

## Socio-economic Benefit of Home Garden Agro forestry Practice to Smallholder Farmers in the Ethiopia Country

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### Abstract

Traditional home gardens in southwest Ethiopia is well-known land use practices playing an important role in both biodiversity conservation and livelihood aspects. Home garden is more diverse and provides multiple products for farm households. The objective of this seminar was to review and describe existing tree species agro biodiversity, identifying the socioeconomic contribution of home garden to household livelihood, assess the factors affecting home garden of the practice in Ethiopia. Over population growth and degradation of land reduce the total land area. Thus Home garden Agro fore story plays a significant role in improving livelihood for the smallholders in developing countries like Ethiopia. Some Farmers in Ethiopia are very poor. They have not enough land. They cultivated fruits, vegetables, tree, timber species around their homestead and those are managed by traditionally. The high diversity of species in home garden have a wide socioeconomic and ecological roles including production of food and a wide range of other products such as firewood, fodders, spices, medicinal plants and ornamentals and avoidance of environmental deterioration of climate related hazards commonly associated with mono-culture production systems income generating site.

**Keywords:** 1.Home garden Agro fore story practice, 2.Agro biodiversity, 3.Socioeconomic,4.Woody Plants, 5.Ethiopia

## **1. Introduction**

### **1.1. Background**

Home gardens (HGs) are traditional farming systems, presumably one of the oldest land use system (Gbedomon et al, (2017)). Home gardens have been common practices for indigenous communities in many developing countries such as Ethiopia. It started with the domestication of edible plants and can be described as a mixed cropping system that encompasses vegetables, fruits, plantation crops, spices, (DawitDaba&GemedoDalle, 2020) and herbs, ornamental and medicinal plants. Homegarden agroforestry is a diverse land-use system in which multipurpose trees and shrubs are deliberately grown in intimate association with annual and perennial agricultural crops and/or livestock (TeferaJegoraetal, 2019). A home garden is an integrated system that comprises different things in its small area that produces a variety of foods and agricultural products including staple crops, vegetables, fruits, medicinal plants and so on. (BirukKefale, 2020)

Large percentages of the Ethiopian population (80%) depend upon agriculture for their livelihoods, and contribute 42-45% of the total gross domestic product of the country. But currently the agricultural production falls under a risk due to a number of factors. Among them; climate change, land degradation in the form of soil erosion, soil fertility loss (which are important for grain yield production) and severe soil moisture stress, which is partly the result of loss of trees in their field and organic matter (Ewuketu Linger, (2014)). Ethiopian is an agrarian country and there are diverse farming practices that include crop production both in fields and in homegardens as a subsistence farming system mainly in highland and midland agroecosystems. Homegardens provide several services mainly for the farming communities such as food, firewood, fodders, spices, medicinal plants and ornamentals (DebissaLemessa & AbaynehLegesse, (2018)).

Home gardens have commonly been characterized as biodiverse and sustainable land use systems. Agro biodiversity includes those components of biological diversity relevant to food and agriculture as well as the components of biological diversity that constitute the agro-ecosystem and the knowledge associated with them. Sustainable development requires the reconciliation of demands for biodiversity conservation and increased agricultural production aided by a clear understanding of the biodiversity within such changing landscapes (Edward N *et al.*, (2016)).

## 2. Review of literature

### 2.1. Definition and Concepts of Home gardens of Agroforestry Practice

Homegarden is locally known as yeguaro-ersha, Yeguaro Masa, Yeguarolrsha, and YeatikiltBota (in Amharic language), eddo, Hoddo, Boro, Mandubee in Afan Oromo (in Oromo language) (BirukKefale, 2020). Home gardens, which are one of the traditional agroforestry systems, are defined by a variety of characteristics in accordance with the local physical environment, ecological and economic situation, and cultural characteristics, but they are generally defined as multi-species, multi-storied, and multi-purpose gardens located close to a home (Jeong Ho Park *et al*, 2019). Homegardens are intensively cultivated agroforestry systems managed within the compounds of individual homes. They involve the deliberate management of multipurpose trees and shrubs (the woody component), grown in intimate association with herbaceous species (mainly annual, perennial, and seasonal agricultural crops), and livestock. Based on their contribution to the welfare of households, two types of homegardens are recognized. The common homegarden types that are found in tropics are small-scale supplementary food production system around house in areas where the livelihood of the owner is based on other land use or other activities (TeferaMekonenKebede, 2010) (BirukKefale, 2020). Woody species have various socio-economic and ecological roles. Many existing native species, such as *Cordiaafricana*, *Millettiaferruginea*, *Albiziagummifera*, etc., are planted and retained dominantly as basic components of their homegardens structure because of their roles in providing shade and soil fertility, wood and other products (GetahunYakob *et al*, (2014)).

### 2.2. Agro biodiversity of Home garden

Biodiversity is the totality of genes, species, and ecosystems of a region. Biological diversity for food and agriculture can be managed to maintain or enhance ecosystem functions to provide options for the optimization of agricultural production and contribute to the resilience of ecosystems for risk mitigation. Maintenance of genetic variation within agricultural crops provides a broad range of essential goods and services which support ecosystems functioning, resilience and productivity (GemedTerfassaFida (2018)). Modern monoculture systems, which are characterized by low levels of diversity, could have gains in productivity through improved efficiency in production, but they have a fragile ecological equilibrium, with control coming from external inputs rather than internal feedback mechanisms. Agricultural sustainability is often enhanced through system diversity (TsfayeAbebe, (2005)). Diversity of species of crops and trees in agroecosystems fosters recycling of nutrients, increases efficiency in the use of moisture, nutrients, and sunlight, and reduces incidence of weeds, pests, and diseases (García-Barrios, 2004). The maintenance of soil fertility through decomposition of litter and manure and the low export of harvested products, which are all associated with the diversity and density of species, contribute towards productivity and sustainability. Increased diversity of annual and perennial species in agroecosystems is therefore considered as an essential component for sustainability (Nair, 1993).

Accordingly, the multispecies homegarden agroforestry systems in the tropics have been producing sustained yields for centuries in a most resource-efficient way, with a relatively low energy input for establishment and maintenance (Ewuketu Linger, (2014)). It considered as economically efficient, ecologically sound and biologically sustainable agroforestry systems. In the past it was often considered that such biodiverse systems would gradually be replaced with monocropping systems (DebissaLemessa&AbaynehLegesse, (2018)). At present, however, the merits of these highly diverse land-use systems are receiving increased attention due to ecological and economic reasons. The major reasons are: a) the recognition that biodiversity conservation should not only focus on wilderness areas, but also on landscape niches characterized by high human-selected biodiversity b) the interest in development of multifunctional land-use types which offer scope for contributing towards ecologically balanced land-use patterns, and c) the need for new approaches in agricultural development based on endogenous land-use management systems (TsfayeAbebe, (2005)).

### 2.3. Diversity and Structure of Species in Home gardens

Home garden is commonly defined as; land use system involving deliberate management of multipurpose trees and shrubs in intimate association with annual and perennial agricultural crops and invariably livestock within

the compounds of individual houses, the whole tree-crop, and animal unit is being intensively managed by family labor (Ewuketu Linger, (2014)) (BirukKefale, 2020). The high diversity of species in homegardens, which combines crops, trees and animals having different uses and production cycles, is considered as an essential component of sustainable agriculture because of the wide socioeconomic and ecological roles it plays in these systems (TesfayeAbebe, (2005)). Woody species are very important part of homegardens that contributes to the livelihoods diversification. According to (DestaHamore&BelaynehLemage, (2019)) in the Tembarro District, Southern Ethiopia, the upper story was dominated by *Cordiaafricana*, *Albiziaagummifera*, *Millettiaferruginea*, *Persea Americana* and *Mangiferaindica*; the middle story occupied with Ensete, coffee, maize and banana while vegetables, spices, and herbs cover the ground layers. Various studies have shown that broad-leaved trees and fruit tree crops are among woody species that dominated the upper story of the coffee-based agroforestry practice and homegarden in southern and other parts of Ethiopia. Many authors have reported that distinct horizontal zones occur in the homegarden, and that their location, size and plant species composition reflect deliberate management strategies.

According to the report of (DebissaLemessa&AbaynehLegesse, (2018)) farmers either plant or retain different plant species in their homegardens to fulfill their demands of various products. However, the extent of either retaining or planting of plants in the homegardens depends on the availability of the space, compatibility with agricultural crops and household objectives. For example, plant species including *Croton macrostachyus*, *Ensetentricusum*, *Cuppressuslutanica*, *Calpurnia aurea*, *Zeamays*, *Brassicacarinata*, *Justiciaschimperia*, *Rhamnusprinooides*, *Albiziaagummifera*, *Cucurbitapepo*, *Vernoniaamygdalina* and *Prunusafricana* are the most frequent plant species and found in more than 50% of the homegardens. Of these species, *Croton macrostachyus* occurs in all assessed homegardens due to its importance for shade, improving soil fertility and positive association or compatibility with food crops.

The different plant life forms of the plant species assessed in the study homegardens were tree, shrub, herb, grass and liana accounting 47.3%, 25.8%, 22.6%, 2.2% and 2% respectively. Households use these different plant life forms for different purposes, for example, 53.4% for wood (construction, fire wood etc.), 8.5% are vegetable crops, 7.1% are root crops, 5.5% are used as spices, 5.51% used as fruits, 3.81% as stimulants, 3.67% used as tuber crops, 3.3% are cereals, 2.8% as forage, 2% are ornamentals, 1.8% used as beverage, 0.2% are pulse crops and 0.1% were as live fences (DebissaLemessa&AbaynehLegesse, (2018)). The difference in species richness and diversity between sites could be the result of differences in agroecology of the sites whereas within site variation related to garden size (land), management skill and household species preference for various purposes. As sited by (DestaHamore&BelaynehLemage, (2019)) reports of different authors, it is in line with the result reported from Beseku, and the mean number of woody species per homegarden (8.95) is lower than that (11.0) from 111 samples homegarden from different agro-ecological zones in Ethiopia and (16.0) reported for Sidamahomegarden.

#### **2.4. Benefits Commonly Attributed to Home gardens**

Home garden crops represent a supplementary source of food and privileged basis for nutritional quality in rural households. They can also become a source of income. They are helpful to cope with shortage periods and failures of staple crops. The crop diversity that homegardens typically or potentially hold can provide a wide range of resources, such as nutritious foods, marketable products, firewood, herbs, spices, and medicinal plants (TeferaMekonenKebede, 2010). Home gardens play a fundamental role in providing subsistence food and income to indigenous people, and in serving as an important habitat for wild flora and fauna through a multi-strata structure in the area (Jeong Ho Park *et al*, 2019).

##### **2.4.1. Livestock**

Livestock contribute significantly to the household income of small-scale homegardens in many developing countries, while fulfilling many social and cultural needs. In some of the very small gardens, where land is a

constraint to production, livestock are sometimes the main income generators, serving as cash buffers and capital reserves and also contributing to the nutrient cycling in the system. Livestock also offer opportunities for milk and meat-processing ventures, thus increasing employment especially in rural areas. They can be used to control weeds in perennial tree crop systems, and to control insect pests.

#### **2.4.2. Socioeconomic contribution of home garden agro forestry**

The high diversity of species in home garden have a wide socioeconomic and agro-ecological roles including production of food and a wide range of other products such as firewood, fodders, spices, medicinal plants and ornamentals and avoidance of environmental deterioration of climate related hazards commonly associated with monoculture production systems income generating site (Ewuketu Linger, (2014)). The associated component diversity of Homegarden agroforestry enhances the livelihood of the local people by providing socio-economic and agro-ecological service than non-tree based garden; important to adapt climate change or climate related stress (drought) (Ewuketu Linger, (2014)).

Cash crops and fruit trees play a vital role in cash income generation in addition to household consumption. Coffee, ginger, avocado and mango are major sources of income while satisfying household consumption. The income difference between households may be wealth status difference, knowledge of desirable species integration and composition of economically important species and the size of homegarden and households preference for specific crops (Desta Hamore&BelaynehLemage, (2019)).

#### **2.4.3. Home garden contribution to the family health**

Home gardens has been established that even moderate and mild energy malnutrition contributes to child mortality, and micronutrient deficiencies are associated with increased risk of child and maternal mortality. Home gardens are one strategy for addressing malnutrition and micronutrient deficiencies. Even though animal products are the best source of micronutrients, vegetables and fruits may be the only source of micronutrients that are reliably available to poor households. One of the most important vitamins supplied by homegardens is vitamin A, which is essential not only for healthy eyes but also for protection of infectious diseases such as measles (Tefera MekonenKebede, 2010).

#### **2.4.4. Production benefits from trees**

Home gardens tend to have some tree output that can be used for long-term production and sale for profit. Palms are traditionally of significant importance in small farm management as sources of edible fruits, oil, green vegetables, fiber, thatch, construction wood, fuel wood and other useful products are often found in home gardens (Soumya Mohan, 2004). The purposes of planting and retaining woody species in the homegardens were consistent with the findings of where they asserted that tree species were deliberately retained and/or planted on farmlands for the provision of fuel wood and wood supply, income generation and environmental services (Getahun Yakob et al, (2014)).

#### **2.4.5. Nutrition and food availability**

Nutrition and food supply are major aspects of home gardens. Food crops are not only widely prevalent, but they also provide a significant portion of the household nutritional requirement in many home gardens around the world (Soumya Mohan, 2004). The principal goal home gardens is not to optimize production, as it could be in the rest of the farm, but to guarantee a minimum supply of different food products at all times of the year functioning as a buffer in times of low income and food scarcity often, high value products from home garden can be sold to purchase staple food during period of scarcity. Since the diverse mixture of crops is harvested at different times, a constant supply of food in some or the other is available from these home gardens at all time or

the year (Tefera Mekonen Kebede, 2010). Home gardens can enhance food security in several ways, most importantly, through direct access to a diversity of nutritional rich food, increased income from sale of garden products and fallback food provision during period of temporary scarcity. In many parts of the world, home garden supplement food supply for people, but in some case, home garden can yield basic staples, when they are large enough to plant sufficient quantities of tuber crops or cereals (TeferaMekonenKebede, 2010).

#### **2.4.6. Improving the gender role in home garden**

Home gardens contain possibilities of increasing family participation in the production and contribution toward family well-being. It attributes development of the home garden as a regular feature of the traditional farming system in parts of tropical Africa, in part to the division of labor between the sexes. Women traditionally cooked soups and sauces, and needed the continuous availability of the condiment plants, spices and vegetables grown in the home gardens. These women's' gardening practices created intensive interaction between the physical and social environment and they were increasing their management and manipulation of no domesticated resources. The women who developed and maintained these systems used gardening as a way to express their autonomy and worth within the village setting (Soumya Mohan, 2004).

Ethiopia is a country with many different nationalities and ethnic groups with heterogeneous traditions, cultures, religions and norms. In home garden agro forestry women are responsible for post-harvest handling, household food supply and selling and trading of some products for care taking of their family. Women are responsible for selling surplus food crops, fruits, vegetables and dairy products to supplement their household food supply while livestock, poles and timber has been traded by men. Meanwhile, men's market opportunities and control through trading of khat, and eucalyptus has increased in Gemetto Galle. Women are mainly involved in "petty trading" such as buying and selling of small scale products for subsidizing food supply in their household. Men are involved in livestock trading and whole sale and large scale trading of food crops such as potatoes, avocado and trading of items besides khat and eucalyptus in the market (Mersha Gebrehiwot, (2013)).

#### **2.4.7. Aesthetics and ornamentation**

The home garden is often a haven for the family members of rural communities to relax and gather together after a hard day's work. They are often focal community meeting points. The gardens sometimes have a variety of flowers and other ornamental decorations. Some villages use these home gardens as a way to gain recognition for the village as a whole. The villagers are proud of the way their gardening contributes to the beauty of the village. In several tropical cultures, these ornamental flowers and some other selected plants are used for ritualistic and cultural reasons (Soumya Mohan, 2004).

Aesthetic plants that are grown for the display of aesthetic features including the flower, leaves, scent, overall foliage texture, fruit, stem and bark and also prominent thorns of rose sericea and cacti. The plants which have the ability to create visual interest in the compound and also to help purify the air, reduce stress, and enhance productivity. Ornamental plants are plants that are grown for decorative purposes in gardens and landscape design projects, as houseplants, cut flowers and specimen display. The cultivation of ornamental plants is called floriculture, which forms a major branch of horticulture (Wikipedia, 2021).

#### **2.4.8. Other businesses**

Home gardens often allow for the setup of small cottage industries that provide an additional source of income to the household. For example, the traditional art of pickling mangos and other fruits is a lucrative cottage industry. Another potential cottage industry involves using non-food materials from the garden, such as coconut



fiber (coir), which has traditionally been used in the production of mats, ropes and other products, and can be sold to local markets (Soumya Mohan, 2004).

#### 2.4.9. Home gardens as a Source of Supply of Medicinal Plants

According to World Health Organization (WHO), medicinal plants form the bases of traditional or indigenous healthcare systems used by the majority of the population of most developing nations. Indeed, it is reported that more than 3.5 billion people rely on plants for the treatment of both human and livestock diseases. In south Asian countries, alone 500 million people are reported to seek health security from the leaves, roots and barks of trees. Home gardens can be used to grow certain traditional herbs and spices. Traditional medicine and medical properties of plants are fields that are currently generating much interest among researchers (Tefera MekonenKebede, 2010). Plant based medicinal systems, although in practice for thousands of years, are now coming to the forefront and attempts are being made to recognize their medicinal properties (Soumya Mohan, 2004).

Traditional healers in Ethiopia utilize the herbal resources available in nature for various disease treatments. As reported before, approximately 800 species of the medicinal plants grown in Ethiopia are used for treating about 300 medical conditions (Admasu Moges &YohannesMoges, 2020). For instance, *Croton macrostachyus* for malaria, diarrhea, epilepsy, ringworm and skin rash, *Cordiaafricana* to cure evil eyes, *Euphorbia candelabrum* for ringworm, *Millettiaferruginea* for fungal infection, *Vernoniaamygdalina* is used for preventing headache and intestinal worm and for treating tumor/cancer in general (AdmasuMoges&YohannesMoges, 2020).

*Azadirachtaindica* is used Digestive disorders, malaria, fever, hemorrhoids, hepatitis, measles, syphilis, boils, burns, snakebite, and rheumatism. *Parkiabiglobosa* is used for Piles, malaria, stomach disorders, and jaundice. *Prosopis cineraria* flowers are used for blood purification and curing skin diseases. Bark against summer boils, leprosy, dysentery, bronchitis, asthma, leucoderma and piles. *Tamarindusindica* used for curing stomachache; it is also used for treating bile and intestinal worm using the fruit juice with hot water in the morning before breakfast. It's Fruit pulp is used in Indian medicine as refrigerant, carminative and laxative. It is also recommended in febrile diseases and bilious disorders.*Ximenia Americana* its Oil from the fruit kernel is applied to fresh wounds to prevent infections and also used by some people, who have their ears or lips pierced Used for treating stomachache and tonsillitis (Admasu Moges&YohannesMoges, 2020).

*Paw paws* can be used to treat asthma, rheumatism and intestinal worms. *Lemongrass* can help in relieving fever. Sap from the *Aloe Vera* is excellent for treating burns. *Acacia nilotica* gum is used for treating diarrhea, dysentery, diabetes, sore throat, bark used to arrest external bleeding. *Moringaoleifera* is another plant that has high levels of iron, calcium and Vitamin A, and can be used to boost the immune system, as well as treat a range of illnesses. It is normally consumed by drying the leaves and them pounding them into a powder. This can then be mixed with flours, or with other foods such as meat. For HIV/AIDS sufferers it offers an excellent source of nutrients which can help to support their immune system and slow down the advance of the disease (Fisseha M, (2007)).

#### 2.5. Factors Influencing Adoption of Home garden

Species diversity and composition of home gardens is influenced by ecological, socio-economic and cultural factors. Species composition, structure and function of home gardens may be influenced by ecological, socioeconomic and cultural factors, such as distance from urban markets, household size and composition, environmental degradation and family tradition. According (Megabit Beyene et al, (2018)), home gardens, whether found in rural or urban areas, are characterized by a structural complexity and multi functionality, which enables the provision of different benefits to ecosystems and people. Lack of scientific knowledge on home garden agro forestry systems structure and species diversity may pave the way for destruction of diverse plant species. Wealth status and accessibility of homesteads to market and road network infrastructure influenced the wood production of home gardens (GetahunYakob et al, (2014)).

### **2.5.1. Physical environment**

Altitude and climate are important ecological factors that influence species diversity. Rainfall and temperature are the two important factors of climate that influence species diversity. Diversity of species increases with increased amount of rainfall and temperature as it is demonstrated for humid lowland tropical areas, which are very rich in species as compared to other ecological zones.

### **2.5.2. Socio-economic and cultural environments**

In this category, two major groups of variables can be distinguished; local (external) environment and household environment (household's resource levels). Among the local environment, commercialization and access to market, reliance on off-farm income, access to inputs and access to off-farm resources are believed to influence species diversity of farms. Commercialization and access to market often causes a decline in the diversity of species. Homegardens close to market towns, particularly in well-off households, tend to emphasize on high-value cash crops instead of staple foods (BirukKefale, 2020).

On the other hand, farmers tend to compensate their lack of access to markets and resources by producing as much of their consumption from home production as possible. An increasing reliance on off-farm income results in less labor being available on the farm and hence farm level diversity will be low. Changes in the cost and/or availability of inputs such as fertilizer and labor can also influence diversity of a farm system. Increased access to these inputs often results in decreased diversity, as farmers tend to produce more commercial crops. Access to off-farm natural resources, e.g. forests, of farmers is likely to reduce diversity of plants in their farms since they can obtain some of their requirements (e.g. wood, medicinal plants, etc.) from the forest (BirukKefale, 2020).

### **2.5.3. Household resources**

The resources of the household, mainly land, but also labor and capital could affect farm level species diversity and composition. As per capita land-holding increases, so does the diversity of the cropping pattern, although the planting density of each crop falls. On the other hand, farmers with little access to resources, particularly land, may focus on the production of few staple food crops or trade-off home production of crops with off-farm waged work, depending on their individual comparative advantage (GetahunYakob et al, (2014)).

## **2.6. Management of Home garden Agro forestry**

In Gumbo district (hereafter woreda) of Kaffa zone, it is obvious that farmers practice homegardens for economic, social and environmental benefits. However, management of woody species and their contribution is not well known by scientific communities. Hence, understanding on why and how farmers manage the homegardens: available knowledge on preference, arrangement, uses of woody species and other components is limited only to farmers. In Ethiopia, information on homegardens and on farm trees is generated from limited studies and are more specific in terms of site, culture and socioeconomic (GetahunYakob et al, (2014)).

Farmers manage woody species mainly to reduce resource competition, enhance growth, and to achieve the aim of targeted production. These productions continued through the integration of multipurpose woody species, which are economically feasible and socially acceptable (DestaHamore&BelaynehLemage, (2019)). According to the report of (GetahunYakob et al, (2014)), protection was done through fencing to protect from damage by animals. The pruning of shade tree species retained in the homegarden was done for reduction of the shade for coffee production and collecting wood to be used for fencing, constructing houses, firewood and also for sales and the majority of farmers (75%), organic waste material from the household and animal manure were the only form of fertilizer added to the homegardens.



### **3. Conclusions and recommendations**

Home garden can be defined as a land use system, which involving deliberate management of multipurpose trees and shrubs in intimate association with annual and perennial agricultural crops and invariably livestock within the compounds of individual houses, the whole tree-crop-animal unit being intensively managed by family labor. They occur in both rural and urban areas, temperate and tropical regions, low- and highland altitude, and low- and rich-income countries. Diversity and household food supply and availability of this system is currently being challenged by population, economic and market growth and a broad transition towards monoculture production of khat and eucalyptus. Homegardens is used for social and economic developments and environmental regulation. Homegardens are an important element of rural landscape of the study and they play a vital role in the predominantly biodiversity conservation.

- ❖ Wealth status and accessibility of homesteads to market and road network infrastructure influenced the wood production of homegardens, and coffee and fruit trees are the major problem that hinders the productivity of homegarden. Therefore, it is recommended that appropriate intervention either through research or extension has to take place in order to reduce the impacts.
- ❖ Widespread of organic matter and manure application were the major management practices in the homegarden to improve the soil fertility status of the homegardens. However, farmers' knowledge on compost preparation was very limited. Therefore, it is recommended that provision of awareness creation and training is very crucial for improvement of soil fertility in the homegardens.
- ❖ Linking function to the composition and plant diversity of homegardens revealed that multi-functional homegardens had higher plant diversity. However, there is no guarantee for long term maintenance of plant species in home gardens. Therefore, it is important to notice that the motivation of gardener and consequently the function of home gardens may change with time. This change is a driver of home gardens dynamic.
- ❖ Although we still know less about factors affecting the dynamic of home gardens and their functions, their consequence on maintaining agrobiodiversity mainly crop wild relatives, crops, and wild plant species is of high concern for sustainable conservation. Therefore, all stakeholders study and investigate the solution for all factors related with these problems.

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