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Original Article

The Contribution of Traditional Agroforestry Systems and Challenges of Adoption by Smallholder Farmers in Ethiopia. A review

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ABSTRACT

Agroforestry is a system of land use that incorporates the use of trees with either crops, livestock, or both. In Ethiopia, traditional agroforestry systems such as home gardens, parkland, border planting, woodlots, coffee-based, enset-based, and fruit-based systems have been used. Therefore, the goal of this review study was to gather, arrange, and analyse traditional agroforestry systems' social, economic, and environmental contributions as well as the factors influencing their uptake. In Ethiopia, traditional agroforestry systems enhanced biodiversity and improved the livelihood of the society by providing cash income, fuelwood, pole, timber, fencing, indigenous medicines and food. Additionally, they increase soil fertility and restore biomass carbon in the range of 12 to 228 Mg ha^{-1}. Despite their importance, a variety of factors have prevented farmers from implementing these agroforestry techniques. They include the uncertainty of tenure, the availability of land, the age of the family's leader, labour, gender, degree of education, access to training, and the availability of water. Therefore, it is important to encourage agroforestry practices in order to increase production, raise soil carbon stocks, and conserve biodiversity. This can be done through offering training, equitable land sharing, and institutional stability.

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INTRODUCTION

Agroforestry is a strategy of land use that integrates the conservation of trees with either agriculture, livestock, or both (Nair, 2005). Agroforestry finally replaced agriculture as the predominant method of land use in southern Ethiopia, growing by 25.1% in 2015 (Temesgen et al., 2018). In regard to land utilisation, agroforestry practices and annual and perennial crops are grown on 21,890 ha, or 85%, of the total area (Dori, Asefaw & Kippie, 2022).

Farmers purposefully maintain the native tree species component in many traditional agroforestry systems throughout Ethiopia so that crops and workers are protected from the sun's heat, sustain fodder supply, fuelwood or fruits, and that the soil is more productive (Asfaw & Lemenih, 2010). The building of homes, kitchenware, heating, lighting, and handles for farm equipment are all necessary benefits (Negash, 2007). Agroforestry systems can be efficient and sustainable in agricultural areas (Demessie, Singh & Lal, 2013). Trees provided the homestead with products and services that allowed it to expand, including shade, shelter, fuel, food, and fodder (Gebrewahid et al., 2018; McNeely & Schroth, 2006). A total of 144.62 tons of fuel were used for cooking in northern Ethiopia in the 2017–18 fiscal year, and 137.3 tons (94.9%) of that total were woody biomass (Tadele et al., 2020).

About 45% of all farms in the world have more than 10% tree cover, making private farming an integral part of the global forest cover. Estimates place the total amount of carbon stored on agricultural land at 45.3 billion metric tons, with trees accounting for more than 75% of that total (Gassner & Dobie, 2022). Traditional agroforestry techniques had improved the function of agroecosystems by supplying raw materials, such as weeds, grasses, and tree leaves for compost production that maintained the soil's fertility for at least three years and up to four years while also conserving soil moisture when rainfall shortages occurred (Linger, 2014).

In Ethiopia, local soil fertility improvement programs have used agroforestry and agroforestry-based spatial land-use integrations schemes (Asfaw et al., 2007; Negash, 2007; Guteta & Abegaz, 2015; Amare et al., 2018). Agroforestry systems in parkland and backyard gardens improve the soil's physical and biological characteristics (Dori, Asefaw & Kippie, 2022). Agroforestry techniques have improved the soil qualities and enhanced species composition in southern Ethiopia (Tesfay et al., 2022). Agroforestry systems have significantly improved soil organic carbon (SOC), total nitrogen, accessible phosphorus, soil electric conductivity, soil citation exchange capacity, and carbon-to-nitrogen ratios than open land (Gebrewahid et al., 2019).

Traditional agroforestry systems have improved ecosystem services by offering shade thereby providing a favourable environment for elders to hold meetings for dispute resolutions in the communities. Additionally, they provide shade and shelter for wild animals and birds, live fences, windbreaks, demarcation, recreation, and ornamental and medicinal products for people and animals (Negash, 2007; Linger, 2014; Jemal et al., 2018; Temesgen et al., 2018; Gebru et al., 2019). However, the adoption and practice of agroforestry systems are not similar in the country and even among the farmers living in the same district. Agroforestry upscaling and agroforestry-based

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spatial land-use integrations have been influenced by socioeconomic characteristics such as wealth status, farm size, labour potential, and animal size (Agidie et al., 2013; Guteta & Abegaz, 2015; Amare et al., 2018; Tafere & Nigussie, 2018; Beyene et al., 2019). To secure tenure security for individuals to embrace farmer-managed regeneration on the one hand and to control the externalities of communal grazing and practice high-value agroforestry on the other, it is essential to reduce risk and uncertainty through policy and institutional frameworks (Iiyama et al., 2017). Therefore, the objective of this paper is to review, combine and organise the findings of traditional agroforestry systems and their contribution to Ethiopia.

METHODOLOGIES

The articles, books, reports, and proceedings were used in reviewing and preparing this paper.

FINDINGS AND DISCUSSION

Overview of Agroforestry Practices in Ethiopia

There are many agroforestry practice models in Ethiopia. Farmers incorporate trees in their farmlands as parkland (Agidie et al., 2013; Gebrewahid et al., 2018; Tadesse et al., 2019; Tadele et al., 2020; Manaye et al., 2021), boundary planting around home and farmlands (Asfaw et al., 2007; Legesse & Negash, 2021; Manaye et al., 2021), alley cropping as a hedge (Tafere & Nigussie, 2018), multi-story home garden (Betemariyam, Negash, & Worku, 2020; Jegora, Asfaw, & Anjulo, 2019; Linger, 2014), coffee-based agroforestry as shade (Negash & Starr 2015; Tesfay et al., 2022), woodlot (Asfaw et al., 2007; Agidie et al., 2013) and enset (*Ensete ventricosum*) based with different fruit trees (Tesfay et al., 2022). Farmers get functions of soil fertility, fuel wood, construction materials, cash income, food, medicines, and life fences from agroforestry systems. The major contributions are discussed in the following sections.

Improvement of Biodiversity

The addition of trees to agricultural landscapes improves the diversity of strata, as well as the variety of microclimates above and below ground (Rosenstock et al., 2019). Numerous studies conducted in Ethiopia have shown that traditional agroforestry techniques have promoted biodiversity and increased species cover (*Table 1*). A considerable number of species (132, 86, 59, 59) were discovered in the Tigray region of northern Ethiopia, the central rift valley of Ethiopia, the Kachabir district, and the Kebtatembaro zone, respectively. On the other hand, only a small number of species (32, 36) were discovered in the districts of Shashemene, South-eastern Ethiopia, and Yirgacheffe, Southern Ethiopia, respectively (*Table 1*). The proper management techniques are most probable to be responsible for the increase of tree species in different regions of the nation. The reason could be that more tree and shrub species need adequate area; therefore farmers with larger tracts of land are preferred for a variety of woody species (Jegora, Asfaw, & Anjulo, 2019).

Coffea arabica, *Millettia ferruginea*, *Vernonia amygdaline*, and *Croton macrostachyus* were the most dominant species in the Yirgacheffe district of Southern Ethiopia with frequencies of 18.41%, 15.92%, 10.95%, and 10.45%, respectively (Tesfay et al.,2022). Fifty-three per cent (53%) of the total number of woody species contributed to over 90% of the total abundance. According to research was done by Jegora et al. (2019) in the Shashemene district of Ethiopia, *Cordia africana* was the most common tree species, found in 45%, followed by *Croton macrostachyus*, *Persea americana*, and *Casimiroa edulis*. Home gardens and parklands predominated in Assosa district of western Ethiopia, whereas alley cropping and on-farm border planting were less popular techniques (E. Tadesse et al. 2019). Asfaw & Lemenih (2010) discovered that in Ethiopia’s central rift valley, woody species are grown by 70% of households across all agro-ecological zones, while 95% of households

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maintain the species on their farms as part of the process of changing natural vegetation into farmland.

In Southern Ethiopia, Sidama, 33 tree species (or 69%) and 15 shrub species (or 31%) were noted (Birhane et al., 2020). Additionally, 138 plant species, 113 genera, and 62 families have been identified in the southern Ethiopian state of Sidama (Tadesse et al., 2021). Southwest Ethiopian researchers Jemal et al. (2018) found 127 plant species from 47 families in the Illubabor zone of the Oromiya state. Additionally, Tafere and Nigussie (2018) discovered that for the Tekake, Harbu, and Abaso Kotu kebeles in the South Wollo zone, Northern Ethiopia, the average number of trees and bushes in home gardens per farm was 190, 153, and 89, respectively.

Table 1. Summary of species in the agroforestry systems in different parts of the country

No. of species per agroforestry practices	Source	Location
86	Asfaw and Lemenih 2010	Central rift valley of Ethiopia
49	Birhane et al., 2020	Hawassa Zuria district, Sidama
127	Jemal et al., 2018	Illubabor, Southwestern Ethiopia
36	Jegora et al., 2019	Shashemene district, Ethiopia
59	Legesse and Negash 2021	Kachabira district, KembataTembaro Southern Ethiopia
59	Manaye et al. 2021	Northern Ethiopia (Tigray region)
55	Molla and Kewessa, 2015	Dellomenna District, Southeast Ethiopia
57	Tadesse et al., 2019	Assosa district, Western Ethiopia
32	Tesfay et al., 2022	Yirgacheffe district, southern Ethiopia

Table 2 displays the diversity indices of various agroforestry systems. Home garden agroforestry approaches exhibited higher diversity indices than woodlots (Asfaw & Lemenih, 2010; Birhane et al., 2020; Jegora, Asfaw, & Anjulo, 2019; Legesse & Negash, 2021; Manaye et al., 2021; Molla & Kewessa, 2015; S. Tadesse et al., 2021), which had lower diversity indices (Manaye et al., 2021). According to several studies (Agnoletti, Pelegrín, & Alvarez, 2022; Asase & Tetteh, 2010; Assogbadjo et al., 2012; Islam, Dey, & Rahman, 2015; Maroyi, 2009; Rendón-Sandoval et al., 2020) traditional agroforestry systems have boosted biodiversity in several nations.

Table 2: Diversity indices of evens, richness, Shannon, and Simpson under different agroforestry systems

Common Agroforestry systems	Evenness	Species richness	Shannon index	Simpson	Source
Home garden	0.7	6.55	1.23	-	Asfaw and Lemenih 2010
			2.4	0.71	Tadesse et al., 2021
	0.81	7.8	1.65	0.71	Legesse and Negash 2021
	0.81		1.87	0.77	Birhane et al. 2020
	0.77		2.22	0.84	Jegora et al. 2019
	0.95		2.64	0.92	Molla and Kewessa 2015
	0.76	3.44	0.93		Manaye et al. 2021
Parkland	0.8	4.58	1.15	-	Asfaw and Lemenih 2010
	0.41	1.58	0.38	0.24	Legesse and Negash 2021
	0.81	3.02	0.82	0.46	Gebrewahid et al. 2019
	0.51	3.1	0.62		Manaye et al. 2021

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Common Agroforestry systems	Evenness	Species richness	Shannon index	Simpson	Source
Boundaries	0.51	2.43	0.57	-	Manaye et al. 2021
			2.5	0.89	Tadesse et al. 2021
	0.69	3.76	0.94	0.49	Legesse and Negash 2021
Wood lot	0.21	1.53	0.20	-	Manaye et al. 2021
			1.4	0.63	Tadesse et al. 2021
Silvopasture	0.85	4.78	1.19	-	Asfaw and Lemenih 2010
Coffee based	0.78	4.95	1.22	0.65	Tesfay et al. 2022

Livelihood Improvement

The Federal Democratic Republic of Ethiopia Ministry of Environment and Forest has declared that the government of Ethiopia is interested in enhancing the forest sector's contribution to economic development while ensuring the social and environmental sustainability of this expansion (Federal Democratic Republic of Ethiopia Ministry of Environment and Forest (MEFCC, 2018). Since trees immediately contribute to both reducing greenhouse gas emissions and raising living standards, as well as sustainable management of existing forests and tree-based landscape restoration is a crucial task (MEFCC, 2018). A partial picture of the multi-story and parkland agroforestry systems in northwest Ethiopia is depicted in Figures 1 and 2. Numerous research conducted around the nation found that agroforestry products are used by societies for a variety of livelihood strategies. For instance, a woodlot in Central Ethiopia called Menageshasuba is used to process trees that have grown larger than pole size into poles, fuel wood, and occasionally split wood for local usage. Other advantages of this sort of land use include the production of fencing materials (such as small, bent poles), farm equipment, and grass for livestock feed, although in most cases, the grass is only produced during the first two to three years (Duguma, 2013).

On the island of Lake Ziway in south-central Ethiopia, the majority of fuelwood (93.3%), building supplies (81.7%), and farm implements (63.3%) come from agroforestry trees. Products from agroforestry are also a source of food, medicine, and bee forage (Zegeye, Teketay, & Kelbessa, 2006). Out of 127 species found in the three techniques (home gardens, multi-story coffee systems, and multipurpose trees on farms) in Illubabor zone of Oromiya area, southwest Ethiopia, 80 are edible and 55 are managed as "active food." Nearly 90% of the household income comes from farming in agroforestry systems, with the multi-story coffee system having the biggest share (60%) thanks mostly to the sale of *Coffee arabica* (Jemal et al., 2018). In the Abaya Chamo catchments of Ethiopia's Southern Rift Valley, about 90.10% of the respondents who were interviewed said they received food, particularly in the form of various fruits like mango and citrus species, and 60.96% said they received traditional medicine primarily for people and livestock. Forty-five per cent (45%) of respondents revealed as they got fuel wood from their farm. Other socioeconomic roles, timber, pole and fodder, were informed by 11.96%, 27.20% and 12.60% of the respondents, respectively (Gochera & Worku, 2022).

The sale of agroforestry system goods provides farmers with additional revenue flow. Construction of homes, domestic utensils, cooking, heating, lighting, and handles of farm equipment, for instance, are key agroforestry benefits in Wonago district, Southern Ethiopia, in addition to the major advantages for households. In June 2006, the users reported that fuelwood from a single *Millettia* tree that was standing and grown might bring in between \$14 and \$37. *Eucalyptus* poles and *Cordia*-sawn wood are in high demand and fetch a high price on the market. An approximate age of standing *Cordia* tree that is completely matured is valued at close to

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$18. Since it may be used for a variety of purposes, including construction, furniture manufacture, farm equipment, fuel and charcoal, and income creation, farmers favour *Eucalyptus camaldulensis* (Negash, 2007). Similarly, the farm gate price of *Eucalyptus* in North-western Ethiopia's Koga watershed is estimated at US$ 1.1 per log, and if farmers carry it personally to sell it in the local town market, the price jumps up to US$ 1.4 per log (Agidie et al., 2013). The income of parkland agroforestry user households in Hawzen district, eastern Tigray, northern Ethiopia, was 4231 Ethiopian Birrs (137 USD) higher than that of nonuser households in the fiscal year 2016/17, according to Tadele et al. (2020). The most notable benefits of traditional agroforestry systems to indigenous societies include shade, firewood, edible fruit, medicine, wood for producing tools and fences, as well as ornamental and ritual applications (Papa, Nzokou, &Mbow 2020; Rendón-Sandoval et al., 2020).

Plate 1: Partial view of a multi-story agroforestry system in northwestern Ethiopia

Plate 2: Partial view of parkland agroforestry system in north-western Ethiopia

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Carbon Storage Potential and Soil Fertility Enhancement

Agroforestry technologies such as fuelwood plantations, shelterbelt/windbreak systems, and woodlots can reduce carbon emissions by replacing fossil fuels with sustainably produced fuel wood and fodder (Nair, 2005). Globally, agroforestry systems have a carbon storage capacity that ranges from 12 to 228 Mg C/ha (Dixon, 1995). The results of many types of research conducted in various regions of Ethiopia showed that the biomass carbon of various traditional agroforestry systems is within the range of international reports (Table 3). However, several studies (Gebrewahid et al., 2019; Manaye et al., 2021; Tsedeke, Dawud, & Tafere, 2021) revealed that parkland agroforestry techniques had lower biomass carbon than worldwide reported due to lower tree densities for the indicated agroforestry practices. Additionally, studies revealed that under various combinations of agroforestry approaches, trees have a variable share of C stock. For instance, Negash and Starr (2015) reported that trees accounted for 73% of the total biomass of C stock in the Enset system and 79% in both the Enset-Coffee and Fruit-Coffee systems in Gedeo zone of Southern Ethiopia, where the total small holding biomass (trees, coffee, enset, herbs, and litter) Mg ha^{-1} C stock ranged from 22 to 122. The contribution of both fruit and non-fruit trees to the small holding biomass C stock in the Southern Nations, Nationalities, and Peoples Regional State of Ethiopia has been estimated to be 90%, 69%, and 77% for the coffee-fruit-enset integrated, enset based, and enset-coffee integrated agroforestry systems, respectively, in the range of 108 to 328.1 Mg ha^{-1} C. For all three agroforestry systems, the average ratio of total above-ground biomass C to total biomass C stock was 76.4% (Tesfay et al., 2022). The size and density of trees in the suggested agroforestry system may be the cause of the variation.

In southern Ethiopia, the soil organic carbon stock ranged from 28.2 to 98.9 Mg ha^{-1}, or 12 to 43%, in the age sequence of 12, 20, 30, 40, and 50 years of forest and agroforestry land uses (Demessie, Singh, & Lal,2013). Regarding the age of land management (5, 10 and 15 years, respectively), Ketema and Yimer. (2014) also noted that the overall mean of SOC was greater in soil under agroforestry conservation-based tillage (16.43%, 52.63%, and 88.35%) than in maize-based conventional tillage. In comparison to conventional tillage based on maize, agroforestry conservation-based tillage had better average porosity and soil moisture content. Similar to this, in southern Ethiopia's Wonago area, soils used for agroforestry had an average soil organic carbon (SOC %) level that was 0.5 higher than soils used for cultivation. In terms of land use, the Wonago district has a SOC of agroforestry greater than grassland, and cropland (Negasa et al., 2017). This is because agroforestry systems are well managed. The SOC content of *Rhamnus prinoides* intercropping farms in Northern Ethiopia's drylands (1.7 0.8%) is much higher than that of surrounding open farms (1.3 0.7%) (Gebremeskel et al., 2021).

Parkland agroforestry methods recovered roughly 31 Mg C ha^{-1} in northern Ethiopia, showing that these practices increased and accumulated ecosystem carbon stock (Gebrewahid et al., 2018). However, 59.65 Mg C ha^{-1} was discovered in Minjar Shenkora's parkland agroforestry practice, proving the system's necessity due to the higher density of trees (Tsedeke, Dawud, & Tafere, 2021). Compared to grassland and agriculture, the soil of the natural forest had concentrations of C that were roughly 4.4 and 3.7 times higher, respectively (Assefa et al., 2022). When compared to forest soil, grazing area had the greatest reduction in total soil C storage (0–50 cm), followed by cropland (50%) and eucalyptus plantations (47%) (Ahmed, Assefa, & Godbold, 2022). Due to the trees' larger size compared to the comparatively small ones, the carbon stock has increased (Takimoto, Nair, & Nair, 2008).

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Table 3. Above and below ground soil organic carbon and total agroforestry carbon under different agroforestry systems in different parts of the country

Agroforestry system	Carbon stock (Mg ha^{-1})			Location
	Above and below-ground carbon	SOC	Source	
Home garden	67.1	181	Negash and Starr 2015	Gedeo zone of southern Ethiopia
Parkland	8.3	51.3	Tsedeke et al. 2021	Minjar Shenkora Woreda, Ethiopia
Home garden	70.1	137.1	Tesfay et al. 2022	DillaZuria district southern Ethiopia
Home garden	22.7	85.7	Tesfay et al. 2022	Yirgacheffe district of Southern, Ethiopia
Home garden	7.8	108.8	Manaye et al. 2021	regional state of Tigray
Parkland	7.8	71.7		
Wood lot	31.1	96.9		
Boundary	4	112.7		
Parkland	10.9	20.1	Gebrewahid and Meressa 2020	Western Tigray region, Northern Ethiopia
Home garden	76	155	Sahle et al. 2021	Gurage zone, southern Ethiopia
Home garden	45.2	131.1	Betemariyam et al. 2020	Mana district, south western Ethiopia
Home garden	33.6	92.1	Birhane et al. 2020	Hawassa District in Sidama Zone

Factors Affecting the Adoption of Agroforestry Practices

The use of agroforestry approaches varies greatly in Ethiopia due to a variety of factors Table 4. Farmland, agricultural labour, loans, agricultural extension services, and agroforestry seedlings are scarce resources that resource-poor farmers have restricted access to. Therefore, agroforestry upscaling and agroforestry-based spatial land-use integration imply reduced participation from farmers with limited resources. When compared to homes who did not participate in an agricultural extension program, the proportion of households that practiced upscale agroforestry and agroforestry-based spatial land-use integration was higher. Agroforestry practices were implemented on their farmland in a way that was positively correlated with family size, total amount of land possessed, and adoption of agricultural technologies (Amare et al., 2018).

For example, in the Amhara area of north western Ethiopia, an increase in the number of households led to a 2.4% increase in the adoption of farmland agroforestry. The opportunity to practice farmland agroforestry grew by 35% for every additional hectare of land that was held. The likelihood of implementing farmland agroforestry increased by 13.4% in the presence of experience with the adoption of other agricultural technology (Amare et al., 2018).

Legesse and Negash (2021) reported that they found many issues that made it difficult for these practices to be implemented in the Kachabira district of the Kembata Tembaro Zone of Southern Ethiopia. According to the majority of respondents (90% and 84%, respectively), maintaining home gardens has been difficult due to a lack of land and the drought,

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whereas managing parklands has been difficult due to the drought (88%), a lack of seedlings (58%), a lack of fuel wood (72%), and a lack of labour (69%) The diversity of tree species rises with farm size. Households with better economic standing had significantly more diverse, dense and mature trees than households with lower incomes (Bayern et al., 2019; Agile et al., 2013; Yaebiyo et al., 2021).

According to Guteta and Abegaz (2015), access to agroforestry seedlings, home farmland distance, farmers' production orientation, and farm features all had an impact on agroforestry upscaling in southwest Ethiopian highlands. Similarly, in Desse Zuria and Kallu districts of south Wollo zone, farmer characteristics such as age, size of landholdings, incentives, existence of municipal regulations, and labour availability had a good impact on and were strongly connected to farmers' adoption of agroforestry technology (Tafere &Nigussie, 2018). In the five years preceding 2011, farmers in the Zegie Peninsula, northwest Ethiopia, who had planted trees on their farms, including those who planned to do so in the future, experienced water shortages and a lack of shade trees to a greater extent than those who had not planted trees in the past or do not have plans to do so in the future. However, diseases and pests, low soil fertility, unsecured tenure, and a lack of land had a greater impact on individuals who did not plant trees, including those who do not plan to do so (Alelign et al., 2011).

The main barriers to tree planting and water retention in southern Tigray included a shortage of water or moisture (34.7%), a lack of available land (27.2%), poor income, a species' slow development rate (10.9%), and the absence of fruit tree seedlings (10.9%) (Gebru et al., 2019). Similar factors include the amount of land holdings, labour availability, water availability, agroecology, distance to market, institutions, and legislative frameworks, which influence the adoption of agroforestry systems in Ethiopia's Oromia area (Iiyama et al., 2017).

Table 4: Summary of factors affecting the adoption of agroforestry practices in Ethiopia

Factors	Effect	Source
Education	Positive	Agidie et al. 2013; Guteta and Abegaz 2015; Gebru et al. 2019b
Age	Positive/Negative	Agidie et al. 2013; Guteta and Abegaz 2015; Amare et al. 2018; Beyene et al. 2019b; Gebru et al. 2019
Family size	Positive	Guteta and Abegaz 2015; Amare et al. 2018; Gebru et al. 2019
Income	Positive	Alelign et al. 2011; Agidie et al. 2013; Guteta and Abegaz 2015
Landholding size	Positive/Negative	Alelign et al. 2011; Agidie et al. 2013; Guteta and Abegaz 2015; Amare et al. 2018; Gebru et al. 2019
Water availability	Positive	Alelign et al. 2011
Access to training	Positive	Guteta and Abegaz 2015; Amare et al. 2018; Beyene et al. 2019
Distance to town/ market	Positive /Negative	Guteta and Abegaz 2015; Beyene et al. 2019
Access to seedlings	Positive	Alelign et al. 2011; Amare et al. 2018
Tenure insecurity	Negative	Alelign et al. 2011; Beyene et al. 2019
Access to credit	Positive	Amare et al. 2018; Beyene et al. 2019
Environmental awareness	Positive	Beyene et al. 2019

CONCLUSIONS

Different traditional agroforestry techniques have been practiced in various regions of Ethiopia. Farmers who employ agroforestry have better livelihoods than those who do not. By selling fruits and coffee-related products, they were able to acquire food, wood, fodder, fuel, medicine, fencing material, compost, and money. Agroforestry land use methods are more beneficial to the soil than mono-cropping in terms of soil organic matter, soil fertility, and soil carbon store. Due to the potential of the atmosphere to store carbon, this mechanism is also employed to mitigate climate change. Ethiopia does not, however, always use traditional agroforestry technologies. Major factors influencing the adoption of agroforestry in Ethiopia include socioeconomic considerations, education level, land holding size and security, distance from town, gender, age, and availability to training. To scale up agroforestry systems, awareness-raising, education and experience-sharing, market accessibility, town road development, and land use policies should be implemented.

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