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Silvopasture: An Agroforestry Practice

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Introduction

Silvopasture is a type of agroforestry system in which trees and shrubs are intentionally integrated with forages and livestock on the same unit of land. Silvopasture systems achieve multiple ecological, social, and production benefits. In addition to their value for timber and nontimber products, trees in silvopasture systems create beneficial shade for livestock during summer months and can enhance forage quality and quantity and provide other ecosystem services.

The most common ways to establish silvopastures are to add trees to pastures or to remove trees from forests and establish or manage existing forages (Chedzoy et al. 2022). Silvopasture establishment can also include other approaches such as integrating grazing livestock into orchards and managing natural savanna systems through grazing.

Not all combinations of trees, forage, and livestock constitute silvopasture. Allowing livestock access to forests without consideration for tree and soil health, forest regeneration, environmental impacts, or forage composition and availability will result in degradation of the site. The trees, forages, and livestock of a silvopasture system must be managed collectively to ensure the system will function and to reduce negative impacts on production and the environment.

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Banner Photo: USDA Natural Resources Conservation Service photo by Joe Alley.

Silvopasture management requires grazing management—the manipulation of grazing in pursuit of a specific objective or set of objectives (Allen et al. 2011). In silvopasture management, those grazing management objectives may include the success and longevity of the trees and shrubs within the system, management to reduce livestock heat stress, forage production throughout the year, or other conservation or production goals. When managed to support silvopasture objectives, livestock generally have short periods of occupation in silvopastures, creating extended rest periods for the forages to rebound. Grazing management helps maintain the productivity and function of the system over time and helps to reduce negative impacts. In some geographic regions, terms such as management-intensive grazing or rotational grazing are used to describe grazing management that moves livestock through pastures regularly to distribute grazing intensity and duration among the paddocks. For more information about silvopasture systems compared with other grazing approaches, see Agroforestry Note #46, "Forest Grazing, Silvopasture, and Turning Livestock Into the Woods."

Silvopasture establishment and management are most effective when they reflect the conditions of the land and the producer's goals. A majority of producers have a combination of treeless pastures and silvopastures in their systems and silvopastures are included as part of the regular grazing rotation (fig. 1). Some producers may reserve silvopasture paddocks for short-term grazing, particularly during hot and dry periods.

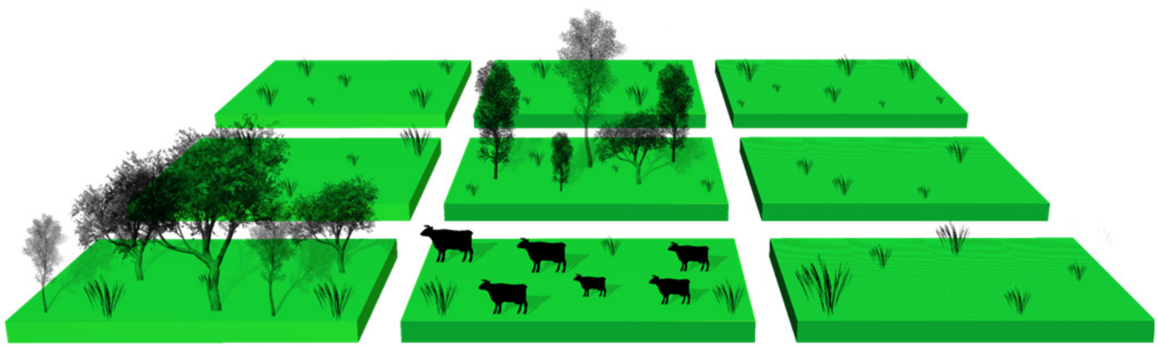

Figure 1—This diagram illustrates how silvopastures can be combined with treeless pastures as part of a rotational grazing system. According to a synthesis of silvopasture studies, 96 percent of silvopasture adopters use a combination of silvopastures and treeless pastures and 98 percent of silvopasture adopters use rotational or management intensive grazing (Smith et al. 2022).

Planning Considerations

Site assessment and planning are key to successful silvopasture implementation. The following planning considerations are important for establishing silvopasture systems that meet producer goals. General resources to help address these considerations are provided, but regional resources may offer the best information for considering these topics. Characteristics of each silvopasture component, as well as the site itself, will influence planning and implementation.

General considerations:

- Consider the time it will take to manage trees, forages, and livestock in a single integrated system as it compares to current farm management.
- Develop production goals for both the short (1 to 5 years) and long term (10 or more years) for each component of a silvopasture system: trees, forage, and livestock. For example, a long-term goal might be to increase shade to reduce livestock heat stress.

- Understand whether changes associated with silvopasture implementation (e.g., adding trees to agricultural land or livestock presence in forested land) may impact participation in State preferential property tax programs (Chizmar et al. 2022).
- Consult soil maps to understand areas under consideration for silvopasture establishment. On easily compactable or highly erodible soils, exercise caution in establishing silvopastures. The U.S. Department of Agriculture, Natural Resources Conservation Service's (NRCS) Web Soil Survey can be a useful tool to identify soils at the proposed silvopasture site (USDA NRCS 2019).
- Assess whether invasive species are present and create a management plan to address them.

Tree selection considerations:

- Investigate suitability of tree species for the site's soil types and landscape position. Resources such as State NRCS plant lists may be useful.
- Consider the labor required to perform management activities such as thinning, pruning, and potential harvest associated with selected tree species.
- Research commercial markets for pulp, timber, tree crops, and other products, if applicable.
- Consider how forage growth may change over time due to tree planting density and species selection (Castillo et al. 2020).
- Evaluate tree species that might be useful as fodder and that provide nutritive value.
- Determine if tree species may be toxic to livestock. Cornell University maintains a database of toxic plants (Cornell University 2024).
- Ensure that tree spacing and arrangement match producer goals. For example, optimal spacing for nut crops (wide spacing for wide crowns) is not optimal if prioritizing timber (narrow spacing for knot-free wood). Also consider the size of any equipment that may be used to manage forage, weeds, trees, or livestock in the silvopasture when determining tree spacing and arrangement. Tools that estimate trees per acre at different spacing may provide a useful starting point.
- Consider form and growth of tree species and how this may affect anticipated tree spacing and arrangements through time. If planting multiple species, consider how their growth characteristics may affect one another.

Livestock considerations:

- Assess the potential impact that specific livestock may have on trees and how to mitigate negative outcomes through fencing, tree tubes, or grazing management.
- Understand current and planned grazing management at the site. This includes livestock type or breed, stocking rates, seasonal pasture use, fencing and other infrastructure, acreage available for open pasture and silvopasture management, and other factors. The ATTRA (Appropriate Technology Transfer for Rural Areas) "Grazing Planning Manual and Workbook" provides a grazing planning template that may help guide decision making (Rinehart 2017).
- Make note of existing issues or limitations with livestock.
- Plan for the development of necessary infrastructure (such as water tanks and permanent and/or temporary fencing).

Forage considerations:

- Evaluate the ratio between treeless pasture and silvopasture acreage and how it may influence forage and grazing management across the entire year.
- Determine whether existing forages have negative influences on livestock metabolism or physiology leading to a reduction in performance and overall profitability, such as tall fescue (*Schedonorus arundinaceus*) (Cornell University 2024).
- Consider how selected forage species respond to varying light conditions found in a silvopasture (Castillo 2024).
- Test soils for nutrient status and pH to support proper forage growth and selection. Determine whether amendments may be necessary.
- Assess seasonal variations in forage growth and availability (Karki 2010).

Cattle graze in a planted silvopasture in Jakin, GA. USDA Forest Service photo by Richard Straight.

During the planning phase, it is important to consider how components of the system may interact (table 1). This is especially important for the initial layout of trees or infrastructure, which is difficult and potentially costly to modify later. Further, producers can develop a plan to monitor the silvopasture system as it matures, since each component of the system may need more intensive monitoring at different times. For example, as trees mature and cast more shade, forage yields may decrease, requiring intervention such as thinning or pruning trees or seeding more shade-tolerant forage species. A well-designed plan for monitoring and modification can help producers and managers reduce mistakes and achieve their goals.

Table 1—Summary of silvopasture component characteristics

Trees	Height, growth rate, canopy cover, rooting depth and architecture, phenology (leaf emergence and drop), leaf/needle form and chemistry, water use, planting/thinning configuration
Forages	Perenniality, ease of establishment, photosystem (C3 and C4; i.e., cool season and warm season), rooting structure, nutrient use and requirements, adaptability to grazing, water use, shade tolerance
Livestock	Species, fencing requirements, breed, age/class, social learning, stocking rate and duration, water use, seasonal timing of grazing
Site	Elevation, hydrology, aspect, soil type, soil characteristics, soil fertility, infrastructure, topography, water holding capacity, climate

Benefits

Producers utilize silvopasture systems for a wide variety of ecological, economic, and social benefits. Conservation benefits may include erosion reduction, water quality improvement, wildlife habitat enhancement, increased biological diversity, carbon sequestration, and more (fig. 2).

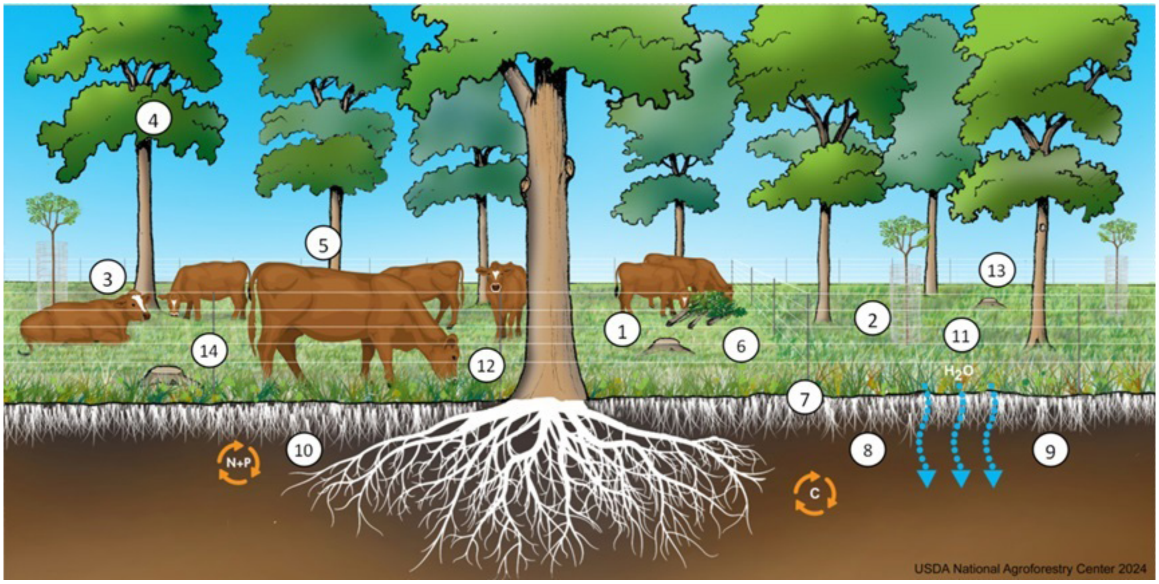

Figure 2—Illustration and summary of primary benefits from silvopasture as they relate to forages, livestock, trees, and the broader ecosystem (Smith et al. 2022).

Key	Component	Summarized primary effects
1	Forage	Microclimate modification can maintain or enhance forage yield and quality compared to open pasture depending on species and management.
2	Forage	Microclimate modification can extend forage growing season by reducing drought impacts in summer months and reducing early and late season frosts.
3	Livestock	Shade reduces solar radiation and livestock heat stress.
4	Livestock	Shelter from trees can offer thermal protection for livestock during winter by reducing wind and precipitation that reaches sheltering animals.
5	Tree	Tree growth can benefit from nutrient input if livestock are adequately managed to prevent negative impacts.
6	Tree	Leaf fodder and mast (e.g., acorns, honey locust pods, apples) can augment livestock diets and offer nutritional value depending on species.
7	Ecosystem service	Soil carbon storage is increased at various soil horizons and depths when converting from open pasture to silvopasture but may decrease when converting from forest. Soil and biomass carbon sequestration is generally higher in silvopasture than open pasture but may be lower than forests.
8	Ecosystem service	Soil health may be better in silvopastures compared to open pastures. Soil compaction may be higher in silvopastures compared to forests.
9	Ecosystem service	Silvopasture can enhance nutrient recycling and reduce phosphorus loss and nitrate leaching when compared to open pasture.
10	Ecosystem service	Infiltration rates are similar or slightly higher in silvopasture than open pasture but lower than forests.
11	Ecosystem service	Wildlife habitat and biodiversity may increase with silvopasture management compared to open pastures but may be less than diverse natural forests.
12	Ecosystem service	Grazing and woodland management in silvopasture systems may reduce fuel load and wildfire risk.
13	Ecosystem service	Silvopasture may provide cultural ecosystem services including sense of place, aesthetic value, recreation and ecotourism, and cultural heritage value.
14	Ecosystem service	Silvopasture may be used to reduce weeds and invasive species, which may also help reduce herbicide use, mowing, or other plant management activities.

Many of the benefits of silvopasture outlined in figure 2 can translate to economic benefits for producers. In some cases, forage yields can increase under the shade of tree canopy relative to open pasture, reducing feed costs for producers. Shaded forage yields may increase earlier in the growing season, allowing producers to get livestock out on pasture for more time (Frost and McDougald 1989, Kallenbach et al. 2006). Research has also shown that silvopastures may be more resilient during times of drought due to increased soil organic matter that increases water retention (Amorim et al. 2023). Depending on the setting (orchards and vineyards, for example) silvopasture management may also reduce fertilizer application and weed management costs (Mazaroli et al. 2024, Smith et al. 2022). In addition, silvopasture management has been found to reduce fuel loads and potential wildfire risk (Batcheler et al. 2024).

The trees within silvopasture systems can be sources of income. Producers can select trees that provide one or more products spanning both short-term (e.g., tree nuts) and long-term (e.g., timber) planning horizons (Greene et al. 2023, Smith et al. 2022). Trees can be spaced in a silvopasture system to allow easier harvesting access for timber and nontimber products.

Silvopasture systems may also provide various social benefits for both producers and local communities. Many practitioners describe their silvopasture systems as enjoyable and attractive places to spend time (Smith et al. 2022). Producers and local community members may be interested in wildlife species whose habitat may improve through silvopasture design (Shrestha et al. 2004). This can create a dual benefit for culturally valued wildlife conservation and social enjoyment for wildlife viewing. Producers may draw additional revenue from recreational activities in the form of ecotourism and/or hunting opportunities (Moreno et al. 2018).

The ability to stack enterprises may also create an opportunity for multiple generations to manage the land (Keeley et al. 2019). This can support intergenerational land and knowledge transfer and encourage a mix of enterprise activities for individuals within and outside the family. Engaging local communities through a silvopasture demonstration site may open opportunities to share best practices and lessons learned via workshops or other educational and outreach opportunities.

A group of chickens hides and forages in the shade provided by a row of hazelnuts. Courtesy photo by Main Street Project.

Challenges

A primary challenge of silvopasture establishment is the inherent complexity of integrating multiple components into a single management system. Compounding these challenges is a lack of regionally specific information available to guide producers in managing the interactions among these components (Smith et al. 2022). To determine if silvopasture is a good fit for the land and the producer, it is helpful to examine the economic, ecological, and management challenges of silvopasture systems.

Establishment Challenges: In addition to the challenge of protecting new trees and forages, establishing them on the same unit of land can be difficult due to competition for light, water, and nutrients. Site preparation can help mitigate this competition. Herbicide application or other forms of weed control, such as mowing or brush hogging, may be appropriate prior to tree planting. Regular watering, especially during the first several years, may also help ensure trees are well established. Selecting shade-tolerant forage species will also help to reduce competition for light.

Silvopasture systems may require additional labor, infrastructure, and equipment. Livestock management and forestry infrastructure can have high up-front costs. This can include electric fencing and tree tubes to protect trees from livestock and wildlife damage, as well as harvesting equipment for removing trees. The economic success of silvopasture is thus highly dependent upon establishment costs, which may take multiple years to recoup (Bruck et al. 2019, Godsey et al. 2009). It may be beneficial to work with State and Federal program staff or technical service providers to explore financial assistance options.

Fencing wooded paddocks can be challenging for multiple reasons, and producers can benefit from considering fencing logistics during silvopasture establishment (New England Grazing Network 2020). It may be useful to create open lanes for fences when carrying out the initial thinning. In many areas, rocks or other features may add additional challenges to installing permanent fences. Falling trees and branches can damage fences. Producers can mitigate this risk by using smooth high-tensile wire and compression springs and insulators to allow the smooth wire to slide.

A flock of white sheep graze beneath elevated wine trellises at Paicines Ranch in California. Courtesy photo by Paicines Ranch.

Management and Maintenance Challenges: Depending upon economic and ecological goals, producers may find it challenging to manage for multiple objectives. For example, silvopasture systems established in vineyards and orchards may require livestock exclusion to prevent crop contamination from livestock waste or to allow for ease of harvest and other management tasks. This may put more pressure on other treeless pastures, requiring a high degree of livestock management to prevent overgrazing on established forages in those areas (Karki et al. 2022). Producers may prioritize one component over the others while ensuring that the system still functions as a whole. For example, the forages in an orchard silvopasture may need grazing in late summer, but the fruit crop may also need to be protected from livestock, requiring the producer to choose between forage and fruit goals. In this specific case, the producer might mow or hay the forages at this time of year instead of grazing them.

Another challenge is that forage production will decrease over time as trees mature and reduce light levels to the forages below. Canopy density will need to be reduced periodically to allow enough light to maintain healthy forage production. Changes to understory composition may also occur over time and require management of invasive, exotic, or unpalatable species. In addition, livestock grazing may compact soil, requiring the need for soil monitoring and management (Sharrow 2007). These challenges will need to be monitored over time to determine an appropriate livestock stocking rate and rotational grazing schedule (Feldhake et al. 2010).

A flock of sheep graze in an orchard in spring bloom. Licensed photo by Dieter Hawlan/ Adobe Stock.

Because of the complexity of silvopasture, regional examples of working systems help producers select forage, tree, and livestock species that are compatible in their region. Regional examples can also help provide a comprehensive understanding of monitoring and evaluation of a silvopasture system.

Team and Roles

In some cases, silvopasture establishment may require significant investment of time, labor, and funds. Building a team of individuals to assist the producer with silvopasture planning, design, establishment, and management can be useful due to the complexity of the system. Ideally, this team will include individuals with diverse skillsets (forestry, grazing, livestock management, ecology, etc.), with at least one member having previous experience with silvopasture. The team may include university cooperative extension staff and/or technical service providers who can help assess site suitability and identify management goals. Depending on the producer's specific areas of interest, other types of expertise such as wildlife biology or ecological restoration may be beneficial. The producer may want to consider including everyone who currently manages the site on the team, including family members, hired workers, or companies and professionals who do contract work on site.

Design and Establishment

To establish silvopasture systems, it is helpful to consider each component of the system and how they influence one another. There are a variety of design and establishment methods for silvopastures, which create different considerations for each component of the system. In addition to the planning and design considerations discussed elsewhere in this publication, some specific considerations related to each silvopasture establishment method are listed below.

To establish silvopastures from pastures and fields by planting trees:

- Control vegetation around newly established trees.
- Defer grazing until forage is well established.
- Defer livestock access to trees until trees are well established and continue to monitor tree/livestock interactions to prevent browsing, rubbing, trampling, or scraping.
- Establish appropriate infrastructure (water tanks, permanent and/or temporary fencing). Include silvopasture in rotational grazing plan.

To establish silvopastures from existing tree plantations by removing trees and incorporating livestock and forage:

- Thin trees in stages to reduce windthrow and epicormic branching.
- Be careful not to damage residual trees and tree roots in the process of thinning.
- Remove downed woody debris through mastication, chipping, pile burning, or other methods and evaluate understory composition prior to seeding of forage.
- Consider timing and application of herbicides.

To establish silvopastures from existing forests, woodlots, or forested edges by removing some trees and incorporating livestock and forage:

- Thin trees in stages to reduce windthrow and epicormic branching.
- Be careful not to damage residual trees and tree roots in the process of thinning.
- Remove downed woody debris through mastication, chipping, pile burning, or other methods and evaluate understory composition prior to seeding of forage.
- Amend soil if needed for forage establishment.
- Consider timing and application of herbicides.

- Include silvopasture in the rotational grazing plan with sufficient grazing periods to favor forages instead of woody plants.

To establish silvopastures in savannas by adding livestock, given the diminished extent of savanna ecosystems:

- Ensure tree density, arrangement, and species selection supports native vegetation and wildlife when thinning or planting trees.
- Pay special attention to livestock congregation and soil compaction risks given potentially lower canopy density and shade availability.
- Assess forage species and yields to determine appropriate livestock stocking rate.
- Monitor forage composition.

To establish silvopastures from fields or pastures over time by allowing trees to grow naturally:

- Select and retain species that are adapted to the site conditions.
- Manage tree density through thinning if needed.
- Determine the seeding rate, timing, and method for preferred forages and consider using grazing management to achieve forage goals.

To establish silvopastures from orchards by incorporating livestock:

- Determine the timing of crop harvest and animal exclusion requirements, including consideration of the Food Safety Modernization Act and other relevant regulations (U.S. FDA, n.d.).
- Consider changing pruning structure to minimize livestock impacts.
- Assess the impact of any tree crop pesticide use on livestock and grazing timing.
- Identify suitable pastures for livestock grazing during periods of exclusion in the orchard.
- Confirm that trees and crops are not toxic to livestock.

Protecting young trees from livestock during tree establishment is important. This silvopasture in Washington State uses tree tubes to protect chestnut and hazelnut trees from sheep. USDA Forest Service photo by Mark Batcheler.

Management

Like all managed grazing systems, silvopasture management benefits from observing and adjusting grazing frequency, timing, and intensity based on forage condition. These components can also be adjusted to support tree health and managed to maximize beneficial synergistic interactions and minimize negative competitive interactions.

Managing Forage

Seasonality: A majority of producers with silvopasture have a combination of treed and treeless pastures in their grazing system (Smith et al. 2022). Deciding when to graze these pastures is part of developing the larger grazing plan. Many operators use their silvopastures in the hottest parts of summer to provide shade and reduce animal stress. During hotter periods, forage availability in silvopastures may be greater than forage availability in open pastures (Kallenbach 2009). Some operators also use their silvopastures to stockpile forage for winter grazing (Kallenbach et al. 2006). Others use bale grazing in their silvopastures in winter to spread nutrients and reduce costs (Chedzoy 2023). Grazing during wet conditions, especially during spring thaw, can create soil compaction and damage trees.

Grazing Intensity: In a synthesis of surveys of producers using silvopasture management, 98 percent of producers used rotational grazing, also known as management-intensive grazing (Smith et al. 2022). In this approach to grazing management, rotation duration is matched to forage availability.

Rotational grazing systems are dependent on periods of grazing and rest as animals are rotated between paddocks. The number and size of paddocks depend on the operation, site conditions, and livestock type. Paddock size is often adjusted based on site quality (including forages and soils) so that production in each paddock is similar (Hamilton 2008). Producers can create paddocks that are large enough to justify fixed costs like water supplies (Chedzoy and Smallidge 2022). However, paddocks that are too large can result in forage regrowth within the paddock while the animals are still in it. This can be problematic because animals will revisit the new growth instead of grazing the rest of the paddock, which can lead to overgrazing of some areas (Hamilton 2008). It can also lead to less palatable species going to seed and spreading over time.

Grazing objectives might be focused on vegetation management, livestock production, or some combination that changes depending on needs. To determine grazing intensity, producers can work with a grazing specialist to determine forage yield, species composition, and other factors that may influence their grazing plan.

Timing: The producer may reserve grazing in silvopastures for heat waves or droughts or may use the silvopastures as part of their regular grazing plan. In addition to using silvopastures to provide shade to reduce heat stress for livestock, forage in silvopastures is often available earlier and later in the season compared with open pastures (Kallenbach 2009). During periods when the ground is frozen, silvopastures may also be used strategically for short durations to provide protection and shelter for calving and lambing (Atkin-Willoughby et al. 2022).

Grazing intensity within silvopasture paddocks is dependent on forage availability and animal units. Producers can benefit from assessing forage availability before introducing livestock to the silvopasture and reassessing regularly during the grazing period. Producers find success when livestock are removed from the silvopasture proactively, as opposed to reactively in response to tree or forage damage.

Other Forage Management Activities: Some operators can support forage quality and quantity by applying fertilizer and lime (Frey and Fike 2018). Depending on the site, this can be challenging or costly. If weed control is necessary, producers may mow or apply herbicides after livestock grazing (Brantly 2012, Frey and Fike 2018), use bale grazing to smother invasive shrubs, or use high-density (mob) stocking (Allen et al. 2011). Some producers also use prescribed fire to improve forage conditions (Barlow et al. 2016, Goodchild 2021, Mills 2000).

Managing Livestock

Type: Silvopasture systems feature many types of livestock (Smith et al. 2022). When choosing livestock (e.g., cattle, goats, chickens, etc.), producers can consider potential impacts to the forage and tree components of the system. For example, when trees are younger, smaller livestock such as poultry or sheep may be more appropriate than larger livestock such as cattle (if trees are unprotected). Producers have also found that specific livestock breeds have characteristics that may make them better suited to silvopasture management than others (Smith et al. 2022). In general, pigs are challenging to effectively integrate into silvopasture systems due to difficulties with fencing, tree damage, and soil erosion and compaction. Caution and a high level of manager expertise are warranted when considering these systems (Orefice et al. 2017). Poultry may be well suited to urban silvopasture systems and small ruminants may be a good fit for semi-urban or suburban systems (Conway and Nieman 2022). Multiple types of livestock can be rotated through silvopasture systems in succession to achieve different goals (Batcheler et al. 2024, Mazaroli et al. 2024).

A herd of small brown and black goats graze under the shade of a large pine tree in a fenced silvopasture paddock. USDA Forest Service photo by Richard Straight.

Fencing: Paddock shape can be designed for ease of fencing. Paddock size is dependent in part on water availability (see Agroforestry Note #29, "Silvopasture Water and Fencing Systems for Cattle"). Most silvopasture fencing plans use a combination of permanent and temporary fencing. Gates and access points can be carefully planned to facilitate the grazing plan. For portable fences, the number of wires, wire spacing, voltage requirements, and other fencing characteristics will vary depending on the type of livestock.

Managing Trees

Many operators prune the trees in their silvopasture systems for multiple benefits. Removing lower limbs can create less midstory shade and increase forage production. The higher the tree canopy, the more the shade moves throughout the day, reducing livestock impact at the base of the trees. Pruning can also improve timber quality and tree crop production and reduce knots. If fodder trees are planted, pruned branches can be given to livestock as supplemental nutrition. For more information on silvopasture pruning, see Agroforestry Note #31, "Silvopasture Tree Pruning."

Over time, producers may need to remove additional trees in silvopasture systems. As trees grow, forage production may decrease due to shading. Some silvopasture systems with trees planted in rows are planned with the intention that trees will be removed after a set amount of time. Trees may be removed because they are trainer trees (trees used to improve the form of other trees) or trees may be selected to be thinned due to poor quality. Finally, trees may also be removed because they are mature and the producer wants to harvest them.

Gradually, some producers may want to add more trees to their silvopastures. Producers can protect new trees if they want to continue to graze the silvopasture. If the producer is willing to exclude livestock, natural regeneration can be a pathway to establish more trees.

Silvopasture created by thinning trees in Missouri. USDA Forest Service photo by Richard Straight.

Economic Considerations

Decisions made during silvopasture establishment and management have both short- and long-term economic costs and benefits. Producers may want to consider the economic impacts of these decisions in advance. When designing new silvopasture systems, there is often a tension between the desire to start small to develop best practices, test assumptions, and learn onsite and the need to operate at a scale required to make the use of mechanical equipment worth the costs. This is especially apparent in establishing silvopastures on wooded sites that need significant thinning. Loggers may require a job to be a certain size to engage in the project. Some producers have found success coordinating thinning work with their neighbors, but this also has challenges. Silvopasture sites may or may not have valuable timber to remove from the site as part of the thinning operation to offset site preparation costs. Producers may want to consider sequencing logging and slash removal with mechanical forage establishment, if possible, to reduce multiple equipment entries.

Site preparation may have significant impacts on how well forages are established in silvopasture systems, especially those established on wooded sites with large quantities of slash. Leaving slash onsite can create areas where forage establishment is challenging or unsuccessful. This may have long-term consequences on overall forage production and also create growing space for weeds or nonpalatable species to grow and spread. While it can be expensive, ideally slash is removed from the site or processed (chipped, ground, etc.) to prevent issues with forage establishment. While slash can be piled, this may not be an effective solution due to forage loss and weed issues. Slash piles may also be problematic in regions prone to fire. It will generally be less expensive to remove slash at the beginning rather than making multiple entries.

Fencing is a key cost to consider as it is important to managed grazing approaches and can be more expensive and challenging to put up on wooded sites. Seeding rates, forage species selection, and soil amendments will also affect establishment and management costs. However, in the long term, many producers find these upfront costs are worthwhile due to the economic benefits from reduced heat stress on livestock, additional forage, and other opportunities.

Conclusion

A silvopasture system can take many forms with different combinations of livestock, trees, and forage. It can work well in rural and urban contexts and across small and large land areas. When viewed as part of a larger landscape—whether agricultural or forested—silvopasture can introduce structural variety to otherwise uniform landscapes. Variation in environmental conditions, resource availability, and the spatial configuration of land cover types can increase species diversity and serve important ecological functions. However, the success of silvopasture management in addressing specific resource concerns or achieving conservation benefits depends on individual site conditions, landscape structure and processes beyond property boundaries, and the management approach a producer pursues.

During the planning and establishment phases, it is critical to align the specific ecological context of a selected site with the goals of the producer. Working with a team of knowledgeable technical assistance providers can help determine timelines of establishment and management for livestock, trees, and forage. Finding a balance in managing these different but connected components can be a challenge. However, with clear short- and long-term goals, teamwork, and an integrated design plan for each component, silvopasture can bring many lasting benefits.

Additional Information

Agroforestry Note #31, "Silvopasture Tree Pruning" (Robinson et al. 2006)

Agroforestry Note #46, "Forest Grazing, Silvopasture, and Turning Livestock Into the Woods" (Brantly 2014)

Agroforestry Note #50, "Considerations for Establishing Silvopastures on Wooded Sites" (Chedzoy et al. 2022)

Plants Poisonous to Livestock (Cornell University 2024)

Silvopasture: Establishment & Management Principles for Pine Forests in the Southeastern United States (Hamilton 2008)

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