

# Future Generations University

## Finding Additional Farm Value: Elderberry in Appalachia

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# Growing Elderberry in a Riparian Buffer

## Shrub Culture, Care, and Cultivation/Propagation

### Introduction

This plant, known as American elderberry, American elder, American black elderberry, common elderberry, or by its scientific name *Sambucus canadensis* or *Sambucus nigra ssp. canadensis*, is native to North America and commonly found in the central Appalachian region. The eight- to ten-foot-tall woody shrub-like plant grows on the outskirts of moist forests, in ditches or disturbed areas, and in wet areas with well-draining soils such as riparian forest buffer areas.

Parts of the American elder plant can be harvested for plant stock, wood, culinary, and medicinal products. The plant provides ecosystem services such as erosion control in riparian forest buffer areas, wildlife habitat and corridors, and a source of food to wildlife, including native pollinators.

The medicinal properties of the shrub's dark purple berries gave rise to its increase in popularity during the COVID-19 global pandemic. The berries are rich in vitamins, minerals, and antioxidants. There is a long history of using elderflower and elderberries to treat mild upper respiratory tract inflammation, fever, rheumatism, sore throat, and gastrointestinal illnesses.

### Enterprise Planning and Land Management

Sustainable land management is a key component to developing a successful nature-based enterprise. Work with a technical service provider to develop a management plan before investing in a new enterprise.

Depending on the intended purpose of the riparian forest buffer area, the design of the plantings will need to be considered. The publications cited below outline design guidelines for addressing water quality, biodiversity, productive soils, economic opportunities, protection and safety, aesthetics and visual quality, and outdoor recreation.

The U.S. Forest Service publication, [\*Conservation Buffers-Design Guidelines for Buffers, Corridors, and Greenways\*](#) by Gary Bentrup lists the following typical planning process:

1. Identifying problems and opportunities
2. Determining objectives
3. Inventorying resources
4. Analyzing resources
5. Developing alternatives
6. Evaluating alternatives and making decisions
7. Implementing the plan
8. Evaluating the plan

A guide titled “[Grow Agriculturally Productive Buffers](#)” by Liz Brownlee suggests the following practices for designing, managing, and growing crops in a riparian forest buffer area:

- Let the river meander.
- Follow the USDA’s [three-zone buffer design](#); Zone 1: Unmanaged Forest, Zone 2: Managed Trees and Shrubs, Zone 3: Managed Woody Florals and Forbs.
- Allow your buffer’s boundaries to “float” or move when the river changes.
- Do not protect plantings from the river’s natural movement with rip rap or other methods.
- The unmanaged strip along the waterway must be at least 10 feet wide (25 feet for medium and large farm operations).
- Leave banks in their natural state.
- Limit trampling and equipment damage on banks.
- Do not develop roads within the buffer.
- If trees or shrubs are already growing along your river, leave them in place, and plant crops in openings.
- Grow a diversity of perennial crops.
- If you amend soils, do so based on soil tests.
- Do not apply manure within the buffer.
- Limit application of chemicals to crops.
- Limit equipment use for planting, maintenance, and harvest.

It is important to note that riparian areas are prone to flooding and changes in shoreline. Before investing in new plantings, consult with a professional to assess the soils, slope, and hydrology of the riparian forest buffer area. Under the Federal Food, Drug and Cosmetic Act, if the edible portion of a crop is exposed to contaminated flood waters, the crop is considered “adulterated” and should not be consumed by humans (Graziosi 2016).

## Shrub Culture

*Sambucus nigra*, American elderberry, is a woody shrub-like plant that grows up to ten feet tall at maturity. See Figure 1 for mature form. It naturally grows in edge-conditions and open fields; it is often found in fencerows. Elderberry is an early succession species, so it establishes quickly in ditches or disturbed areas, and in wet areas with well-draining soils, such as riparian forest buffer areas.



Figure 1 - Mature elderberry shrub at the forest edge. (Photo credit: Ted Bodner, USDA PLANTS 2023)

### Cultivars

Understanding the characteristics of different cultivars helps to determine which cultivars align with site conditions, as well as the intended elderberry product or market. In central Appalachia, Jonathan McCray of Silver Run Forest Farm grows “Scotia” most successfully (McCray 2023). Popular commercial cultivars from the Midwest include Bob Gordon, Kelly 7-14, Ozark, Ranch, Rogersville, Wyldewood, and Pocahontas (McGowan 2017; Savanna Institute 2021). Adams, York, Kent, Nova, Victoria, Johns, Berry Hill, Coomer, and Goodbarn, as well as the previously mentioned Scotia, are cultivars that were originally developed in New England (Wilson 2016).

Refer to the University of Vermont Extension’s [Growing Elderberries: A Production Manual and Enterprise Viability Guide for Vermont and the Northeast](#) and The University of Missouri Extension’s publication, [Growing and Marketing Elderberries in Missouri](#), for more information about each cultivar.

## **Maturation to Calculate a Harvest Schedule**

Research indicates that American elderberry takes three to five years to reach a mature harvest. A partial harvest can begin as early as the second year, but this may impact the amount of time it takes to reach maximum yields. In year one, or the “establishment year”, remove flowers to redirect energy away from fruit production and instead encourage development of the plant's root system (Byers et al. 2022). With proper care and regular pruning, an American elderberry may produce for upwards of 20 to 30 years (Eifer 2009).

The timing of flowering and fruit ripening depends on climate, the cultivar, and the pruning process in the late winter/early spring. Based on data gathered in Missouri and Vermont, flowering occurs in June to mid-July (Byers et al. 2022; Wilson 2016). Researchers at West Virginia University Extension reports that fruit develops and ripens over a six-to-eight-week period from July to late September (Bulatovic-Danilovich 2022). In USDA Zones 4 to 5, ripening is usually between mid-August and mid-September, see Figure 2 (Wilson 2016). As discussed in the pruning section of this primer, pruning canes every year to the ground reportedly narrows the harvest window for berries because it forces the shrub to flower exclusively on new cane growth (instead of both new and old canes) which leads to greater variance in ripening windows. When planning a harvest schedule, consider which pruning approach best suits the operation and anticipate production needs during harvest season, such as labor, equipment, storage space, and processing.



*Figure 2 - Ripening elderberry berry cluster. (Photo credit: Future Generations University)*

## Care

### Soil Requirements

#### *Hydration*

American elderberries prefer wet, well-draining soils. In the West Virginia University Extension article, *Elderberry: A New Old Crop*, Bulatovic-Danilovich recommends ridge or berm planting in clay soils to avoid waterlogging and plant drowning. Apply three to four inches of mulch around the base of the plants to retain soil moisture. University of Vermont Extension's *Growing Elderberries: A Production Manual and Enterprise Viability Guide for Vermont and the Northeast* lists wood chips, ramial mulch, or straw as options for mulch (Wilson 2016). Irrigation is necessary for the first two to three years when the plants are getting established, especially during weeks without substantial rainfall.

#### *Soil Composition*

For greatest yield and long-term productivity, plant American elderberry in fertile soils rich in organic matter. It is recommended to add soil amendments prior to planting and during years of production (Wilson 2016).

#### *Nutrient Management*

Test your soils before planting and then every two to three years to monitor pH levels. American elderberry prefers a soil pH of 5.5 – 6.5. In the fall before planting, begin bed preparation by adding amendments such as limestone to achieve ideal pH levels as well as proper levels of phosphorous, potassium, and organic matter. The nursery Elmore Roots in Elmore, Vermont recommends adding three shovelfuls per bush of tree planting mix at the time of planting for heavy soils or a mineral mix of rock phosphate, greensand, azomite, kelp meal, Sul-Po-Mag and peanut meal for fluffy, well-drained, rich soils (Fried 2016).

Every two to three years, do a leaf analysis to measure the nutrient levels of the plant. For commercial production, it is recommended to feed mature plants with one to two pounds of nitrogen per 1,000 square-feet. For plantings in riparian forest buffer areas, avoid applying excess nutrients to prevent runoff into waterways.

### Sunlight

While elderberry tolerates partial shade, the plant thrives in full sun. Unlike many plants, American elderberry can be planted under walnut trees, which produce juglone chemicals that suppress, stunt, or kill other plants (Missouri Department of Conservation 2023). That said, more research is needed to determine if the presence of juglone impacts berry yield or other growth factors. Additionally, for greatest yield, establish American elderberry plantings in areas with full sun.

### Pruning

There are multiple options for pruning when caring for elderberry. Prune American elderberry after the second growing season in late winter/early spring before budding. "Remove dead, damaged, or over three-year-old canes. Any pruned canes that are suspected of harboring pests or diseases should be buried away from the elderberry orchard to prevent reinfection" (Wilson 2016).

In the University of Missouri's "Selective vs. Complete Pruning" methodologies study, researchers compared the following three pruning methods recommended by River Hills Harvest: "1) selectively

remove dead and undesirable canes each year; 2) remove all canes near ground level every other year; 3) remove all canes annually near ground level when the plant is dormant” (River Hills Harvest 2022). This research found that annual or biannual complete pruning to the ground “spurs vigorous new growth and results in a shorter window for fruit ripening. Canes produce fewer fruit clusters, but those produced are larger” (River Hills Harvest 2022). Large-scale growers have found this method is also advantageous because pruning can be done using mechanized equipment such as a sickle-bar cutter, therefore saving labor inputs. Be cognizant when using mechanized methods in a riparian area because of the potential impact to streambank and floodplain soils stability. If selective pruning is the chosen pruning regime, leave an equal number of one, two, and three-year-old canes (Wilson 2016). “Depending on the cultivar, each bush should have six to ten canes total” (Wilson 2016).

### **Propagation**

Elderberry is readily propagated. Once a single elderberry shrub is cultivated on a farm, there is never really a need to purchase another because all additional cultivation can be done through propagation (McCray 2023). That said, it is often advantageous to plant and propagate multiple cultivars within a specific site for climate and weather resilience and for cross-pollination. Elderberry propagation may be accomplished through dormant vegetative cuttings, root cuttings and sucker plant harvest, and through seed. The best way to guarantee plant vigor and flower/fruit yield is through cuttings as seedlings can exhibit significant variability in performance (Byers et al. 2022).



*Figure 3 - Vegetative cuttings, taken at the end of the dormant season, in a prepared bed for nursery cultivation. (Photo credit: Future Generations University)*

#### *Vegetative Cuttings*

During dormant season pruning, typically when pruning should be occurring, collect the cuttings from healthy canes (McCray 2023). Cuttings can be prepared for immediate rooting or stored under refrigeration for four to six weeks to root later (Byers et al. 2022). Cut canes into two to four-node sections, each section can be rooted to become a new shrub (McCray 2023). Cuttings can be rooted in a

jar or small bucket of water or in a well-drained soil medium. Once rooting has occurred (typically within 6 weeks), plant into well-hydrated prepared soil beds or into grow-pots for nursery/indoor cultivation, see Figure 3 (McCray 2023, Byers et al. 2022). If placing directly into a growing medium, at least one basal node should be below the soil surface and cuttings should be kept from freezing (Byers et al. 2022).

#### *Root Cuttings and Sucker Cultivation*

Root cuttings should be collected by late winter and before new growth begins (Byers et al. 2022). Pencil-diameter or slightly smaller roots may be cut four to six inches long, see Figure 4), then placed horizontally in growing medium in a pot or growing flat and covered with an additional three-quarters of an inch to an inch of growing medium. Growing medium should be kept warm and moist (Byers et al. 2022). Elderberry plants often naturally set suckers from rhizomes as well. Once the suckers are established, typically with at least one year of vegetative growth, they can be dug up and the rhizome cut, and then transplanted in a new location, as shown in Figure 5 (McCray 2023).



*Figure 4 - Taking root cuttings for elderberry propagation. (Photo credit: University of Missouri, Patrick Byers)*



*Figure 5 - Elderberry sucker dug up and rhizome cut. (Photo credit: Future Generations University)*

#### **Disease**

Fungi and viruses are the two types of pathogens that cause elderberry diseases. Bulatovic-Danilovich lists tomato ringspot virus, fungal canker, powdery mildew, verticillium wilt, and root rot as potential diseases that may affect elderberries in West Virginia. For successful disease control, Bulatovic-Danilovich recommends proper care for elderberry plants through weed suppression, cultivation and sanitation practices – proper nutrient applications, proper hydration and drainage, maintaining clean tools when disease is suspected or present – and removal of any diseased materials/plants from the cultivation site (Bulatovic-Danilovich 2022).



## **Pest and Weed Management**

### *Weeds*

Aggressive ground cover will outcompete American elderberry plantings especially during the establishment years. Identify and manage existing perennial ground cover prior to planting. Applying three to four inches of mulch around the base of the plants will help to suppress weeds. American elderberries have shallow roots. If weeding with tools, do not cultivate more than two inches in depth to prevent damaging roots (Bulatovic-Danilovich 2022; Wilson 2016).

### *Pests*

Elderberries in West Virginia are subject to spotted wing drosophila, eriophyd mites, Japanese beetles, cane or shoot borers, and the elderberry borer beetle. Monitoring and pruning canes with insect damage is essential to pest management (Bulatovic-Danilovich 2022).

# Harvest and Processing

## Elderflowers and Elderberries

### Flowers

#### Harvest

American elderberry produces small white or creamy-white flowers clustered in a circular grouping. In West Virginia, flowering usually begins in June. Harvest the flowers when all the flowers on a cyme are open.

#### Processing

The flowers of the elderberry can be removed from the stems before drying by rubbing the stems of flowers over hardware cloth. An alternative is to dry flowers on the stem individually in paper bags at 80.6 degrees Fahrenheit for 48 hours (Wilson 2016).



Figure 6 - Floral cyme, or umbel, with outer flowers open. (Photo credit: Ted Bodner, USDA PLANTS 2023)



Figure 7 - Ripened berry clusters. (Photo credit: Ted Bodner, USDA PLANTS 2023)

### Berries

#### Harvest

Berries are ready to harvest when they reach their darkest color, and they start to lose their shine and become “dusty” (Durham and Patton 2020). The juice of the berry when squished is deep reddish-purple. Some commercial producers use a Brix meter to measure the sugar content. Harvest when the sugar content reaches 12 to 13 percent.

Ripening is often uneven and is dependent upon several factors. Berries in partial shade will ripen later than berries exposed to full sun. The fruit on younger canes can ripen 14 to 21 days later than fruit on secondary branches or more mature canes. For more even ripening, select commercial cultivars with this characteristic or ground prune as described previously.



Figure 8 – Location of the berry cluster or flower umbel “wrist”. (Photo credit: Ted Bodner, USDA PLANTS 2023)

To harvest the flowers or the berry clusters, clip or break the “wrist” of the head with shears or by hand, see Figure 8. Harvest berries in the morning before the day warms to keep berries cool during harvest. Collect clusters of berries in a harvest container, such as a food-grade bucket (Durham and Patton 2020). See Future Generations University’s video, made in partnership with Silver Run Forest Farm, for demonstrations of harvesting and processing berries; find it here:

<https://www.youtube.com/watch?v=UP52fTck28U>

## Processing

### *Destemming*

There are several options for destemming berries depending on the scale of the operation.

- Option A: For small scale operations, at the point of harvest knock the stems lightly against the side of the harvest bucket. Ripe berries should fall into the bucket.
- Option B: Like destemming the flowers, gently rub the stems with the berries against hardware cloth with a collection vessel below. The berries will separate from the stems and fall through the cloth into the collection vessel.
- Option C: Another option is to freeze the berries still attached to the stem after washing and sanitizing. After the berries are fully frozen – leaving the bag closed – rub the outsides of the bag together with berry clusters between them to loose the berries from the stem. Do this until the bare stems make their way to the top of the bag. Place the frozen berries on a screen and shake to separate the stems and the berries. Prevent the berries from completely thawing while destemming. Thawing and refreezing will result in lower quality berries (Wilson 2016).

### *Wash and Sanitize*

Wash and sanitize the berries directly after destemming or before freezing. Place the berries in a bucket, mesh basket, or colander inside of a sink of water to fully submerge. As the berries sit in the water, any remaining stems, unripe berries, and other debris will rise to the surface. Skim off any of the debris on top and discard. Drain the berries on a screen.

River Hills Harvest stores washed and sanitized berries in four-gallon square buckets that each weigh 25 pounds. For all operations, it is typically best practice to label the bucket with the harvest date and cultivar name. For cooperative growing or wholesale, growers may also need to provide additional information on location and growing conditions (for example, see labeling requirements for selling to the Appalachian Harvest Herb Hub on page 11). Other producers use one-to-three-pound food-grade plastic bags to store and sell in smaller quantities (Durham and Patton 2020). To follow Good Agricultural Practices (GAPs), there are additional practices to be followed and recorded in the wash and sanitize steps, such as adding an approved sanitizer to the wash water. Keep the processed elderberries in cold storage or a freezer.

### *Drying*

Dried elderberries are an alternative to fresh or frozen berries. Dry berries in a dehydrator until the dried weight is a quarter the weight of the fresh berries. To be certain the berries are at the appropriate dryness, weigh the fresh berries and divide that weight by four to estimate the desired finished weight. Check the weight throughout the dehydration process. Dried berries should be stored in a dry location away from exposure to sunlight or in sealed packaging in the freezer.

### **Equipment, Infrastructure, and Technology**

Starting one or more nature-based enterprises may require an investment in equipment, infrastructure, and/or technology. The scale of production, the final product, and participating markets will determine the appropriate equipment, infrastructure, and/or technology to invest in.

Production of American elderberries on a commercial scale is recent, so equipment, infrastructure, and technology designed for the elderberry industry is new. Terry Durham of River Hills Harvest is one of the first and only to prototype, build, and sell grower supplies for the small elderberry farmer.

# Value-Added and Craft Products

## Producing, Marketing, and Selling Elderberry Products

### Introduction

The hardwood cane, flower, and berry of the American elderberry each have a variety of uses. The elderberry plant has important culinary, medicinal, and craft uses in both Native American and European traditions. The flower is used in liqueurs and vinegar-based shrubs, the berries for jelly, juice, and wine, the stems as spiles in tapping maple trees, and the whole plant for decorative landscaping or creating hedgerows. Elderberry syrup is a traditional medicine, often sold presently as a nutritional supplement. The berries have been foraged from the edges of woodlands and intentionally cultivated in gardens. It's an incredibly versatile plant with important traditional uses.

### Market Potential and Sales Information

In 2007, in the article, *Elderberry as a Medicinal Plant*, the market potential for elderberries was evaluated and it was found that over 100 elderberry products were being sold online (Charlebois 2007). The research found that most of the products were sourced from the European native black elder (*Sambucus nigra*), which has a longer history of being used in commercially sold value-added products. Similarly, the report *Elderberry Market Research*, based on data collected in 2009, concluded that the low supply of American elderberry in the United States is a barrier for commercial processors to scale up its use in production of value-added products (Cernusca et al. 2011). In 2021, Terry Durham of River Hills Harvest and Chris Patton of the Midwest Elderberry Coop observed that the market demand for the American elderberry is still growing (Durham and Patton 2021). “On the commercial scale,” Patton shared, “the buyers are interested but we do not have enough secured supply in large quantities for them to make commitments and contract for that in advance. This is the goal of the co-op” (Durham and Patton 2021).

The Appalachian Harvest Herb Hub’s “2023 Buyer Projections” document reports \$20 per pound for American elderberry berries and \$40 per pound for dried elderflower. The Appalachian Harvest Herb Hub is part of Appalachian Sustainable Development and actively works to support and promote sustainable agroforestry and forest farming in central Appalachia. They purchase fresh and dried woodland medicinal plants and provide new and existing producer assistance through technical support. Find out more about Appalachian Harvest Herb Hub and connect directly with their staff through their website: <https://www.asdevelop.org/programs-resources/herbhub>. If a grower is planning to sell product to them, the Appalachian Harvest Herb Hub requires a certificate of origin for all products. This requires the following information:

- Date
- Common name
- Latin name
- Harvest date
- Harvest location
- Harvester name
- Lot number
- Invoice number
- Pesticides used or not
- Production method

## Recipes

### Elderberry Syrup

Recipe reprinted from *Growing and Marketing Ginseng, Goldenseal and other Woodland Botanicals* by Jeanine Davis and W. Scott Persons

- 1 cup fresh or 2/3 cup dried elderberries, completely de-stemmed
- 3 cups water
- 1 cup raw honey or sugar
- Optional: 2 TBS grated ginger, 1 to 2 tsp ground cinnamon, and/or ½ tsp ground cloves.

*Put the elderberries and water in a medium saucepan. One or more of the optional ingredients can be added at this time. Bring to boil and then reduce to a simmer. Simmer, uncovered, for 30 minutes to one hour, stirring and mashing the berries occasionally, until the mixture is reduced by about half. Strain through a metal kitchen strainer or cheesecloth into a bowl. Let the liquid cool till warm (compost the berries). Add the honey or sugar to the warm liquid, stirring well. Pour into a clean pint mason jar or other sturdy glass bottle. Label and date. Store in the refrigerator and use within two to three months.*

### Elderflower Shrub

Recipe reprinted from the University of Vermont Extension's *Growing Elderberries* publication and originally provided by Lewis and Nancy Hill, Hillcrest Farm in Greensboro, Vermont.

*Shrubs are fruit or herb-infused vinegar-based syrups, popular in colonial times. Place a couple of elderberry blossom clusters in a gallon of cold water in a glass jar. Add one lemon cut in 4 pieces, 2 Tbsp. white vinegar, and 1 pound of granulated sugar (or the equivalent in honey). Set the concoction in hot sun for a day, joggling it occasionally as you walk by. Strain, bottle, keep in the refrigerator and use in about 3 weeks. Serve chilled, over ice.*

## Craft Culture

### *Canes*

Elderberry canes have historically been harvested as part of the craft culture in Appalachia. Canes are harvested at the end of the dormant season/beginning of the Spring. Save the healthiest, pencil-thick cuttings from pruning to use to propagate planting stock. The wood of the branches is considered toxic for consumption because it contains cyanide-producing glycosides and possibly other toxins (Thayer 20210). The woody parts of the plant can still safely be made into several wood products. Elderberry wood was a popular material for making carved spiles to collect maple sap for maple syrup. Whistles, flutes, and popguns are more examples of products made from the hardwood cane of an elderberry shrub. Branches are also used as materials for basket-making and as arrow shafts.

### *Dye*

Berries and berry stems have long been used by indigenous peoples as well as early settlers in Appalachia for fiber and basket dyes. A deep black dye can be achieved from the berry stems and with alum<sup>1</sup> as a mordant, a purply blue can be made from the berries themselves.

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<sup>1</sup> As a mordant – a substance used to set the color when dyeing fabrics such as cotton, silk, and wool, or other natural materials like basket reed and paper – the most typical form of alum used is potassium alum. It changes the chemical structure of the dye bath to create a permanent bond between the dye and the natural material.

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