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USDA National Agroforestry Center  
U.S. DEPARTMENT OF AGRICULTURE

# Inside Agroforestry

VOLUME 28 ISSUE 1

## *Productive Buffers*



Buffer Benefits - Beyond the Basics

## NAC Corner

Agroforestry practices, including riparian and other conservation buffers, have always provided multiple benefits. However, in recent years there has been increasing interest in “multifunctional” buffers, also called “productive” or “income-producing” buffers.

These are trees, shrubs, and other plants designed to create both conservation benefits and products that can be harvested and sold, such as fruits, nuts, and decorative woody floral species.

The [USDA National Agroforestry Center](#) has spent years working with many partners to research, demonstrate, and provide guidance on multifunctional buffer establishment and management.

In 2012, the National Agroforestry Center partnered with Virginia Tech to create a woody floral demonstration site that widened an existing riparian buffer at the [Catawba Sustainability Center](#). In 2016, National Agroforestry Center staff, with assistance

from Appalachian Sustainable Development and Virginia Tech, developed the [tool](#) to estimate income potential from harvesting and selling fruits, nuts, and other species incorporated into buffers. Since this project, NAC has worked with many partners to advance multifunctional buffers through publications and workshops around the U.S.

In addition to the tools highlighted by partners in this issue, the Center also has multiple tools to assist in multifunctional buffer design. The Center’s [Conservation Buffer Guide](#), first published in 2008, provides design guidelines that help buffers achieve multiple functions. [Tree Advisor](#), a new tool the Center developed for the Northern Great Plains, also helps with selection of tree and shrub species for multiple conservation and production purposes. Please reach out to Center staff with ideas for tools that would help you in your work, or if you’d like to share examples of multifunctional buffers near you!

## National Agroforestry Producers Survey

Many farmers and researchers know the National Agricultural Statistics Service from the Census of Agriculture, which collects important information from farmers on their production and conservation practices, along with other information. This information is essential for program funding and design. The National Agroforestry Center has partnered with the National Agricultural Statistics Service, Agricultural Research Service, and the

Natural Resources Conservation Service to carry out a National Agroforestry Producers Survey to collect information about the types of agroforestry practices used, how they are used, and the number of operations using them. This survey was sent to producers who said they used agroforestry practices on the 2017 Census of Agriculture. Results from this survey will be available from USDA later this year.

## Looking to keep up with NAC?

Subscribe to our [Agroforestry Connection](#) e-mail list and stay up to date on new publications, events, and presentations from the National Agroforestry Center!



## Working Trees Information Sheets

The National Agroforestry Center has released two new “Working Trees Information Sheets” related to agroforestry and climate change:

- How does Climate Variability Influence Agroforestry Plant Selection?
- How Can Agroforestry Increase Carbon Sequestration?

These information sheets are available for download on the “Climate Change” page of the National Agroforestry Center website: <https://www.fs.usda.gov/nac/topics/climate-change.php>

Printed copies can also be ordered at <https://www.fs.usda.gov/nac/resources/publications/order/index.php>

## Research Publications

The National Agroforestry Center has released several new research publications available on the Publications page of the National Agroforestry Center website: <https://www.fs.usda.gov/nac/resources/publications/index.php#research>

- Windbreaks in the United States: A Systemic Review of Producer-Reported Benefits, Challenges, Management Activities, and Drivers of Adoption
- Silvopasture in the USA: A Systemic Review of Natural Resource Professional and Producer-Reported Benefits, Challenges, and Management Activities
- Making Trees Outside Forests Count story map

**Common benefits of windbreaks identified by producers across the U.S.**

Wind direction → Windbreak → Protected zone 8 - 10 times the maximum tree height

- Reduce soil erosion
- Increase crop yield
- Protect livestock
- Provide wildlife habitat
- Enhance aesthetics
- Manage drifting snow
- Increase livestock production
- Reduce heating and cooling costs

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**Key Benefits and Challenges to Silvopasture Identified by U.S. Producers**

Benefits	Challenges
<ul style="list-style-type: none"> <li>• Increased shade for animal wellbeing, calving, and production</li> <li>• Diversification of farm income</li> <li>• Short- and long-term cash flow</li> <li>• Enhanced forage quality</li> <li>• Enhanced forage production during shoulder seasons, mid-summer, and times of drought</li> <li>• Increased quality and size of trees for timber</li> <li>• Restoration of savanna habitat</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of information</li> <li>• Lack of assistance from resource professionals</li> <li>• Increased time required for management</li> <li>• Expense of management</li> <li>• Lack of land</li> <li>• Tree regeneration in established systems</li> <li>• Possible need for new or modified equipment</li> </ul>

# Elderberry Hedgerows Provide Farm Income and Environmental Benefits

**Sonja Brodt**, University of California Sustainable Agriculture Research and Education Program

*This article was adapted from “Native blue elderberries in western hedgerows provide farm income and environmental benefits,” published in the Temperate Agroforester: Volume 26 Number 4, December 2020.*

As semi-wild places in otherwise intensively-managed agricultural landscapes, hedgerows provide numerous ecological benefits. They provide natural habitat and travel corridors for wildlife, support beneficial insect populations with pollen, nectar, and shelter, can act as windbreaks for crops and shelter for livestock, and, if designed appropriately, can also serve as living fences and boundary markers.

While native hedgerows on farm edges have these benefits, hedgerow planting by farmers in California is limited, often due to establishment and maintenance costs. But what if hedgerows could provide a source of farm income to offset costs?

California’s native blue elderberries (*Sambucus nigra*, ssp. *cerulea*) are already often planted in hedgerows, and grow in a wide range of microclimates across the state. Elderberries are also displaying adaptability to a changing climate and growing

water constraints. In the meantime, with increasing consumer interest in health foods, elderberry product sales nationwide have jumped 10 to 50 percent in recent years, but almost no commercial supply originates in California. Although native blue elderberry has been an important resource for Tribes for thousands of years, little is known in the commercial agriculture and food sector about its food chemistry or its cultivation and marketing.

Hedgerows of native perennials can be costly to install and maintain during the first few establishment years, with installation costs typically running from \$3,000 to \$4,000 per 1,000 linear feet for 10-foot wide hedgerows in California. Although State and Federal programs provide cost-share incentives, hedgerows still appear relatively infrequently on intensive, high-value agricultural landscapes like those in the Central Valley of California.

In a 2.5-year project, the University of California Sustainable Agriculture Research and Education Program collaborated with local farmers to demonstrate a new role for hedgerows – one



👉 Blue elderberries show promise as a hedgerow crop. Courtesy photo by Katie Uhl, University of California Sustainable Agriculture Research and Education Program.



📍 Blue elderberry hedgerow along a roadside. Courtesy photo by Sonja Brodt, University of California Sustainable Agriculture Research and Education Program.

in which they can produce a marketable crop at the same time as providing ecosystem services. Blue elderberry is related to the better-known European and North American black elderberries, and it grows robustly in many areas of the West, from near sea level to 10,000 ft in elevation.

Although it is generally considered a riparian species, it appears to be much more drought-tolerant than black elderberries, and can grow well in the summer-dry Mediterranean-type climate of much of California, with minimal, or, in some areas, no irrigation inputs required once mature. Blue elderberry is already a common species included in multi-species native hedgerows, but only a few small-scale farms in California are known to harvest and use it for value-added products.

The farmer-researcher team recently completed a field trial in the southern Sacramento Valley (part of the larger Central Valley) to assess the profitability of blue elderberry production in multi-species hedgerows. Three organic farms implemented three distinct planting designs: 1) a wide, multi-species hedgerow with elderberries comprising about 15 percent of total plant numbers, 2) a closely-spaced (6-foot) elderberry-only hedgerow placed against a narrow pre-existing habitat strip, and 3) elderberries widely interspersed in a mature border habitat strip.

The team found that with good weed control (accomplished by extensive mulching) and soil preparation in a deep clay loam soil, elderberry yields from a 1,000-foot hedgerow could provide as much as \$3,000 to \$4,000 in revenue by the second year, essentially paying for establishment costs. However, the trial also showed that competition from weeds or other mature plants, as well as planting in compacted, untilled soil could significantly slow early growth, delaying this break-even point for another few years.

Exploratory harvest of large, mature blue elderberries already in the landscape showed that potential gross future revenue possibilities could range in the tens of thousands of dollars from a 1,000-foot hedgerow, at current prices for frozen, de-stemmed elderberries. Value-added processing and specialty products made on-farm could further increase overall profitability.

Participating farmers found that one of the primary bottlenecks to increasing production was the labor-intensive nature of hand harvest and de-stemming the berries. The team is exploring options for mechanized de-stemming, similar to that used in the Midwestern elderberry industry.

The team also surveyed elderberry buyers to assess marketing potential. Consumer demand for elderberry-based products has skyrocketed in

recent years. While there is currently no large-scale infrastructure or standardization of quality parameters for blue elderberry, substantial interest from small-scale buyers and potentially also larger retailers exists. Two-thirds of surveyed herbal and specialty foods processors and retailers reported strong interest in sourcing California-grown elderberries. They also indicated they could not find enough supply to meet their needs.

Farmers who grow blue elderberry can tap into this growing market. The team is currently exploring options - such as producer cooperatives and other mechanisms, for scaling up production and marketing to meet growing interest from larger-scale companies, while still maintaining the integrity of the hedgerow production model and the ecosystem services it provides.

This research project has compiled a wide range of resources about elderberry as a hedgerow crop for California farms:

- [Producing Blue Elderberry as a Hedgerow-Based Crop in California](#)
- [Growing Elderberries in California](#)
- [Why Plant Elderberries in Multi-species Hedgerows?](#)
- [Harvesting, Processing & Marketing](#)
- [Health & Flavor](#)
- [Blue Elderberry Compared to Black](#)
- [Indigenous Relationship to Elderberry](#)
- [Elderberry Cost & Return Studies](#)



📍 Field trip participants learn about elderberry at Cloverleaf Farms. Courtesy photo by Sonja Brodt, University of California Sustainable Agriculture Research and Education Program.

To learn more about this research and to find educational resources for cultivating, processing, and marketing elderberry, visit <https://ucanr.edu/sites/Elderberry/>. 🌱

## Growing Soil and Doing Good While Doing Well

**Tracey Coulter**, Pennsylvania Department of Conservation and Natural Resources, Bureau of Forestry

There is a point in Potter County, Pennsylvania that is known as the Triple Divide – a place where three springs rise to follow their divergent paths to the sea. One forms the Allegheny River, whose waters are destined for the Gulf of Mexico. Another, the Genesee, flows north to the Great Lakes. The last, the Susquehanna River,

joins Pine Creek as part of the largest watershed in Pennsylvania. The Susquehanna, along with Pennsylvania's share of the Potomac, provides nearly 50 percent of the Chesapeake Bay's fresh water.

Before it reaches the bay, the Susquehanna flows past cities and farms, picking up nutrients, sediment, and pollutants along the way. These pollutants negatively affect the ecosystem, including blue crab, oyster, and fish species that support fishery-dependent



🕒 Austin Unruh and Louise Bugbee planting a buffer at Misty Valley. Courtesy Photo by Austin Unruh, Crow and Berry Land Management.

communities. In the mid-1980s, Pennsylvania joined other states to form the Chesapeake Bay Program, a partnership to guide the restoration of the bay and to address the flow of pollutants that impair its waters.

Planting streamside buffers quickly became a key strategy to restoring the bay. State and Federal agencies, non-governmental organizations, and individuals rallied to plant buffers. The USDA's Conservation Reserve Enhancement Program was used to establish and fund buffers early in the effort. In this program, farmers receive a 10 to 15-year rental payment in exchange for removing their land from production. They also receive financial assistance to plant perennial cover, including trees, shrubs, and grasses. Conservation Reserve Enhancement Program contracts prohibit sale of products grown in Program-funded plantings for the length of the contract.

Profitability was not a concern when Ann and Don English worked with a restoration specialist with the Chesapeake Bay Foundation to design a four-acre program-funded buffer. Ann is a landscape architect, and Don a forest economist, and both have off-farm jobs. Their buffer goals were to reduce pollution - especially sediment - create pollinator and bird habitat, increase species diversity, establish a food forest, and rebuild soil impacted by years of annual cropping.

To begin this process, they planted 534 plants comprised of 65 tree and shrub species, including oak, chestnut, persimmon, hickory, elderberry,

chokeberry, holly, and virburnum in their buffer. In 2020, they harvested 100 pounds of honey from bees foraging in this restored ecosystem. They are now working with researchers at Rutgers University to trial blight-resistant hazelnuts on two acres of former crop land to expand their buffer even further.

Costs of establishment and time required for maintenance can deter busy farmers and landowners from buffering their streams. While profitability is not always the sole motivation, it is certainly a reason that landowners consider planting and retaining a riparian forest buffer. For some people, harvesting products or deriving rental fees from their buffers is important.

State and Federal agencies, non-governmental organizations, and partners considered these factors when they looked at ways to increase buffer adoption. New programs and funding sources emerged to provide financial assistance for the planting and maintenance of buffers that enhance water quality and habitat and also can produce nuts, berries, fruits or cut florals for sale. Some grant-funded trials even feature buffers expanded with tree-lined alleys, to allow rotational grazing or hay production.

Technical service providers and consultants like Andrea Ferich and Austin Unruh are the "boots on the ground" who work directly with the landowners to get the buffers planted. Ferich has a passion for conservation and community. After serving as the Director of Sustainability for

the Center for Environmental Transformation in Camden, New Jersey, she returned to Pennsylvania to lead Penn's Valley Conservation Association as its executive director. Penn's Valley is home to farmland and renowned trout streams.

In 2016, Ferich established Ironwood Forestry, a forestry consultancy that provides buffer design and implementation services throughout the community. Her clients include farmers, herbalists, bakers, a nascent fishing lodge, and even an outdoor adventure camp. This multifunctionality of intention, whether to teach campers about wild edibles, provide elderberries for a local winery, protect a destination trout stream, or supply herbal remedies, connects this community to their streams.

Village Acres is the last farm on Lost Creek before it joins the Juniata River, which eventually joins the Susquehanna River. This is a place of multiples – multiple generations, multiple enterprises, and

multiple ideas for buffer design. Ferich worked with the Brubaker family to meet these goals.

She planted woody florals for Phoebe's floral designs, shade trees and willows for Chandler's sheep and Hannah's chickens, flowering trees and shrubs for the insects that pollinate the fruits, and vegetables sisters Debra and Angela grow for the family's community supported agriculture program. Cousins Chandler, Owen, Andrew, Riley, and Frances are university students who provide welcome and capable assistance during breaks from their coursework. Brother Roy Dale, a forester, and his wife Julie, farm nearby. They raise beef, pork, and lamb that they market along with the vegetables from the family farm.

Hope Brubaker, though, is the family matriarch and gifted at growing anything. Her ability to grow pawpaw trees is legendary. The buffer was dubbed "Hope's Forest" because so many of her own trees were planted there. Community is important to the people of Mifflintown, and for this family, that



📍 Austin Unruh and his nursery. Courtesy photo by Austin Unruh, Crow and Berry Land Management



means nurturing life - a value reflected in their newly planted “forest.”

Unruh, founder of Crow and Berry Land Management, knows opportunity when he sees it. Just after Labor Day, 2016, Unruh attended a training at Penn State’s Fruit Research and Extension Center in Biglerville, funded by the Northeast Sustainable Agriculture Research & Education Professional Development Grant Program. More than 30 participants and trainers from nine states gathered for the three-day training.

Looking back, Unruh says the networking at the event helped spur the founding of his business. Buffers were a launching point for this new enterprise because buffers (and technical service providers) were in demand in the region, and State and Federal funding was available to get them on the ground.

A turning point came when Unruh was hired by the farmers at Fiddle Creek Dairy to perform maintenance on their Conservation Reserve Enhancement Program buffer. Fiddle Creek Dairy sells yogurt and other dairy products as well as beef from its grass-fed herd.

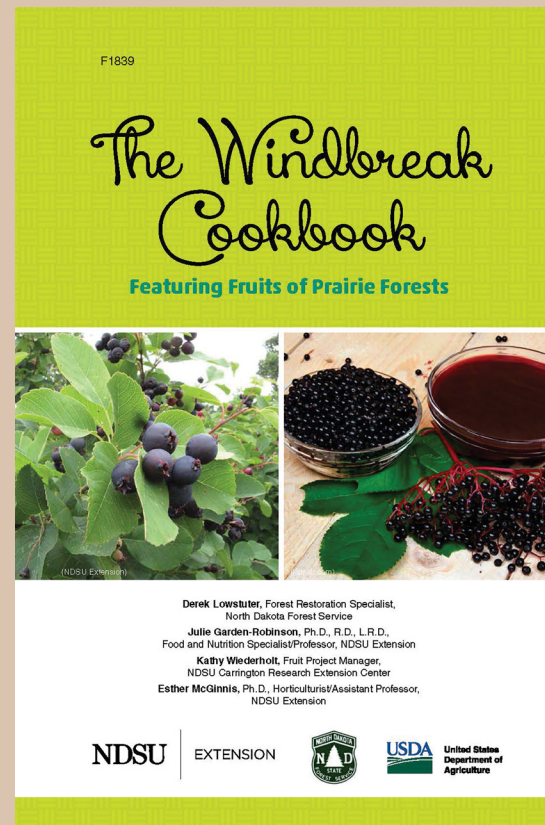
While talking to the farmers, Unruh brought up the idea of expanding the buffer into the pasture. Noting that a silvopasture planting of trees would help to “keep the water up high” by reducing the flow to the streamside buffer, Unruh sought and received a Pennsylvania Department of Conservation and Natural Resources grant to pilot an expanded “grazed buffer” provided that the existing buffer was left intact.

Protecting water quality took on a new look. Instead of planting elderberries and woody florals, Unruh sought out sources for improved mulberries, black locusts, honeylocusts, and persimmons. Lucky for him, John Hershey had already done the work in the 1930s and '40s, and what remained of the famous Downingtown orchards was nearby. Ever the entrepreneur, Unruh began a nursery and another enterprise, Trees for Graziers.

When viewing the world solely through a lens of conservation, opportunities can be missed. These Pennsylvania stories provide examples for how and why land managers are interested in developing buffers with many functions, including on-farm

# The Windbreak Cookbook

Featuring Fruits of Prairie Forests



Beside shade and wind protection, many trees provide edible fruits that can be used on our menus. This publication provides information about trees, as well as many recipes. The publication was developed by the North Dakota Forest Service and North Dakota State University Extension Service.

To learn more about what can be made with products from windbreaks, visit <https://www.ag.ndsu.edu/publications/lawns-gardens-trees/the-windbreak-cookbook-featuring-fruits-of-prairie-forests> for more recipes and ideas.

benefit and income Crow and Berry’s website says it well: “Sometimes the best results come from unlikely combinations, like growing profit while growing soil and doing good while doing well.”

# Harvesting in Conservation Reserve Enhancement Program Contracts: 2018 Farm Bill Updates

Richard Straight, USDA National Agroforestry Center

The USDA Conservation Reserve Program and related programs like Conservation Reserve Enhancement Program, have been around for more than 30 years. Each Farm Bill since the Conservation Reserve Program's inception has provided a variety of modifications to these programs. The 2018 Farm Bill was no exception. Of particular interest to farmers with an eye toward agroforestry is the potential to harvest a food crop from a riparian forest buffer that is under a Conservation Reserve Enhancement Program contract.

One of the important provisions of the Conservation Reserve and the Conservation Reserve Enhancement Program is an annual rental payment as a part of the 10-15-year contract. As a result, farmers are limited on the allowable income-generating activities on land under contract.

For example, a farmer is not allowed to graze livestock, harvest hay, or sell hay cut from land under contract. The exception for this stipulation is when drought occurs, thereby allowing what is commonly called “emergency haying and grazing.” In such cases the annual payment is reduced.



➦ Aronia. USDA Forest Service photo by Richard Straight.



➦ Pecans. USDA Forest Service photo by Richard Straight.

A new provision under the 2018 Farm Bill allows food-producing woody plants to be included in a Conservation Reserve Enhancement Program

planting as part of a riparian buffer if the following criteria are met:

- Plants contribute to the conservation of soil, water quality, and wildlife habitat.
- Plants are consistent with recommendations of the applicable State Technical Committee.
- Plants are consistent with the Natural Resource Conservation Service Field Office Technical Guide.
- Plants are provided for in the conservation plan.

In addition, it provides that if such species are planted, the participant may harvest from the food-producing woody plants if other criteria are met, regardless if the crop is sold or not:

- The participant agrees to a reduction in the annual rental payment commensurate with the value of the crop harvested.
- All the food-producing woody plant species in the riparian buffer that are within 35 feet of the water body must be native plant species.
- The harvesting will not damage the approved cover or otherwise have a negative impact on the resource concern being addressed by the riparian buffer.
- The harvesting is conducted in accordance with the conservation plan.

However, the food-producing plant itself may not be harvested. In addition, the annual rental payment will be reduced commensurate with the value of the crop harvested. This provision is not allowed for windbreaks, hedgerows, or any other conservation practice.

It is important to note that the planting of food-producing plants and the expectation to harvest during the life of the contract must be a part of the conservation plan.

If you're interested in growing a tree crop in a riparian buffer, check out the [Conservation Reserve Program](#)

[website](#), or give your USDA Service Center a call to set up an appointment to find out if a Conservation Reserve Enhancement Program contract is for you.🌲



🌲 Highbush Cranberry. USDA Forest Service Photo by Richard Straight.

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## Available Resources

NTFP webinar series:

<https://www.srs.fs.usda.gov/webinars/ntfp/>

Conservation Webinars: NRCS  
Science and Technology  
Training Library:

<https://conservationwebinars.net/>

Agroforestry Webinar Library:

<https://www.fs.usda.gov/nac/resources/webinar-library/index.php>

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### NAC Mission

The USDA National Agroforestry Center (NAC) is a partnership of the Forest Service (Research & Development and State & Private Forestry) and the Natural Resources Conservation Service. NAC's staff is located at the University of Nebraska in Lincoln. NAC's purpose is to accelerate the development and application of agroforestry technologies to attain more economically, environmentally, and socially sustainable land use systems by working with a national network of partners and cooperators to conduct research, develop technologies and tools, establish demonstrations, and provide useful information to natural resource professionals.

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