Agricultural Research & Technology
Open Access Journal
ISSN: 2471-6774

Juniper Publishers
key to the Researchers

Review Article
Volume 20 Issue 3 - March 2019
DOI: 10.19080/ARTOAJ.2019.20.556128

Agri Res & Tech: Open Access J

Opportunities and Challenges of adopting Home garden Agroforestry Practices in Ethiopia: A Review

Abay Bantihun*

Debre Markos University, Ethiopia

Submission: February 11, 2019, **Published:** March 13, 2019

***Corresponding author:** Abay Bantihun, Debre Markos University, Burie, Amhara, Ethiopia

Abstract

Home garden enables farmers to secure their food availability, mitigate environmental change, increase consistency of social-cultural value and protect species provenance. In other hands, it conserves biodiversity and sequesters carbon and improves a biogeochemical process even if the home garden has multifunctional value for the country, it has yet given special consideration from neither decision makers nor scientific front. The objective of the review is to identify the factors hindering the adoption of home garden agroforestry practice in non-adopted part of Ethiopia the second is to show existing opportunities to scale-up the practice with advocating the dual purpose that is socioeconomic and climate change mitigation system. Although biodiversity has been reduced in Ethiopia, there are potential suitable agro-ecological zones that can minimize the frequency of degradation to deal with the influence of climate change due to EI Niño and its effect on food crises.

The dominant species in various home gardens are economically appreciated as they have prevailed up to fulfill their demand. Women are more engaged than men for home garden activity which creates job opportunities and other social acceptance. There is also available indigenous and scientific knowledge that has to managed and administered by concerned stakeholders. Many researchers found that there were high species diversity, suitable environment, good experience, available products, willingness of women participation, and important component interdependence with flexible arrangement but, narrow farm size and discouraged land and tree tenure. The government and responsible body should do is that promoting community service and researches conducted on home garden agroforestry. To improve sustainable home garden production system in the country, government should have to undertake positive actions like agroforestry awareness creation, scale up appropriate home garden components combination based on agro-ecological zone elsewhere in the country or outside, provide support with good and multipurpose hybrid varieties, and formulate policy and strategy that encourage farmers to take home garden as an alternative to secure food stability.

Keywords: Home garden; Carbon sequestration; Socio economic; Gender; Species diversity; Policy and strategy

Introduction

The definition, structural and functional of home garden varies from place to place according to the local physical environment, ecological characteristics, socioeconomic and cultural factors [1]. Home garden agroforestry is a special category of agroforestry that deals with the cultivation of multipurpose and multi-storied trees, crops and animal husbandry around homestead [2,3]. The home garden helps to connect the livelihood income and conserved natural ecosystems by linking marketable cultivated species with conserving species diversity and genetic diversity [4]. Species found in home gardens do not show a pre-determined spatial arrangement and the location of plants species are random and conveniently determined by the farmer's needs. Species density is variable depending on the household and market demand [5].

Traditional knowledge is mainly activated in the rural area of Ethiopia, especially where agroforestry practices are performed conveniently [6-8]. From those practices, home garden agroforestry practice is the one that farmers are using to sustain their livelihood [9-11].

When we show the adaptation level of the home garden in the country, almost all works of literature are reviews about the southern part of the country. The home garden is prominently well known in Ethiopia, in general, and in southern and southwestern part of the country in particular Since Catha edulles, coffee and inset are dominantly cultivated for economic value [12] most researches deep looking on such species. Despite the fact that the practice has attracted researchers to study home garden well ad-

opted area of Oromo and SNNP regions, it has also been adopted by the rest or Amhara, Benishangul gumuz and Tigray regions of the country. Around the Amhara region only one research has conducted that found appreciable value of species evenness, that is one [13], which indicates that the type of species is occurred equally in number. The next two regions have potential resource to adopt it. However, yet no provision of consideration for them as far as the prepared document impacts the scientific community.

Generally, the main objective of this review is to show the contribution of home garden regarding socioeconomic importance especially gender mainstreaming perspective particularly climate mitigation strategy and its hindrance factor to adopt in a different part of Ethiopia. This review may help the government body, scientific researchers, and students who have a big interest in this very important land use system. The review could answers which scientific breakthroughs/milestones led to substantial/critical changes in home garden agroforestry practices in Ethiopia?

Methods to Review

The review is trying to focus on the benefit of home garden agroforestry on the socioeconomic, gender and environmental resilience and its challenges to adopt in Ethiopia. Existing extensive kinds of literature which are concentrating on Agroforestry home garden and related documents were reviewed. Other main sources were books, journals, online materials, reports and other relevant published documents. Google was also the keyway of carried out to access other relevant publications. In addition, materials from the libraries of Debre Markos University were reviewed. Several authorities were consulted through personal Communication

Historical Background of the Home Garden in Ethiopia

Agriculture was developed step by step along with agroforestry. The so-called agroforestry was not named scientifically. After it is named as agroforestry the prominent explanatory practice was home garden agroforestry since it combines all components of agroforestry and it was well adapted by the cultivars. In Ethiopia, conserving medicinal plant in the home garden was started for a long period even though the effort is minimal. Accordingly, it can occur in all strata of the garden [6,14-17]. Monasteries and other Traditional spiritual healers grow or gather these plants in their home garden [18].

All types of layer and family in the home garden comprises different species which can become the most important sites for in-situ conservation [3]. It is also a means of motivation to participate farmers to plant trees in a social forestry. The home garden has taken as a strategy for food security [3,19,20] plus it is used for environmental protection purpose [3,20-22] including promoting the resilience or adaptation to climate change [11,23,24].

Agro Climactic Zone of Home Garden in Ethiopia

As a result of different researchers prefer to carry out their study regarding the study area where it is suitable and potential of agroforestry home garden these are located SNNP and Oromo regions and some are in Amhara which indicates that the suitable agro ecological zone is in the Southern part of Ethiopia. As Kumar BM & Nair [25] shows from their figure of global distribution of home garden-like structures, the moderate shade of the extent covers all most all part of Ethiopia. Thus, Ethiopia is the country that home garden agroforestry practice is dominantly or moderately practiced relative to world's countries. Home gardens in central, eastern, western and southern Ethiopia are characterized as backyards, front-yards, side-yards and enclosing yards [26].

Species Diversity

Almost all research findings in Ethiopia related to home garden agroforestry practice are more concentrate on species diversity with their role that resulting for development of the practice. Tropical home gardens contain high diversity of trees, shrubs, vegetables and crop species, animals, including in the spatial arrangement of these components [26].

Even though the study area of [22], in Wolayta Zone, has a rich source of useful plant species agro-ecosystem, it is affected by various factors. Such as, socio-economic status, soil fertility, garden size, rainfall pattern, distance from home, management system, proximity to market and roads, cultural preferences and personal preferences/perception have their own influence.

In Ethiopian high land, many literatures stated that there is high species diversity [13,15,17,22,27-29] as compare with other practices, as if there is adoption of home garden agroforestry practice in their study area. Since the home garden land size shortage per farmer and available of irrigation water, farmers more preferred a tree which have extended root type species and high market value species than indigenous species [5,30].

Table 1: Summarized studies on the feature of home garden agroforestry practice in Ethiopia.

Spp. No.	Size (ha)	Dominant Species Sequentially	Diversity			Uses	Altitude (m.a.s.l)	Area of Agroforestry Home Garden	References
			H'	E	richness				
33		Ev, *Rosa hybrida*, *Vernonia amygdalina*, Cl, *Cyperus alternifolius*, *Nephrolepis undulata* and *Ruta chalepensis*	4.3		74	Food, Fiber, Fodder, Medicinal	2195-2300	Sabata Awas (Alamganaa District)	[22]
159	0.36	(Ev, Ca, sweet potato (*I. batatas*), *Z. mays*, *Phaseolus vulgaris* and *Brassica sp.* pl., Pa, *Musa paradisiaca*, Mi, *Zingiber officinale*	1.54	0.63	49	Food and medicines	1410-2300	Damot Woyde, Damot Gale, Boloso Sore and Humbo	[17]

How to cite this article: Abay Bantihun.Opportunities and Challenges of adopting Home garden Agroforestry Practices in Ethiopia: A Review. Agri Res& Tech: Open Access J. 2019; 20(3): 556128. DOI: 10.19080/ARTOAJ.2019.20.556128

11		Ev, Cfa, pineapple (*Ananas comosus*), Ce	1.45	0.53		*Manure fertilize the farms		Aleta Wondo, Dale, Dara and Hawassa zuriya	[28]
76		*Acacia tortilis*, *Jatropha curcas*, Cm, *Azadirachta indica* and *Acacia Senegal*	3.05	0.34	62	Fruit, Timber, * and Medicine	1600-2300	Adamitulu Jido Kombolcha, Dugda, Boset, Bora and Lume	[29]
69		Ce, Cfa, *Sesepania sespaine*, Rp, Pa, *Brasica intrgri folia*, *Capsicum fruticinus*, *Musa paradisicale*	2.34	0.68	93	*	1500-2300	Jabithenen district	[13]
27		Ev, Cfa, Mi, *eucalyptus species*, Ca, and Cm.	3.42	0.41		*Medicine, live fence, construction, shade and ornamental	1350-2600	Chichu, Golla, Bulla, Shigedo	[15]
55		Mi, Cm, and Pa	2.64	1	33		1000–2500	Burkitu, Chire and Erba; (Bale Zone,)	[30]
15	0.31	Mi, Ca, *Carica papaya*, Pa and *Saxifraga hederifolia*	0.447	0.537		Food and generating income	1314-1508	Dallo Mena district	[15]

Common species abbreviations: Ev= *Ensete ventricosum*, Cfa= *Coffe arebica*, Ce= *Catha edulis*, *Milletia ferruginea*, Caf= *Cordia africana*, Cm= *Croton macrostachy*, Rp= *Rhamnus prinoides*, Pa= *Persea americana*, Cl= *Cupressus lusitanica*, Mi= *Mangifera indica*
Agroforestry practices as an artificial ecosystem it can provide
*provision of services such as food, source of energy, fodder and generating income,
**Environment regulatory the services like conditioning microclimate, controlling erosion, mitigating desertification and carbon sequestration and so on.

**Supporting services including, soil fertility and productivity improvement, conservation of biodiversity and pollination.

According to result; it reveals that the number of native species that are grown in home garden agroforestry is more than the exotic species (i.e. 53.3% and 46.7%, respectively). As listed in table 1, the use of a home garden has many roles. However, this practice in different studies has not been considered as a means of diversifying of tree species and climate change mitigation by farmers since they do not take it in to account this view as if it could not generate income and produce food. So that, they prefer the exotic species which have high fruit production efficiency species that lead to a reduction of indigenous tree species diversity. The attitude of farmers on climate mitigation by tree requires change.

In this table also Shannon index evenness and richness show the level of species diversity Shannon index is more explanatory than Simpson index and richness so the value of Shannon index can express highly and low diversity respectively when the value between 4.5 and 1.4. So that, the lower Shannon index value of 0.44 and the higher value of 4.3 which indicates lower and higher species diversity in the area respectively. The evenness indicates how much tree species are distributed equally through the surveyed area. The mean evenness value of one [15] indicated that each species is equally distributed throughout the study area. In other words, there is no dominant species in the area. However, the evenness value between 0.34- 0.68, in the table, indicates their corresponding dominant species has covered the studied garden. Plant species with the mean evenness value of 0.4 corresponds to the home gardens in EloErasho where *E. ventricosum* and *I. batatas* mainly cover the garden. In general, the relative evenness value of the whole population of the most useful plant species in the study sites was 63%. In another study Maize, chat and pineapple are sequentially a predominant species in Southern home gardens [13,15,17,22,27-29,31] (Table 1).

Indigenous Knowledge

In the tropical and sub-tropical countries many farmers have several traditional knowledge and practices conserving agricultural ecosystem and a means of integrated land use system [27,32]. Traditional socio-cultural and ecological knowledge often permits the farmer to decide the species choice and the spatial and time sequence of its growing [33]. Farmers manage the tree inside the home garden to reduce light computation by means of pruning. Farmers use the excretion of cattle and human to the garden to fertile and productive while they want to keep their sanitation [16,22,26].

C. africana, *Erythrina brucei*, and *Millettia ferruginea* are the species that the farmer preferred to the garden to have fertile soil. Ninety-eight percent of respondents produce plants of different use values mainly for home consumption and they harvest whenever they need it throughout the year. The prominent species that occur in SNNP region home gardens is *Ensete ventricosum* which provide food with steady state as an appropriate management system [34].

In Southern Ethiopia, women are the only labor to do the processing and preparing food from the plant which is dominant in

How to cite this article: Abay Bantihun.Opportunities and Challenges of adopting Home garden Agroforestry Practices in Ethiopia: A Review. Agri Res& Tech: Open Access J. 2019; 20(3): 556128. DOI: 10.19080/ARTOAJ.2019.20.556128

the home garden that is inset even though men have other harder works [35,36]. This indicates that women are the only person who has been processing the food which could eat when food shortage has occurred. The food has taken long-term to prepare and requires care and experience or indigenous knowledge. Yet there is no research had been undertaken over how to prepare and interact with scientific knowledge, particularly with human nutrition.

In different research findings farmers are identifying and familiarized with their preferred species which is used for food and other purposes like [5,28,31,37] finding showed that in average 59 species are familiarized by farmers, also 25 number of species preferred for the purpose of food, 21 species for medicine, sell, live fence, building or home materials,, shade and ornamental and 38 species for fuel purpose. Home gardens in the area produce a significant amount of the food needed by the family in addition to minor and supplementary products. Of the 60 households interviewed, 59 Plant species which were listed as most important food crops by the local people are listed in Table 3 in their order of preferences. However, there is loss of traditional knowledge of different management practices [38].

Marketed and Marketable Home Garden Products

Its surplus product can sold to the market when the market distance seems to closer to farmer's garden which helps them to get money from marketed products. The income which is obtained from the marketed product will help them to purchase another food type to satisfy their food utilization. Some researchers found that the major cash crops which grow in the country's home garden are cabbage, enset, lumen, orange, papaya, mango, and avocado etc. some other also found like *Coffe arebica*, *Catha edulis*, *Milletia ferruginea*, *Cordia africana*, *Croton macrostachy*, etc. are trees those are more useful for improving soil fertility and capability to conserve soil moisture [19,38,39]. In Mekonen et al. [38] study Catha edulis, Rosmarinus officinalis and Rhamnus prinoides were the most preferred marketable plant in Sebeta-Awas area. They use powders which obtained from *C. macrostachyus* that serve as a preservation method to store crop seeds and tubers are buried under the soil for short period for future use in its shortage. Local markets (qoccaa) and markets are closer to towns have a great contribution to selling their product. Contrary, species richness is negatively affected by proximity to markets and access of road [27].

Gender

The country Ethiopia has different nation and nationalities which have varied in their custom and culture which resulting mainly from religion. Hence, usually, the women inferiority and men superiority has been shown [9,40]. In the home garden, women are frequently engaged to cultivate it while men need to change the land used to cash crop production.

Agriculture is the main activity of men in the country. However, women play their own role towards the management of home gardens and also of the farm fields. For instance, carrying animal manure to the farm land, soil preparation, weeding, and harvesting are some of the activities of which women had direct involvement. Work division for male and female is the way that farmers manage their human resources like crop selection the majority agricultural activities are given for male, transporting animal manure, site preparation, weeding and harvesting are responsible for female [3,9,40]. Despite the fact that women are aware of the use of plants and the means of maintaining them, they can manage together with identifying local varieties and managing mainly minor plants like vegetables, spices, tasty varieties and plants of medicinal value.

Home gardens are prevalent in the highlands of Ethiopia and accommodate supplementary fruits and vegetables as a principal means of livelihood for households and sites that have been considered as a sign of prestige and pride [22]. Women play great role towards the management of home gardens and also of the farm fields. Aggregate data show that women contain about 43 percent of the agricultural labour force globally and in developing countries [41]. In all aspect of women participation is important for the development of the community particularly involvement in a broad range of home gardens management activities is leading to beneficial for their own socio-economic well-being, but also imperative for sustaining the livelihoods of their communities and for preserving the agro-biodiversity [21]. [42] recorded that in about 60% of total number of small home gardens (<0.4ha) women contribute significantly for the management. They also reported that only in 22% and 12% respectively of total number of medium sized home gardens (0.41- 0.12ha) and large home gardens (>1.2ha) the role of women in garden management is significant [33,42,43]. The marginalization process would facilitate by which the community has lost a profit and desired need for cash to meet family needs. Women contribution for cultural and traditional practices would no longer evoke respect when the need is supplied by the market and the authority of women undercut [44].

A research conducted in Sidama zone reveal that [40] women's access to land, market, and trading, the decision-making process has been restricted Institutionally at the household and community levels. The reason is the majority of farm women are illiterate, little knowhow about the techniques of farming, face dominance by males and restricted mobility due to several cultural taboos [41]. But the proclamation Ethiopian Rural Development Policy and Strategies says that "Women, who want to engage in agriculture, shall have the right to get and use rural land" (Proclamation, No. 456/2005).

Component Interaction

In home garden animal, tree and crop have symbiotic relationship between them.

Tree vs. crops

Trees are the dominant component of home garden which holds and ties different ecosystem components like soil, insects,

How to cite this article: Abay Bantihun.Opportunities and Challenges of adopting Home garden Agroforestry Practices in Ethiopia: A Review. Agri Res& Tech: Open Access J. 2019; 20(3): 556128. DOI: 10.19080/ARTOAJ.2019.20.556128

microorganisms and dead parts. So that trees used as an input to have high production capacity for the soil by providing decomposition materials, its decomposer or soil fauna and being as a host. Trees help to regulate microclimate to wet that is suitable for crops to use water efficiently as it reduces evaporation. The more diversity of trees in home garden provides fertile soil in it through fixation of nitrogen [3,19,28]. On the other hand, crop residue also the one which is used as a material input for decomposition.

Animal vs. crop/tree

Fodder for livestock can bring from remnant trees and farmers use trees for construction materials that help to make animal shade. In other hands, livestock manure provides compost for crops and trees get essential elements [3].

Farm size

As the area of the garden is narrower the activities under taken inside the garden could minimal. Because, number of species is lower in number to manage. So that it is recommended to have large area in order to engage high number of laborers, diversify tree and crop species and increase number of products as per the income. The proportionality of home garden size accessed with those family members has been wider. However, different parts of the region have various agricultural systems. The average size of a home garden, in several tropical and sub-tropical regions, is much less than a hectare [31,39,42,45].

Mesfin et al. [16] stated that the maximum and minimum size of home gardens encountered is between 0.05ha and 0.25ha and the average size is 0.06 and /or [32] 0.7ha. [46] also classify south-central highlands of Ethiopia its size is 0.35, 0.27 and 0.12 hectare for rich, medium and poor households, respectively. A study for the Food and Agriculture Organization of the United Nations (FAO) estimated that to grow three to five trees, a household would need at least 167m^2 of land. It may mentioned here is that very often such small sized land use system with subsistence level of mono-cropping is not viable, particularly in the rural ecosystems [47]. The author's [17] study in Wolyta home garden. The garden provide different practice is declining like shade as well as suitable places for conducting ceremonies and get-togethers for the villagers during social gatherings and religious holidays where coffee and snacks (of roasted grains) and bread may serve due to the consequent decrease in land holdings.

Gebrehiwot [9] study in Sedama zone reveals that the income that generated from the home garden as the laborers are females and the earned many has been governed by themselves. However, while the land use change from home garden to crop production the generated income will used by males since the labor force to produce crop typically by the male. To get a marriage female should show their ability to manage the home garden in their home. so that, if they have not home garden, they will not get the opportunity to get marriage [9,36,40]. Simultaneously the species diversity will go to reduce by its rate of change of home garden to monoculture crop production land use system. Decision makers and other related stakeholders have to take the issue in to account to state the policies and strategies.

Even though the income that getting from sold cash crop product is contributing to spending for goods besides food, the household members could not get sufficient access to food. On the other hand, the Plants [17] study describes the surplus product that as got from the garden will sell to the market to satisfy a balanced diet for household members.

People's intention to have a wider farm size garden has not been yet studied. Even though in some part of the country this agroforestry practice is adopted well, dispersing it to other parts those has potential on adopting experience and suitable environment. The way to adopt or scale up as a new technology for others can introduced by means of integrating it with other concerning stakeholder's programs to deal with poor living status of farmer in Ethiopia [48].

Function and Arrangement of Home Garden

Function of home garden

The function of home garden like other agricultural activities has to taking into account the sustainable utilization of its products as if the next generation needs suitable environment to have the soil potential to produce quality food for access. According to [49], the term sustainability is often used only referring to present and stable conditions, but the changing needs of future generations and social dynamics should considered. Consequently, a sustainable agro-ecosystem should, in addition, able to respond/adjust to changes in environmental and socio-economic conditions [50].

Fertility of home garden can improved by application of animals, one of the components of home garden, manure, wastes of humans who live in the house managing the home garden and the tree/crop itself which fixes nutrients like carbon and nitrogen, meanwhile, all components provides ecosystem service through carbon sequestration by which farmers are not get income and the government is not considering it and gives incentives. To advocate this thought research should conducted which shows the amount of carbon stoked in the garden or by the garden and increase farmers' attitude towards how the practice stores a carbon in it.

Socioeconomic function

From the above table 'Table 1' the function of trees in the home garden is typically used for Food security, Fuel wood, Agricultural improvement, Constriction, Fodder medicine and income generation. Most of the time the rural part of Ethiopia residents are farmers no study is concerned about the relationship between rural people and urban people based on their cultural, costume exchange which leads the economic development of both areas.

Contribution for food security: Home gardens play significant role as a source of minerals and nutrients [51]. In addition, the diverse products available year-round contribute to food se-

How to cite this article: Abay Bantihun.Opportunities and Challenges of adopting Home garden Agroforestry Practices in Ethiopia: A Review. Agri Res& Tech: Open Access J. 2019; 20(3): 556128. DOI: 10.19080/ARTOAJ.2019.20.556128

curity especially during dry seasons [3]. When there is reduction of production of crop field, home garden uses as a supplementary food supply for household members; prominent experience that uses of inset food for starvation period in SNNP region Ethiopia.

A large number of fruits producing trees are integral parts of traditional home gardens and no chemical inputs are used, the products from such home gardens can expected to of superior quality. Although several of these fruit trees have not been studied scientifically and are thus under-exploited and little known outside their habitat, they make significant contributions to food and nutritional security [3].

Enhance livelihood income: Product diversification from the home gardens through value addition is an area of utmost priority in meeting the market challenges. For instance, the diverse bamboo species in Awi zone with nursery or seedling production plus animals specially Horse (used for plowing) and caw which is not studied yet. Home gardens in the highlands of Ethiopia collectively house a large diversity of plant types that range from staple food crops to ornamental plants [32]. Home gardens also offer economic stability to farmers and provide a significant amount (30-50%) of household income [11,52].

Increase spices and medicinal plant product: Most spice plants are used as a medicinal plant in the home garden [14] this help farmers to grow this plant as a multipurpose tree, used as a source of income as well.

Creating a job opportunity: Specially, women are highly engaged with the activity, since they are the prominent participant in the home and home related works like home garden. Household members will get more benefit as they have more resource in the garden to manage, however, the less active participation of female in the garden [21] during the narrow size of garden, the water availability of the area, introduction of environmentally sound and productive variety of tree, crop and livestock and awareness on the capability of the garden to avail the food for all members of the household.

Agro-ecosystem function

As a climate change mitigation and adaptation measure: Agroforestry attracted special attention as a C sequestration strategy following its recognition under the afforestation and reforestation activities of the Kyoto Protocol mechanisms of Joint Implementation (JI), Clean Development Mechanism (CDM) and Emissions Trading (ET), only CDM is relevant to developing countries. This was in recognition of the perceived advantages of the large volume of aboveground biomass and deep root systems of trees in accomplishing that task [53]. The amount of carbon in the above ground and below ground biomass of an agroforestry system is generally much higher than in an equivalent land use system without trees [54]. The estimates range from 0.29 to 15.21Mg ha^{-1} yr^{-1} above ground, and 30-300Mg C ha^{-1} up to 1meter depth in the soil [55]. Average aboveground standing stocks of C ranged from 16 to 36Mg ha^{-1}, with small home gardens having higher C stocks on unit area basis than large and medium sized ones [1]. There is projected 630 million hectares potential area for agroforestry system, which could sequester 0.586 million tons C per year by 2040 [55].

The above-ground biomass stock of the gardens ranged from 1 to 56Mg C ha^{-1}. The smallest gardens, which were the most densely planted and most biodiversity, had the highest carbon stocks, averaging 26Mg C ha^{-1}, while the gardens over 1ha that were sampled averaged only 8Mg C ha^{-1}.

To some extent, C substitution by reducing fossil-fuel burning through promotion of wood fuel production is advisable. Most reports indicated that addition of a large proportion of the relatively high quantity of plant materials produced in a system will increase C stock in soils [24]. Therefore, it is reasonable to surmise that home gardens will help substantially in C sequestration [11,25]. Hence, scopes are high, opportunities are exciting, however, international level interventions are necessary to simplify the methodological complexities in smallholder CDM till then the rural poor will beyond the reach of the benefits of CDM. The Indian's experience should intensify here to undertake in Ethiopia. Most C sequestration reports also have disclaimers and caveats that lack of reliable inventories/estimates and uncertainties in the methods of estimation presents serious difficulties [25]. Thus, as in the case of intangible and difficult to measure benefits and services, C sequestration of home gardens, remains one of the potential sources of income that have not been even quantified or the owners. In other words, paying for the amount of carbon stored in agroforestry home garden has been in question.

As an environmental conservation measure: One of the determinant factors for stainable agricultural productivity is reducing soil quality due to contamination with toxic metal, nom-metal, salts and organic pollutant which is mainly urban and industrial outlets [33]. The ecological benefits rendered by the perennial trees in the home gardens such as nutrient cycling, litter dynamics like inset [31], safety net role, nutrient pumping by deep roots are prominent among the drivers of biophysical sustainability [57,58]. The central factors that help maintain home gardens as low input systems is the availability of cost-effective nutrient sources such as turnover through litter route [3]. Evidences of productivity enhancement in home gardens with inherent nutrient turnover pathways and also using such technologies as mulching for residue management are also reported [59]. Again, nutrient turnover is strongly influenced by the species composition and biomass of the tree components [1,58].

Unlike monoculture or dual component systems, the multi-species, multi-strata composition of home gardens permits the enhancement in resource acquisition efficiency. Manna, Jha, Ghosh, & Acharya [57] revealed that multispecies land use systems such as agro-horticultural, agro-pastoral and agro-silvipasture are more effective for soil organic matter restoration than non-agro-

How to cite this article: Abay Bantihun.Opportunities and Challenges of adopting Home garden Agroforestry Practices in Ethiopia: A Review. Agri Res& Tech: Open Access J. 2019; 20(3): 556128. DOI: 10.19080/ARTOAJ.2019.20.556128

forestry system. Yet another advantage is the potential to contain nutrient loss from the system through role of root system. This is particularly true in high rainfall upland regions [1,42]. The high tree density and variable belowground stratification allows deeper displacement of tree functional roots and efficient capturing of leached nutrients and/or horizontal transfer of nutrients to rhizosphere of other trees [42]. Such density induced plasticity in root spread has been reported for Acacia mangium, a prominent tree component of home gardens of Kerala [60]. The efficient use of subsoil resources by deep rooted trees often function as nutrient hydraulic lifts/pumps [33]. Similarly, the soil remains insulated from direct sun and litter cover prevent soil from surface erosion.

Arrangements of home garden

Analysis of area occupied by canopy cover of different constituents indicated that in tradition home gardens, which are not less than 40-45-year-old, the crown to land ratio ranged from 210 to 88% [39]. Several studies in Ethiopia indicated that with commercialization, often a gradual change from subsistence to commercial crops occurs in home gardens, while the crop diversity decreases [17].

Spatial arrangement: Tropical home gardens are characterized by vegetation layers (stories), imitating the tropical forest structure. The top story consists of a canopy of tall trees which reduces radiation and mechanical impact of rainfall, creates a relatively constant micro-climate in the lower layers and through leaf fall contributes to the maintenance of soil fertility. The lower layer features staple food and fruit production followed by bush level growth in the third layer. In-ground and ground-covering species, the last layer, lower stories even though it lacks order and pattern [31].

Vertical arrangement: (Figure 1) (Table 2).

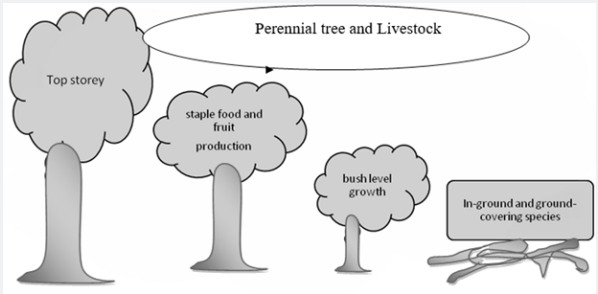

Figure 1: The vertical and horizontal features of the practice.

Table 2: Vertical arrangement.

Tall Trees 10m to 25m Height.	Inset, Coffee, Banana, Papaya	Cassava, Maize, Peppers, etc.	Roots and Tubers and Others
Forth Layer	**Third Layer**	**Second Layer**	**First Layer**
Milletia ferruginea, *Cordia africana*, *Croton macrostachy*, *Persea americana Mangifera indica* (mango), *Azadirachta indica* (neem), mango, *Persea americana* (avocado)	Banana, nutmeg, papaya, and saplings of trees., Ensete ventricosum Coffe arebica, Catha edulis	(*Cajanus cajan* (pigeon pea), *Arachis hypogaea* (peanuts), Phaseolus, *Psophocarpus* and *Vigna species* (beans and other legumes)), tuber crops; *Colocasia esculenta* (taro),	Korerima, *Zingiber officinale* (ginger), *Ananas comosus* (pineapple), *Passiflora edulis* (passion fruit), *Saccharum officinarum* (sugarcane), *Zea mays* (corn or maize)

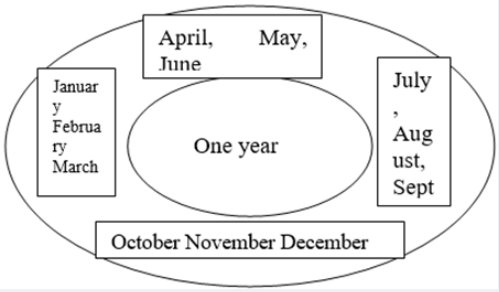

Figure 2: Diagram indicating about the seasons at which farmers would produce.

Temporal arrangement: The food type supplied from the home garden has periodically unlike so that it's behaved that farmers manage their production and harvesting schedule. It is the arrangement of home garden plant species or animals that are planted and rare as per the time at which households requires available food to sustain food security. Throughout the year there are different components that are providing access to food for household members like fruit, milk and grain. When household members use the garden product to sustain food security, they conveniently partition the months of a year. Accordingly, the month has classified in to four, let we show each class by mean of the diagram (Figure 2).

The three months July, August and September are a season of production since farmers are cultivating by rain water and the next October, November and December months through which marketable products could shown. Other the rest January February and March are months at which farmers use available products for feeding and selling. Know days, home garden cultivation has been influenced its structure which could changed from more diverse to monoculture cropping strategy that caused by high population pressure shortage of farm land concentrating on high income generating plants like Catha edulis (khat) and eucalyptus species.

Classification of Home Garden

These systems have also been described as a small-scale 'supplementary' food production system using 'marginal land and marginal labor' [10]. As indicated in the above description, home gardens often are part of a more complex farming system which also includes other cropping systems. This, however, is not always the case. Two types of home gardens can recognized on the basis of their species composition and contribution to the welfare of households.

The first one category of home gardens is ''monoculture home garden'' which extends including a wide range of rural, semi-urban

How to cite this article: Abay Bantihun.Opportunities and Challenges of adopting Home garden Agroforestry Practices in Ethiopia: A Review. Agri Res& Tech: Open Access J. 2019; 20(3): 556128. DOI: 10.19080/ARTOAJ.2019.20.556128

and urban gardens. Most of the time the home garden area was covered with different species composition latter on renowned home gardens that supplement monoculture production like khat and eucalyptus [9,25,61] and most home gardens from Latin America [25] belong to this category. Even thought species diversity is reduced and this wonderful system is faced future threat, still it is an agroforestry home garden. Farmers are thinking it as subsidiary task or providing their effort in addition to the main work and its outcome also used as a feed and shelter [31]. Urban gardens used to produce vegetables and ornamentals to supplement non-agricultural income of owners also fall in this category.

The second categories of home gardens are extended farm fields around houses that form the principal means of livelihood for farming households. Most of the home gardens in the highlands of Eastern Africa [3,25] belong to this category. Here, the farmers have no additional land, or it is small and supplementary to the home gardens. Home gardens are found throughout the tropics, but they are more common in the humid lowlands. In addition, they occur also in several tropical highland regions. An overview of the agro-ecological and geographical distribution of most home gardens in the tropics is given in table 1. Ethiopia is one of the tropical countries where home gardens are prevalent in the highlands. In this country, both types of home gardens exist. In the cereal-crop based farming systems, staple food crops such as tef (*Eragrostis tef* (Zucc.) Trotter), barley (*Hordeum vulgare* L.), wheat (*Triticum sativum* L.) and Sorghum (*Sorghum bicolor* L.) are grown in outer farm fields [29,36,48], while supplementary vegetables, fruits and spices are grown in home gardens. Such gardens are also common in most of the urban areas in Ethiopia.

The second category of home gardens is common in the perennial-crop based farming systems [26] of the south and south-western highlands. Which is the so called ''ally cropping home garden'' Here, staple food crops (inset and maize) as well as other cash and food crops are grown in the home gardens and these garden farms make the principal means of livelihood for almost all the households [36].

Policy and Strategy of the Country

To meet future challenges of land and water scarcity, and to ensure food security as a result of adverse effects of climate change, future mitigation and adaptation strategies that can used by local land users through effective support by stakeholders and policymakers need further attention [54].

The evidence suggests that policy plays an important role in distinguishing countries and regions which have benefited greatly from agroforestry from those who have not. Three policy areas appear to most important. The first concerns essential long-term private property rights over land and trees [9,40]. Where these have been absent or contested, tree planting and management by farmers has been limited. Second, policies related to tree germplasm multiplication and dissemination are important in facilitating the expansion of agroforestry [3,62]. Finally, the recognition of agroforestry as an attractive investment area within agricultural institutions and programmes is also important.

The adoption or lack of adoption of agroforestry is influenced by a variety of factors. Some have relatively little to do with policy [3,11,63] -- including climate conditions (e.g. rainfall), household and farm characteristics (e.g. resource endowment, size of household), and attributes of the particular agroforestry technology (e.g. time lag between costs and benefits) [64]. However, a number of important factors are directly linked to policy.

Land tenure systems and tree ownership one of the critical factors to determining the potential acceptability of agroforestry. Bishaw [65] gave the assertion that to have acceptable and scaling up new or the already agroforestry technology land tenure systems is a critical factor. Lack of land ownership and usage rights is the priority determinant factor to adopt it [3,30].

The policies that stated on tenure and related discipline discourages tree planting around homestead the by regulating harvesting, cutting or sale of tree products and certain tree species. It is restricting the harvesting, cutting or selling of tree products [30,34,62,64]. Although sometimes well intentioned, such protective policies, when applied to agricultural landscapes, discourage farmers from planting and protecting new seedlings that emerge.

The way of changing home garden to other system requires decision makers who has able to recall cutting tree is illegal activity not the right to use the land and tree itself [6,62]. Family members has a responsibility to participate in all case of farm activity including women, like on the cases of species selection and with what labor input are important, farming input, marketable products, financial income with its distribution throughout the members, land use change and including power division [9,22]. However, the inclusiveness has not observed yet in Ethiopia, as if the decision-making process is powered for men.

Conclusion

From the categorization of agroforestry, the one which is traditionally practiced in Ethiopia is agroforestry home garden. There are prospects of the home garden for climate change mitigation, gender participation in decision making, its marketable products, and food availability and accessibility for the wellbeing of the community. It means that it has socioeconomic, cultural, environmental importance.

In other hands, the hindrance actions which obstruct to scale up this potential land use type are community perception on women empowerment, biodiversity degradation, retain income from complimentary tree carbon storage and balanced diet. There are week activities to providing support through an extension to disseminate the new technology, germplasm, and ideas with considering policy on the proportionality of farm size to the number of family members. On station, research hasn't been undertaken over home gardens of the country.

How to cite this article: Abay Bantihun.Opportunities and Challenges of adopting Home garden Agroforestry Practices in Ethiopia: A Review. Agri Res& Tech: Open Access J. 2019; 20(3): 556128. DOI: 10.19080/ARTOAJ.2019.20.556128

Recommendation

In all part of Ethiopia, this practice is not well known since there is weak scaling up through adopting it from the experienced area of the country based on the agro-climate of the country. Therefore, using a good extension strategy this agroforestry practice should adopted. It is also recommended that both on-station and on-farm research should encouraged.

References

1. Kumar BM, Nair PKR (2004) The enigma of tropical homegardens. Agroforestry Systems. 61(1-3): 135-152.
2. Kabir ME, Webb EL (2008) Can homegardens conserve biodiversity in Bangladesh? Biotropica 40(1): 95-103.
3. Galhena HD, Freed R, Maredia KM, Johnson-Welch C, Alemu B, et al. (2013) Home gardens: a promising approach to enhance household food security and wellbeing. Agriculture & Food Security 2(1): 8.
4. Galluzzi G, Eyzaguirre P, Negri V (2010) Home gardens: Neglected hotspots of agro-biodiversity and cultural diversity. Biodiversity and Conservation 19(13): 3635-3654.
5. Mengistu B, Asfaw Z (2016) Woody Species Diversity and Structure of Agroforestry and Adjacent Land Uses in Dallo Mena District, South-East Ethiopia. Natural Resources 7(10): 515-534.
6. Asokan A, Chouhan S, Singh V (2015) Sacred Grove-A Nature 's Gift-as a Remedy for Human Ailments, a Biodiversity Reservoir for Restoring Indigenous Traits for Endangered Listed Plants-A Review. Biomedical & Life Sciences 2(7): 1-13.
7. Suryanto P (2012) Traditional Knowledge of Homegarden-Dry Field Agroforestry as a Tool for Revitalization Management of Smallholder Land Use in Kulon Progo, Java, Indonesia. International Journal of Biology 4(2): 173-183.
8. Madalcho AB, Tefera MT (2016) Management of Traditional Agroforestry Practices in Gununo Watershed in Wolaita Zone, Ethiopia. Madalcho and Tefera, Forest Res 5(1): 1-6.
9. Gebrehiwot M (2013) Recent Transitions in Ethiopian Homegarden Agroforestry: Driving Forces and Changing Gender Relations. Epsilon Open Archive 21: 53.
10. Kehlenbeck K, Maass BL (2005) Crop diversity and classification of homegardens in Central Sulawesi, Indonesia. Agroforestry Systems 63(1): 53-62.
11. Mattsson E, Ostwald M, Nissanka SP, Marambe B (2013) Homegardens as a multi-functional land-use strategy in Sri Lanka with focus on carbon sequestration. Ambio 42(7): 892-902.
12. Haile G, Lemenih M, Senbeta F, Itanna F (2017) Plant diversity and determinant factors across smallholder agricultural management units in Central Ethiopia. Agroforestry Systems. 91(4): 677-695.
13. Linger E (2014) Agro-ecosystem and socio-economic role of homegarden agroforestry in Jabithenan District, North-Western Ethiopia: Implication for climate change adaptation. SpringerPlus 3: 154.
14. Getahun A (1976) Some Common Medicinal and Poisonous Plants Used in Ethiopian Folkmedicine. p. 25.
15. Mengitu M, Fitamo D (2015) Plant Species Diversity and Composition of the Homegardens in Dilla Zuriya Woreda, Gedeo Zone, SNNPRS, Ethiopia. Plant 3(6): 80-86.
16. Mesfin F, Seta T, Assefa A (2014) An ethnobotanical study of medicinal plants in Amaro Woreda, Ethiopia. Ethnobotany Research and Applications 12: 341-354.
17. Plants M (2013) Home gardens of Wolayta, Southern Ethiopia: An ethnobotanical profile. Journal of Medicinal Plants.
18. Kassaye KD, Amberbir A, Getachew B, Mussema Y (2000) Original article A historical overview of traditional medicine practices and policy in Ethiopia. Ethiopian Journal of Health Development 20(2): 127-134.
19. Alemu MM (2016) Indigenous Agroforestry Practices in Southern Ethiopia: The Case of Lante, Arba Minch. OA Lib Journal 3(12): 1-12.
20. Reta R (2016) Useful plant species diversity in homegardens and its contribution to household food security in Hawassa city, Ethiopia. African Journal of Plant Science 10(10): 211-233.
21. Akhter S, Alamgir M, Sohel MSI, Rana MP, Monjurul Ahmed SJ, et al. (2010) The role of women in traditional farming systems as practiced in homegardens: A case study in Sylhet Sadar Upazila, Bangladesh. Tropical Conservation Science 3(1): 17-30.
22. Hailu H, Asfaw Z (2011) Homegardens and Agrobiodiversity Conservation in Sabata Town, Oromia Regional State, Ethiopia. J Sci 34(1): 1-16.
23. Endale Y, Derero A, Argaw M, Muthuri C (2017) Farmland tree species diversity and spatial distribution pattern in semi-arid East Shewa, Ethiopia. Forests Trees and Livelihoods 26(3): 199-214.
24. Lal R (2004) Soil carbon sequestration impacts on global climate change and food security. Science 304(5677): 1623-1627.
25. Kumar BM, Nair PKR (2006) Tropical Homegardens: A time-tested example of sustainable agoforestry. Advances in Agroforestry.
26. Belachew W, Zemede A, Sebsebe D (2003) Ethnobotanical Study of Useful Plants in Daniio Gade (Home-Gardens) in Southern Ethiopia. Ethiopian Journal of Biological Science.
27. Abebe T (2013) Determinants of crop diversity and composition in enset-coffee agroforestry homegardens of southern Ethiopia. Journal of Agriculture and Rural Development in the Tropics and Subtropics 114(1): 29-38.
28. Endale Y (2014) Assessment of Tree Species, Diversity Distribution Pattern and Socioeconomic Uses on Farmland in Oromia Regional State: The Case of East Shewa Zone.
29. Molla A, Kewessa G (2015) Woody Species Diversity in Traditional Agroforestry Practices of Dellomenna District, Southeastern Ethiopia: Implication for Maintaining Native Woody Species. International Journal of Biodiversity 2015: 1-13.
30. Eskil Mattsson (2015) Trees in Home Gardens: Making the Most of an Age-Old Practice to Improve Food Security and Nutrition. Forests, Landscapes & Food Security. p. 4.
31. Tesfaye Abebe (2005) Diversity in Homegarden Agroforestry Systems of Southern Ethiopia. Tropical resource Management. pp. 143.
32. Abebe T, Bongers F (2012) Land-use dynamics in enset-based agroforestry homegardens in Ethiopia. Forest-People Interfaces. p. 69-85.
33. Kerala VK, Tripathi AM (2016 Vegetation composition and functional changes of tropical homegardens: Prospects and challenges. Agroforestry for Increased Production and Livelihood Security in India.
34. Bishaw B, Abdelkadir A (2003) Agroforestry and Community Forestry for Rehabilitation of Degraded Watersheds on the Ethiopian Highlands. Combating Famine in Ethiopia, p. 1-22.
35. Negash A, Niehof A (2004) The significance of enset culture and biodiversity for rural household food and livelihood security in southwestern Ethiopia. Agriculture and Human Values 21(1): 61-71.
36. Tsegaye A (2002) On indigenous production, genetic diversity and crop ecology of enset (Ensete ventricosum (Welw.) Cheesman). pp. 198.

How to cite this article: Abay Bantihun.Opportunities and Challenges of adopting Home garden Agroforestry Practices in Ethiopia: A Review. Agri Res& Tech: Open Access J. 2019; 20(3): 556128. DOI: 10.19080/ARTOAJ.2019.20.556128

37. Kebede BTM (2010) Homegardens Agrobiodiversity Conservation in Sebeta-Hawas Wereda, Southwestern Shewa Zone of Oromia Region, Ethiopia.

38. Mekonen T, Giday M, Kelbessa E (2015) Ethnobotanical study of homegarden plants in Sebeta-Awas District of the Oromia Region of Ethiopia to assess use, species diversity and management practices. J Ethnobiol Ethnomed 11: 64.

39. Rana P, Tewari SK, Kumar V, Kumar A (2016) Floristic Structure, Composition and Functional Characteristics of Homegardensin Garhwal Region, Uttarakhand, India. International Journal of Agriculture, Environment and Biotechnology 9(6): 1045-1059.

40. Gebrehiwot M, Elbakidze M, Lidestav G (2018) Gender relations in changing agroforestry homegardens in rural Ethiopia Gender relations in changing agroforestry homegardens in rural Ethiopia. Journal of Rural Studies 61: 197-205.

41. Chayal K, Dhaka BL, Poonia MK, Tyagi SVS, Verma SR (2013) Involvement of Farm Women in Decision- making In Agriculture. Stud Home Com Sci 7(1): 35-37.

42. Kumar V (2015) Importance of Homegardens Agroforestry System in Tropics Region Biodiversity. Conservation and Sustainable Development (Issues & Approaches) Importance of Homegardens Agroforestry System in Tropics Region.

43. Kumar V, Tiwari A (2017) Importance of Tropical Homegardens Agroforestry System. Int J Curr Microbiol App Sci 6(9): 1002-1019.

44. Robbins JA, Von Keyserlingk MAG, Fraser D, Weary DM (2016) Invited review: Farm size and animal welfare. J Anim Sci 94(12): 5439-5455.

45. Devi NL, Das AK (2013) Diversity and utilization of tree species in Meitei homegardens of Barak Valley, Assam. J Environ Biol 34(2): 211-217.

46. Tolera M, Asfaw Z, Lemenih M, Karltun E (2008) Woody species diversity in a changing landscape in the south-central highlands of Ethiopia. Agriculture, Ecosystems and Environment 128(1-2): 52-58.

47. Geiger K (2015) Characterizing the traditional tree-garden systems of southwest Sri Lanka. Tropical Resources 34: 93-103.

48. Tafere SM, Nigussie ZA (2018) The adoption of introduced agroforestry innovations: determinants of a high adoption rate – a case-study from Ethiopia The adoption of introduced agroforestry innovations : determinants of a high adoption rate – a case-study from. Forests, Trees and Livelihoods, p. 1-20.

49. Seppo Vehkamäki (2005) The concept of sustainability in modern times. Sustainable Use of Renewable Natural Resources- from Principles to Practices 3: 1-13.

50. Francis C, Lieblein G, Gliessman S, Breland TA, Creamer N, et al. (2008) Agroecology: The Ecology of Food Systems. Journal of Sustainable Agriculture 22(3): 99-118.

51. Asfaw Z, Woldu Z (1997) Crop associations of home-gardens in Welayta and Gurage in southern Ethiopia. Sinet, an Ethiopian Journal of Science 20(1): 1-12.

52. Birthal PS, Negi DS, Jha AK, Singh D (2014) Income Sources of Farm Households in India: Determinants, Distributional Consequences and Policy Implications. Agricultural Economics Research Review 27(1): 37-48.

53. Nair Ramachandran PK, Nair VD, Kumar BM, Haile SG, et al. (2009) Soil carbon sequestration in tropical agroforestry systems: a feasibility appraisal. Environmental Science and Policy 12(8): 1099-1111.

54. Murthy IK, Gupta M, Tomar S, Munsi M, Tiwari R (2013) Carbon sequestration potential of agroforestry systems in India. J Earth Sci Climate Change 4: 131.

55. Nair P Ramachandran K, Nair VD, Kumar BM, Showalter JM (2010) Chapter Five-Carbon sequestration in agroforestry systems. Advances in Agronomy 108: 237-307.

56. Nair PKR, Kumar BM, Nair VD (2009) Agroforestry as a strategy for carbon sequestration. Journal of Plant Nutrition and Soil Science 172(1): 10-23.

57. Manna MC, Jha S, Ghosh PK, Acharya CL (2003) Comparative efficacy of three epigeic earthworms under different deciduous forest litters decomposition. Bioresour Technol 88(3): 197-206.

58. Seneviratne G, Kuruppuarachchi KAJM, Somaratne S, Seneviratne KACN (2006) Nutrient cycling and safety-net mechanism in the tropical homegardens. International Journal of Agricultural Research 1(2): 169-182.

59. Benjamin TJ, Montañez PI, Jiménez JJM, Gillespie AR (2016) Carbon, water and nutrient flux in Maya homegardens in the Yucatán peninsula of México. CEUR Workshop Proceedings 1621: 36-43.

60. Kunhamu TK, Kumar BM, Viswanath S, Sureshkumar P (2010) Root activity of young Acacia mangium willd trees: Influence of stand density and pruning as studied by32P soil injection technique. Agroforestry Systems 78(1): 27-38.

61. Gebrehiwot M, Elbakidze M, Lidestav G, Angelstam P (2016) From self-subsistence farm production to khat : driving forces of change in Ethiopian agroforestry homegardens From self-subsistence farm production to khat : driving forces of change in Ethiopian agroforestry homegardens. Environmental Conservation 43(3): 263-272.

62. Place F, Ajayi CO, Torquebiau E, Detlefsen G, Gauthier M, et al. (2012) Improved Policies for Facilitating the Adoption of Agroforestry. Agroforestry for Biodiversity and Ecosystem Services - Science and Practice. pp. 113-128.

63. Emiru Birhane (2014) Final Report Agroforestry Governance in Ethiopia. p. 50.

64. Ajayi O, F K, Akinniffesi G, Silashi S, Chakeredza P, Matakala P (2007) Economic framework for integrating environmental stewardship into food security strategies in low income countries: case of agroforestry in southwestern African region. African J Environ Sci Technol 1(4): 59-67.

65. Bishaw B (2003) Deforestation and Land Degradation on the Ethiopian Highlands: A Strategy for Physical Recovery. Ethiopia Tree Fund Foundation, Ethiopia, pp. 1-9.

How to cite this article: Abay Bantihun.Opportunities and Challenges of adopting Home garden Agroforestry Practices in Ethiopia: A Review. Agri Res& Tech: Open Access J. 2019; 20(3): 556128. DOI: 10.19080/ARTOAJ.2019.20.556128

DOI: 10.19080/ARTOAJ.2019.20.556128

How to cite this article: Abay Bantihun.Opportunities and Challenges of adopting Home garden Agroforestry Practices in Ethiopia: A Review. Agri Res& Tech: Open Access J. 2019; 20(3): 556128. DOI: 10.19080/ARTOAJ.2019.20.556128