Extent of Agroforestry Extension Programs in the United States

Abstract

An email survey of Extension professionals across the United States was carried out in 2011 to learn about agroforestry Extension programs. The most common agroforestry practices were riparian buffers, windbreaks, and forest farming. Programs provided some degree of effectiveness and success, but numerous obstacles to more widespread adoption were noted. Critical factors include an appreciation of interest in agroforestry, availability of markets and resources such as personnel and funding, having a dedicated program within each state, and having an active schedule of trainings, demonstrations, and other educational opportunities. Extension is in a unique position to facilitate promotion of agroforestry.

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Introduction

Agroforestry is the intentional and integrated use of agricultural and forestry technologies to create more diverse, productive, and sustainable land-use systems. Agroforestry is one of the world's oldest land uses, especially in the tropics, but was formally recognized as a science in the 1970s and 1980s, concurrent with the establishment of the World Agroforestry Centre in Kenya and the National Agroforestry Centre in Nebraska (Buck, 1995).

In the United States, windbreaks and shelterbelts became the early poster child of agroforestry practices, with the significant wind and soil erosion concerns in the Midwest. More recent environmental concerns over water quality, biodiversity, and climate change and the desire for income diversification among farmers and forest landowners led to more interest in agroforestry practices such as riparian buffers, alley cropping, silvopasture, and forest farming (Hughes et al., 2005; Current, Brooks, Ffolliott, & Keefe, 2009). Anecdotally, however, agroforestry is not widely adopted. In order to understand why, it is important for Extension professionals to first to know what is out there. This led to the basic research question in this article: What is the current extent of the agroforestry practices in the United States?

A review of the literature on agroforestry Extension adoption in the United States finds only a few examples. These mainly came through large state or federal funded programs. Missouri, through its Center for Agroforestry, has developed a number of programs that include Extension activities. For example, their chestnut program is quite successful in developing an industry and building consumer awareness (Cernusca, Gold, & Godsey, 2008).

In Florida, the Center for Subtropical Agroforestry (CSTAF) assessed existing agroforestry practices in the southern states and found lower than expected adoption and interest (Workman, Bannister, & Nair, 2003). Other states have surveyed farmers, forest landowners, and resource providers to assess interest in agroforestry (Strong & Jacobson, 2006; Kays, 2004). These studies all indicate an interest in agroforestry practices within diverse populations that could satisfy specific land management objectives, but lack of knowledge and assistance were key barriers.

Because agroforestry practices require the integration of trees with crops and/or livestock, in most cases it is carried out through forestry-related programs. The distinct nature of forestry and agriculture disciplines hinders mutual synergies and objectives. In addition, there are important issues with respect to complexity of combining crops, livestock, and trees in one system, and the unclear economic returns (Mercer, 2004).

Despite the apparent environmental benefits of agroforestry, very few Extension educators have agroforestry as their primary work area, and few universities have courses or training in agroforestry. In many cases, it is the few forestry Extension professionals experienced in agroforestry that develop a program for his or her state. In some cases, federal and state conservation programs have helped the agroforestry adoption by supporting establishment, mainly of riparian buffers and windbreaks (Garret & Buck, 1997).

To take stock and to learn about issues, constraints, and limitations to effective implementation and adoption of agroforestry Extension programs across the United States, we carried out a survey of forestry Extension professionals. Specific objectives were to: 1) determine the extent and types of agroforestry extension programs and 2) evaluate factors that influence success of agroforestry programs.

Methods

The survey was carried out by email using SurveyMonkey. The cover letter defined an agroforestry program and illustrated types of agroforestry practices. An agroforestry program was defined "to be a dedicated (more than a onetime event) program that involves an academic institution, government, NGO, and/or industry that provides training or helps implement one or more agroforestry practices."

The survey comprised two main sections. The first section asked general questions from a statewide perspective of the types of agroforestry programs, their success rates, and factors and obstacles that influence success. The second section addressed questions on specific programs that the respondent wanted to discuss detail. The questionnaire was pretested by a number of agroforestry experts across the nation.

The mailing list for the survey was taken from the USDA - National Institute of Food and Agriculture who have a catalogue of forestry-related Extension professionals in every state. The list has over 400 names, and from this list we identified at least two people from each state, if possible. These included the lead state Extension forester and another Extension educator whom we thought may have knowledge of agroforestry programs. In the event we missed an educator who may be doing work on agroforestry, we asked those who received the survey to provide us with names of other Extension educators dealing with agroforestry in his or her state. In this way we felt we would capture the population of Extension educators involved in agroforestry in each state. The survey was emailed to 109 Extension professionals in May, 2011. Reminder emails were sent to non-respondents a week later, and final follow-up was sent 2 weeks thereafter.

One of the main reasons we did not survey other natural resource professionals such as those with USDA agencies was that it would have required time-consuming authorization at high levels.

Results and Discussion

We received 45 responses (41% response rate, covering 32 states). About half (23 of 45 respondents) said that their state currently has or has had an agroforestry Extension program. The respondents who currently have agroforestry programs represented 16 states (Table 1). There are probably a few states that did not respond who are doing agroforestry, so the results are indicative of those that responded. The factors that hinder the agroforestry adoption may not be generalized for all the states of the U.S.

Table 1.
States That Currently Have Agroforestry
Extension Programs

| State	Number of Programs
Alaska	3
Arkansas	1
California	20
Georgia	1
Hawaii	5
Iowa	8
Michigan	1
Minnesota	6
Missouri	10
North Carolina	3
New York	5

Pennsylvania	2
Tennessee	2
Virginia	4
West Virginia	3
Wisconsin	4

Of those who said they do not have a program, most said they never knew of Extension programs addressing agroforestry in their state. The main reason cited for having no program was due to limited resources, including personnel and funding (50%). Other common reasons were that agroforestry is a low profile land use and does not have a critical contribution to state programming.

Respondents who have programs on average said their state had between one to four programs. Of these programs, over 80% were statewide, the remainder being local to a region of the state. Interestingly, over 50% of the programs began more than 10 years ago. Only one quarter started in the last 5 years. Over 70% of the programs were implemented through university/Extension organizations.

The most common or popular agroforestry practices were riparian buffers followed by windbreaks, with forest farming coming in a close third (Figure 1).

Figure 1.
Most Common Agroforestry Practices
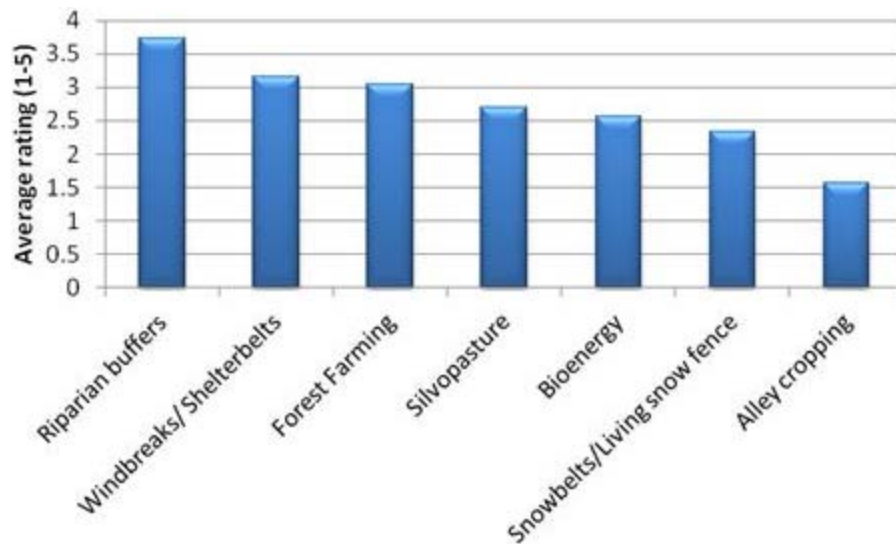
Only one-quarter of respondents said their program(s) were very or fairly successful. Most respondents said their programs were somewhat successful, but a little over one in 10 said their programs were not successful (Figure 2). In a few cases, respondents were unable to evaluate the program because they were too new.

Figure 2.
Overall Success of Agroforestry Extension Programs
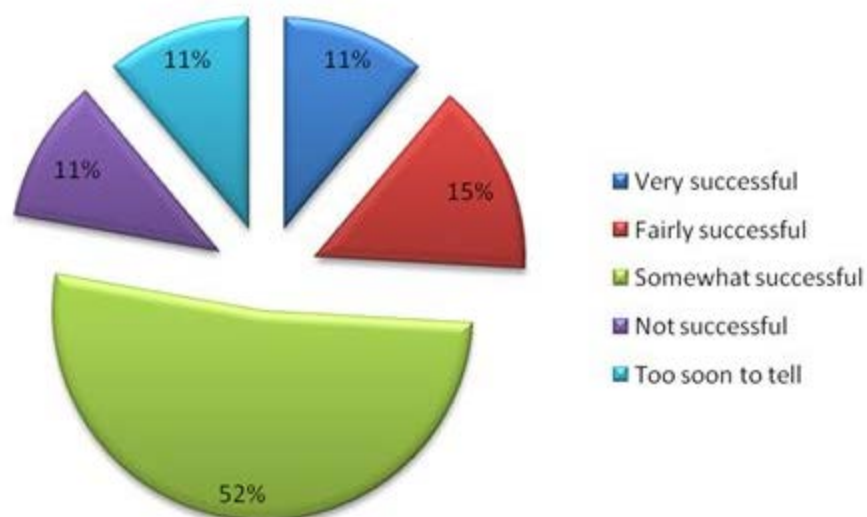
Because one crucial role of Extension is to meet client's objectives, a question was asked about how well the programs were doing in terms of meeting a variety of objectives (Table 2). The most effective programs were ones that met environmental objectives such as biodiversity conservation, water quality, and soil productivity. Another objective that ranked quite highly was making clients more aware of natural resource management. The least effective objectives met were income generation, diversification of income, gaining market access, and marketing local and organic products. However, on average the programs provided some degree of effectiveness. This corresponds with the result that the programs were for the most part "somewhat successful."

Table 2.

Effectiveness in Meeting Objectives (Rating 1=not effective to 4=very effective)

Objectives	Rating
Protects riparian or water quality	3.00
Biodiversity conservation	2.89
Protects productive capacity of soil	2.81
Protects wildlife/fish habitat	2.79
Awareness of natural resource management	2.76
Sustainable forestry	2.75
Diversification of income sources	2.56
Sustainable agriculture	2.50
Product market access	2.44
Income generation	2.40

Local and organic products	2.40
Encourages community well being	2.36

Obstacles to why agroforestry programs are not more widespread varied, but more often were due to economic-related issues (Table 3). These included poorly developed markets, lack of profit potential, additional expenses, and lack of financial assistance. In addition there were quite a few issues related to lack of familiarity, complexity, and the time-consuming nature of many agroforestry technologies. Other major issues have to do with lack of outreach, training, and demonstrations of agroforestry in action.

Table 3.

Obstacles to Agroforestry Adoption (Rating 1=not critical to 5=highly critical)

Obstacles	Rating
Lack of developed markets for products	3.65
Unfamiliar with technologies	3.58
Have not seen agroforestry successfully used	3.48
Competition between trees, crops, and animals	3.46
Lack of financial assistance	3.46
Does not show much profit potential	3.43
Lack of demonstration sites	3.39
Expense of additional management	3.33
Lack of training or expertise	3.25
Do not know where to market products	3.25
Lack of technical assistance	3.17
It will be too time consuming	3.08
Cannot afford adoption or start up costs	3.00
Unfamiliar with alternative marketing approaches (e.g. web)	2.92
Information about agroforestry unavailable	2.83
It is inconvenient	2.79
Do not have infrastructure (e.g. buildings, equipment)	2.75
Lack of equipment	2.48
Insufficient land	2.22

Lack of seed/ seedling sources	2.09

Respondents were asked to discuss factors that help make agroforestry programs successful. Three distinct but interrelated categories were identified and a few quotes from respondents were chosen and are displayed in italics to highlight the point.

- **Show an appreciation of interest in agroforestry and that it can make a difference in food production and resource conservation**. Related to this is the need to show more evidence of economic potential. It was clearly noted in Table 3 that economic factors are critical to adoption. Although agroforestry is touted for its environmental benefits, without clear economic potential it is unlikely that more farmers and forest landowners will adopt it.

  - "Many farmers interface with state and federal agencies that are not actively promoting agroforestry practices. Those same agencies are providing subsidies and cost-share for conservation but when they are contacted by farmers/landowners, agroforestry practices are usually not or rarely suggested. I think we need agroforestry systems that address farmers'/landowners' problems/income generation at the same time they achieve conservation benefits. There is a need for innovative systems that address those problems and generate benefits for the landowner. I think sometimes we are too restricted by the traditional agroforestry systems and practices."

  - "This is a topic that has been slow to catch on with extension professionals, so little attention has been devoted to it in the past."

- **Ensure availability of resources such as personnel and funding and have dedicated program within that state**. This includes staff training, expertise, leadership and having an advocate in the government's promoting and recognizing agroforestry. This ties into having a research program that address concerns over complexity, potential complexity among crops and resources and unfamiliarity with technologies.

  - "Financial resources to have dedicated personnel focused on the promotion of agroforestry practices and able to interact with a wide array of stakeholders to create tailor made agroforestry trainings. All of this is supported by original and relevant research."

  - "The interest is there, but there are only a few of us who can really push agroforestry programs - so it takes time to build momentum."

  - "Demand for Forest Farming / mushroom training exceeds our capacity to provide training.

  - "Greater support is needed from state agencies in the way of partnerships between agriculture and forestry leaders to support development of decision-making training and frameworks that integrate both elements across the whole farm or property"

- **Have an active schedule of trainings, demonstrations and other educational opportunities**.

The most often cited tool to show potential clients was ability to show successful demonstrations.

- ○ "Work with farmers around the state to set up viable demonstration sites across the varied landscape."

Conclusions and Recommendations

The research reported here has shown that less than one third of the states have agroforestry programs. Furthermore, most of these programs are rated as only moderately successful. This is indicative of the limited role of agroforestry in meeting natural resource, forestry, or agricultural program objectives. The majority of programs exist because of an interested Extension professional, institutional support, and funding, not only from the university but also from U.S. agencies such as Farm Services Agency and the Natural Resources Conservation Service, which they can provide technical assistance to farmers and landowners.

The implication of the study is that more can be done to harness and use the multiple benefits that agroforestry can provide to a broad spectrum of stakeholders. More is needed in terms of raising the visibility of agroforestry. One positive sign is the *USDA Agroforestry Strategic Framework, Fiscal Year 2011–2016*. It brings together agencies within USDA and a diverse set of stakeholders to promote agroforestry (USDA, 2011). These partners include universities/Extension, conservation districts, and state forestry agencies. This initiative, together with agroforestry discussed in the new Farm Bill negotiations, can help raise its profile. To grab this opportunity, Extension strategies should include leveraging more personnel and funding to promote pilot agroforestry programs and showcasing their economic/environmental benefits, with special focus on the states where these programs are absent.

For the most part, the programs and the resultant practices were designed more to meet environmental objectives such as water quality, soil erosion, or biodiversity enhancement than economic ones (Jose, 2009). Environmental benefits are and will remain a prime motivator for agroforestry, but as the study reported here shows clearly, positive economic benefits in terms of income generation or market diversification are also needed (Current et al., 2009). Agroforestry has the potential through niche and specialty markets, organic farming, and local food movement to provide income diversity to farmer and forest landowners (Gold, Godsey, & Josiah, 2004; Josiah, 2000).

Another major obstacle to overcome is the lack of understanding and familiarity with agroforestry technologies. Agroforestry is more complex than forestry or agriculture on its own because it combines both land uses in one system. This and the nature of competition for resources and fear of giving up land for uncertain benefits by combining crops and/or livestock with trees can be daunting for a farmer or landowner without seeing it being successfully demonstrated. Simpler approaches through applied demonstrations and research on farms can go a long way to show economic and environmental benefits.

Agroforestry offers an opportunity for Extension professionals to bridge forestry and agricultural disciplines and to build strong community-based, collaborative partnerships to enhance conservation and land use objectives. To this end education in agroforestry is critical. As Extension educators do more with less, integrating land uses and disciplines is what agroforestry brings to meet the needs

of clients and our food security and conserve natural resources. Extension administrators and resource managers who are looking to downsize and combine programs will find opportunities to use agroforestry as a system that encourages collaboration among faculty and Extension staff across disciplines. More local studies on taking stock of what is out there, doing market development assessments for agroforestry products, and more training on agroforestry technologies would better equip the Extension professionals to ensure widespread adoption of agroforestry practices.

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