimmons, acorns, and other adaptable species like Chinese chestnut⁶ and hybrid hazelnut?⁷

Any of these species has great potential to support sustainable agroforestry, but I want to introduce you to what J. Russel Smith in *Tree Crops: A Permanent Agriculture*⁸ calls the “King [of crops] without a throne.”

THE KING OF CROPS: MULBERRY

Mulberry is an extremely adaptable, vigorous deciduous tree species found worldwide from the humid tropics, to semi-arid lands, from mountain tops to the hills of Appalachia.⁹ The most common varieties of are the Asian-originated *Morus alba* (White Mulberry) and *Morus nigra* (Black Mulberry, which cannot tolerate cold winters), the North American *Morus rubra* (Red Mulberry), and hybrids of *alba* and *rubra*.¹⁰

NOTES ABOUT COMMON VARIETIES

Morus alba, because of its vigor and adaptability, is considered invasive in many parts of the United States. It spreads easily by seed and is



carried far and wide by birds. It readily hybridizes with *Morus rubra*, and the new generations of hybrids compete with the native *rubra*, threatening to replace pure *Morus rubra* in the wild entirely. Already firmly established in Ohio, *Morus alba* is here to stay.

Encouraging farmers and homeowners to plant more *alba* may be considered a disservice to the local ecosystem in some agriculture circles. While I have experimented with many *Morus alba* cultivars, moving forward at Solid Ground Farm, our plan is to focus on finding good wild *Morus rubra* cultivars, as well as planting *rubra* hybrids, though they may also be considered invasive. For the purposes of this booklet, however, I will discuss mulberry tree varieties that work for specific reasons. These recommendations are neither supportive of a specific cultivar nor intended as suggestions against others, just what is currently in use.

HABIT

Mulberry trees range in size from large shrubs to 75ft. tall trees (*rubra* being the tallest), commonly with a spreading or sometimes weeping form. Trees can be male, female, or both on one tree, but only female trees bear fruit. A male tree is not required for fruit but one or several are required for seeded fruit.

While mulberry prefers a neutral (pH), well-drained loam, and full sun, it will thrive in degraded soils, survive drought, and fruit even in partial shade. Extremely late to flower, and even producing secondary flowers if the first ones are killed by a late frost, mulberry trees are consistent annual producers of delicious blackberry sized fruit that also resembles it. The fruit is abundant, very sweet, soft, juicy, and notorious for staining the hands and faces of children.



Grafted trees begin bearing immediately and reach good production at 4-5 years. At the peak of production (around ten years), a single tree can produce up to ten bushels of fruit a year and continue to fruit for a hundred plus years. *Morus nigra* is the longest lived, while some of the *alba* cultivars may only produce for 15 years.¹¹

USES

I have grown almost every type of fruit on my property, and I believe that mulberry is hands down the easiest fruit tree to cultivate and most consistently productive of them all. Mulberries can be eaten out of hand, dehydrated, frozen, or turned into jams, jellies, pies, wine, etc. They are nutritious and delicious and are a favorite snack of children. At my summer camp for kids, Rising Appalachian Warriors¹², campers will spend hours under the mulberry trees picking and eating fruit.

Depending on the variety, mulberry trees can fruit from the end of May into August, and if you plant a diversity of cultivars, then you can enjoy fresh fruit all summer. Amazingly, they have little to no pests or diseases in our region, require no chemical spraying, and mulberry trees can flourish without pruning, fertilizing, or irrigation (although a little attention can certainly increase yields). Mulberry authority AJ Bullard stated in a recent phone conversation with me that southern growers are beginning to report some disease issues, particularly with *rubra* x *alba* hybrid cultivars. However, I have not observed any disease problems in Ohio as of this writing.

The fruit (and the leaves, shoots, and stems of *Morus alba*) are also relished by almost all livestock from hogs and poultry to sheep, cattle, and silkworms. *Morus alba* leaves have been cultivated as the sole food source of silkworms for at least 5,000 years.¹³

In *Tree Crops: A Permanent Agriculture*, J. Russell Smith describes North Carolina hog farms of the early 1900's, each planted with hundreds of ever-bearing mulberries that provided a free summer food source each and every year. Growing corn and soybeans to feed livestock is a leading cause of both deforestation and soil loss (not to mention the ever increasing cost of feed). Smith states that a single ten-year-old "Hicks" variety mulberry tree can act as the sole food source for 2 four-month-old hogs for one month... and the hogs do all the harvesting themselves. Imagine feeding livestock for free from on-site mulberry fruit and leaf fall instead of from shipped-in feed grown in another state.

HEALTH BENEFITS OF MULBERRIES

Some of the established health benefits of consuming mulberries¹⁴ include their nutritional content:

- Iron
- Riboflavin
- Vitamin C
- Vitamin K
- Potassium
- Phosphorus
- Calcium
- Dietary fiber

Mulberry's wide range of organic compounds:

- Phytonutrients
- Zeaxanthin
- Resveratrol
- Anthocyanins
- Lutein
- Various polyphenolic compounds

The physical health benefits of mulberries include their ability to:

- Improve digestion
- Lower cholesterol
- Aid in weight loss
- Increase circulation
- Build bone tissue
- Prevent certain cancers
- Slow down the aging process
- Lower blood pressure
- Protect eyesight
- Boost the immune system

APPLICATIONS FOR APPALACHIA

Whether you live in town on a small lot, or have hundreds of acres of farmland, you can benefit from planting a mulberry tree... or a few hundred. A homeowner with a small backyard, a homesteader with a few acres of land or commercial scale farmers can all incorporate mulberry trees into their sustainability efforts.

HOME-SCALE FOOD PRODUCTION

I recommend that everyone with a yard plant a mulberry tree. Grafted female mulberry trees are self-fruitful, provide free, low-maintenance fruit, edible and medicinal leaves, and they can grow in most conditions.

For small spaces, consider planting a dwarf mulberry such as the Gerardi Dwarf, or consider a potted mulberry like Dwarf Everbearing Black Mulberry or Dwarf Issai, either of which can be kept between 2ft. and 6ft. with pruning.

When you plant any of these or other dark fruited varieties, you must consider where you want to put it so the fruit does not stain cars, sidewalks, or get tracked into the house. Also, birds tend to gorge themselves on the ripe fruit and leave droppings nearby. If mess is an issue, grow a white fruited Beautiful Day or a Sweet Lavender mulberry. Both are non-staining and of less interest to birds, however, they are both of the invasive *Morus alba* species.

HOMESTEADERS

In many Middle Eastern countries, mulberries are grown and dehydrated for use as a staple crop. I like to freeze them and eat them all winter long. Either way, if you want to feed your family delicious fruit on the cheap, consider growing a mulberry orchard. Varieties like Illinois Everbearing, and Silk Hope (both *Morus Rubra* x *Morus Alba* hybrids) bear continuously for months with a new batch ready each day for harvest. If you prefer a shorter harvest window, the Korean mulberry, Kokusa, ripens somewhat precipitously.

Standard sized mulberry tree saplings can be planted at 25ft. spacing, and will do best grown with a nitrogen fixing companion plant like a ground cover of clover or an interplanting of thornless honey locust. Anecdotal evidence suggests that mulberries and apples make good companion plants. Bush varieties also do well planted with black walnut and can fruit in the dappled shade of a mature tree.

COMMERCIAL PRODUCTION

If growing fruit for the farmer's market, you will need to hand harvest it and that means the trees need to be pruned annually to keep the fruit within reach. Alternatively, you could plant a dwarf variety like



Gerardi, though it will still require regular pruning. If you choose to prune as a shrub, mulberry trees can be planted on 8ft. spacing.

Mulberries are soft and don't store well, so they must be picked immediately before market. I like to pick and place the fruit directly into the sale containers so the fruit doesn't need to be handled again. Fruit that cannot be sold within a day or two can be dehydrated or frozen and later processed into value added products.

Morus alba varieties are often harvested by laying down a tarp and shaking the tree. If this is the strategy, then trees can be allowed to reach full size.

While trees do perform without much care, irrigated and fertilized trees are more productive, and, if commercial success is the goal, then mulberries should be treated like other market crops and shown care and attention. Birds will certainly eat a good portion of the crop, but with mulberries there are enough for everyone. Mulberry trees do not need pesticides, fungicides, or any noxious chemicals sprayed on them, unlike for many other fruit crops.

MULBERRY TREES FOR LIVESTOCK

LEAVES

Research shows that goats that forage on mulberry leaves exhibit an increase in milk production,¹⁵ while the leaves can supplement the diet of other ruminants and monogasts like pigs as well.¹⁶ When spring forages are slowing down, mulberry leaves are ready to go. They can be foraged in place, or cut and carried, or even dried for later use.



Pure *Morus alba* varieties have the most palatable and best leaves for livestock (and human) consumption. While in many other countries cultivars with especially large and nutritious leaves are readily available, the best option I have found domestically is *Morus alba tatarica*. This variety is an extremely dense tree growing to 35' that can be cut or foraged to the ground yet will quickly regrow, keeping the forage within feeding levels for livestock.

Seedlings can be purchased cheaply in bulk from many nurseries but are unsexed, which means that half of them could be males that won't fruit and will unfortunately produce a lot of noxious pollen. If you desire all female trees, then the trees must be clones (either grafted or grown from cuttings), and will be considerably more expensive. I've been field-grafting (topworking) female cultivars onto all of my three-year-old male seedlings in the pasture to convert them to fruit production. Whether the trees are male or female, you can still harvest at least two leaf crops a year for the livestock, and with the females you get a crop of fruit as well.

FRUIT

If fruit, instead of leaves, for hogs or poultry is your primary goal, then growing full size trees throughout the pasture is the way to go. For a continuous supply of fruit from late May into August, plant a variety of cultivars directly in the pasture. Suggested everbearing trees for this application are:

- Hicks
- Illinois Everbearing
- Downing
- Wellington
- David Smith
- Silk Hope

When planting trees in a pasture, it is important to project them from browsing for the first several years. My pigs and chickens forage for several months at a time among my three year old trees without damaging them. Other livestock such as goats may kill trees if left in a pasture with them for any length of time. The key to creating the right grazing system, as followed through permaculture practices, is to observe, interact, and adapt practice based on your observation and interaction feedback.

PLANTING AND CARE

“The best time to plant a tree was 20 years ago.
The second best time is right now”

-Chinese proverb

LOCATION

Planting a mulberry is like planting any other fruit tree, but because of their innate vigor, rates of success are much higher than for other fruits. Choose a suitable site: the sunnier the better, the richer the soil the better, but really any site that is not water logged, extremely chalky, or completely shaded will do. For any of these less ideal conditions, try a *Morus rubra* as it may grow just fine.

Make sure there is enough room for the tree, at least 25ft. between full size mulberry trees, or plan to prune it annually to keep it small. The other option would be to find a dwarf variety if your intent is for easy to reach fruit. Finally, consider where the fruit will fall and if it will stain anything important.

TIMING

Potted seedlings can be planted in the spring or fall. Bare root trees should be planted in the spring after the ground has thawed, just before a rainy spell is best.

METHOD

Dig a hole twice the diameter of the pot or big enough that the roots of the tree can be spread out in all directions (for bare root) The hole should be just deep enough that the tree can sit on firm soil and rest with the base of its trunk just above ground level. If I plant a potted tree, I like to plant it so that the top of the soil line of the root ball sits an inch above ground level.

Once the tree is in place, refill the hole with the soil that you dug out of it, pack it around the root ball or gently pack it around the spreading roots.

Soak it with few gallons of water. After it settles, readjust by packing more dirt so that the tree stands firmly upright.

Next, spread compost an inch deep around the base of the tree in a 2ft. circle.

Cover this whole area with pieces of overlapping flattened cardboard to smother any remaining sod or weeds.

Cover the cardboard with wood chips or other mulch to keep it from blowing away in the wind.

To protect the tree from rabbits, deer or livestock for the first two or three years while it gets established, first pound a post into the ground about two feet away from the tree, just outside the hole so you don't puncture any roots. I use metal electric fence line posts because they are cheap but strong enough to hold the protective cage. Next cut a 7 ft. or 8 ft. length of 4ft. tall, 2in. x 4in. welded wire garden fence and fashion it into a circular tree cage. Weave the post through the tree cage as you slide it carefully over the tree.

Water the tree (2 or so gallons) once a day for a week, once a week for a month, and once a month for a year, then maybe during a drought in the second year, and after that it can be on it's own.

The cardboard and mulch will keep the weeds at bay for the first growing season, if you did a good job. This can be redone each spring for the first few years or you can immediately begin mowing or scything around the tree a few times a year to keep back the competition. Every few years I add more compost and mulch to enrich the soil. Mulberries respond well to fertilization and commercial growers will want to seek professional guidance regarding fertilization and irrigation.



PRUNING

Pruning is done to control the size of mulberry trees, to give form and structure to the tree, to increase airflow and sun penetration, to increase access to fruit, and to renew and rejuvenate a tree.

1. When starting a pruning program, begin by coming up with a plan for what size and shape you want to give the tree in the long term.
2. Begin to shape the tree when it is young by cutting out branches you don't want and leaving the ones you do want (branches stay at about the same height over time, but thicken, lengthen and branch each year).
3. Always use sharp pruning saws and secateurs (shears).
4. It is generally best to prune when trees are dormant (I like to prune in early March but anytime after leaf fall and before bud break is good). Don't prune just before subzero temperatures or just before it rains.
5. Begin by cutting out any dead or diseased wood, and any crossing or crowded branches.
6. Keep cuts on live branches to under 2in. diameter to allow for the bark to grow over the cut and the tree to heal.
7. Make remaining cuts based on your management goals, keeping in mind that heavy pruning stimulates vigorous regrowth.
8. Make thinning cuts just outside a branch collar and heading cuts just above a bud on branches under 3/4 inch diameter, or for larger cuts, just above a limb/branch that is at least 1/3 the size of the limb being removed (so if cutting off the top of a 1in. branch it should be cut just above a side branch that is at least 1/3in. diameter).



9. If prunings are not diseased, they can be cut into small sections and left under the tree as mulch or run through a chipper. Larger branches make great firewood, and trunks can be used as rot resistant fence posts.

More general pruning information can be found online.¹⁷ I recommend attending a class if you can find one available in your region. If you are in or near Athens County, Ohio, Solid Ground Farm regularly hosts pruning workshops in February of each year.

SOURCES OF MULBERRY TREES

Beginning in 2019, Solid Ground Farm will offer grafted, potted mulberry trees of all the varieties mentioned in this booklet – and more. We will also sell scion wood for grafting your own trees. Great mail order sources of quality trees and seedlings can be found in the resource directory at the end of this booklet.¹⁸ When purchasing trees make sure they are hardy to your area. Solid Ground Farm is at USDA hardiness Zone 6, and, unfortunately, many of the long fruited mulberries are only hardy to zone 7. If in the United States, consider planting native *Morus rubra* for a hearty non-invasive beautiful tree.

Contact us at Solid Ground Farm to see how our value added mulberry research is coming along and consider planting some mulberries to sell wholesale to us.

CONCLUSION

Whether you live on a small lot or on a farm, mulberry trees should be part of your life. Although mulberries are just one of many tree crops that could transform the face of agriculture and move us towards a sustainable food system, I see them as the most promising and most delicious prospect.

Visit **solidgroundfarm.com** for more information and to learn about educational opportunities like grafting and pruning workshops, mulberry tastings, and more. Like **Solid Ground Farm** on Facebook to stay abreast of our projects and events.

CONTACT INFORMATION

For questions about growing mulberry trees or to order trees, contact Weston Lombard at:

740-856-6299

westonlombard@gmail.com

If you would like to access an international network of growers, consider becoming a member of **Mulberry Growers USA** on Facebook.

Thanks for reading,

Weston Lombard
Farmer/Organizer
Solid Ground Farm

RESOURCE AND CITATION LINKS

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- 18: Page 12, *Tree and Seedling Suppliers*
 - Solid Ground Farm (2019): solidgroundfarm.com
 - Whitman Farms: whitmanfarms.com
 - Burnt Ridge Nursery: burntridgenursery.com
 - Lawyer Nursery: lawyernursery.com
 - Twisted Tree: twisted-tree.net

Facebook Groups

- Solid Ground Farm
- Mulberry Growers USA



Rising Appalachia

Our mission is to develop, share, and celebrate sustainable solutions to home- and community-scale food production, and to demonstrate that through creative natural resource management, the land, as always, is still the basis of our health and wealth.

SolidGroundFarm.com

