

Wet Feet Farming

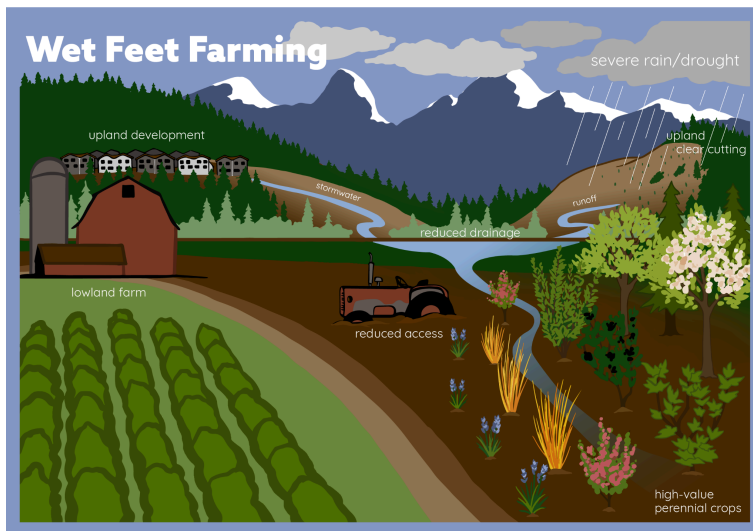
A farmers guide to integrating agroforestry into wet areas

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1 - Introduction

Agroforestry is the intentional integration of trees, shrubs, crops, and animals into an integrated production system to create environmental, economic, and social benefits. Agroforestry is broadly inclusive, and has been practiced in the Salish Sea and around the world for centuries by both industrial and non-industrial societies. Agroforestry systems can vary widely in biodiversity, level of effort, and acre yield, and can produce foods, fibers, animal forage, medicinal products as well as ecosystem services.



Wet Feet Farming is the application of agroforestry practices to wet farmland which is challenging to cultivate or graze, in order to increase production and maximize environmental benefits. This practice can:

- Make your farm more resilient to climate change
- Increase income opportunities
- Increase biodiversity
- Improve soil health and water retention

Wet Conditions are Becoming More Common

Farmers in the Pacific Northwest often have soggy soil for a variety of reasons. With climate change, our total annual rainfall is becoming concentrated into fewer months and farmland is often inundated with periods of too much water followed by long, dry summers. As development in our region expands, this problem is worsened by the increase in impervious surfaces, which causes more runoff, and the loss of forests that once soaked up thousands of gallons of water. Some farms also face challenges with their existing drainage infrastructure..

How it Affects Farmers

Farmers with increasingly waterlogged soil face many challenges, often including loss of income. A farm that used to get three cuttings of hay in one growing season may have such soggy conditions on the shoulder seasons that they can only get equipment out for one cutting. Another farmer may be unable to get their crops planted on time due to saturated soils, making mechanical equipment almost impossible to use until soil is dry enough. Still others may find crops don't perform as well in wet soil conditions or that vulnerability to pests and disease increases.

In the past, the most viable option to deal with wet soil was typically to add new drainage infrastructure, such as drain tiles. Today, the associated costs of installation and local permitting often make this expensive and logistically challenging. This approach may also not be the wisest option given our changing climate, while rainfall may be heavier in the winter months and early spring, our summer and fall is becoming longer and drier. Draining water off a farm in the spring may mean the loss of moisture in the soil that could be of vital importance during the summer.

Applying agroforestry practices such as alley cropping, hedgerows, or food forests may be a better option in these seasonally inundated areas. Rather than draining a field for production, an agroforestry system can allow farmers to integrate high-value perennial crops that are tolerant of wet conditions that allow for the holding of valuable water in the soil for longer.

Why try Wet Feet Farming?

As a farmer, you have to consider many factors before adopting a new practice. How much will it cost? How does it benefit the farm? How much labor is involved? How much time will it take to get established? Farmers rarely have excess time and resources, so new practices must be considered carefully. Wet Feet Farming is an agroforestry approach that may not be suitable for every farm, but in the right application it can provide a win-win solution for farmers dealing with poorly drained soils and for ecosystem benefits.

Wet areas on your farm that are challenging to plant, till, or graze risk losses in production and your overall financial viability. Applying agroforestry practices such as alley cropping or food forests may be a better option in these areas.. By planting species that can tolerate or thrive in these conditions while producing valuable specialty crops, this practice can mitigate farm

losses. However, you must also be aware of the challenges and ongoing maintenance that accompanies establishing a perennial system (see page X, Long Term Planning).

A regional partnership

Snohomish, Skagit, and Whidbey Island Conservation Districts are partnering to spread awareness about agroforestry in the Puget Sound region. With the support of WSDA Specialty Crop Block and Western SARE, we're researching how agroforestry practices can add economic, social, and ecological value to wet areas, field edges, and near water bodies on farmlands. We partnered with seven trial farm sites to test plantings of aronia berry, cider apples grafted on native crabapple rootstock, and basketry willow.

Bell's Farm Since 1946, three generations of the Bell Family have managed a diversified farm on central Whidbey Island. They are most well-known for their strawberries, and also raise flowers, vegetables, and a "fled" of regeneratively grazed Ancient White Park cattle, sheep, and pigs. Third and second generation farmers Paige and Kyle Flack, and Frank and Renee Mueller operate on 65 acres. Bell's Farm partnered with Whidbey Island Conservation District to design and install a 365-count planting on one-acre adjacent their south irrigation pond including native Pacific Crabapple rootstock grafted with cider apple scion, native Beaked Hazelnut and Blackcap Raspberry, several varieties of ornamental willow, and California oatgrass. Apple scion varieties of scion included Puget Spice, Golden Russett, Winesap, Northern Spy, Michelin, and Wickson.

Bell's Farm Wet Feet Farming goals are to improve soil health, increase forage for their livestock, and explore new income streams through perennial crops. Farmer Kyle Flack shared, "This grant has empowered us to try new things while still being able to be fiscally responsible on a small farm that very much faces the modern-day financial pressures of trying to remain viable. We are looking forward to gleaning data on these types of practices".

2 - Getting Started

Site Assessment

A site assessment is a first and critical step to establishing a new perennial cropping system. Considering Wet Feet Farming targets a specific soil type and hydrology, a soils assessment is a great place to start. You can retrieve a free soils assessment using the Natural Resource Conservation Service [Web Soil Survey](#), which can be found online. This tool allows you to draw your property boundaries on a map and receive key soil data including soil type, depth to water table, vegetative productivity, drainage, and more. Combine this data with visual observations onsite to delineate general areas for planting, or contact your local conservation district for help!

Target areas for planting can be further refined by physically marking or mapping these areas on the ground, particularly after heavy rainfall events or during any period that the area is seasonally saturated to the point of affecting existing crop or grazing systems. While not always

necessary, soil tests can provide beneficial information about the nutrient profile and organic matter levels in the intended planting area.

Assessing the **climate** is also an important step. While you probably feel more or less attuned to the weather patterns in your region, growing a new crop requires matching species to site and having a detailed understanding of how those conditions may affect that species. Annual rainfall is obviously a relevant datapoint for this practice, but other things to consider are hardiness zone, exposure to wind and sun, and potential for drought conditions. The latter is becoming increasingly important with hotter, drier summers occurring in the Pacific Northwest. While the sites in question are considered to have “wet soils”, these areas can also become very dry in the late summer and are frequently drying out earlier than normal. To increase crop health and survival, species that can handle both ends of the spectrum (dry and wet) should be selected. [Washington State University's Ag Weather Net website](#) is a good place to find climate data for your region.

Assessing the **financial components** of adoption is also critical. Much of the cost for these systems occurs in the first few years. The cost of establishment at minimum includes plant stock and wildlife browse protection (fencing, tree tubes, etc.). Additional costs could include soil amendments, site preparation, and labor. Fortunately, programs such as the Conservation Stewardship Program or the Environmental Quality Incentives Program through the United States Department of Agriculture Natural Resource Conservation Service (USDA NRCS) and through local conservation districts can provide critical financial assistance to farms for projects such as this.

To learn more about these and other programs, contact your local Conservation District (see professional support resource on page X). These programs can mitigate establishment costs for farmers, but don't necessarily help with ongoing maintenance. Maintenance costs should also be considered when assessing if this system is viable for your farm.

An additional financial consideration is **marketing**. Do you have an existing market for these new crops or will you have to invest in market development? Specialty crops grown in Wet Feet Farming systems are particularly suitable as additions to your CSA (community supported agriculture) or farmer's markets. Accessing wholesale markets may be an option but will likely require additional legwork and professional networking. For more information on marketing, see page X.

Planting Design

Agroforestry system design ensures that trees, crops, and livestock interact in mutually beneficial ways that sustain and better multiple **ecosystem services**. Ecosystem services are the direct and indirect benefits of ecosystems to humans. While farmers have been both intentionally and intuitively designing agroforestry systems for thousands of years, professional support can offer value to landowners:

- Who haven't designed or managed agroforestry systems before

- Who are new to the ecological region they are farming in
- By offering new technical and scientific knowledge to the design and management plan
- By linking landowners to broader resources and collaborations around broader land use considerations

There are many local resources for professional support to get started!

- Your local Conservation District's technical staff [Find your local District](#)
- Agroforestry Northwest for agroforesters [AFNW](#)
- WA State University Extension Office [Find local office](#)
- Your local Natural Resource Conservation Service office [Find closest office](#)

Wet Feet Farming agroforestry systems are adaptations to existing or increasingly wet conditions on your farm including:

- High water tables
- Saturated fields and possibly standing water in winter and spring
- Deep sandy, loam, clay soils
- Dry conditions through long dry summer months

Deciding what will be produced and selecting the components of the system will be limited to the conditions within these systems.

Agroforestry design for wet areas in three steps:

1. Decide what crops will be planted for harvest
2. Select the components of the system
 - a. Determine system diversity (how many crops)
 - b. Support plants for pollinators
 - c. Nitrogen fixers
 - d. Grazing animals (chickens, sheep)
3. Determine how they will be arranged

These three components will affect how the system will be managed into the future.

Remember, there is no "one-size-fits-all" approach to designing agroforestry systems for adaptation. By following these principles and adapting them to your specific context, you can create resilient and productive landscapes to thrive in a changing climate.

3 - Meet the Trial Crops

Aronia / Black Chokeberry (*Aronia melanocarpa*): This up-and-coming superfruit is relatively pest-free. Greater emphasis should be placed on protecting the plant's roots from grass and weed encroachment through the use of mulching materials (plastic, wood, straw) and regular weeding. Protection measures from deer, voles, and birds in its initial year of establishment

should also be adhered to using a combination of stakes, cages, and plant protectors. Pruning recommendations can vary, but general plant productivity can be maintained by pruning every 4-5 years. As Aronia is self-fruitful, it does not require additional varieties to pollinate. Commercial blueberry harvesters work well for gleaning the fruit.

Aronia has been grown commercially in Poland and is a fairly new crop to the United States. It is seen as a “superfruit” because of high antioxidant levels found in its berries. Although not especially palatable fresh due to an astringent taste, value-added products like baked goods, salsas, jellies, jams, chews, juices, and wines can incorporate aronia for added health benefits. Its deep purple color can be used as a dye. Selling wholesale to value-added processors, or developing value-added products in-house using the berries are market opportunities.

Pooling resources with other growers in the region to secure wholesale contracts may be another potential avenue. Explore information provided by the American Aronia Berry Association and North American Aronia Cooperative. As an individual producer, it’ll be unlikely we can compete with processing cooperatives, but seek out relationships with beverage companies interested in incorporating Aronia into their products, and pursue value-added producer grants and resources through organizations like Northwest Agriculture Business Center and United States Department of Agriculture.

Cider Apple Grafted on Pacific Crabapple (*Malus fusca*): Grafted cider apple on native crabapple rootstock enables the growth of cider apples in less ideal soil conditions. However, wet conditions can be risky for an already disease prone crop. Research your apple species carefully with the resources provided in our Appendix. We have found Puget Spice to be a very good dual use apple for both cider and fresh eating, which is resistant to regional disease pressure.

Hard cider is a strong retail and wholesale market in the Pacific Northwest. Cider apples require full sunlight. Numerous apple pests and diseases exist, including apple maggot, apple scab, fire blight, and codling moth. Familiarize yourself with these by working with local experts. Growing apples for cider requires fewer inputs as the fruit doesn’t need to be cosmetically perfect, but you’ll need to pay close attention to the health of the graft union (the area where the cider apple scion is grafted onto the native Pacific Crabapple rootstock). If not grafting onto the native rootstock, you could select other types of apple rootstocks that include dwarfing, semi-dwarfing, and full-sized seedling sizes to place your scion wood onto. Proper grafting hygiene including keeping tools clean using hydrogen peroxide and minimizing touching exposed cambium are essential.

Consistent watering, weeding, and pruning are integral, especially in the plants’ first year, for successful graft union growth and overall plant growth. Most apples will need complimentary apple varieties to be planted adjacent to them to ensure proper pollination. Make sure the scion varieties you select are complementary to the bloom times of one another for fruiting to occur in your planting. Consult your local extension experts for good fits based on the apple bloom period. Cultivating the understory beneath this crop will help support native pollinators and increase pollination. Annual pruning or training of the crop will be needed to maximize harvest.

Despite being a more challenging perennial crop to grow, there is a growing market for hard cider and apples. Cider apples can produce complex and full bodied alcoholic beverages. Blending cider apple cultivars can provide ciders with a range of viscosity and mouth feels. Profitability in the cider market will depend on relationships with local cideries willing to pay well for specialty cider apples. Minimize costs by establishing multiple year contracts with potential outlets once your plants are established and average production yields can be evaluated. The Northwest Cider Association and American Cider Association are avid supporters of the cider market.

Willow (*Salix spp.*): Willow for decorative floral arrangements and basketry are relatively easy to grow in a variety of soil types. They thrive in full sun but can tolerate partial shade. Willow propagates easily through livestock cuttings, but this will require regular weeding, mulching, and watering to ensure the livestock is not outcompeted. An eight- to twelve-inch cutting taken from a dormant one-year-old rod can be planted in early spring. March-April is an ideal time to plant live stakes in the Pacific Northwest.

Willow trees can be coppiced, which means cutting the top growth down to the ground in late winter to encourage young shoots to multiply in future growing years. Some growers may also prefer to let the trees grow into their natural shape and form, removing only dead or damaged growth, depending on your market needs.

Willow for decorative florals or baskets presents unique market opportunities. There are basketry weavers guilds, such as the National Basketry Organization, with potential to cultivate an important market. The demand for cut flowers and additions to floral arrangements for retail florists has grown steadily. Unique colors, bud and stem growths, may be just what your willows could provide. Woody cuts can be sold fresh, but dried arrangements have also increased in popularity in the cut-flower industry.

4 - Plant Selection

Selecting the right plants for your agroforestry system will be key to its success. Draw on your site assessment for important information such as climate, soils, and topography.

The plants selected should compliment one another within the system and avoid competition. Consider characteristics including:

- **Growth habit** What are the plants' size, shape, and space needed to grow to maturity?
- **Root system** Do your plants have tap roots, surface roots, rhizomatous roots, or mat-forming roots?
- **Compatibility** Do plants compliment each other in some way (fruit trees and pollinator attracting flowers for example)?
- **Pest and disease resistance** Are varieties selected resistant to known pathogens in the region?

- **Market value** Is there an existing or emerging market for your crops?
- **Local knowledge** Are there indigenous people, local farmers, technical staff, or others that have knowledge you can draw from?

Bow Hill Blueberry Farm, established in 1947, is the oldest family-owned and operated berry farm in the Skagit Valley. In November of 2020, Audrey and Ezra followed their dream to live and work on a farm of their own and purchased Bow Hill Blueberries. Skagit Conservation District partnered with Bow Hill Blueberries to help plant a buffer. This buffer is designed to improve water quality, while providing some kind of product or revenue. Plants included in the buffer were, Aronia, Cascara, Sitka Willow, Osoberry, and Snowberry. This farming project will improve water quality, increase native pollinator habitat, and help shade out invasive species like reed canary grass!

Recommended Pacific Northwest crops for Wet Feet Farming

📄 Plantchart_V2

Selecting nursery stock

The larger the plant you purchase, the costs and labor to install increases, but time to harvest and survivability increase. Smaller plants are cheaper and easier to transport and plant, but will take longer to produce and are more susceptible to weed and herbivore pressure.

Four categories of nursery stock - bareroot, container, plug+ and live stake

- Bareroot
 - Two number code (1-0)
 - First number is the number of years the plant was grown from seed in the original bed it was sewn in.
 - Second number is the number of years the plant was transplanted then grown in a second bed.
 - A zero for the second number was never transplanted and is called a seedling
 - Any number other than zero for the second number was transplanted and is called a transplant
 - Examples
 - 2-0 - Two years in the original bed, no secondary bed growth. Seedling
 - 1-2 - One year in the original bed, two years of secondary bed growth. Transplant
 - 3-0 - Three years in the original bed, no transplant. Seedling
 - Seedling (SDL)
 - A mixture of various ages and transplants

- Container stock

| Pot Size Inches (Diameter) | Pot Size Gallons |
|----------------------------|------------------|
| 4" | 0.125 |
| 5-6" | 0.25 |
| 7-8" | 1 |
| 10" | 3 |
| 12" | 5 |
| 14" | 7 |
| 16" | 10 |
| 18" | 15 |
| 24" | 25 |
| 30" | 30 |
| 32" | 35 |
| 36" | 40 |
| 44" | 45 |

- Plug+
 - Plants grown in a container the first year, then transplanted to a garden bed
 - Two digit code (plug+1)
 - First word "plug" means it was grown in a container for the first year from seed
 - The plus (+) means it was grown in a container plus time in a bareroot bed, with the number being number of years grown in the bareroot bed
 - Examples
 - plug+2 - one year in a container then transplanted into a bareroot bed for two years of growth
 - plug+1 - one year in a container then transplanted into a bareroot bed for one year of growth
 - Live stakes

- Length and diameter of stake will be denoted in feet or inches depending on the grower

NW Meadows is a family-owned native seed company providing native grass and wildflower seed for pollinator conservation, rain gardens, meadows, and wildlife habitat in Oregon and Washington. Eric Lee-Mäder and his wife, Mari, dreamed of planting a cider orchard of archaic French and Spanish apple varieties. However, the only land they could afford on Whidbey Island was an abused sheep pasture that stayed flooded all winter. At first, they weren't sure how to make the property work but as they took inventory of the 13-acre property and began clearing out invasives, they began to discover a surprising number of native species.

Among them, growing in a hedgerow, was Pacific Crabapple (*Malus fusca*) which thrives in wet soil and is highly disease resistant. "I thought maybe I could graft cider apple varieties onto the rootstock," Eric said. "It turned out there was a small tradition of people who'd had good luck doing it." Eric was awarded a Sustainable Agriculture Research and Education grant to help with the cost of the project. "We planted them densely, basically as hedgerows, since that's how they'd grown naturally. Then we grafted French and Spanish cider apple varieties onto the tops." Read more of [Northwest Meadows story here](#).

5 - Site Preparation

Set your plantings up for success by reducing weed pressure and preparing soils in advance. Prepare sites for planting in the fall when you anticipate planting by the end of spring. Avoid site preparation in wet/ponded areas, or immediately before flooding/ponding during wet season.

Exclude all vegetation within a three feet radius of planted stock through hand weeding or tilling before installation of plants. Till areas with an extensive, deep turf layer to reduce undesirable grass. Tilling should only be used to prepare sites prior to planting and not be used for ongoing maintenance to reduce soil disturbance. Till strips at least six feet to ensure a three feet radius from the center of planted stock. If patches of aggressive grasses persist, hand dig or till using a walk-behind or other small tiller.

Turning over the turf and breaking up continuous colonies of grasses will both suppress regrowth and prepare the ground for plantings. Till or disc large areas using an implement pulled behind a tractor or walk behind tillers for smaller spaces. Brush hogs, brush mowers, and hand held brush cutters can be utilized to remove extensive areas of undesirable woody species. Dig and hand pull to remove woody invasive species as much as possible if present. Continued mowing of woody invasive species after regrowth and before fruiting within the same growing season will keep the plants in check and will eventually exhaust their growth.

No-Till Weed Suppression and Planting Techniques

Operating heavy machinery or tilling in saturated soils can lead to long-term consequences for both productivity and the environment by increasing soil compaction and erosion. Avoiding heavy machinery use in saturated areas is crucial for preserving soil structure, promoting healthy plant growth, and preventing environmental degradation. Though they can require more time and labor upfront, studies have shown that no-till practices can increase crop yields by an

average of 5-10% over conventional tillage methods (Conservation Agriculture Network). Wet Feet Farming can leverage several no-till methods to control weeds and establish plantings:

- **Tarping:** During fallow periods, use biodegradable tarps to smother existing weeds and prevent new ones from germinating. After a designated period, the tarps decompose naturally, leaving a weed-free seedbed for planting.
- **Broadforking:** This manual, no-till tool loosens compacted soil to create planting holes without disrupting the soil structure. Broadforking allows for better root zone development for your desired crops.
- **Mulching, Composting, and Biochar:** These techniques work synergistically with no-till practices:
 - **Mulching:** Apply a layer of organic mulch (straw, wood chips) around plantings to suppress weeds, retain soil moisture, and regulate soil temperature.
 - **Composting:** Incorporate finished compost into the soil to improve fertility, organic matter content, and water holding capacity.
 - **Biochar:** Biochar, a charcoal-like substance produced from organic matter, can be added to the soil to improve drainage and fertility, particularly beneficial in wet environments.

If you choose to use herbicides, follow label instructions carefully as well as all regulations surrounding: safety plans, appropriate certification, application rates, dates and times applied, and any posting of information regarding the application of herbicides near public areas. Herbicides may require the planting time to be pushed back until the herbicides are no longer a threat to new plant installation.

Follow all Local, State, Tribal, and Federal laws, rules, regulations, and ordinances. Check with local permitting agencies for compliance with critical areas when working within them. Follow safety guidelines and wear Proper Protective Equipment when performing site preparation.

Plant Installation

Avoid planting during flooding, ponding, or when access and installation of plantings will create excessive disturbance (such as heavily saturated soil conditions in wetlands). Avoid planting on hot, windy days. Avoid planting during freezing temperatures. Planting site must be free of snow and the soil frost-free.

Limit access to planting areas before, during and after planting, especially to vehicles and equipment, to avoid compaction, erosion, and damage or destruction of established plantings. Access to plantings with equipment and livestock should begin no sooner than 2-3 years after initial installation to limit disturbance during establishment.

Bare root planting instructions

Bareroot seedlings and cuttings may be stored for up to 7 - 10 days at temperatures from 36 to 45 degrees F. If snow is available storage can be provided by constructing a cavity for the packaged seedlings (on a north facing slope or under shade if possible).

If planting has to be delayed or cold storage is not available, unpack bareroot seedlings and "heel in":

- 1) Dig a V-shaped trench in a moist, shady place;
- 2) Break bundles and spread seedlings out evenly, 3 or 4 thick, in an upright position to a depth equal to the root collar;
- 3) Fill in with loose soil, and water;
- 4) Complete filling in soil and pack firmly (See diagram below). Store container plants in a cool area.

Seedling Handling Guidance

In the field on the day of planting, store seedlings in the shade or under a reflective space blanket. Do not use canvas to protect seedlings from solar heating. Periodically moistening the seedlings will help to ensure they stay hydrated and will limit damage to roots during transport and planting, as well as reduce shock after planting. If storing seedling on site overnight or multiple nights, heel the bare roots into moistened wood chips or soil. See the diagram at the bottom of the section for guidance.

Use a suitable container (bucket, planting bag, or planting tray) for carrying plants. Do not carry more seedlings than can be planted in one hour (warm, windy, dry day) to two hours (calm, humid day). Keep wet material around roots to prevent their damage through exposure. Never carry a handful of plants exposed to the sun and wind. Take one plant at a time from the container and install it immediately. Trim excessively long roots with a sharp hatchet, machete, shears, or scissors. Do not tear or rip roots. Limit the amount of foot traffic through areas and avoid compaction of soil and disturbance to installed plants.

To provide shade for new seedlings, plant them on the north side of stumps, logs, rocks, or debris wherever possible. If planting into existing woody vegetation, remove debris and scarify soil in a radius three feet surrounding the center of the planting area. Remove any overhanging vegetation through pruning or sawing as necessary to allow for light to penetrate to the lower canopy. Use hand tools for plantings to minimize damage and stress to plant stock.

Recommended spacing

- 10-12 feet between trees or large shrubs
- 3-6 feet of spacing between small to medium sized shrubs
- Herbaceous plants and low growing or groundcover woody species should be planted no closer than 2 feet to other plants
- Spacing can be adjusted as needed depending on various needs for the farmer/worker and the plants

Rooted Northwest purchased 240 acres in Snohomish County, Washington, including 180+ acres of prime farmland in 2020 to develop a cohousing community near Arlington, Washington, focused on village living and permaculture farming. "On parts of our property, our water table can fluctuate by as much as 14 feet," said Co-Founder, Dave Boehnlein. "Those places will need the most adaptable perennials." Dave decided the agroforestry practice that would work best in their wet area was an alley cropping system. "Since we were planting in our hayfield, I wanted something that would allow us to continue to hay while increasing diversity and providing tree crops."

The planting went in during the fall of 2022 with rows spaced 30 feet apart to allow for equipment. Three-quarters of the plants are Aronia and the other quarter is split between Hazelnuts, Elderberries, and Pawpaws. "We focused on Aronia because they're the most versatile plant I've worked with, bar none. You can grow them on a dry hillside or in a swamp and they produce every year," said Dave. "We're also testing out some new wet-tolerant varieties of Elderberries and we have a mix of Hazels, including some hybrids." Read more of [Rooted Northwest's story here](#).

6 - Long Term Planning

Perennial systems open new economic markets and improve ecosystem services in seasonally saturated sites. But it is important to understand that planting perennial systems can involve more complexities than annual systems. To maximize the return on your investment, keep in mind not all perennial species are created equal. Proper pre-and-post planning is key to your success.

After plants have been installed, they will likely take three to five years before their root systems are fully established. This is a critical time where regular maintenance and attention to your planting will pay dividends in the long run. Be sure to study grafting, mulching, plant protection, irrigation, and pest management in advance.

- **Grafting** The use of grafting to combine one plant part with another to encourage growth as a unified plant is a technique used to unite desired cider apple scion varieties with the wet-tolerant soil traits of the native Pacific crabapple rootstock. If, as part of your planting, you've chosen to graft, be sure to practice proper techniques (such as "whip-and-tongue grafting") and inspect the graft union's progress throughout the first growing season, removing "suckers" coming off the rootstock with sanitized pruning shears. Learn more about grafting through your location extension, such as this resource: [Propagation of Plants by Grafting and Budding \(PNW496\)](#).
- **Mulching** is used to help with weed suppression, protect against temperature extremes, and minimize soil water losses around the base of each plant. Learn about materials that can be used for mulch, and how to arrange them around your plant, such as through this resource: [Guides to Mulches \(WSU Extension C075\)](#).

- **Plant Protection** The use of protector tubes and stakes for individual plants keeps smaller mammals, such as rabbits and voles at bay and encourages proper growth. You may find greater peace of mind by installing a larger fence using t-posts and netting to protect against herbivore browse from deer. Not all wildlife necessarily conflict with new plantings, but learning more about the local populations and researching the most effective protection techniques in advance will increase the plant survival rate and save time later. Resources to check out: [Plant Protection Devices & Solutions](#) (WSU Extension) and [Living with Wildlife Factsheets \(WDFW\)](#).
- **Irrigation** As water becomes a more limiting resource, irrigation planning and management will help you to meet your plants' needs. Although plants adapted to the soils on site were selected, you will still need to provide supplemental water during the driest months of summer. Find resources to help you plan an effective and budget friendly irrigation system by visiting the [Resource Library of Irrigation in the Pacific Northwest](#).
- **Pest Management** Not every plant in your installation may be susceptible to the same types of pest damage. When selecting plants, research each species' disease susceptibility. The use of an Integrated Pest Management System helps you use a combination of techniques, including Setting Action Thresholds, Monitoring and Identifying Pests, Preventing Pests, and Controlling Pests to manage pest damage done using the most economical means, with least possible hazard to people, property, and the environment. WSU Extension's [Integrated Pest Management page](#) details common landscape, garden, and pest problems to be aware of.

Use this maintenance schedule for the first 3-5 years of establishment. Make adjustments as needed for the specific needs of your installation.

| | |
|-------|---|
| March | <ul style="list-style-type: none"> ● Inspect existing plants, observing pests, such as insects, mold, and fungus ● Remove or replace damaged or diseased plants ● Test your soils if you notice nutrient deficiencies after the first year of planting in leaf tissue or new growth ● Repair and replace damaged plant protectors. Weed competing species around the plants' base |
| April | <ul style="list-style-type: none"> ● Repeat any weeding around the plants' base as needed ● Apply mulch for weed suppression and moisture retention ● Fertilize per soil test recommendations |

| | |
|-------------------|---|
| May | <ul style="list-style-type: none"> ● Set-up irrigation system and develop irrigation schedule |
| June-August | <ul style="list-style-type: none"> ● Weed and water as necessary ● Scout for pests |
| September | <ul style="list-style-type: none"> ● Weed and water as necessary ● Scout for pests ● Late season soil test |
| December-February | <ul style="list-style-type: none"> ● Adjust your planning each year based on your record keeping for both commodity and supporting plant species. ● Budget time and money into planning for harvest and storage options |

Potential Markets

Wet Feet Farming has the potential to provide supplemental income by entering you in a new or emerging market. Aronia, Cider Apples, and Willow each fill a unique market niche and consumer audience, and the Pacific Northwest houses many consumer centers willing to pay top dollar for these specialty food and fiber products. Our growing agritourism industry lends itself to exciting sales strategies: farm stands, u-pick, farmers markets, food hubs, direct restaurant sales, florists, value-added products, and more!

Some economic markets can be quite large and well-structured with both wholesale and retail venues, and others are dependent on your personal relationships with local artisans and communities.

Known more commonly as “specialty crops”, products from Aronia, Cider Apples, and Willow grown in perennial systems can fall into one of four categories:

- **Medicinals and Botanicals** Plant-derived substances can be used in food supplements, herbal health, dyes, and cosmetics. Any part of the plant may be used: wood, bark, buds, roots, fruits, flowers, nuts, sap, and even pollen. Aronia is a great crop for this use.
- **Food and Beverage Products** Perennial food products include nuts, fruits, and even mushrooms. Commercial nut markets can include in-shell products, whole and crushed kernels, oils, and confections. Berries are marketed fresh, frozen, or as value-added products in jams, jellies, syrups, concentrates, confections, ciders, and wines.
- **Decorative Florals** Woody plant species like Willow may have a colorful or unusually shaped stem, bud, flower, fruit, or leaf that could be used in decorative floral products. Floral designers use these to enliven floral arrangements.
- **Handicrafts and Specialty Woods** Natural materials and specialty woods can be used in handicrafts such as: baskets, walking sticks, pendants, furniture, instruments, and more.

While the return on investments for perennial commodity crops like Aronia, Cider Apples, and Willow take longer to realize, this gives you time to professionally network and build your marketing skill.

Wet Feet Farming Resources

Scan the QR code for a comprehensive resource publication list of Wet Feet Farming resources to explore more about how to grow and market these specialty products.

The appendix (next page) will be available in the printed version as a QR code.

Appendix

- [Find your local Conservation District](#)
- [Find your local WA State University Extension office](#)
- [Find your local Natural Resource Conservation Service office](#)
- [Agroforestry Northwest](#)

Resources by Guide Section

2 - Getting Started

Natural Resource Conservation Service [Web Soil Survey](#)
[Washington State University's Ag Weather Net website](#)

5 - Site Preparation

[Natural Resources Conservation Service Tree Shrub Site Preparation Standard](#)
[Natural Resource Conservation Service Tree Shrub Establishment Standard](#)

6- Long Term Planning

[Propagation of Plants by Grafting and Budding \(PNW496\)](#)
[Guides to Mulches \(WSU Extension C075\)](#)
[Plant Protection Devices & Solutions](#) (WSU Extension)
[Living with Wildlife Factsheets \(WDFW\)](#)
[Resource Library of Irrigation in the Pacific Northwest](#)
WSU Extension's [Integrated Pest Management page](#)

Farm Highlights

[Northwest Meadows](#)
[Rooted Northwest](#)

Marketing Resources

Research on Establishment of and Income Generation Opportunities

[AgroEcosystem Performance Assessment Tool](#)
[Agroforestry for Rangeland Tool](#)
[An Economic Strategy to Develop Non Timber Forest Products](#)
[Aronia Berry Case Study](#)
[Buffer\\$ A Conservation Buffer Economic Analysis Tool](#)
[Care and Maintenance of Perennials](#)
[Conservation Buffers – Design Guidelines for Buffers, Corridors, and Greenways \(PDF version\)](#)
[Conservation Buffers Multi-Story Cropping](#)
[Conservation Buffers Reference List](#)
[Conservation Buffers Website Version](#)
[Economics of Agroforestry \(1996\)](#)

[Economics of Agroforestry \(2014\)](#)

[Evaluation of economic gains from non-timber products in a riparian forest in the Chesapeake Bay Watershed.](#)

[Growing Specialty Forest Products in Agroforestry Settings](#)

[Guide to Perennial Crop Options](#)

[Hardy Fruits With Special Reference to Their Culture in Western Canada.](#)

[Hardy Fruits With Special Reference to Their Culture in Western Canada.](#)

[Income Opportunities in Special Forest Products - Self Help Suggestions for Rural Entrepreneurs](#)

[Is the future of agriculture perennial?](#)

[Key Perennial Crops - Savanna Institute](#)

[Land Potential Tool](#)

[Landowner Guide to Perennial Crop Options](#)

[Landowner interest in multifunctional agroforestry riparian buffers](#)

[Linking phytoremediated pollutant removal to biomass economic opportunities](#)

[Marketing Agroforestry Products - Lessons from Producers \(USDA\)](#)

[Non-Timber Forest Product Calculator](#)

[Non-traditional tree crops for northern climates](#)

[North American Agroforestry: An Integrated Science and Practice, 2nd edition](#)

[Perennial Crops and Practices Course](#)

[Perennial Crop Grow Guide](#)

[Potential adoption of agroforestry riparian buffers based on landowner and streamside characteristics](#)

[Producing Woody Floral Products in an Alleycropping System in Nebraska](#)

[Productive Conservation – Diversifying Farm Enterprises by Producing Specialty Wood Products in Agroforestry Systems](#)

[Propagation of Plants by Grafting and Budding](#)

[Specialty Berry Market Assessment Study](#)

[The development of native fruit species as horticultural crops in Saskatchewan.](#)

[The use of agroforestry to control erosion – financial aspects](#)

[Third Crop Options - Woody Decorative Florals](#)

[USDA Agroforestry Center Riparian Forest Buffer Publications Hub](#)

Specialty Crop Purchasers

[Dunbar Gardens](#)

[National Basketry Organization](#)

[Northwest Wild Foods](#)

[Northwest Cider Club](#)

Local and National Organizations that Specialize in Study Crops

[Agroforestry Northwest](#)

[American Aronia Berry Association](#)

[American Cider Association](#)

[Arbor Day Foundation](#)

[eXtension Apples](#)

[North American Aronia Cooperative](#)

[Northwest Cider Association](#)

[Northwest Fruit](#)

[Western Cascade Fruit Society](#)

Specialty Berry Markets

[American Aronia Berry Association](#)
[Northwest Wild Foods - Organic Berries](#)
[North American Aronia Cooperative](#)

Apple and Cider Markets

[American Cider Association](#)
[Apple Grower Research and Extension Needs for Craft Cider](#)
[Apple Orchard Pest Resource List](#)
[Cost Estimation of Establishing a Cider Orchard in Western Washington](#)
[eXtension Apples Community of Practice](#)
[Four Scientists Tap Rare and Forgotten Apples to Reimagine Cider](#)
[Montana Heritage Orchard Program](#)
[Northwest Cider Association](#)
[Northwest Cider Club](#)
[Old Time Apple Varieties in Western Washington - WSU Extension](#)
[Tree Fruit Economics](#)
[Savannah Institute's Key Perennial Crops - Cider Apples](#)
[Cider Apple Research at Washington State University](#)

Woody Floral Markets

[Center for Crop Diversification](#)
[Dunbar Gardens](#)
[National Basketry Organization](#)
[Nebraska Cooperative Development Center "Nebraska Woody Florals"](#)
[Ornamental Case Study](#)
[Center for Crop Diversification - Woody Cuts](#)
[Upper Big Blue Natural Resources District Wood Florals Case Study](#)

Other Crop Specific Organizations of Interest

[California Rare Fruit Society](#)
[Managing Food Safety When Integrating Livestock into Specialty Crops - Savanna Institute](#)

Business Planning for Producers

[Northwest Agriculture Business Center](#)
[The WSDA Handbook for Small and Direct Marketing Farms](#)
[Using Enterprise Budgets to Make Decisions](#)

Market Scale Development Tools

[Environmental Markets: A Guide to Tools and Resources to Expand Conservation Practice Adoption](#)
[Guide to marketing channel selection: How to sell through wholesale and direct market channels](#)
[USDA handbook for small and direct marketing farms](#)
[Wholesale Marketing Resources-Cornell University](#)

Retail Outlets

[Eat Local First - Washington Food and Farm Finder](#)
[Farmstand Local Foods](#)

[Island Grown in the San Juan Islands](#)

[Puget Sound Foodhub](#)

[Skagit Valley Farmers Market and Farmstands](#)

[Skagit Valley Food Cooperative](#)

[Washington State Farmers Market Association](#)

[Whidbey Island Farmstands](#)

[Whidbey Island Grown Cooperative](#)

Value-Added Resources

[Skagit Commercial Kitchen](#)

[Value-added Producer Grants](#)

[Whidbey's Goosefoot Community Foundation Commercial Kitchen Project](#)