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Silvopasture in the United States: Results from the National Agroforestry Producer Survey

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Abstract Over the past several decades, research has documented increased adoption of silvopasture in the United States. However, no national survey has been conducted on silvopasture use, limiting understanding of key information needed to inform technical assistance and research. The National Agroforestry Producer Survey was conducted to address this gap. The survey was completed by 5,682 producers with agroforestry (52% response rate). This study provides results from the 1,747 producers who reported using silvopasture, one of the five agroforestry practices covered in the survey. The average acreage in silvopasture per farm operation was 80.7 acres (32.7 hectares), although acreages varied by region. Conversion of forests to silvopasture was the most common establishment pathway (59%), while 25% of producers planted trees into a field or pasture. Most respondents (74%) grazed cattle in their silvopastures, though many livestock types were reported. Producers cited high-value timber tree species or those providing edible crops as most important for use in their silvopastures. A majority (60%) of silvopastures were established over 15 years ago. Key benefits of silvopasture were improved animal welfare and wildlife habitat, while top challenges were added labor and management complexity and expense of maintenance. Roughly 88% of respondents use crops and products from their silvopastures for personal use, while 64% reported selling crops and products. Animal stockyards (59%) were the primary market outlet where producers sold products from their silvopastures. When asked about future intentions, 87% of producers reported maintaining or expanding the acres they have in silvopasture.

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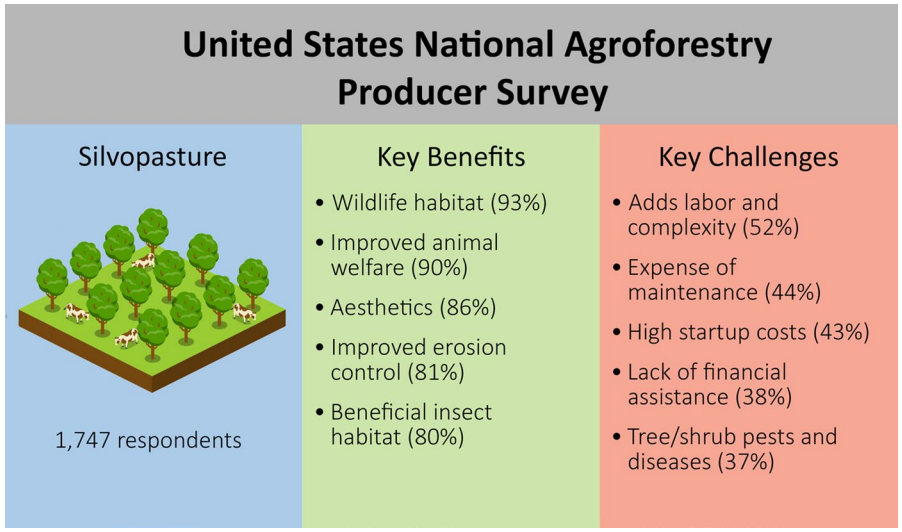
Graphical Abstract



Keywords Silvopasture · Silvopastoral · Agroforestry · Survey · Grazing · Conservation practice

Introduction

In the United States, silvopasture is often defined as the intentional integration of trees, forage, and livestock on the same piece of land. Central to silvopasture is the deliberate integration and management of each system component, which separates this practice from forest grazing. While forest grazing has a long history of use in the United States, uncertainties remain as to when silvopasture, as we define it here, began in the country. As early as the sixteenth century, there was documentation of cattle grazing in southern pine forests (Grelen 1978; Keyes and Keyes 2000), though it is unclear on whether these livestock were being managed more passively using forest grazing or more intensively using silvopasture management.

Studies investigating producer use and interest in silvopasture have been reported as early as the 1940s, when researchers in the southeastern United States documented how producers strategically integrated livestock, trees, and forages on the same paddocks to increase system-wide productivity and resiliency (Biswell et al. 1942; Campbell and Rhodes 1944). Several key findings from these studies include: (1) grazing in forests should only occur when forages can fully support livestock, (2) rotational grazing is necessary to allow paddocks to recover and also allow more complete forage utilization during each grazing event, (3) improved pastures are needed to help balance forage across the site and supplement forest grazing during times of low productivity, and (4) boundary and cross fencing are essential on forest range to facilitate rotational grazing of livestock (Biswell et al. 1942; Campbell and Rhodes 1944). While many producers in these studies were using forest grazing, a handful were using practices consistent with silvopasture management. These early studies helped identify research gaps and provided a foundation for successfully implementing silvopasture.

In the last decade, more regional studies have been conducted in the United States on producers' use and management of silvopasture. For example, Orefice et al. (2017) interviewed producers with silvopasture (n = 20) and found that conversion of forest to silvopasture was the most common transition mechanism in the northeastern United States, and

that producers most valued silvopasture for shade and maximizing use of farm woodlands. Mazaroli et al. (2024) investigated silvopasture adoption in the state of California (n = 17) and found that most silvopasture adopters in the sample established their systems through livestock incorporation into orchards or vineyards. The primary motivation for adopting silvopasture was improving soil health, while challenges included tree establishment and protection, and the steep learning curve associated with multi-system management (Mazaroli et al. 2024). In the Mid-Atlantic region, McRae (2024) found that all 11 study participants using silvopasture were using rotational grazing and primarily relied on direct-to-consumer markets to sell products from their silvopastures. Regional silvopasture case studies have also been conducted in the southeastern United States (Frey and Fike 2018), the mid-Atlantic (Poudel et al. 2025), and in the state of Minnesota (Luhman 2021). Several regional studies have also investigated producer interest, willingness to adopt, and perceptions of silvopasture as detailed in Smith et al. (2022a).

While regional studies provide insight into management practices and geographic extent, no comprehensive national survey of silvopasture extent and use has been undertaken in the United States. As such, the goal of this study is to conduct a national survey of silvopasture adopters to more fully understand how systems are being established, managed, and valued by producers across the country. The following questions were investigated:

1. How many producers use silvopasture?
2. Where are silvopasture systems located across the country?
3. How much land do producers allocate to silvopasture on their farm operation?
4. What silvopasture establishment pathways are producers using?
5. What silvopasture site preparation and management activities are producers using?
6. When were silvopasture systems established, and what plans do producers have for these silvopastures in the future?
7. What funding sources are used to establish and maintain silvopastures?
8. What information sources do producers use to learn about agroforestry?
9. What are the primary benefits and challenges of silvopastures reported by producers?
10. What crops and products are producers harvesting from their silvopastures and where are they selling them?

This study fills critical knowledge gaps in how silvopastures are established, managed, and valued by producers. These data are critical to support producer decision making, inform research and technical assistance, and improve program implementation.

Methods

Sample frame

The sample frame for the National Agroforestry Producer Survey was farm operations from the agroforestry population (N = 30,853) identified in the United States Census of Agriculture (COA) (Smith et al. 2022b; USDA NASS 2024). A random sample, stratified by all 50 states, was taken from this population for this survey. Sample size for each state was determined through two methods. The first method was Cochran's modified formula for finite populations, using a 95% confidence level, a proportion of 95%, and margin of error of 2.5% (Eq. (1)).

$$n = \frac{m}{1 + \frac{m-1}{N}} \quad (1)$$

where:

- n is the state sample size
- $m = [z^2 * p * (1 - p)] / \varepsilon^2$
  - z is the alpha level z score
  - • p is the proportion of farms that practice at least one of the five agroforestry practices
  - ε is the margin of error
- N is the state population

The second method was based on the minimum number of reports, which was needed to meet disclosure rules stipulated by the United States Department of Agriculture (USDA), National Agricultural Statistics Service (NASS), who administered the survey.

Sample size was based on the following formula (Eq. (2)):

$$nr = \frac{r}{pt} \quad (2)$$

where:

- nr is the number of reports
- r is the number of positive reports
- p is the proportion of farms that practice at least one agroforestry practice
- t is the percent of the proportion that is in at least one of the relevant agroforestry categories

The final sample size for each state was based on the larger sample of the two methods (Cochran's or minimum number of reports). Farm type, farm size, and farm value were used by USDA NASS to further stratify the sample for each state. Stratification by state was used to account for varying climate, agricultural crops, tree and shrub species, and regional policies that may impact agroforestry implementation. The final sample size was 11,029 producers, representing 36% of the 2017 agroforestry population.

Questionnaire development

A systematic review of silvopasture adoption studies was used to guide question development for the silvopasture section of the agroforestry survey (Smith et al. 2022a). A four-stage process was used to refine the questionnaire, whereby five agroforestry professionals reviewed the survey instrument, revisions were made, and the instrument was sent to a different set of five individuals. This process was repeated three more times, resulting in a total of 20 expert reviews. USDA NASS then conducted cognitive interviews with nine farmers to further revise the questionnaire. The questionnaire did not include items for sociodemographic and farm characteristics since those data are already available for every respondent through the Census of Agriculture and will be the topic of a future study.

The final questionnaire was 24 pages and included sections on windbreaks, silvopasture, riparian forest buffers, alley cropping, and forest farming. Four pages were dedicated to silvopasture. The first question in the silvopasture section was a screener used to separate respondents with forest grazing from those with silvopasture. The screener provided the following text "*Grazing livestock on a site with trees is considered silvopasture if all three components of the system (livestock, trees, and forage) are deliberately integrated and managed.*" After this definition, respondents were asked whether their operation had any land in silvopasture. If they responded "Yes", they were asked to fill out the rest of the silvopasture section. This screener was necessary, as multiple survey studies of silvopasture adoption have reported producer confusion between forest grazing and silvopasture (Smith et al. 2022a). We did not want producers with forest grazing to fill out the questionnaire since that form of grazing management is not agroforestry and beyond the scope of this study.

After the initial screener, question sets included: silvopasture type, establishment activities, time since establishment, management activities, crops and products used or sold from silvopastures, benefits and challenges, information sources, funding sources, and markets where crops and products were sold. The survey instrument can be found in the Online Resource 2.

Survey implementation

Survey implementation followed a modified version of the Tailored Design Method (Dillman et al. 2014). A four-wave hybrid survey (advance notice postcard, survey packet, reminder postcard, phone enumeration) was conducted from December 2021 to April 2022. The 11,029 operations in the agroforestry sample were mailed an advance notification postcard in December 2021 and provided with a link to the USDA NASS website for more information. The survey packet was mailed in January 2022 and included a cover letter, definitions sheet with pictures illustrating each agroforestry practice, the paper questionnaire, and a prepaid return envelope. The cover letter included a unique survey code for participants to use to respond online, explained the purpose of the questionnaire, and included human subjects informed consent language. A reminder postcard was sent to non-respondents two weeks following the mailing of the survey packets. Phone enumerators from the National Association of State Departments of Agriculture (NASDA) were used to reach respondents who did

not complete the survey after the first month. The Office of Management and Budget (OMB) approval number for this survey is 0535–0271.

Data entry and cleaning

USDA NASS input data from all returned questionnaires (mail, online, phone) into a single data file. All personally identifiable information that could be used to identify individual operations was removed per federal law (USDA NASS 2024). The final data file was uploaded to the Coleridge Administrative Data Research Facility (ADRF) enclave, which is a secure FedRAMP-authorized computational research platform for sensitive confidential microdata. The authors of this study were provided with a link to the data file within ADRF. Data cleaning processes were undertaken by the research team to identify and recode inadmissible responses and institute a standard coding procedure for missing and not applicable responses throughout the dataset.

Data analysis

STATA 18 and Microsoft Excel were used to analyze data within ADRF. Stringent rules prohibit publishing any result with fewer than five responses due to disclosure risk (USDA NASS 2024). Response frequencies between 1 and 4 were either suppressed in the results and coded with a "*P*" to indicate the presence of data or were aggregated into larger response categories. Most results are therefore reported at the national-level or for USDA NRCS Farm Production Regions (USDA NRCS 2022).

Descriptive statistics were determined to be the most appropriate method to answer the research questions, which pertain primarily to describing and establishing baseline information about characteristics of producers, their operations, and their experiences with silvopasture. Patterns and categories were developed by the lead author to analyze open-ended responses using the constant comparative method (Boeije 2002).

Data for this study were also summarized by silvopasture establishment pathway (i.e., field/pasture conversion, forest conversion, orchard conversion, natural regeneration, plantation conversion, and savanna conversion). It is important to note that due to the structure of the survey, analysis by silvopasture pathway could not be exclusive to each pathway due to most producers establishing their systems through multiple mechanisms, and too few respondents using a single pathway. For this reason, there were duplicate responses for each establishment pathway. This study therefore examines only large differences in response frequencies when comparing between silvopasture pathways. All data comparing silvopasture pathways are presented in the Online Resource 1.

Acres of silvopasture and acres in farmland are presented as weighted values as required by NASS since COA data were used in the analysis. All other data are unweighted. Non-response bias was assessed by comparing the average farm size between respondents (5682) to non-respondents (5347) using COA data that was appended to all individuals in the sample. A two-tailed t-test was used to compare farm size between respondents and non-respondents. Results show that non-respondents have larger farm operations than respondents ($p < 0.05$). The literature did not offer potential explanations for why smaller-scale farms with agroforestry may be more likely to fill out surveys than larger farms with agroforestry.

Results and discussion

Response rate and regional distribution

The response rate of this survey was 52% with 5682 usable questionnaires (Online Resource 1, Table 1). The overall margin of error for the survey is 1.2% with a 95% confidence level. Of the 4068 producers in our sample who specified which agroforestry practices they use, 43% reported using silvopasture (n = 1747), 67% windbreaks (n = 2734), 60% riparian forest buffers (n = 2433), 10% alley cropping (n = 388), and 11% forest farming (n = 453).

The regions with the most respondents with silvopasture were geographically dispersed (Fig. 1). State-level data were also dispersed with Texas, Missouri, and Wisconsin having the greatest number of farm operations with silvopasture (Online Resource 1, Table 1). The states with the highest percentage of agroforestry respondents in the sample using silvopasture were Arkansas (66%), Texas (66%), and Wyoming (62%) (Fig. 2). In 47 of 50 states, at least 20% of the statewide agroforestry sample reported having silvopasture. The higher proportion of

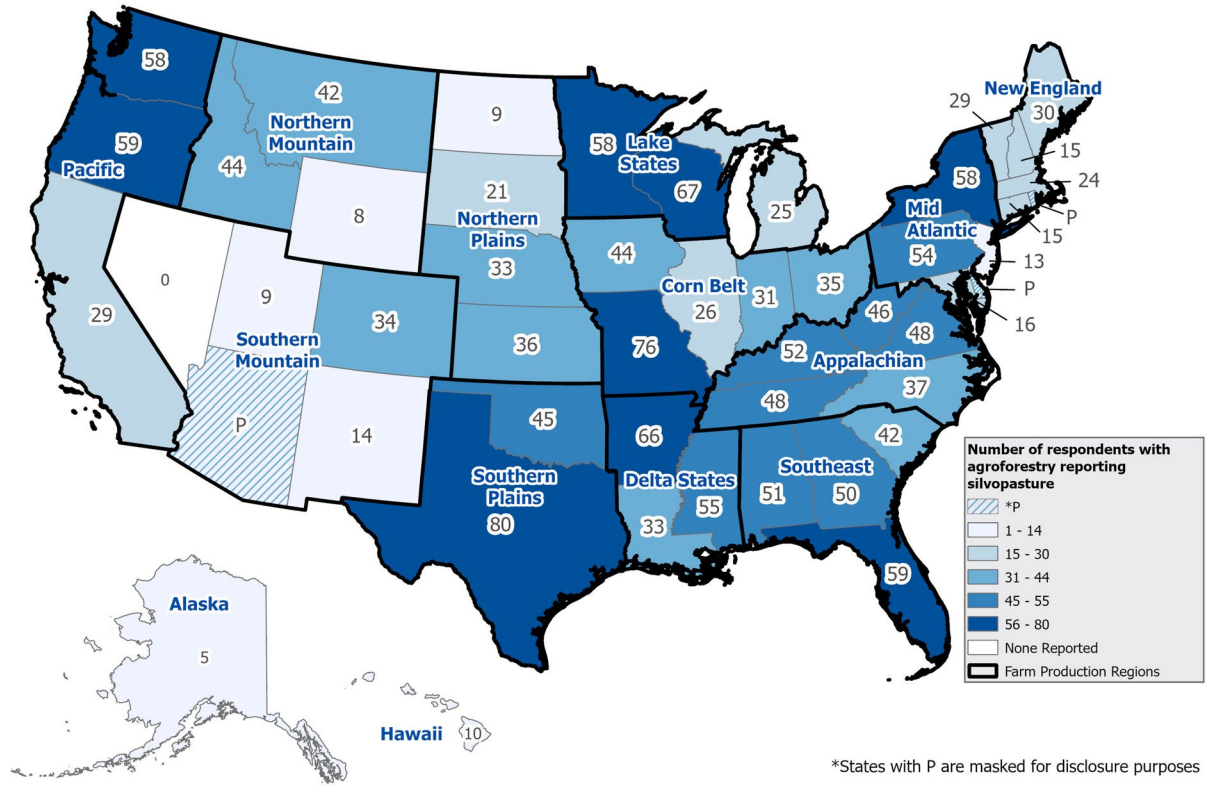


Fig. 1 Number of respondents in sample who reported silvopasture by state and Farm Production Region (n = 1747). Figure notes: states with a "*P*" represent values where n < 5 and are masked for disclosure purposes

silvopasture adopters in some states relative to others is likely due to regional geography, number of livestock producers in the state, forest type, local markets for both livestock and forest products, overall awareness of agroforestry, distribution of other agroforestry practices, and availability of financial and technical assistance (Kellerman et al. 2025). Further analyses are needed to understand whether predictive variables exist for silvopasture extent across the country.

Establishment pathways

Conversion of a forest by thinning trees (59%) was the most common method to establish a silvopasture system (Fig. 3). This was followed by natural regeneration (45%), where trees were allowed to grow naturally in a former field or pasture. Natural regeneration seemed surprisingly high given that this establishment pathway is not often discussed in the silvopasture literature (Smith et al. 2022a). Converting an existing tree plantation to silvopasture (36%) was the third most selected pathway. Regional studies of silvopasture have found this pathway to be common among silvopasture adopters (Frey and Fike 2018; Keyes and Keyes 2000; Orefice et al. 2017). Planting trees into a former field or pasture (25%) was reported less often and may be due to the cost and time for the trees to mature to provide benefits (Frey and Fike 2018; Smith et al. 2022a). As the percents indicate, many producers established their silvopasture systems using multiple pathways.

Respondents were asked to report other establishment pathways not listed in the questionnaire, with 86 producers responding. Responses were primarily management practices and not distinct methods to establish a silvopasture (Online Resource 1, Table 2).

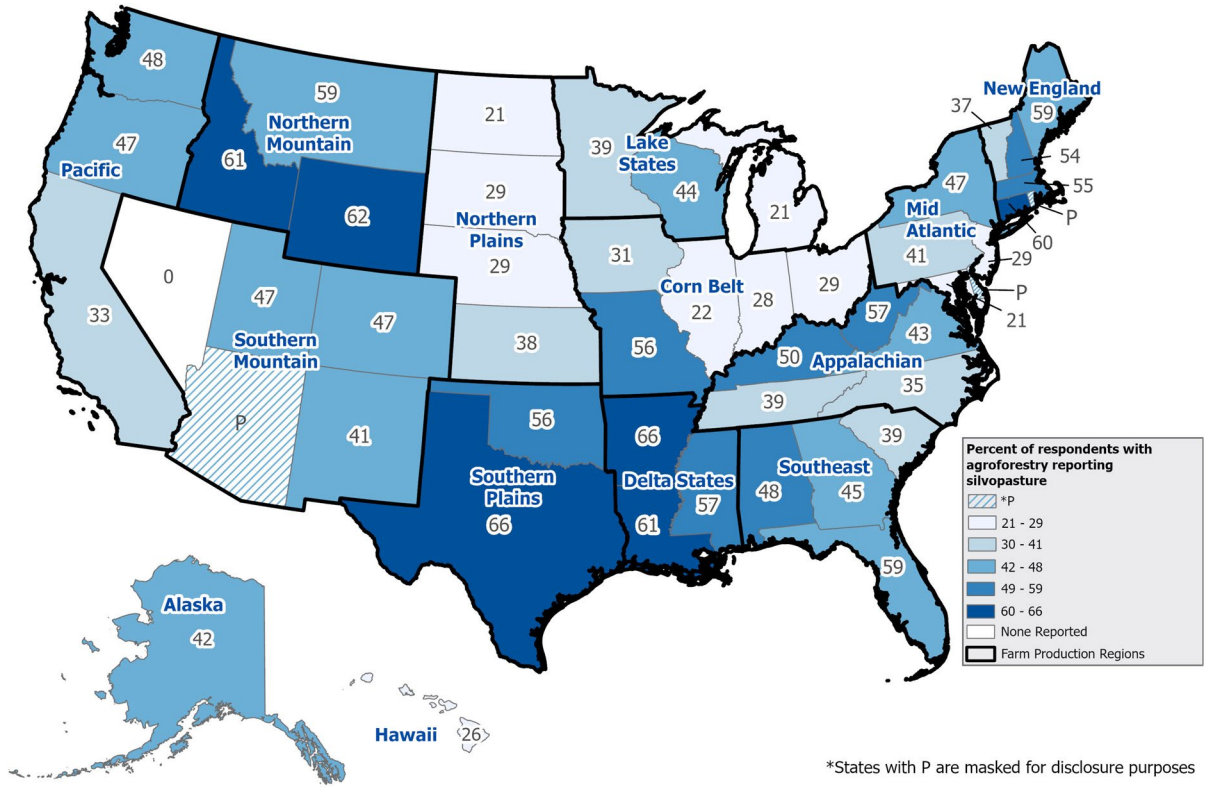


Fig. 2 Percent of respondents with agroforestry who reported use of silvopasture by state and Farm Production Region. Figure notes: states with a "*P*" represent values where n < 5 and are masked for disclosure purposes

Land area in silvopasture

The average acreage in silvopasture per farm operation reporting the practice was 80.7 acres (420.9 acres SD) or 32.7 ha (170 ha SD). Most farm operations (42.4%) had total silvopasture acreages between 10 and 49 acres (Online Resource 1, Table 3). This was followed by 29.4% of farm operations who had silvopasture acreages between 1 and 9 acres, 19.5% between 50 and 179 acres, and 8.7% with 180 or more acres. The small number of producers with silvopasture acreage exceeding 180 acres (72.8 ha) is interesting and may reflect design and management considerations. For example, large silvopasture acreages may present unique challenges related to infrastructure (fencing, watering systems, shelters, etc.) and management (rotational grazing). Further analysis would be useful to understand what types of infrastructure and management begin to limit acreages in silvopasture.

Silvopasture acreages varied by Farm Production Region, with a range of 17.3 acres (7.0 ha) per farm in Hawaii to 409.6 acres (165.8 ha) per farm in the Northern Mountain region (Fig. 4). Silvopasture acreages also varied by establishment pathway, with producers with planted systems reporting an average of 31.7 acres (12.8 ha) per farm compared to forest or plantation conversion of 109.4 acres (44.3 ha) per farm on average (Online Resource 1, Table 4). One possible explanation for this difference may be due to cost. Planting trees to establish a silvopasture can come with more cost than thinning trees in a forest or plantation where wood products can be harvested and sold to offset establishment costs (Smith et al. 2022a).

When aggregating all respondent acreage data with corresponding COA weights to expand the sample to the entire population with silvopasture, there are 636,061 estimated acres (257,405 ha) of silvopastures in the United States. The Pacific

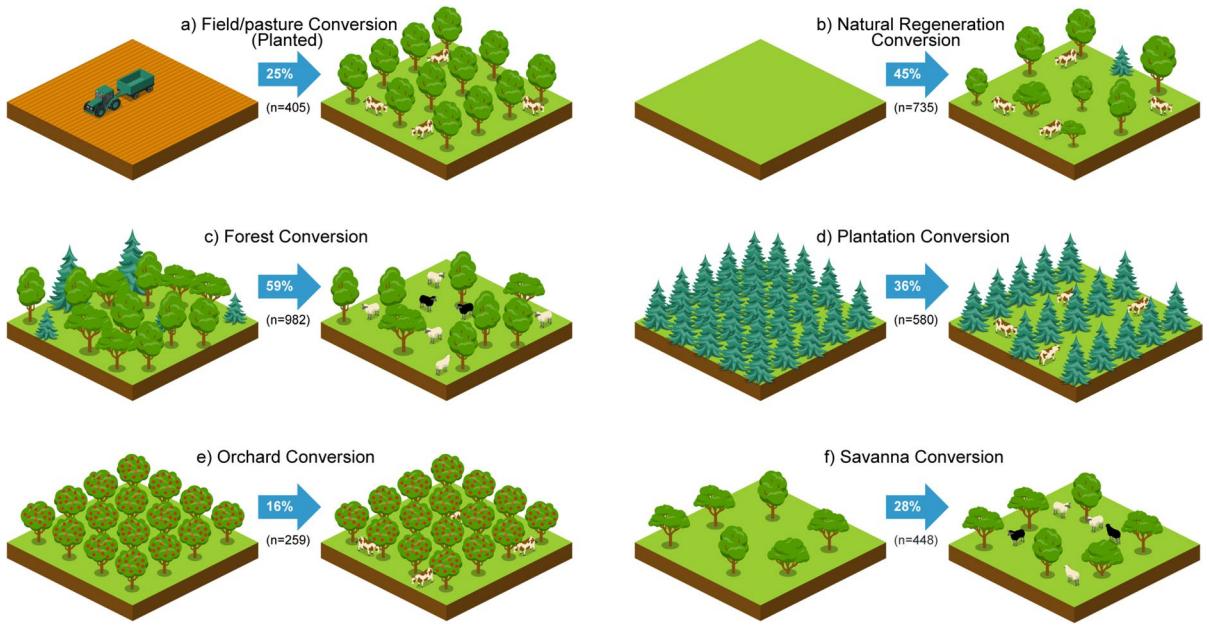


Fig. 3 Percent of respondents who said yes to establishing their silvopasture systems using various establishment pathways. Figure notes: number of producers responding by establishment pathway was field/pasture conversion (n = 1645), natural regeneration (n = 1634), forest conversion (n = 1651), plantation conversion (n = 1630), orchard conversion (n = 1602), savanna conversion (n = 1610)

region (189,448 acres, 76,667 ha) has the most land in silvopasture (Online Resource 1, Table 5).

The average acreage of farms with silvopasture was 300.6 acres (901.1 acres SD) or 121.6 ha (364.7 ha SD). This acreage was compared to the average acreage of farms across the United States farming population using COA data (USDA NASS 2024) to assess whether farms with silvopastures trend toward smaller or larger farms sizes (Table 1) (Online Resource 1, Table 6). The highest percentage of respondents with silvopasture by farm size were in three categories (10 – 49 acres, 50 – 179 acres, and 180 – 499 acres). When compared to the percentage of all farms by farm size class, the silvopasture percentages were generally comparable across all farm size classes, indicating that silvopastures are used on the smallest to the largest farms across the country.

As a percentage of farm size, silvopasture occupies 26.8% of the land area per farm for operations with the practice (Online Resource 1, Table 7). Some differences occurred on a regional basis, with a range of 9.3% of land area per farm in silvopasture for the New England region to 43.3% of land area per farm in silvopasture for the Southern Mountain region. These findings are similar to Poudel et al. (2025), who reported that silvopasture accounts for 23% of farm size for silvopasture adopters interviewed in the Mid-Atlantic region of the United States.

Regional studies provide some comparisons on acreage in silvopasture to this study. A study in Missouri (n = 4) found an average of 36.3 acres (14.7 ha) in silvopasture (Stubblefield et al. 2025), while a study in Washington (n = 19) reported a median of 20 acres (8.1 ha) (Batcheler et al. 2024a). Frey and Fike (2018) conducted case studies of four silvopasture systems in Virginia and North Carolina that ranged in size from 10 to 160 acres (4.0 – 64.7 ha), while a study of the New England region (n = 20) found silvopastures ranging from less than 2.5 – 180.4 acres (< 1 ha – 73 ha), with a median of 12.4 acres (5 ha) per farm (Orefice et al. 2017).

Site preparation and infrastructure activities

Natural regeneration of forages, which does not involve seeding, but instead allowing forages already growing on the site to spread, was the most

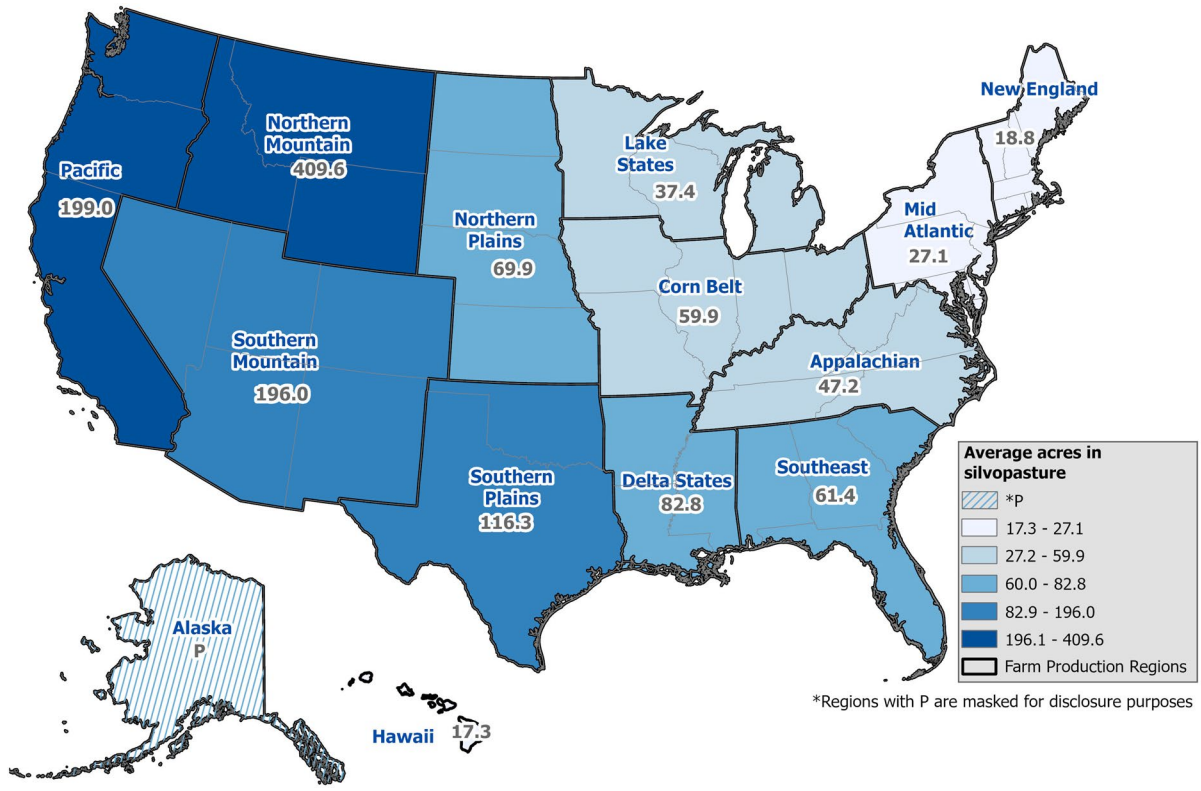


Fig. 4 Average acres of silvopasture per farm operation with the practice by Farm Production Region. Figure notes: regions with a "*P*" represent values where n < 5 and are masked for disclosure purposes

Table 1 Acreage comparison between farms with silvopasture to all farms in the United States by farm size class

Farm size class (acres)*	Percent of farms with silvopastures	Percent of all farms in the United States
1 – 9	4.1	12.3
10 – 49	25.1	29.8
50 – 179	36.6	27.9
180 – 499	21.0	15.2
500 – 999	7.9	6.3
1000 – 4999	4.9	7.0
5000 +	0.5	1.4

*Acre size classes correspond to 0.40—4.04 ha, 4.04—20.23 ha, 20.23—72.84 ha, 72.84—202.34 ha, 202.34—404.69 ha, 404.69—2023.43 ha, > 2023.43 ha

selected site preparation activity used by producers (87%) (Fig. 5). Over half of the respondents (51%) also seeded forages, indicating respondents often used both methods. This finding is similar to Orefice et al. (2017) who reported that 55% of producers in the New England region of the United States were actively seeding forages into their silvopastures. Batcheler et al. (2024a) also reported that 58% of producers in the U.S. state of Washington seeded preferred forages into their silvopastures.

The second most selected site preparation activity was installing fence infrastructure (83%). Fencing is often necessary for rotational grazing, a key management activity that defines silvopasture (Gabriel 2018; Smith et al. 2022a). Installation of fence infrastructure is consistently reported across studies of silvopasture adoption (Batcheler et al. 2024a; Orefice et al. 2017; Smith et al. 2022a).

Results suggest that numerous site preparation activities are used and that several would likely occur sequentially, such as clearing debris (76%), removing stumps (41%), and seeding forages (51%). The least used activities were weed control using cultivation (35%), herbicide weed control (26%), and prescribed fire (21%). Respondents were also asked to report other site preparation activities not included in the

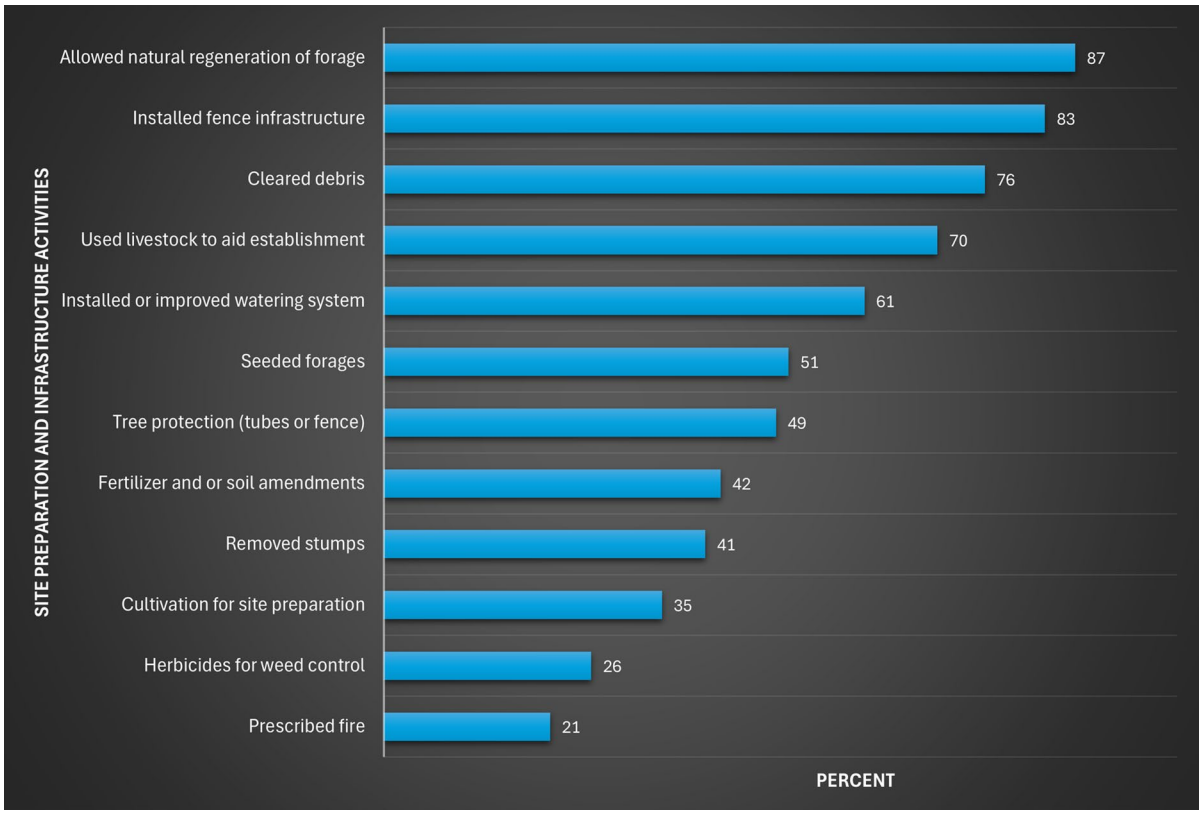


Fig. 5 Percent of respondents who used various site preparation and infrastructure activities to establish their silvopastures. Figure notes: number of respondents ranged from 1589 – 1659 depending on response option and are reported in the Online Resource 1, Table 10

questionnaire, with 114 producers responding (Online Resource 1, Table 8). Unique responses included installation of access roads, bridges, culverts, and irrigation ponds.

When analyzing this question by silvopasture establishment pathway, few differences existed. One notable difference was that producers who established their silvopasture systems through tree planting were more likely to protect trees from wildlife/livestock using fencing or tree tubes (Online Resource 1, Table 9 and 10).

Types of livestock used in silvopastures

The most reported type of livestock used by silvopasture adopters (n = 1628) was cattle, with 74% of respondents reporting their use (Fig. 6). Horses (26%) were the next most reported type of livestock. Most producers with horses (77%) also reported using other livestock species, such as cattle (Online Resource 1, Table 11). Sheep (17%), chickens (17%), and goats (16%) were also used in silvopastures. Of the primary livestock species used in the United States, pigs (8%) were reported the least often. In general, pigs are considered as a high-risk species for use in silvopastures, due to their rooting behavior, which can damage trees, cause soil erosion, and degrade the site (Orefice et al. 2017). Respondents were also asked to specify whether other livestock types were used in their silvopastures, with 154 producers reporting 18 other types of livestock (Online Resource 1, Table 11). The most reported were donkeys, ducks, turkeys, and deer. Data from this national survey are similar to regional studies of silvopasture adoption, where cattle were found to be the most common type of livestock used (Batcheler et al. 2024a; Orefice et al. 2017; Rule et al. 1994).

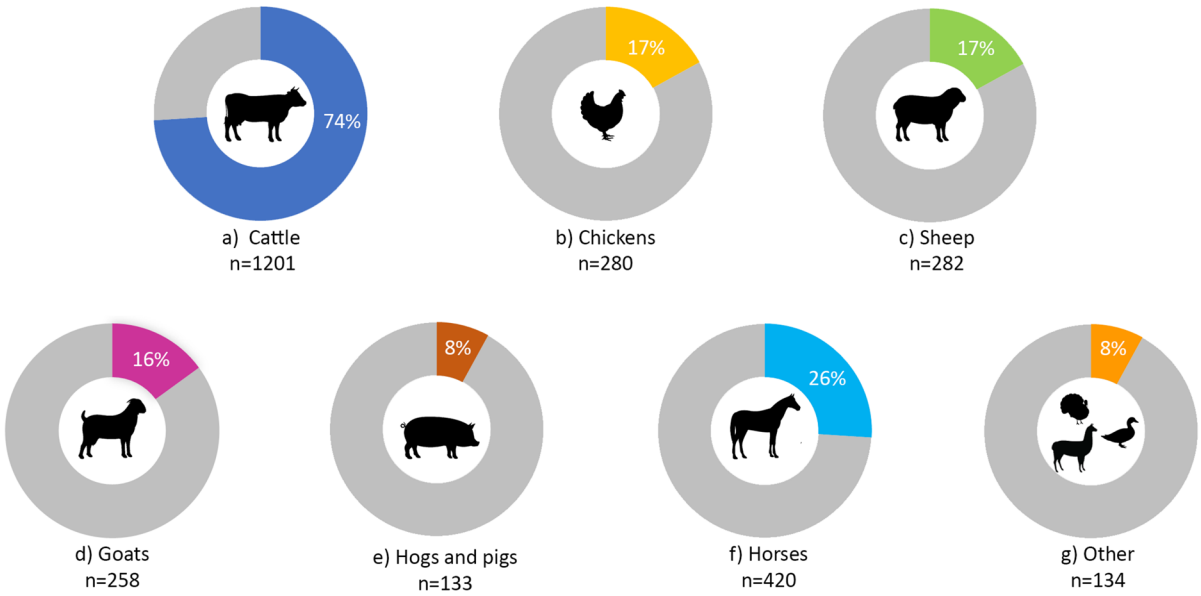


Fig. 6 Percent of respondents reporting various types of livestock used in their silvopasture systems from across the United States (n = 1628)

Sixty percent of respondents reported using only one type of livestock in their silvopastures, while 40% reported using multiple types. Due to the structure of the survey, it is unclear whether producers were using multiple types of livestock in the same paddocks or were grazing different types in separate paddocks or grazing during different times of the year. Regional studies have also reported high use of multi-species grazing in silvopastures, including 64% of respondents in the Mid-Atlantic region of the U.S. (McRae 2024), 26% of respondents in Washington state (Batcheler et al. 2024a), and 71% of respondents in California (Mazaroli et al. 2024).

Comparisons between silvopasture pathway and livestock type reveal several interesting nuances (Online Resource 1, Table 12). Producers who established some or all their silvopastures through tree planting were less likely to report use of cattle. These producers also reported a higher use of chickens, sheep, and other livestock. This finding is likely due in part to the risk of using cattle in newly planted silvopasture systems, where trampling, rubbing, or browsing may inhibit tree survival.

Types of trees used in silvopastures

Producers were asked to specify which tree species growing in their silvopastures offer the most value for their desired goals (Table 2). Respondents (n = 260) listed 112 different tree species covering 49 different genera (Online Resource 1, Tables 13 and 14). Of these respondents, 27% reported species, while 42% provided a combination of species and genus of tree, and 31% provided only genus. The high level of genus-level reporting limits our understanding of all the possible tree species used in silvopasture systems across the country.

The tree species most reported were white oak (*Quercus alba*), Douglas fir (*Pseudotsuga menziesii*), loblolly pine (*Pinus taeda*), and ponderosa pine (*Pinus ponderosa*). When all producer responses were aggregated into genus, the most reported were oaks (*Quercus*), pines (*Pinus*), maples (*Acer*), walnuts (*Juglans*), and hickories (*Carya*) (Online Resource 1, Table 14). Data were also analyzed based on whether the silvopasture systems were planted or not (Table 3) (Online Resource 1, Table 15). For producers

Table 2 Most important trees used by producers with silvopasture in the United States (n = 260)

Rank	Most frequent responses	Percent	Most frequent trees species	Percent
1	Oak spp. (*Quercus*)	38	White oak (*Quercus alba*)	12
2	Pine spp. (*Pinus*)	27	Douglas fir (*Pseudotsuga menziesii*)	9
3	Red oak (*Quercus rubra or falcata*)	17	Loblolly pine (*Pinus taeda*)	8
4	Maple spp. (*Acer*)	15	Ponderosa pine (*Pinus ponderosa*)	8
5	White oak (*Quercus alba*)	12	Apple (*Malus domestica*)	5
6	Walnut spp. (*Juglans*)	10	Eastern white pine (*Pinus strobus*)	4
7	Douglas fir (*Pseudotsuga menziesii*)	9	Quaking aspen (*Populus tremuloides*)	3
8	Hickory spp. (*Carya*)	9	American sweetgum (*Liquidambar styraciflua*)	3
9	Juniper spp. (*Juniperus*)	9	Pecan (*Carya illinoinensis*)	3
10	Loblolly pine (*Pinus taeda*)	8	Sugar maple (*Acer saccharum*)	3

planting trees, the most cited were pine spp., oak spp., and fruit trees. Tree data were also analyzed based on Farm Production Region to understand regionality and are reported in the Online Resource 1, Table 16.

While the tree species data is somewhat limited due to the high degree of genus-level reporting by respondents, some overarching trends are apparent. Most species reported by producers as having the highest value for their desired goals were timber species or species that produce edible fruits, nuts, or saps. Regional studies of silvopasture adoption have also reported similar findings (Batcheler et al. 2024a; Frey and Fike 2018; Orefice et al. 2017; Poudel et al. 2025).

Table 3 Most frequent tree species planted into silvopasture systems (n = 65)

Planted trees	Percent	Species
Pine spp.	62	Pinyon, slash, longleaf, ponderosa, eastern white, scotch, loblolly
Oak spp.	57	White, northern red, water, scrub
Fruit trees	40	Apple, apricot, cherry, guava, peach, pear, persimmon, plum
Walnut spp.	17	Black, white
Spruce spp.	17	Blue, white, Norway, black hills
Hickory spp.	15	Pecan, shagbark
Maple spp.	15	Silver, sugar, Amur
Juniper spp.	9	Eastern redcedar

Types of forages planted in silvopastures

Respondents (n = 585) reported a wide range of forage species that they planted into their silvopastures, with at least 66 different forage species being reported across the country (Table 4) (Online Resource 1, Table 17). Most producers planted multiple forage species into their silvopastures, with 37% planting three or more forage species, 29% planting two species, and 34% planting a single species. Forage combinations were often grass-legume mixtures. It is important to note that only 33% of respondents reported species of forage exclusively, while 23% reported species and genus, 18% genus-only, 22% in a broad category (i.e. hay, grass, forage), and 4% not an actual forage. The high frequency of reporting on the genus-level limits our understanding of all the possible species and forage combinations used in silvopastures across the country.

Regional nuances were present in the forage data (Online Resource 1, Table 18). For example, regions with more temperate or cooler climates prioritized forage mixes that combined cool season C3 grasses

Table 4 Top ten most planted forages used in silvopasture systems (n = 585)

Forages planted	Scientific name	Percent
Unspecified grass / hay / forage mix	NA	27
Clover spp.	*Trifolium* spp.	27
Fescue spp.	*Festuca* spp.	14
Orchard grass	*Dactylis glomerata*	13
Perennial ryegrass	*Lolium perenne*	10
Rye	*Secale cereale*	8
Bahiagrass	*Paspalum notatum*	6
Timothy grass	*Phleum pratense*	6
Red clover	*Trifolium pratense*	5
Bermudagrass	*Cynodon dactylon*	5

with legumes, while producers in warmer climates (i.e., Southern Plains, Delta States, Southeast) prioritized warm season C4 grasses and legume mixes. Some producers reported using both warm and cool season grasses on the same farm. While some of these silvopastures occur in the transitional zone between warm season and cool season grasses, others were not. It is uncertain whether these grasses were planted in the same or different paddocks. Use of both warm and cool season grasses on the same farm can be used to balance overall forage production across the growing season (Smith et al. 2022a).

Forage data from this study are hard to compare to other survey studies of silvopasture adoption from the United States, as questions on forages used is not often a topic of investigation outside of case study research. Case studies that have investigated this topic reported similar forage species as those in this study, such as Batcheler et al. (2024a) for the Pacific region, Orefice et al. (2017) for the New England region, Rule et al. (1994) for the Corn Belt and Lake States, and Poudel et al. (2025) for the Appalachian region. Forage data could not be compared by silvopasture establishment pathway due to response rate, the large number of forage species reported, and disclosure rules.

Time periods silvopasture systems were established

Most silvopasture adopters (60%) reported that they had silvopasture systems that were 15 years old or older. Many respondents also reported establishing silvopastures over multiple time periods, as reflected in percents exceeding 100 (Fig. 7). Establishing silvopastures over time may suggest that producers are trialing the system first before committing more land to the practice. Cost of establishment may also result in expansion over time. Multiple studies investigating silvopasture adoption have found that startup costs are a challenge (McRae 2024; Smith et al. 2022a), which may result in incremental additions over time. Differences in producer responses by silvopasture establishment pathway were inconsequential (Online Resource 1, Table 19).

While no national dataset exists to make comparisons, some of these findings contrast with recent studies of silvopasture adoption, where most producers

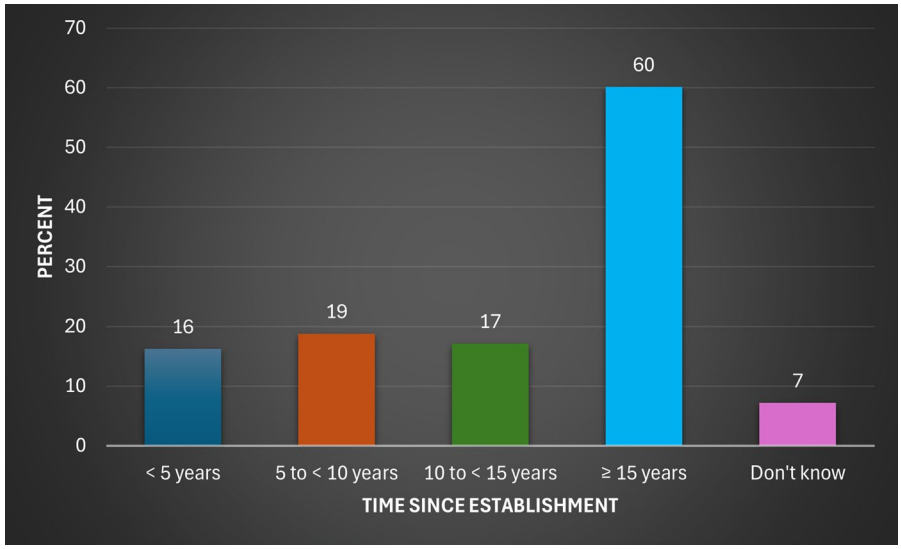


Fig. 7 Time periods silvopasture systems were established by producers (n = 1688)

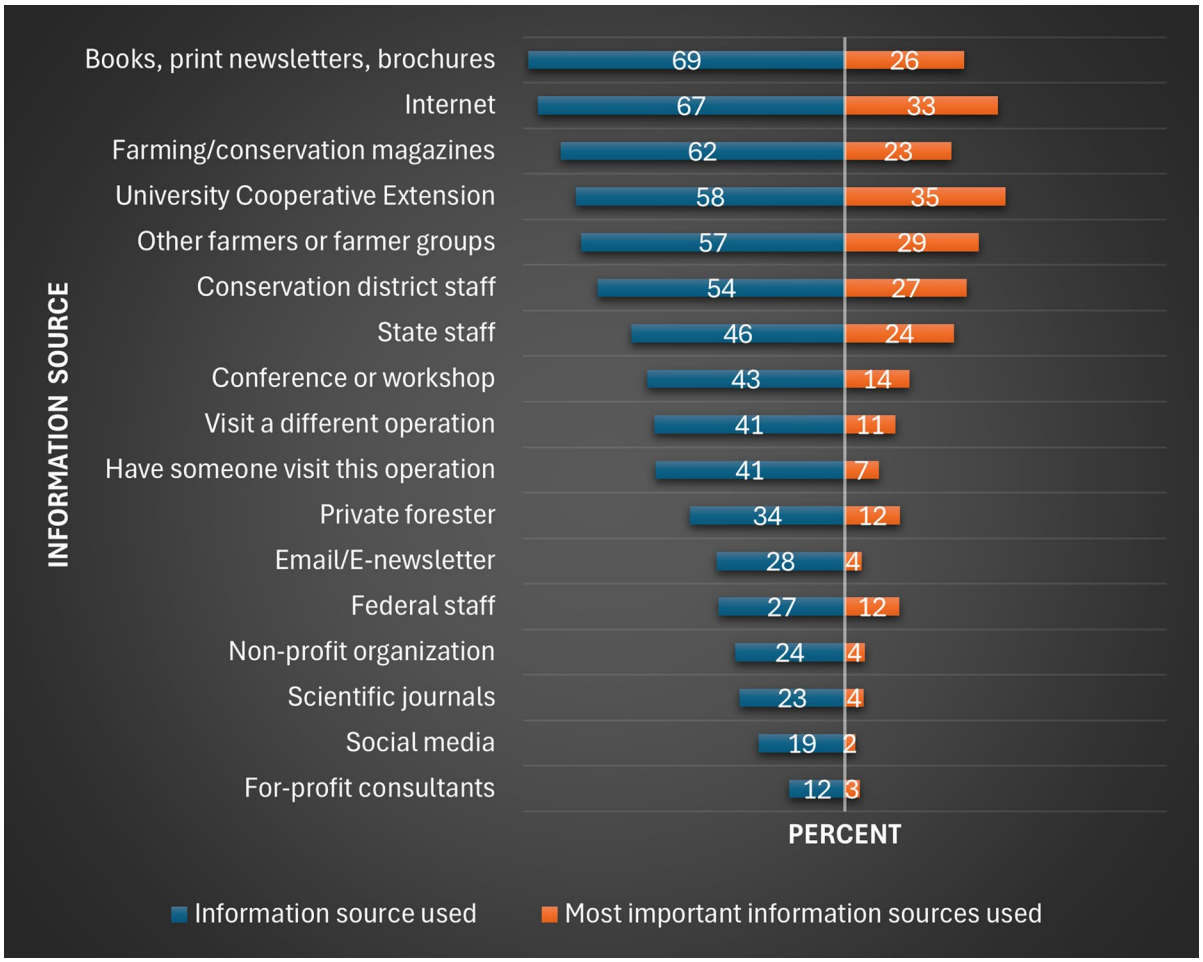


Fig. 8 Percent of silvopasture respondents who used various information sources to learn about agroforestry, along with percent of respondents who reported an information source was among the three most important to them. Figure notes: number of respondents for information sources used ranged from 1475 to 1538 depending on response option and are reported in the Online Resource 1, Tables 20 and 21. Number of respondents for most important information sources was 1320

reported silvopastures that were established less than 15 years ago (Batcheler et al 2024a; Mazaroli et al. 2024; Orefice et al. 2017). For example, Mazaroli et al. (2024) reported that 88% of producers with silvopasture in their study had systems less than 14 years old. This contrast may be due in part to sampling protocols used to select silvopasture adopters.

Information sources

Respondents relied on a wide range of information sources to learn about agroforestry. The three most reported were: 1) books, print newsletters, and brochures (69%), 2) internet (67%), and 3) farming or conservation magazines (62%) (Fig. 8). A systematic review of farmer surveys about communication also reported the importance of print publications and farming/conservation magazines (Witzling et al. 2021).

Respondents were also asked to select the three information sources most important to them, with university cooperative extension (35%), internet (33%), and neighboring farmers, non-neighbor farmers, or farmer groups (29%) being the most reported (Fig. 8). This was followed by conservation district staff (27%), books, print newsletters, and brochures

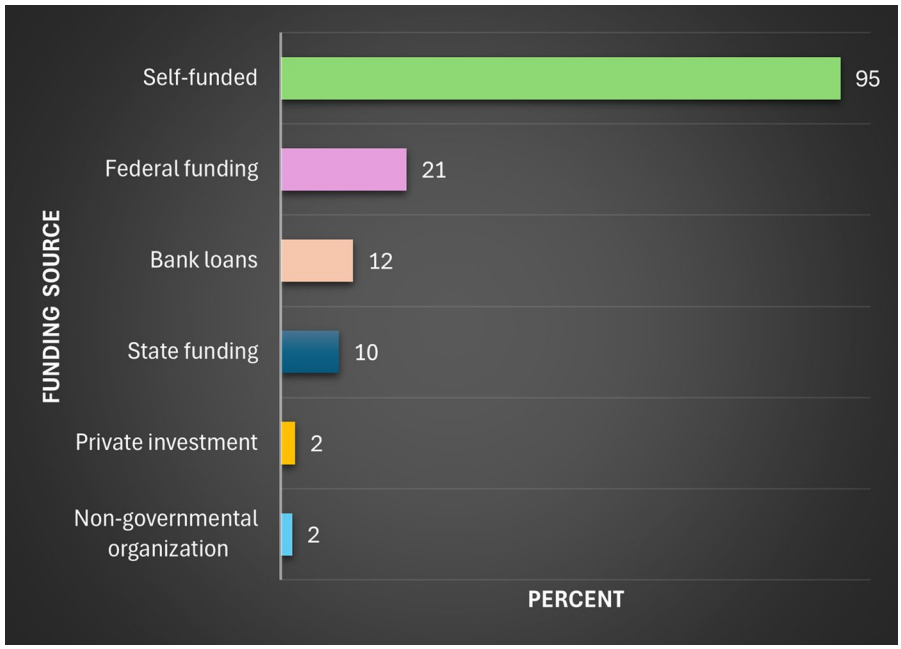


Fig. 9 Percent of respondents who used various funding sources to establish and or manage their silvopasture. Figure notes: number of respondents ranged between 247 and 275 depending on response option and are reported in the Online Resource 1, Table 24

(26%), state agricultural, environment or forestry staff (24%), and farming or conservation magazines (23%). These data highlight the importance of public sector natural resource professionals among information sources most useful to producers with silvopasture.

The low percentage of respondents selecting private foresters as most important (12%), is interesting, especially for respondents establishing silvopasture by thinning forests or tree plantations (Online Resource 1, Table 23). This is noteworthy given that involving a forester is often recommended for this silvopasture establishment pathway (Chedzoy et al. 2022; Zamora et al. 2017). Further, in the United States, a forest management plan developed by a forester is often a requirement for participation in state and federal programs related to silvopasture. Regional studies have also found that a majority of silvopasture adopters collaborated with a forester (Batcheler et al. 2024a; Orefice et al. 2017). The relatively low ranking could also reflect private forester reluctance or opposition to the practice, as reported in Mayerfeld et al. (2016).

In addition to the information sources listed, 106 respondents provided other information sources through an open-ended question. Of these respondents, 32% listed personal experience as their source for gathering information on agroforestry (Online Resource 1, Table 22). Differences between information sources used by establishment pathway were inconsequential (Online Resource 1, Table 23).

Funding used to establish and manage silvopasture systems

Because the survey asked about funding across all agroforestry practices, this analysis uses responses from producers who only had silvopasture without any other agroforestry practices. Almost all (95%) silvopasture-only respondents reported that they used some of their own funds to support silvopasture establishment and management (Fig. 9) (Online Resource 1, Table 24). This makes sense as most programs that provide financial assistance for silvopasture also require some match or other funds to be provided by the participant. In addition, the funding question of the survey asked about both establishment and management and few programs cover all management and maintenance costs (Chenyang et al. 2021; McRae 2024). A study of silvopasture producers in the state of California also reported that silvopasture establishment was predominantly self-funded (Mazaroli et al. 2024).

The second largest source of funding for silvopasture establishment and management was federal programs (21%). The two most used programs specified by respondents were the USDA Natural Resources

Conservation Service (NRCS) Environmental Quality Incentives Program (EQIP) and the NRCS Conservation Stewardship Program (CSP) (Online Resource 1, Table 25). Producers using these programs reported using the silvopasture conservation practice standard (code 381), forest stand improvement (code 666), and fencing (code 382). The use of conservation practices other than silvopasture to establish the practice was also reported in Mayerfeld et al. (2023).

About 10% of respondents specified that they used state funding. When asked to provide information about which state programs were used, 23 producers responded. However, 26% of these responses were federal programs administered at the state level (Online Resource 1, Table 26). As such, federal funding to support silvopasture is likely higher than the values reported here. Loans from banks (12%), private investors (2%), and funding from non-government organizations (2%) were uncommon funding sources for silvopasture. Funding source was not analyzed by silvopasture establishment pathway because of response rate for the silvopasture-only data.

Management activities

The most reported silvopasture management activity was providing supplemental feed and minerals to livestock (86%) (Fig. 10) (Online Resource 1, Table 27). This was followed by rotational grazing (83%), which was reported less often than expected. Rotational grazing, or other forms of management intensive grazing, are often considered a requirement of silvopasture management to prevent overgrazing, damage to trees, and soil erosion (Smith et al. 2022a). It should be noted that the questionnaire explicitly asked about "rotational grazing" and producers using other forms of management intensive grazing may not have selected this response option. Because grazing terminology varies (Allen et al. 2011) it could explain the lower-than-expected value.

The use of treeless pastures was the third most utilized management activity (79%). This finding is interesting and suggests that for most producers, silvopastures are one part of a larger grazing plan. These data are like Smith et al (2022a) who reported that 96% of silvopasture adopters across studies in their synthesis used a combination of treeless pastures and silvopasture.

Many respondents also reported activities associated with understory vegetation management, including removal of unwanted understory plants (77%) and mowing and cultivation for weed control (75%). These findings were also reported in other surveys of silvopasture adoption (Frey and Fike 2018; McRae 2024).

Across silvopasture establishment pathways, there were few differences in the types of management activities reported. One notable exception was that producers who used tree planting to establish their silvopastures were more likely to report tree protection using fencing or tree tubes, replanting trees, and irrigation than producers using other establishment pathways (Online Resource 1, Table 28).

Respondents were also asked to report other management activities through an open-ended question, with 77 producers responding (Online Resource 1, Table 29). Unique management activities included removal of debris such as rocks, brush piles, and mulching (9%), fencing maintenance (9%), and maintaining roads and water infrastructure (6%).

Benefits of silvopasture

In this study, producers could select from 30 different response options for benefits provided by their silvopasture systems (Fig. 11). Wildlife habitat (93%) was the most selected benefit received and was also the second most reported top benefit when producers were asked to select the silvopasture benefits they value most. The importance of wildlife habitat to producers has also been reported in other studies of silvopasture adoption (Batcheler et al. 2024a; Orefice et al. 2017). The high value of wildlife habitat is likely due to both intrinsic and extrinsic motivations. For example, increasing wildlife habitat has implications for those who hunt. In this study, 56% of respondents said hunting was a benefit gained from their silvopastures.

The second most selected benefit experienced was improved animal welfare (90%). This benefit was selected most often when producers were asked to select the silvopasture benefits they value most (Fig. 11). These findings parallel other studies of silvopasture adoption (Batcheler et al. 2024a; Orefice et al. 2017) and are also supported by studies investigating animal behavior, heat stress, and well-being (Pent et al. 2019; Poudel et al. 2022).

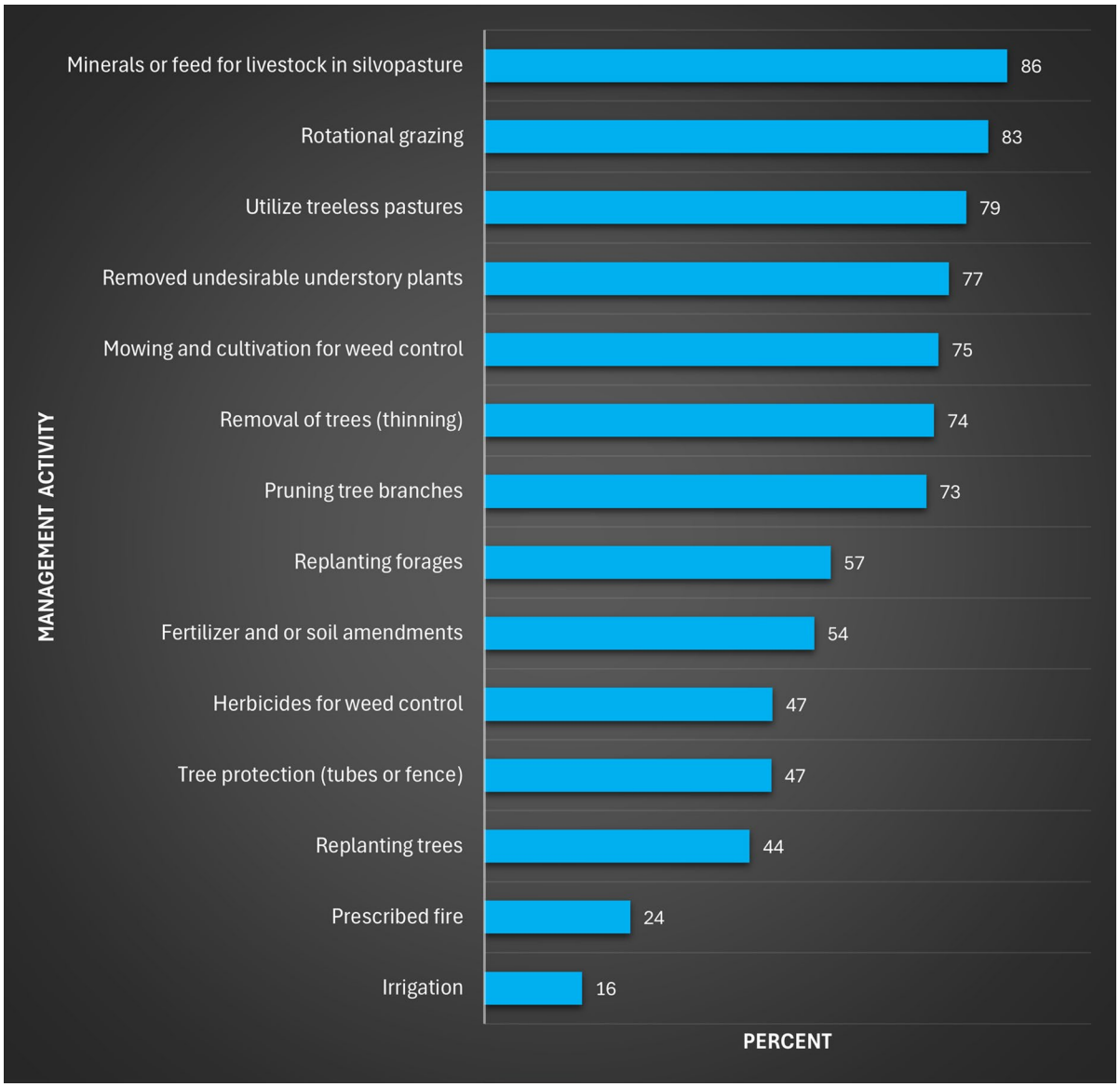


Fig. 10 Percent of respondents who use various management and maintenance activities in their silvopastures. Figure notes: number of respondents ranged between 1598 and 1651 depending on response option and are reported in the Online Resource 1, Table 27

Interestingly, aesthetics was the third most reported benefit experienced (86%) and also selected frequently as a most important benefit (Fig. 11). Other studies of silvopasture adoption have also found that producers value silvopasture for aesthetic purposes (Batcheler et al. 2024a; Frey and Fike 2018). Producers with silvopasture have also reported increased land value that they attributed to their silvopasture systems (Oviedo et al. 2017; Smith et al. 2022a).

Habitat for beneficial insects and pollinators (80%) was notably high. One potential reason may be due to the use of fruit trees by silvopasture adopters in this study. Additionally, silvopasture systems have been found to reduce biting fly populations when compared to open pasture due to increased habitat for beneficial

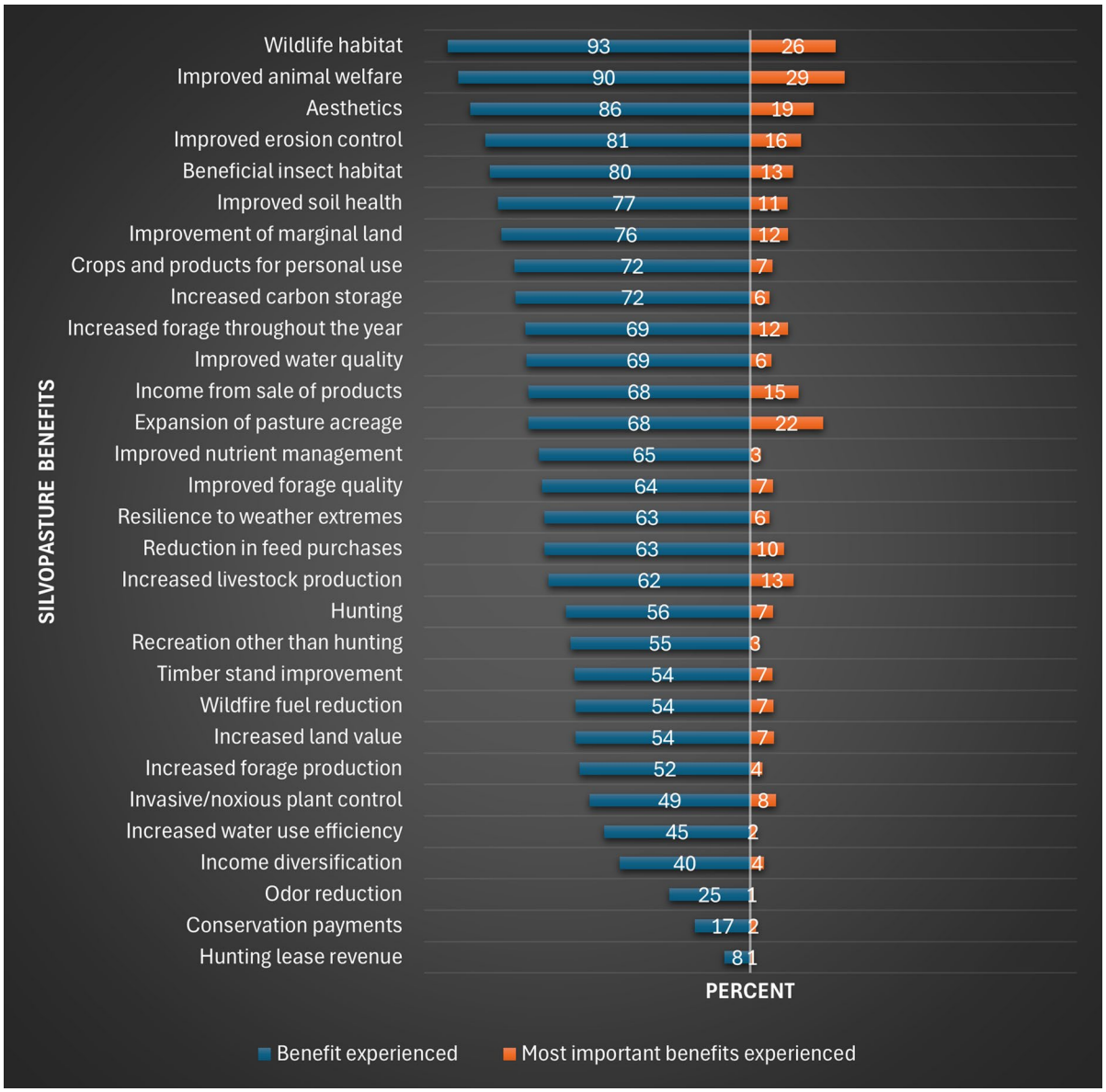


Fig. 11 Percent of respondents who received a specific benefit from their silvopastures, along with percent of respondents who reported a silvopasture benefit was among the three most important to them. Figure notes: number of respondents for benefits experienced ranged between 1566 and 1675 depending on response option and are reported in the Online Resource 1, Tables 30 and 31. Number of respondents for most important benefits experienced was 1450

insects (Giraldo et al. 2011), and producers may have been reporting on this beneficial function. Future silvopasture surveys may be strengthened by asking producers to clarify how beneficial insects support their operation.

Wildfire fuel reduction (54%) was also high given that this benefit is most applicable to select regions of the country. As weather patterns change and wildfire becomes more common in certain regions of the country, use of silvopasture to reduce fuel loads may become more important for some livestock operators (Batcheler et al. 2024b).

Most respondents selected crops and products for personal use (72%) and income from the sale of

products (68%) as benefits of their silvopasture systems (Fig. 11). However, when producers were asked to select the top three benefits most valuable to them, only 7% selected crops and products for personal use and 15% selected income from sale of products. Given the production-oriented nature of silvopasture, one might expect these to have been selected as top benefits by more respondents. This finding is interesting and warrants further investigation.

Respondents were also asked to input any benefits they receive from their silvopastures that were not provided as one of the 30 response options. In total, 119 respondents reported other benefits (Online Resource 1, Table 32). Unique responses included stewardship (9%), happiness/lifestyle (9%), reduction of farm costs (7%), and benefits to orchards (4%).

When comparing benefits gained and most important benefits by silvopasture pathway, a few differences were present (Online Resource 1, Table 33 and Fig. 1). For example, income diversification was selected more often as a benefit gained and most important benefit for producers who established silvopastures through tree planting than for respondents not using that pathway. This finding makes sense given that many of the species producers reported planting into their silvopastures were fruit, nut, or timber species that have income potential. Many of the livestock-related benefits were also lower for producers establishing silvopastures by planting trees, suggesting that livestock were not the primary motivation for implementing silvopasture. A similar finding was reported for silvopasture adopters in the state of California (n = 17), where orchard-based silvopastures are common. The primary motivations were more systems-based, such as soil health and fertility, ecosystem restoration, and weed management (Mazaroli et al. 2024). For our study, and that of Mazaroli et al. (2024), one contributing factor could also be system age, where newly planted trees may not be large enough to provide livestock with beneficial shade and shelter.

Challenges of silvopasture

Across silvopasture pathways, the most reported challenge experienced was added labor and management complexity (52%) (Fig. 12). This challenge was also the most selected when producers were asked to report the three challenges most significant to their operation. The next most reported challenges experienced were all finance-related, and included expense of maintenance (44%), high startup costs (43%), and lack of financial assistance (38%). Producers also selected these financial challenges as most important to their operation with 30, 28 and 22%, respectively. Management complexity and cost have also been reported in other studies of silvopasture adoption (Batcheler et al. 2024a; Mazaroli et al. 2024; Smith et al. 2022a).

Other challenges reported often by producers were related to tree management and included tree/shrub pests and disease (37%), livestock damage to trees (37%), difficulty establishing trees and forages (35%), windthrow (33%), and wildlife damage to trees (33%). In a study of silvopasture adopters in Californian (n = 17), respondents also noted issues with establishing trees and protecting them from livestock (Mazaroli et al. 2024).

Respondents were also asked to report whether they have experienced other challenges associated with their silvopastures not provided as a response option, with 154 producers responding (Online Resource 1, Table 36). The most reported other challenges were weather damage (16%), fencing (particularly trees falling onto fence) (10%), and invasive species (10%). Challenges associated with fencing in silvopastures were also reported in Orefice et al. (2017) for silvopasture adopters in the Northeastern United States.

When comparing respondent data by silvopasture establishment pathway, only a few differences were notable (Online Resource 1, Table 37 and Fig. 2). Respondents who established silvopastures through tree planting tended to report challenges more often, as indicted by the higher percentage across most response options. This was particularly true for wildlife damage to trees, and livestock damage to trees. This finding makes sense given that newly planted trees are more susceptible to damage from both wildlife and livestock. Producers with planted systems may also be more aware of damage to their trees due to more active tree management to ensure successful establishment.

Crops and products

Producers were asked whether they have sold, plan to sell, or use crops and products for personal or

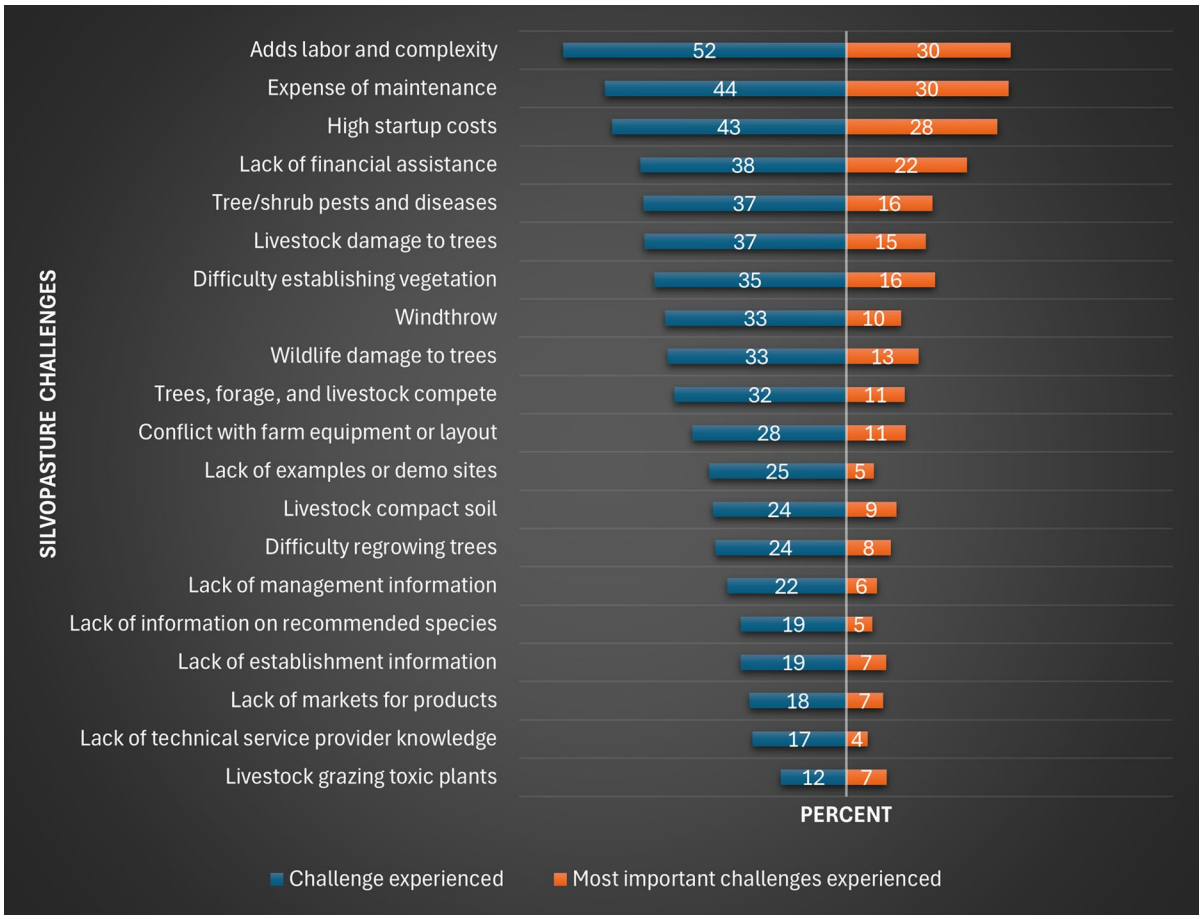


Fig. 12 Percent of respondents who experienced a specific challenge when establishing or managing their silvopastures, along with percent of respondents who reported a silvopasture challenge was among the three most important to their operation. Figure notes: number of respondents ranged between 1568 and 1610 for challenges experienced depending on response option and are reported in the Online Resource 1, Tables 34 and 35. Number of respondents for most important challenges experienced was 1300

on-farm use from their silvopasture systems (Fig. 13). Across silvopasture establishment pathways, 96% of producers reported having sold, plan to sell, or use crops or products for personal or on-farm use from their silvopastures. More specifically, 88% use crops and products from their silvopastures for personal or on-farm use, 64% sold crops and products, and 52% plan to sell crops and products from their silvopastures in the future. Though personal use does not provide direct income, it is likely the use of these products has an economic benefit to the farm, potentially as avoided costs.

The most reported products sold were from livestock (42%), trees for timber products (27%), forage for livestock (15%), and firewood (15%). When comparing between silvopasture pathways, producers who established systems through thinning a forest or a tree plantation reported having sold trees for timber products more often than other respondents, while producers establishing silvopastures through tree planting reported sale of edible crops more frequently (Online Resource 1, Table 38).

The most reported products producers plan to sell in the future were livestock products (29%) followed by trees for timber products (25%), trees for non-timber wood products (13%), and edible crops (12%) (Fig. 13). There were few differences in responses when comparing between silvopasture establishment

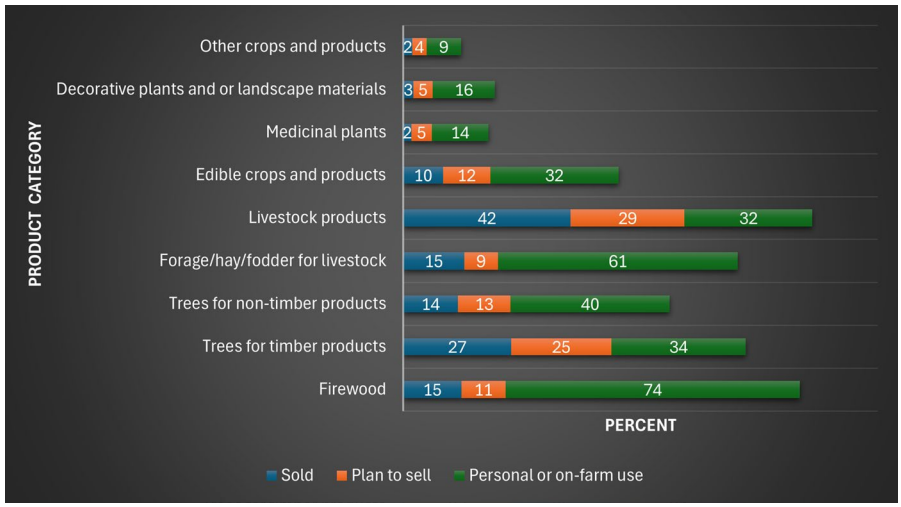


Fig. 13 Percent of respondents who sold, plan to sell, or use crops and products from their silvopastures (n = 1747). Figure notes: across all product categories 64% have sold products, 52% plan to sell products, and 88% use products from their silvopasture systems

pathways, though producers who planted trees into their silvopastures reported plans to sell edible crops in the future more often than those who did not plant trees (Online Resource 1, Table 39).

The most reported crops and products for personal or on-farm use were firewood (74%), forage for livestock (61%), and trees for non-timber products (40%) (Fig. 13). These results differ from current or future products to be sold. This may be due to farm infrastructure (heating homes with firewood), or livestock management systems (stockpiling forages for livestock) (Online Resource 1, Table 40).

Producers were also asked to specify the livestock, edible, medicinal, and decorative crops and products they have sold, will sell, or use that originate from their silvopastures. Respondents (n = 836) listed 33 different livestock products. The top five responses were cattle for meat consumption (47%), cattle for breeding stock (26%), sheep for meat (16%), broiler chickens for meat (10%), and layer chickens for eggs (10%). Multiple other species and animal products were reported and used to a lesser degree (Online Resource 1, Table 41). Seventy-five percent of respondents reported that they sold, plan to sell, or use livestock products from only one type of livestock, 16% from two types, and 9% from three or more types of livestock.

Respondents (n = 483) reported 70 different edible crops being harvested from their silvopastures. The top five responses were apples (*Malus* spp.) (37%), walnuts (*Juglans* spp.) (26%), syrup from sugar maple (*Acer saccharum*) (14%), pecans (*Carya illinoinensis*) (13%), and pears (*Pyrus* spp.) (10%). Apples and walnuts were reported across geographic regions, while maple syrup was most common in New England, Lake States, and Mid-Atlantic. Pecans were most common in the Southeast, Southern Plains, and Delta State regions. Pear, plum, and peach were also reported across geographic regions (Online Resource 1, Table 42).

Respondents (n = 124) reported 55 different medicinal crops being harvested from their silvopastures. Of these respondents, the most common responses were American ginseng (*Panax quinquefolius)* (18%), elderberry (*Sambucus* spp.) (10%), and goldenseal (*Hydrastis canadensis*) (6%). Use of medicinal products was most common in the Appalachian region, with ginseng and goldenseal being the two most common products. Elderberry spanned most geographic regions (Online Resource 1, Table 43).

Respondents (n = 148) reported 38 different decorative plants and landscaping materials being harvested from their silvopastures. The top five products were landscaping materials (timbers, fence posts, pine straw) (28%), tree stock and ornamental trees (18%), flowers for floral arrangements (17%), woody material for floral arrangements (16%), and evergreen trees and shrubs (10%). Specific species used are detailed in the Online Resource 1, Table 44.

Markets where crops and products are sold

Respondents were asked to report where they sold crops and products originating from their

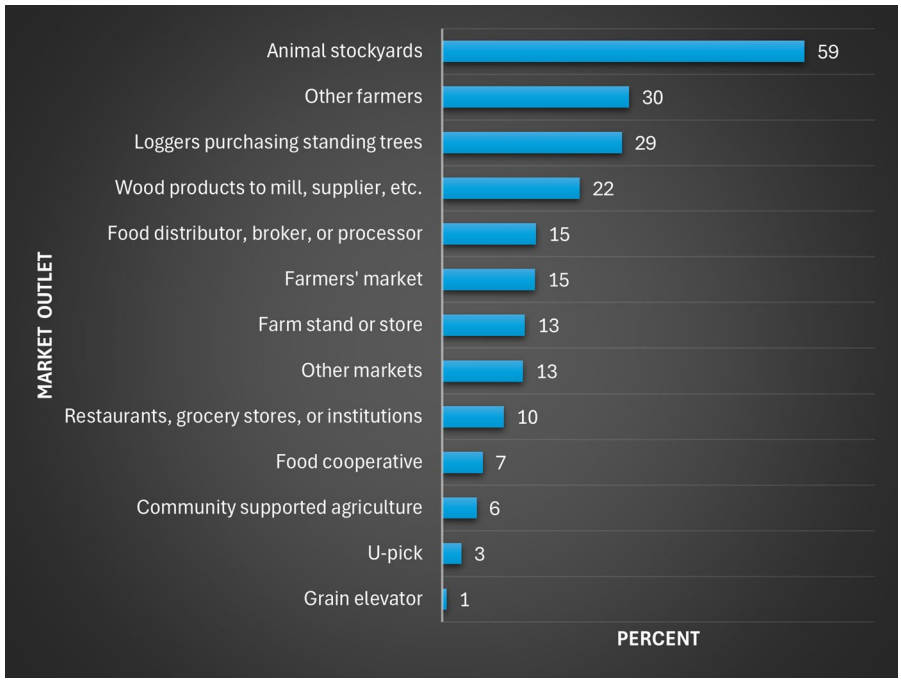


Fig. 14 Distribution of markets where respondents sold crops and products from their silvopastures (n = 1025)

silvopastures, with 1025 producers responding (Fig. 14). Animal stockyards (59%) were the most common market outlet. These data align with findings in the crops and products section of this study, where sales of livestock products were highest. Notably, there is a steep decline between animal stockyards and the rest of the market outlets, suggesting that silvopasture markets are dominated by sales of livestock and associated products. The second most selected market was other farmers (30%).

When asked to specify other markets where products were sold, 27 producers responded. The most common response was selling products directly to private individuals or customers. This information is consistent with regional surveys and case studies that reported how producers use direct markets to sell at least some of their crops and products from their silvopastures (Mazaroli et al 2024; McRae 2024; Orefice et al. 2017). Other responses included auctions, aggregators, and landscapers.

Some nuances appeared when analyzing the data by silvopasture establishment pathway (Online Resource 1, Table 45). For example, those establishing silvopastures by tree planting were more likely to use farm stand/store, food cooperatives, farmers' market, and U-pick than those establishing silvopastures via other pathways. These producers were also less likely to sell to loggers, mills, and animal stockyards. Possible explanations may be due to system age, where the trees are too young for timber and or the trees are for fruit and nut production.

Future of silvopasture

When asked about future intentions for their silvopasture systems, 1626 producers responded. Most producers (66%) plan to keep their silvopasture acreage the same, 21% plan to increase their silvopasture acreage, 10% were unsure, and 3% said they were planning to decrease their silvopasture acreage (Fig. 15). Few differences existed between silvopasture pathways.

When asked to specify the reasons why they were going to increase their silvopasture acreage, 303 producers provided open-ended responses. The most frequent response was planned incremental additions (48%) by planting trees or thinning sections of forest on a continual basis. The continual expansion suggests that producers add more silvopasture acreage as time and funds permit. The second most cited reason was to increase farm profit (14%). More than half of these respondents described having marginal forests and wanting to increase the value and function of the forest

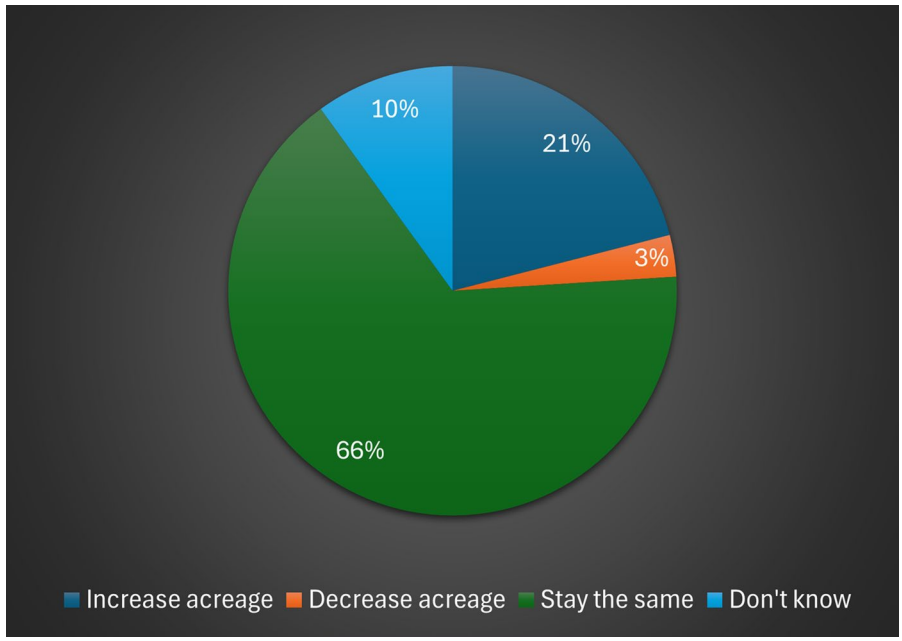


Fig. 15 Future plans respondents have for their silvopastures over the next five years (n = 1626)

through timber stand improvement. Other reasons are provided in the Online Resource 1, Table 46.

Sixty-two respondents provided reasons for decreasing their silvopasture acreage. The primary reason was conversion to more pasture, cropland, or orchard (16%). This was followed by harvesting trees (11%), sold land or retiring (11%), removing trees due to overgrowth or encroachment (8%), and tree mortality from insect or wildlife pests (8%) (Online Resource 1, Table 47). The small number of producers reporting a decrease in silvopasture acreage (3%) speaks to the value adopters have found for this integrated grazing practice. This finding is similar to a synthesis of silvopasture adoption by Smith et al. (2022a) in which 88% of producers reported that they would continue the practice into the future.

Study limitations and future research

One limitation of this study relates to the analysis of silvopasture systems by establishment pathway. Due to the structure of the survey and the number of producers establishing silvopastures through multiple pathways (i.e. planting trees, thinning forest, incorporating livestock into orchards, etc.) it made a distinct analysis by pathway impossible. However, the general analysis we completed shows that nuances exist, and would likely be more pronounced if separating producers into distinct groups. This type of analysis could be accomplished through a modified survey design where each sub-type is treated separately.

Looking to the future, there are several questions asked in this survey that could be expanded upon to fill key gaps in our understanding of silvopasture adoption and management. One question would be about the breed of livestock used by producers in their silvopasture systems and whether they have any recommendations. Expanding upon the forage and tree species question would also be valuable, especially to understand whether producers found certain species to be problematic for use in their silvopasture system. Understanding tree spacing and trees per acre would also be useful. Economic and business-related information about silvopasture management, which was beyond the scope of this phase of the study, would also be of great use to understand.

Conclusions

This study provides the most comprehensive assessment of silvopasture use in the United States to date with the largest sample size of silvopasture adopters providing details about their operations. Key findings include:

1. Silvopasture systems are used by 43% of agroforestry producers in the United States.
2. Conversion of forest to silvopasture is the most common establishment pathway.
3. The average acreage in silvopasture per farm operation reporting the practice is 80.7 acres (32.7 ha).
4. Cattle are the most common type of livestock used in silvopasture systems.
5. The most valued tree species in silvopastures are those known for high timber value or species providing edible crops.
6. Forage species planted into silvopasture systems vary by region, with most producers planting a mix of grasses and legumes.
7. Most silvopasture systems were established 15 or more years ago.
8. Producers with silvopasture systems use a wide range of information sources to learn about agroforestry, with printed materials being the most reported.
9. The most reported funding sources used to establish or manage silvopasture systems are personal funds followed by federal funding.
10. The most reported management activities used in silvopasture systems are the provision of minerals or feed for livestock, rotational grazing, and use of treeless pastures.
11. The top producer-reported benefits of silvopasture management are improved animal welfare, wildlife habitat, and expansion of pasture acreage.
12. The top producer-reported challenges of managing a silvopasture system are added labor and management complexity, expense of maintenance, and high startup costs.
13. Eighty-eight percent of respondents use crops and products originating from their silvopasture systems for personal or on-farm use, while 64% reported having sold crops and products.
14. The most utilized market for crops and products sold from silvopasture systems are animal stockyards.
15. Most producers plan to maintain or expand the acreage they have in their silvopasture systems, with only 3% planning to decrease the acreage.

Data from this national survey reveal the diversity of silvopasture systems across the country, both in how they are managed and how they are valued by producers. This diversity speaks to the multi-use nature of this agroforestry practice and how it is adapted to meet regional needs and producer goals. From these results, technical service providers, program managers, and policymakers can identify potential pathways and opportunities for improving the understanding, effectiveness, and scalability of silvopasture adoption. While this survey provides an important national baseline, continued work is needed to better understand how producer characteristics, regional contexts, and policy or technical assistance frameworks shape adoption and long-term management outcomes.

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Data availability All shareable data are available in the Online Resource 1. Some data summaries were derived using data collected in the 2017 Census of Agriculture by the National Agricultural Statistics Service (NASS), United States Department of Agriculture. Any interpretations and conclusions derived from these data represent author viewpoints and are not necessarily those of NASS.

Declarations

Conflict of interest The authors declare no competing interests.

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