

Characterization of Agro Forestry Practices and Their Socioeconomic Role at Guji Zone Southern Ethiopia

Temesgen Giri^{1*}, Sintayo Demise², Aschalew Emire³
Oromia Agricultural Research Institute, Bore Agricultural Research Center,
Ethiopia

Corresponding Author: Temesgen Giri temesgengirii92@gmail.com

ARTICLE INFO

Keywords: Agroforestry,
Characterization,
Socioeconomic Role

Received : 06, October

Revised : 24, October

Accepted: 28, November

©2025 Giri, Demise, Emire: This is an open-access article distributed under the terms of the [Creative Commons Attribution 4.0 International](https://creativecommons.org/licenses/by/4.0/).



ABSTRACT

Agro forestry offers a potential solution to the problem of declining rural agricultural production. The study was conducted in Guji zone southern Ethiopia to characterize the existing agro forestry practice at study area. Accordingly, districts were stratified based on agro ecology of study area. Based on this two districts from highland and two districts from midland was selected and two PA from each districts were selected based on purposive sampling. 15 farmers from each PA, totally 120 farmers selected from both agro ecology. To collect data, semi structured questionnaire was applied through survey interview, key informant and direct field observation. As a result, home garden agroforestry practices dominates study area (17.5%) and followed by coffee based agroforestry practice (13.3), the least distributed agroforestry practice at study area was alley cropping which shows 3.3%. The major Importance of agroforestry practices were for income, regulated climates, soil improvement, used for shade, food and livestock feed, properly using the land, construction, fuel wood and timber. On the other hand, impacts of wild animals, Insect pest and disease, Competition trees with crop (i.e. shading effect), shortage of land for tree planting, lack of capital, lack of knowledge, taking long time for profit, lack of seed accessibility and Shortage of labor the major constraints recorded in the study areas.

INTRODUCTION

The land use system in Ethiopia is associated with the decrease in the size of holding both for arable and grazing lands. Thus, there is continued trend toward the conversion of forested and marginal lands to agricultural lands, resulting in massive environmental degradation and a serious threat to sustainable agriculture and forestry. The decreasing in the size of land holding is related to population explosion. Agro forestry offers a potential solution to the problem of declining rural agricultural production in the tropics. Cultivating trees, agricultural crops and pastures and/or animals in intimate combination with one another spatially or temporally is an ancient practice that farmers have used throughout the world (Nair, 1989; 1993). Agro forestry (AF) is a relatively new name for a set of old practices. There are several types of traditional systems exist in different parts of Ethiopia, and there are new technologies started by several institutions at a national level across different land use systems (Abebe Yadesa et al., 2001).

The authors identified major agro forestry system in Nigeria as including shifting cultivation: home garden, Taungya, Shelter Belts Alley Cropping; bounding trees, dune fixation, and Aqua forestry; shifting Cultivation according to Adedire (1992). Agro-forestry had been claimed, to have the potential of improving agricultural land use systems and providing lasting benefits and alleviating adverse environmental effects at local and global levels. The aim and rationale of agro forestry lies in optimizing production based on the interactions between the components and their physical environment. This will lead to higher sum total and a more diversified and /or sustainable production than from a monoculture of agriculture or forestry alone. Agro forestry provides a wider range of products, more secure subsistence or more cash income from wood products to enable the farmer to buy food. Nair (1993) indicated that the combination of several types of products which are both subsistence and income generating, helps farmers to meet their basic needs and minimizes the risk of the production system's total failure. In addition above mans' life is unimaginable without the natural environment to supply him with his basic need such as air to breathe, water to drink, food and /or animal products (Atolagbe, 2002). The integration of trees into the farming system could go a long way to help ameliorate environmental problems. Specifically by creating microclimates favorable for crop growth and enhancing the recycling of materials to provide a more complete ground cover which could help to protect the soil from erosion and moderate extreme temperatures (Adedire, 2004). In tree home gardens, the production is for home consumption, but any marketable surplus can provide a safe guard against future crop failures and security for interval between the harvests (e.g. rice in Java and Sri Lanka, coffee and maize in Tanzania, coconut and rice in South Western India). Conservation agriculture with trees is now emerging as the most promising land use option to sustain agricultural productivity and livelihoods of farmers (Syampunani et al., 2010). For example Potential benefits of trees on farms have been proven in Zambia, Malawi and Tanzania where the intervention has been widely adopted (Akinnifesi et al., 2009).

Agro forestry has been practiced by many farmers in different corners of the Guji zone by traditional and cultural way of cultivation. But no scholars have been carried out researches on existing agro forestry practices in Guji zone and there is no compiled information is available on potential agro forestry practices and their role to generate livelihood alternatives in rural communities to the stakeholders at different levels. So, this study intends to characterize the existing agro forestry practice in the study area while evaluating the contribution of these practices to rural livelihood and assessing perception of farmers towards management and problems of agro forestry practices and available management options in the selected district.

THEORETICAL REVIEW

Agroforestry is a land-use system that integrates woody perennials with agricultural crops and/or livestock on the same land unit, either spatially or temporally. Theoretically, agroforestry is recognized as a sustainable approach that enhances land productivity, diversifies outputs, and maintains ecological stability. Nair (1989; 1993) explains that the interactions between trees, crops, and the physical environment generate higher total production compared to monoculture systems due to more efficient use of light, water, and nutrient cycling.

From a socio-economic perspective, agroforestry strengthens household resilience by providing subsistence products (food, fodder, fuelwood) as well as high-value commercial outputs such as fruits and timber. It also minimizes production risks through diversification, reducing the likelihood of complete crop failure (Nair, 1993). Ecologically, land conservation theory highlights that trees within farming systems improve soil structure, enhance fertility through leaf litter, create favorable microclimates, and reduce soil erosion (Adedire, 2004). FAO (2013) further emphasizes that agroforestry contributes significantly to climate change mitigation through increased biomass and carbon sequestration.

Previous literature identifies multiple traditional agroforestry systems such as home gardens, coffee based agroforestry, intercropping, and parkland systems as common practices in Ethiopia (Abebe Yadesa et al., 2001). These systems serve not only daily subsistence needs but also function as adaptive strategies for environmental degradation and land scarcity. Overall, the theoretical framework of agroforestry establishes that such systems deliver simultaneous economic, social, and ecological benefits. This framework underpins research that characterizes existing agroforestry practices and evaluates their socio-economic roles, including studies such as the one conducted in the Guji Zone of Ethiopia.

METHODOLOGY

Astronomically, Guji zone is located between 4°30'-6°25'N latitudes and 38°16'-41°34'E longitudes. It is located in the southern central portion of Oromia Region. The total area of the zone is 33,364.51 km². Bore and Uruga Districts have similar agro ecology where diverse crops such as bread wheat, food barley, horticultural crops (mostly potato, Enset, garlic and head cabbage) and highland pulse crops (Faba bean and field pea) were largely produced in each district. These districts are also known for rearing of livestock. White honey is produced in each districts from natural vegetation

found. Adola Rede and Oddo Shakiso District are characterized by three agro-climatic zones namely humid, sub humid and dry arid zones. Traditional farming system of these both districts are: Teff, Haricot bean, sweet potato, coffee and maize.

About 71% of the total area of the districts is characterized by tropical/kola climatic condition while about 26% and 3% of the total areas of the district are characterized by sub-tropical/woinadega and dega agro-climatic conditions respectively. It is characterized by two rainy seasons, namely spring and autumn (Locally known as "Gannaa" and "Hagayya" rains respectively) and experience mean annual temperature of 15^oc -20^oc and 1200-2000mm of annual rainfall. Attitudinally, the zone extends from about 500 to 3000masl.

High forests, broad-leafed forests, woodland, bush and shrub land, grassland and plantation trees are available in the zone. Woodland, shrub land and grassland cover respectively about 15.78%, 8.24% and 10.72% of the total areas of the district. Also natural forest is one of characterization of Guji Zone. From land coverage of Guji zone, woodland, shrub land and grassland cover about 15.78%, 8.24% and 10.72% of the total area of the zone respectively. While the remaining were characterized by dense bush land, exposed sand soil, Riparian woodland, swampy or marsh land, Arable land and built-up areas.

At first stage, discussion was made with Zonal agricultural office to get districts with agro forestry potential. Also at district stage, discussion occurred with agricultural experts to get potential kebeles with agro forestry practices. So to contact respondents, structured questionnaire was prepared and survey of the agro forestry practices was undertaken by using purposive sampling methods to select districts and kebeles depend on the potential of agro forestry practices.

From Guji zone, two districts from each Agroecology (high land, midland) totally four districts were selected. Namely from highland agroecology: - Bore and Uruga Districts and from midland Adola Rede and Oddo Shakiso Districts were selected. Then, from each districts by purposive method, two kebeles (PA) were selected. Totally 120 respondents were interviewed for this study and 15 respondents from each kebele for both agro ecology. So Data were collected through face-to-face interview using a pre-prepared questionnaire and types of agro forestry practices exist were identified with the help of farmer's indigenous knowledge on component, arrangement of agro forestry practice and direct field observation.

The data collected from samples household responses were analyzed by using statistic package for social science (SPSS version 20). Descriptive analysis was employed to the tools such as percentage, and frequency distribution.

RESULTS AND DISCUSSION

Socio Economic Characteristics of Respondents

This research revealed that the sex ratio of household respondents engaged in agro forestry was 70% men and 30% women that show male respondents more participate in agro forestry practice and agriculture. About 37.5% of the respondents were aged between 30 and 40 years. Those in the age class 50-60 were 31.7% while the third largest class was 40-50 years with 15.8%. The remaining 15% was in the old age 20-30 years. So, the results of this study

revealed that most of the respondents are in a condition of ability to participate in any agro forestry practices and economic activities.

With regarding of marital status, result of survey shows that 77.5% was hold by married respondents followed by single that takes 20.9 percentages. The least percentage share was divorced that shows 1.6% of respondents. Regarding family size largest percentage (60.8%) hold by 5-8 number of family followed by 1-4 (19.1%) number of family and the smallest range number of family shows as it is >8 (17.5%). The education level of respondent's shows that the largest number was educated (79.9%) and 20.1% was uneducated. From educated respondents 23.3% educated up to grade four and 56.66% educated more than grade eight.

Table. 1 socioeconomic description of sample respondents

Category	Variables	Frequen cy	Percent
Age class	20-30	18	15.0
	30-40	45	37.5
	40-50	19	15.8
	50-60	38	31.7
	Total	120	100
Sex	Male	84	70
	Female	36	30
Marital status	Single	24	20.9
	Married	93	77.5
	Divorced	3	1.6
	Total	120	100
Family size	1-4	23	17.5
	5-8	73	60.8
	>8	24	19.1
	Total	120	100
Level of education	Uneducated	24	20.0
	Grade 1-4	28	23.3
	Grade 5-8	39	32.5
	>9-12	29	24.16
	Total	120	100
Farming experience	1-5 years	2	1.7
	6-14 years	26	21.7
	15-24 years	50	41.7
	above 25 years	42	35.0
	Total	120	100

Types of Agro Forestry Practices at Study Area

Based on survey result, eleven (11) types of agro forestry practices were identified for the study area. As of other part of our country, farmer’s community of Guji zone practices different types of agro forestry practices for different socio economic services. So depending on result analysis, home garden agro forestry practices were the most practices dominates (17.5%) the study area for both agro ecology (Highland and Midland) followed by coffee based agro forestry practice(13.3%) and fruit trees based agroforestry practices (11.6%) (Table 2).The least agro forestry practice exist at study area was alley cropping which shows only 3.3 percent. In line with this study, reported that home garden and coffee based agro forestry practices are the types of Agro forestry practice mostly practiced by farmers at Ilu Ababor Zone of Oromia region south western Ethiopia Mezgebu(2023).

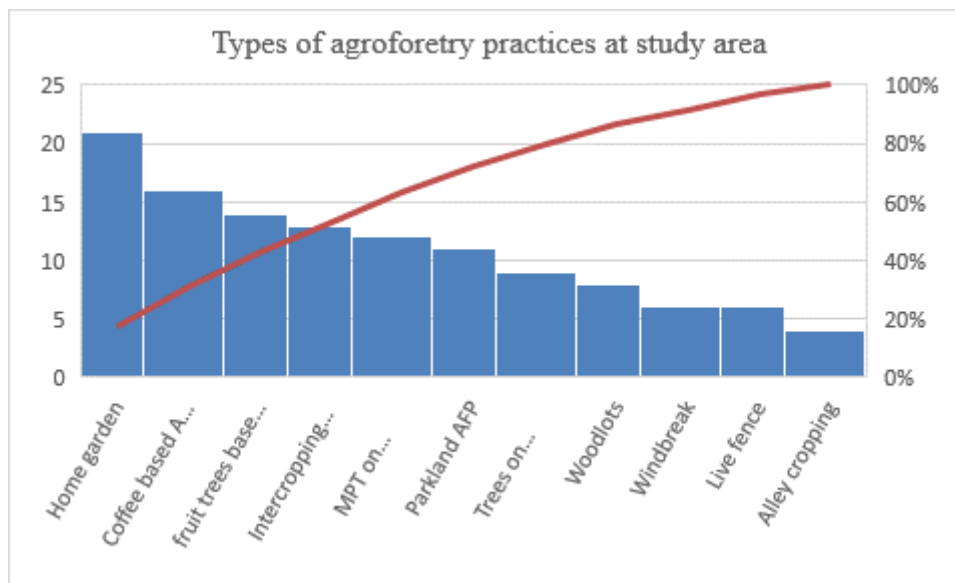


Figure: 1 Types of Agroforestry at study area

Table. 2 Distribution of AFP with agro ecology at study area

	Agro forestry practices									
	Home garden	MPT on farm land	Coffee based AFP	Liv fences	Parkland AFP	Intercropping	Windbreak	Trees on rangeland	Woodlots	Alley cropping
Highland	9	7	7	4	6	10	4	8	5	4
Midland	12	8	9	2	5	8	2	6	3	1
Total	21	15	16	6	11	18	6	14	8	120

Home Garden Agro Forestry Practices of Study Area

The concept of home gardening involves cultivating a small piece of land nearby the family home or nearby a walking distance. It can be seen as a mixed cropping system consisting of vegetables, fruits, plantations, spices, herbs, ornamental and medicinal plants and livestock that can serve as a source of food and income. Table below shows list of plants cultivated by farmers at both agro ecologies at their homestead. Farmer's uses home garden Agro forestry practices for dietary services and generate cash income.

Table 3: List of Plants as Homestead at Highland of Study Area

Highland Agro ecology					
Scientific Name	Vernacular Name (Afaan Oromo)	Amharic Name	Family Name	Parts Used	Habit
<i>Allium cepa</i> L.	Shinkurti Baalaa	Baro Shinkurt	Alliaceae	Steam and leaf	Herbs
<i>Allium sativum</i> L.	Shinkurtii Adii	Nech Shinkurt	Alliaceae	Bulb	Herbs
<i>Brassica carinata</i> A.Br.	Shaanaa/Raafuu	Gomen	Cabombaceae	Leaf	Herbs
<i>Capsicum annum</i>	Qaaraa	Qariya	Solanaceae	Fruit	Herbs
<i>Cymbopogon martini</i> (Roxb.) Wats.	Marga Citaa	Tej sar	Poaceae	Leaf	Herbs
<i>Ensete ventricosum</i> (Welw.) cheesman.	Weesii	Enset	Musaceae	Leaf, Steam and Root	Herbs
<i>Liphia adoensis</i>	Uddoo	Koseret	Verbenaceae	Leaf	Herbs
<i>Ocimum basilicum</i> L.	Bassobila	Bessobila	Lamiaceae	Leaf	Herbs
<i>Ruta chalepensis</i> L.	Sukuttee	Tenadami	Rutaceae	Leaf and Seed	Herbs

Source: Household survey, 2022-2023

Table 4: List of Plants as Homestead at Midland of Study Area

Midland Agro ecology					
Scientific Name	Vernacular Name (Afaan Oromo)	Amharic Name	Family Name	Parts Used	Habit
<i>Canavalia ensiformis</i> (L.) DC.	Adenguare	Adenguare	Fabaceae	Seed	Climber
<i>Carica papaya</i> L. Ca	Papaya	Papaya	Caricaceae	Fruit	Tree
<i>Catha edulis</i> (vahl.) Forssk.ex.Endl.	Caatii	Chat	Celastraceae	Leaf	Shrub
<i>Coffea arabica</i> L.	Buna	Bunnaa	Rubiaceae	Seed	Tree
<i>Mangifera indica</i> L.	Maangoo	Mango	Anacardiaceae	Fruit	Tree
<i>Medicago sativa</i> L.	Alfalfa	Alfelfa	Fabaceae	Leaf	Herbs
<i>Musa x paradisiaca</i> L.	Muuzii	Muz	Musaceae	Fruit	Herbs
<i>Persea americana</i> Mill.	Abukaatoo	Avokado	Lauraceae	Tree	Tree
<i>Phaseolus lunatus</i> L.	Boloqqee	Boloke	Fabaceae	Seed	Climber
<i>Ricinus communis</i> L.	Qobboo	Gulo	Euphorbiaceae	Leaf and Seed	Shrub
<i>Saccharum officinarum</i> L.	Shankoraa	Shenkora	Poaceae	Steam	Herbs
<i>Zea mays</i> L.*	Boqqolloo	Boqolo	Poaceae	Seed	Herbs
<i>Moringa stenopetala</i> L.	Moringa	Shiferaw	Moringaceae	Leaf and Fruit	Tree
<i>Annona senegalensis</i> Pers.	Giishxaa	Gishta	Annonaceae	Fruit	Tree

Source: Household Survey, 2022-2023

The Total number of plants species identified under home garden agro forestry practice at both agro ecologies was 23 (6 woody 17 Herbaceous). Most

plants managed in home gardens agro forestry practice at both agro ecologies were Herbs (13) followed by trees which is 6 and climber 2 as of shrubs.

Coffee Based Agro Forestry Practice

At both agro ecology of the study area, coffee based agro forestry practice was the second one at which farmers grow trees such as *Polysias ferruginea*(Tala), *Croton mychrostachya*(Bakkanisa), *Cordia africana* (Waddessa), *Persia americana*(abukato) and *Albizia gummifera*(Garbi) for coffee shade(Table 5).

Table 5: List of Trees Used by Farmers For Coffee Shade At Study Area

Scientific name	Vernacular Name(Afaan Oromo)	Family Name
<i>Cordia africana Lam</i>	Waddessa	Boraginaceae
<i>Croton macrosstachyus Del</i>	Bakkanisa	Euphorbiaceae
<i>Ficus sur Forssk</i>	Harbuu	Moraceae
<i>Syzygium guineense (Wild.) DC. subsp. Guineense</i>	Badessa	Myrtaceae
<i>Persea americana Mill.</i>	Abukato	Lauraceae
<i>Albizia gummifera (J.F.Gmel.)</i>	Garbii	Fabaceae
<i>Ricinus communis L.</i>	Qobboo	Euphorbiaceae
<i>Grevillea robusta var.A.Cunn. ex.R.Br</i>	Giravilia	Proteaceae
<i>Vernonia amygdalina Del.</i>	Ebicha	Asteraceae

Mostly at midland agro ecology of study area, sampled respondents described as they use *Cordia africana* firstly, followed by *Militia ferruginous* and *Albizia gummifera* as third priority for their coffee shade. The finding of these result also supported with Emire and Asfaw (2018) that *Cordia africana*, *Militia ferruginous* and *Albizia gummifera* are the most preferred trees used by farmers of study area as coffee shade.

Fruit Tree Based Agroforestry Practice

The third and the most important agroforestry practices at study area is fruit tree based agroforestry practice which farmers use it in their daily life. In the study area household used fruits for household consumption and for income generation. As of respondents, they have good farming practice to cultivate fruit trees. They also used it as live fence, for coffee shade especially avocado at midland agro ecology of the study area. Fruit tree based agroforestry practice

those farmers cultivate at study area are: *Percia Americana* (Avocado), *Mangifera indica* (Mango), *Musa paradisiaca* L. (Muuzii), mostly. They also cultivate *Anona Senegalese pers.* (Gishxa) and *Malus pumila* (Apple). In contrast to this finding, at Dale District, Sidama Zone, Southern Ethiopia, Avocado, Mango and Banana are the most fruit tree based agroforestry practices cultivated (Adane *et al.*, 2018).

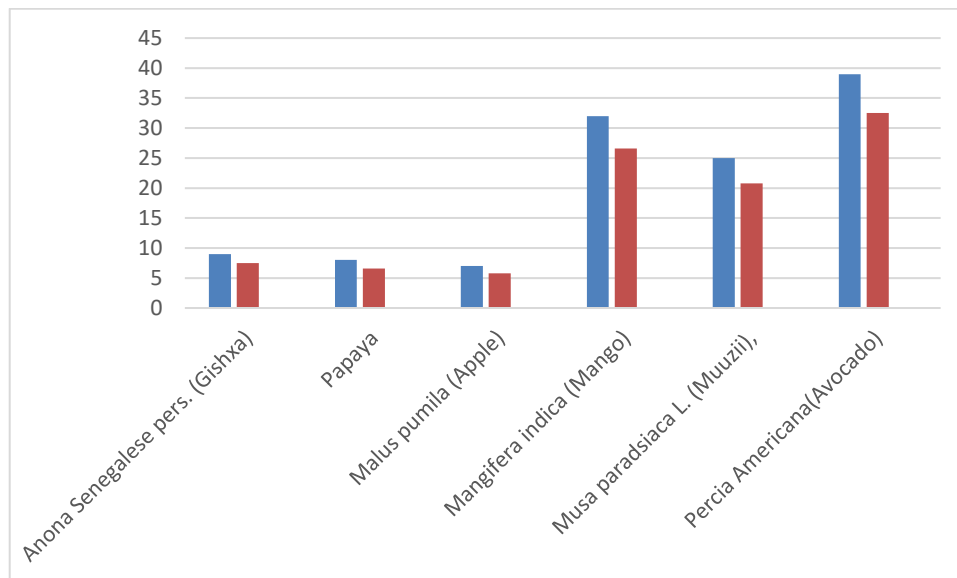


Figure: 2 Fruit tree based AFP of study area

Intercropping Agroforestry practices

Farmers of study area practice intercropping agroforestry to save space and resources, to get better yields and to reduce weeds from crops which can harm productivity of their farm. As respondents idea intercropping can provide nutrient for neighbor plants. At midland agro ecology of study area were: - Coffee with Ginger and Maize with Haricot bean; at highland agro ecology of study area, Inset with maize, Apple based agroforestry practice with Onion, Maize with lettuce, Fababean with Maize and Fababean with field pea are the common intercropping agroforestry practice those farmers cultivate on their farmland. Similar to this study finding result, Hailu *et al.*, 2018 reported the same finding of farming system at west Wollega zone Oromia regional state of Ethiopia.

Multipurpose Trees on Farmland

Farmers at study area uses multipurpose trees for the purpose of fuel wood, construction material, as wind break and for logging. At both agro ecology of the study area, multipurpose trees on farmland agroforestry practice were applied as exotic and indigenous multipurpose trees by farmers. *Grevillea robusta*, *Pinus patula*, *Acacia saligna*, *Cordia africana*, *Sesbania sesban*, *Lucenea leucocephala* and *Cupresses lustanica* were those plantation by private individuals and government on farmland and around home for their multiple benefits. Also there were indigenous multipurpose trees such as *Hagenia abysinica*, *polysias ferruginous* and *Crotonmycrostachya* used by farmers of study area.

Other Agroforestry Practices at Study Area

Parkland agroforestry practices, trees on rangeland woodlots and alley cropping agroforestry practices are another agroforestry practices assessed and recorded at study area for both of agro ecology. Parkland agroforestry trees identified were: podocarpus falcutus, Ficus sur, Cordia africana, Croton mycrostachya, Prunus africana, Hagenia abyssinica, Syzygium gunineese and Schefflera abyssinica were trees preferred and used by farmers of study area. In line with this finding result Demise and Emire (2024) reported related result at Anasora District of Guji zone Southern Ethiopia. Eucalyptus, Grevillea robusta and Pinus patula were trees used by farmers of study area as woodlots. As respondents they use these trees for high level of wood production such as timber, pole production, and fuelwood and construction purpose. Trees in range land agroforestry practice were also another agroforestry practice at study area.

Major Common Trees and Their Importance at Study Area

At study area, many of plants were indigenous and some of them are exotic trees. Farmers at study area plant trees naturally based on their experience. Hagenia abyssinica, Cordia africana, , Croton mycrostachya, Aningeria adolfereidrin, Strichynos spinosa, Polysias ferruginous, Albizia gummifera and Ekerbegia capensis are indigenous common trees those serve farmers with different benefits such as shade, for construction and for fuel wood. Also there are exotic common trees such as Eucalyptus species, Pinus patula, and Gravilia robusta were common trees exist at study area.

Table.6 Common Trees and Their Importance at Study Area

Tree spp.	Local Name	Its importance	Respondent s%
Hagenia abyssinica	Heexoo	Timber/soil fertility/medicine	33.8
Cordia africana	Waddessa	Soil fertility/shade/construction/timber	54.3
Crotonmycrostacha	Mokkonnisa	soil fertility/shade/construction/medicinal	12.1
Eucalyptus spp.	Baarzaafii	Timber/Construction	9.5
Gravilia robusta	Giraaviliyaa	Timber/Construction	22.6

Podocarpus falcutus	Birbirsaa	soil fertility/shade/construction/tim ber	8.1
Prunus africana	Sukkee	soil fertility/shade/medicinal/timber	7.4
Albizia gummifera	Garbii	soil fertility/shade/construction/med icinal	11.1
Pinus patula	Shuwashu we	Timber/Construction	37.7
Aningeria adolferidrin	Guduba	Soil fertility/timber	4.2
Strichynos spinosa	Baddeessaa	Soil fertility/timber	3.2
Polysias ferruginous	Tala	Shade/ Soil fertility	17.1
Ekerbegia capensis	Anoonuu	Timber	8.6
Juniperus procera	Gaattiraa	Timber	6.3

Source: Household survey 2022-23

Major Fruit Trees/Shrubs, Crops and Livestock at Study Area

Based on survey result, all component of agroforestry were recorded at study area. The desire of farmers regarding these component was different based on their experience of practicing agroforestry and the land they holded. Based on these, the most dominant fruit trees exist at study area were: - Apple, Mango, Banana and Avocado whereas wheat, Barley, potato, Onion, Faba bean, Maize and Enset are the most dominant crops farmers cultivate at study area. Also Oxen, Calve, chicken, Sheep, Goat, Donkey and Horse are the most dominant livestock component practiced by farmers. This indicates agroforestry can be practiced for economic, social and environmental benefit. In line with this result, FAO (2013) described as the collective term for land-use systems and technologies in which woody perennials (e.g. trees, shrubs, palms or bamboos) and agricultural crops or animals are used deliberately on the same parcel of land in some form of spatial and temporal arrangement.

Farmers Perception Towards Agroforestry Practices

Survey result shows that there was high participation of farmers in agroforestry practices around farmland and home. They described as agroforestry was important economically and environmentally. Farmer’s negative perception about agroforestry was they think as this practice take long time to generate income, competition of resources, shading effect, attract pest and disease and attract birds (Figure.3).

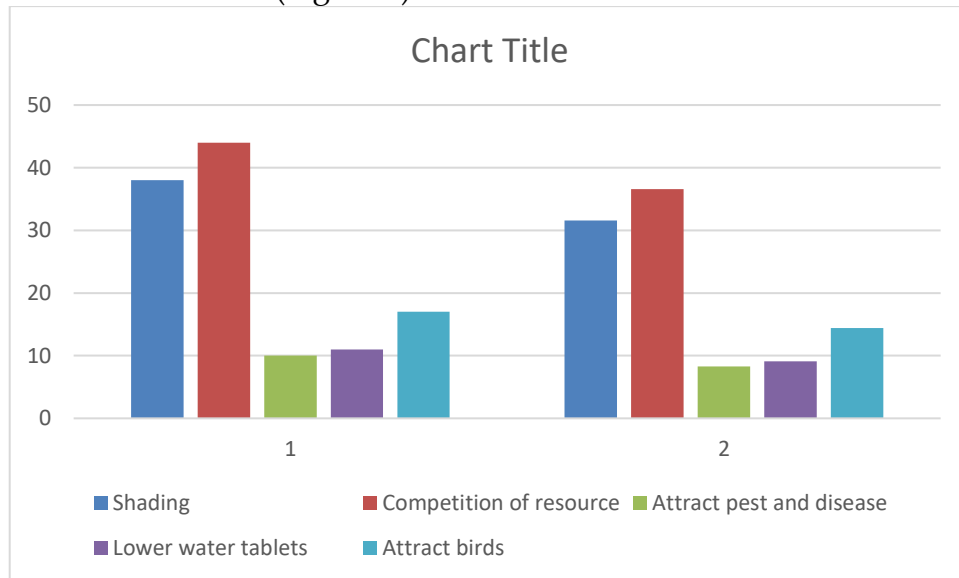


Figure: 3 Negative perception of farmers about agroforestry

Positively farmers aware that agroforestry has benefit such as increased farm income, soil fertility, decreased complete crop failure and a potential of solving their fuel wood needs. The results of this study similar with the finding of Alemayehu et al., 2021, the farmers had positive perception on agroforestry practices and they know very well on its utilities for income diversification, improvement of soil quality, fuel, construction materials, food, and feed, provision of shade, accessibility and ecological value could be understood from the given inquiry parameters

Major Constraints and Opportunity of Agroforestry at Study Area

As of respondents study area has potential of agroforestry. But there was constraints and opportunity regarding agroforestry practice at study area. Major opportunities of agroforestry practice at study area are: Improve soil fertility, source of income for household, regulate climate, use for food and fodder, for proper use of land, for construction and for fuel wood and timber production. As of respondents; there were also constraints such as: - competition for resources, shortage of land for tree planting, lack of knowledge, Insect pest and Disease. The trend of agroforestry practice at study area for the last ten year was increasing. Especially fruit tree based agro forestry, home garden agroforestry, plantation trees and animal rearing was at stage of increment for the last ten years. Also crop production status at study area shows as there is increment for last ten years as of cultivation of coffee shows increment.

CONCLUSIONS AND RECOMMENDATIONS

The study area has covered with different types of agroforestry practices. Home garden, coffee based agroforestry practices, fruit tree based agroforestry practices, intercropping, multipurpose tree on farm land, parkland agroforestry, Woodlots, wind break, live fence and Alley cropping agroforestry practices are those recorded at study area. These agroforestry practices distribution varies across agro ecology. Mainly home garden agroforestry practices, coffee based agroforestry practice and fruit tree based agroforestry practice was dominated the study area. This implies as the area was rich of agroforestry practices. As home garden agroforestry, farmers of study area cultivates vegetables, fruits, spices, herbs and medicinal plants for daily activities.

Farmers of study area used *Polyscias ferruginea*, *Croton mycrostachya*, *Cordia africana* and *Albizia gummifera* as coffee shade trees. Especially at midland agroecology of study area farmers used *Cordia africana*, *Millettia ferruginea* and *Albizia gummifera* for coffee shade. *Percia Americana*, *Mangifera indica* and *Musa paradisiaca* are fruit tree based agroforestry at study area. At midland agroecology of study area, maize with haricot bean and coffee with Ginger, at highland agroecology of study area; Inset with Maize, Maize with Lettuce and Apple based agroforestry with Onion are the main intercropping agroforestry practice farmers cultivate. Home garden agroforestry practice dominate the study area and alley cropping shows the list domination. Generally at study area farmers practices different types of agroforestry activities for their livelihood. But there were positive and negative constraints regarding agroforestry practice from farmers of study area. As recommendations, the following ideas have been forwarded.

1. At midland agroecology of the study area, there was low distribution of intercropping, wind break, trees on range land, woodlots and alley cropping agroforestry practices. So it should be diversified through providing necessary inputs and materials for adoption of more agroforestry practice for farmers. so more research and extension service should be applied to maximize farmers benefit from agroforestry by minimizing constraints exist at study area.
2. Even if farmer's perceptions towards agroforestry practice are positive most of the farmers still not adopted agroforestry practice in the study area. So adoption of agroforestry practice should be improved in the different at both agro ecology. Especially for shifting cultivation and alley cropping.

FURTHER STUDY

Future studies should examine how less adopted agroforestry practices – such as alley cropping, woodlots, windbreaks, and trees on rangeland – can be improved and promoted among farmers in different agroecological zones. Further research is also needed to evaluate the long-term ecological and economic impacts of dominant systems like home gardens, coffee-based agroforestry, and fruit tree-based practices, particularly in relation to soil fertility, biodiversity, and household income. In addition, future investigations could

explore the socioeconomic factors that influence farmers' adoption levels, including labor availability, land size, access to inputs, and perceptions toward competition and pests. Studies that integrate indigenous knowledge with modern agroforestry techniques would also be valuable for enhancing productivity and resilience. Finally, research that assesses effective intervention strategies to overcome major constraints—such as resource competition, pests and diseases, and limited seed or capital access—would support wider and more sustainable adoption of agroforestry practices in the region.

REFERENCES

- Adane, F., Legesse, A., Weldeamanuel, T., & Belay, T. (2019). The contribution of a fruit tree-based agroforestry system for household income to smallholder farmers in Dale District, Sidama Zone, Southern Ethiopia. *Adv Plants Agric Res*, 9(1), 78-84.
- Alemayehu. D., Shimalis. D, and wasihun, G., (2021). Assessment of Existing Agroforestry Practices in West Hararghe Zone of Oromia Region, Ethiopia. *International Journal of Research GRANTHAALAYAH*, 9(12), 286-302. doi:10.29121/granthaalayah.v9.i12.2021.4436
- Alemu, M. (2016) Indigenous Agroforestry Practices in Southern Ethiopia: The Case of Lante, Arba Minch. *Open Access Library Journal*, 3, 1-12. doi: 10.4236/oalib.1103278
- Aschalew Emire, A. E., & Zebene Asfaw, Z. A. (2018). Coffee growers' local knowledge on shade tree species in Adola Rede District, Guji Zone, Southern Ethiopia.
- Bekele-Tesemma, A. 2007. Useful trees of Ethiopia: identification, propagation and management in 17 agro ecological zones. Nairobi: RELMA in ICRAF Project, 552p.
- Demise, S., & Emire, A. (2024). Assessment of Parkland Tree Species and Their Management Practice in Ana Sora District of Guji Zone, Southern Ethiopia. *International Journal of Plant & Soil Science*, 36(5), 1033-1045.
- Diriba, A., Dekeba, S., & Gizaw, W. (2021). Assessment of Existing Agroforestry Practices in West Hararghe Zone of Oromia Region, Ethiopia. *International Journal of Research-GRANTHAALAYAH*, 9(12), 286-302.
- Endale B (2017). Environmental Contribution of Agroforestry Systems to Smallholder Farmers around Jimma town, southwestern Ethiopia, unpublished MSc. Thesis

- FAO, 2013. Advancing agroforestry on the policy agenda: a guide for decision-makers. FAO, Rome. Agroforestry Working Paper No. 1. <http://www.fao.org/docrep/017/i3182e/i3182e00.pdf>. (Accessed 25 March 2021).
- Hailu, A., Kisi, K., & Sida, A. (2018). Characterization and Analyses of Farming System in the Major Agro-Ecology of West Wollega Zone, Oromia National Regional State of Ethiopia. In *Regional Review Workshop on Completed Research Activities* (p. 206).
- Mezgebu, M. (2023). Assessment of agroforestry practices in Buno Bedele and Ilu Abba Bora zone of Oromia region, Ethiopia.
- Musa .A, ,Bira . Ch, . Robe. E. Assessment of Existing Agroforestry Practices in East Hararghe Zone Oromia, Ethiopia. *International Journal of Natural Resource Ecology and Management*. Vol. 7, No. 1, 2022, pp. 29-41. doi: 10.11648/j.ijnrem.20220701.15
- Nair, P.K.R. and Dagar, J.C., 1991. An approach to developing methodologies for evaluating agroforestry systems in India. *Agroforestry Systems*, 16, pp.55-81.
- Tefera, Y., Babu, A., & Bizuayehu, B. (2019). Homegarden plant use and their traditional management practice in Bule Hora district, West Guji Zone, Southern Ethiopia. *Agric Res Technol*, 21, 556168.
- Yadessa, A., Itanna, F., & Olsson, M. (2001). Contribution of indigenous trees to soil properties: The case of scattered *Cordia africana* lam. Trees in croplands of western Oromia. *Ethiopian Journal of Natural Resources*, 3(2), 245-270.