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Full Length Research Article

Characterization of homestead gardening in smallholder farming systems

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Nowadays, developing countries are concerned with the problems of scarcity of land where most of the farmers cultivate less than one hector of land and consequently food security remains an issue for many families. To address this issue of food insecurity related to the small size of land holding, the majority of rural households have developed integrated agriculture practices around their houses which help them to grow basic commodities as subsistence food to their home and occasionally to the markets. This paper is aiming at reviewing the literature that relates to homestead farming practices which are broadly used in smallholder farming systems across the developing countries. In this study, it was revealed that homestead farming is playing a significant role in providing food in terms of quality and quantity for smallholders in several developing countries. It reviewed in turn different services benefited by small scale farmers while implementing homestead farming such as agro ecology services, agriculture growth, socio economic benefits, biodiversity services and we looked at the role of women in home gardens. After reviewing and experiencing several documents discussing on this research subject, the researcher gave some recommendations to different actors for favorable support to this farming practice which is responding well to the sustainability of small-scale farming systems in developing countries.

Key words: Characterization, Homestead gardening, Smallholder farming, Marketing, Agriculture

INTRODUCTION

Home gardening is one of the world's most ancient food production practices and is commonly practiced throughout the world. Therefore, home gardens, sometime referred to as mixed, backyard, kitchen, farmyard, roof top garden, compound or homestead gardens can be grouped into two basic categories:

- Traditional gardens, those cultivated independent of any intervention.
- Promoted gardens, those receiving support from an outside organization.

Traditional gardens often vary in size, bio-diversity and products and are adapted to local resources and cultural preferences [1]. In the literature, various terminologies are used to define homestead depending on the context of the country. A home garden can be defined as an intensive land use system that combine diverse farming components such as annual and perennial crops, domestic animals, occasionally fish that are provide environmental services, employment opportunities and household needs. Homestead refers to home and adjoining land occupied by a family to cultivate some crops for their own consumption and marketing. Generally, the purpose of homestead is small-scale agricultural production, home upkeep, sanitation, health and nutrition. According to Abdullah, home garden is a land occupied by the dwelling unit of the household and the immediate area surrounding it, including courtyard, pond, road space around homesteads, space used for cultivation of trees and vegetables and unutilized space. Home garden also referred as a household or homestead farm, multi strata tree garden, analogue forest, compound farm, village forest garden and household garden.

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Home gardens are classified from a land-use perspective as an agroforestry system with a mixture of trees, shrubs, herbs, and other agricultural crops within the household boundary and under the family labour and management. Homestead farming is defined as homegarden which is a complex sustainable land use system that combines multiple farming components, such as annual and perennial crops, livestock and occasionally fish and provides environmental services, household needs and employment [6].

And income generation opportunities to the households. A home garden is a mixture of deliberately planted vegetation, usually with a complex structure and designed to produce natural products for the household or market. Similar observations were made by Marsh cited in Alfred Maroyi, who stated that home gardens are a production system that the poor can easily enter at some level since it may be done with minimal or no economic resources, using locally available planting materials, natural manures, and indigenous methods of pest control [2].

A promising approach to reach a better understanding of home gardens is to address the underlying reasons for their design, management and plant species selection. These can be analyzed, to a great extent, by focusing on existing home garden micro-zonation. Home garden zones are easily visualized and their location, size and plant species composition reflect deliberate management strategies. Plants and their local uses, which are included in zones, provide additional information on a farmer's management priorities and socioeconomic needs. To complete the analysis, the above information can be integrated with data on the socioeconomic importance that home gardens hold for the people that manage and conserve them [3]. Homestead farming practices are common in the developing countries and are intensively available in many countries of Africa, Latin America and Asia. Home gardens are common throughout the tropics, and also referred to as household or homestead farms, multi-strata tree gardens, analogue forests, compound farms, backyard gardens, village forest gardens, dooryard gardens, and house gardens and receive different local names such as Talun-Kebun and Pekarangan in Java (Indonesia), Shamba and Chagga in East Africa, and Huertos Familiares in Central America. In Asia, the home garden system is common in Indonesia, Philippines, Cambodia Malaysia, Vietnam, Thailand, Bangladesh, Sri Lanka, Nepal and India. Often referred to by different names, these gardens benefit family nutrition, increase household income, provide a buffer to food insecurity during lean season, provide habitat protection and soil conservation. In addition to homestead production, gathering of wild vegetables for home consumption is also commonly practiced in some countries in south Asia [4].

Home gardens around the world often exhibit remarkable variability in composition and structure. In tropical areas, gardens can support a wide variety of perennial and semi-perennial crops and trees that adapt well to local micro-climates and can be maintained with a limited amount of purchased inputs.

The evidence collected so far shows that some plant species grown on a small scale with limited inputs provide a major source of income for the poorest people. They do not require large capital investments or working capital to provide inputs for production or to trade home garden products. The market for home garden products was found to be informal and untapped. This provides great potential for growth as far as marketing of home garden products is concerned [5].

Home gardens have attracted considerable research attention during the past three decades, mainly due to the following reasons:

- they contain characteristics which make them an interesting model for research and the design of sustainable agro ecosystems, including efficient nutrient cycling, high biodiversity, low use of external inputs and soil conservation potential and
- Home gardens have been shown to provide a diverse and stable supply of socioeconomic products and benefits to the families that maintain them [7].

LITERATURE REVIEW

Homestead and food security

Agricultural development in sub-Saharan Africa faces challenges from climate change, natural resource degradation, persistent food insecurity, and increasing intensification pressures from the millions of people whose livelihoods are rooted in smallholder farming. Godfray cited in Leah M. Mungai argue that to address these challenges, more food needs to be produced in sustainable ways as compared to use of unsustainable practices that contribute to continuous loss of biodiversity and land overuse that causes land degradation. According to Rahman, SA, et Al., the choice of species is determined to a large extent by environmental and socioeconomic factors, as well as the dietary habits and local market demands. He continues indicating that there is a remarkable similarity with respect to species composition among different home gardens, especially with respect to the herbaceous components. This can be explained by the fact that food production is the predominant role of most herbaceous species and the presence of an over story requires that the species are shade-tolerant [8].

Food production is thus the primary function and the role of most, if not all, home gardens. An important characteristic of food production in home gardens is the nearly continuous production throughout the year. The combination of crops with different production cycles results in a relatively uninterrupted supply of food products. Depending on the climate and other environmental characteristics, there are peak and slack seasons for harvesting the various products, but generally there is something to harvest daily from most home gardens.

Most of this production is for home consumption, but any marketable surplus can provide a safeguard against future crop failures and security. Additionally, these harvesting and maintenance operations require only a relatively small amount of labor from the members of the family [9].

Homestead farming and agro-ecology services

Agriculture under home gardens is also being recognized for the ecosystem services and multi-functional landscapes it can provide in addition to yield. These include biodiversity, natural habitats for conservation and recreation, climate stabilization and aesthetic and cultural amenities such as vibrant farms capes. One reason for the survival of the ancient home gardens as a land-use system is probably the direct supply of required goods and services to its user. In developing countries, majority of rural farmers survived under home garden's services produced through plants, animals and trees production. For that reason, mixing crop, animal and trees was an excellent alternative and improved source of agro ecological services as well as cultural services. The same historical sustainability can be found in other ancient agro forestry systems such as the parkland system and old peanut areas in Western Africa. Homestead agro forestry plays a vital role in providing fire wood, fodder, fruit and timber. Because of the rapid growth of population and indiscriminate destruction of forest cover, it is difficult to meet the country's huge demand for timber, fuel, food and fodder and maintaining ecological balance. In such a situation home garden represents a land use system involving deliberate management of multipurpose trees and shrubs in close association with seasonal vegetables. These practices are appropriate for poor farmer as they can earn immediate benefit from crops while waiting for long term benefits from trees. Other main attributes of homestead faming systems, that have been identified as contributing to conservation and livelihoods, are: The high levels of biological diversity; efficient nutrient cycling offered by multispecies and multistrata composition; conservation of bio-cultural diversity; low dependence on external inputs; improvement of household income; product diversification, as well as nonmarket values of products and services; and social and cultural values including the opportunity for gender equality in managing the systems.

Akhter as cited in Atikullah, SM mentioned that the farmers consider the trees as savings and insurance against the risk of crop failure and low yield. During natural disasters such as flood and cyclone, homestead is the only one place where people can get shelter and protect themselves. Especially the poor and pro-poor affected during this period, are fully dependent on available plants and vegetables in the homestead. Therefore, massive plantations special attention to uncommon species in the homesteads and their management are the centre for conservation activities.

Homestead and agriculture growth

Continued cultivation and use of home gardens over the past millennium has played a key role in successful achievement of sustainable livelihoods and self-sufficiency. In gardening activities, home gardens helps in controlling pastes and diseases due to different types of plants intercropped which play a role of repellent plants for some insects. The cultivation of different crops in home gardens is

regarded as a strategy of farmers to diversify their subsistence and cash needs. Diversification also helps to stabilize yield and income in cases of incidences of disease and pests, and market price fluctuations. While growing different species of plants, farmers cover the land with beneficial cover crops and consequently soil erosion is regularly reduced and well fertilized to produce. Today, farmers are interested in homestead agro forestry systems where they are cultivating many species of agro forestry trees including leguminous and non leguminous trees around their Houses. These systems attained international popularity because they represent good examples of sustainable and resilient farming systems. They offer practical responses to today's challenges such as land degradation, depletion of forest resources, and the rural energy crisis. Furthermore home gardens contribute to the optimum utilization of scarce land, while enhancing environmental and landscape outcomes. Expansion of home gardens is a land use strategy enabling farmers to rehabilitate degraded lands. As expansion in this sense should not promote competition between productive agricultural land and deforestation; degraded land is a promising land-use type where expansion could take place. These increases occur because of improved microclimates and better moisture retention, reduced wind speeds and thus reduced wind erosion and damage to crops [10].

DISCUSSION

Homestead and biodiversity

From ecological and conservation point of view, assessment of biodiversity of any habitat or locality has been regarded as one of the vital issue for careful preservation, promotion and management of the variety of life-forms. Increased human population and associated development activities in the last few decades has resulted directly and indirectly in depletion of the natural vegetation which in turn increase the pressure on the homestead forest specially in the developing countries to meet various needs of the human beings. Home garden agro forestry systems in the tropics are known for their structural complexity and diversity in crop and other plant species. People have been cultivating a wide range of plant species in and around their homes since the early stages of human history and diversity in species is the most striking features of home gardens. Ahmed as cited in Atikullah, S. M. stated that homestead is the most important source of natural resources and plays an important role in the economy and provides nearly 50 percent cash flow to the rural poor.

An example is given in Bangladesh where homestead is the most important natural resource base in containing a large number of diversified plant species. Some of these plant species are called life supporting species because these species in the homesteads play a vital role for the livelihood of the people, especially during food scarcity or natural disasters in the rural areas [11].

From the conservation point of view, homesteads are the in situ conservation sites of a wide range of plant biodiversity. Under this system, people plant or retain multipurpose trees and annual or perennial crops are inter-planted among the trees. Agro forestry tree species make environment favorable for precipitation, increase humidity and minimize the loss of water through transpiration and keep the microenvironment colder by absorbing water from deep soil level. Unfortunately the homestead forests are under increasing pressure of exploitation due to the growing population. Home garden could also play a significant role in adaptation to change the microclimate, provide permanent cover, diversify the agricultural systems, improve resource use efficiency, improve soil fertility and reduce carbon emissions and increase sequestration and also rich in biodiversity. It is unfortunate that in the last few decades increased human population has resulted directly and indirectly in depletion of the natural vegetation which in turn increases the pressure on the homestead forest especially in the developing countries to meet various needs of the human beings as it provides basic needs of [12] the people such as food, shelter, cash etc with their diversified species. In tropical countries with rapid population growth and declining forest cover, home gardens may become increasingly important to both livelihoods and to conservation, particularly in regions with high population densities, expansive agriculture, or traditional farming practices that include mixed gardens. In such situations, home gardening may be a possible option to maintain species ex situ while replacing goods and services previously found in forests. Home gardens in villages support large numbers of plants, animals, insects, and microorganisms and show greater biodiversity than non-garden farmlands [13].

Homestead and socio economic benefits

The home garden has been described as an important social and economic unit of rural households, from which a diverse and stable supply of economic products and benefits are derived. Continued cultivation and use of home gardens over the past millennium has played a key role in successful achievement of sustainable livelihoods. Therefore, home garden growers get profit in several ways and to fully understand how home gardens function, and what benefits they provide to their users, it becomes necessary to integrate and then analyze both socioeconomic and biophysical aspects of these systems. Plants grown in home gardens and agricultural fields provide rural families with income, nutritious vegetables, animal feed, etc.

This helps communities to achieve self-sufficiency. Home garden acts as a reserve bank of food and cash for farmers. The income from homegarden was significantly different within the farm categories. Larger farm categories were getting more income than the smaller farm categories because of having large pieces of land. It was observed that the medium farmers intensively cultivated the home garden. This might be the reason for getting more income from their home garden. The marketing of home garden products by rural households and small-scale farmers has been identified as a potential means of poverty alleviation [16]. Home gardens are a vital source of income for subsistence economy and contribute to the self-sufficiency of many rural households and the role of home garden to household economy may vary depending on the component products and nature of the products utilization. In their research conducted in Cambodia and Bangladesh, A. Talukder indicated a significant improvement in household income from sale of products from home gardens and animal husbandry in the Homestead Food Production (HFP) program communities. Households used the income earned from the sale of HFP products to purchase additional food for their families. Other important household expenditures were education, including materials and clothing for school and investing in income-generating activities of the household such as reinvesting in the HFP to purchase seeds, seedlings, saplings, and chicks or to invest in other income-generating activities [19].

Trees in the homesteads, often called homestead forests or agro forestry, play an important role in rural economy as well as national economy. Homestead agro-forestry improves the socio-economic condition of the farmers by increasing profitability, sustainability and crop security through balanced soil utilization and fertility preservation. It turns to be a constant source of income. If crop fails farmers may get their income from trees. So it bears no risk for the farmers. A home garden is, therefore, part of a household livelihood strategy and has gained prominence as a natural asset through which sustainable use of resources, particularly for the livelihoods of the poor, may be achieved. Homestead gardening and agro forestry systems provide an important contribution to sustainable agricultural production because of their potential to meet economic, social, ecological, and institutional conditions for sustainable livelihoods. Homestead agro forestry has two categories of social benefits which are livelihood and culture that meet multiple needs of the local people. For livelihood aspect, homestead agro forestry has contributed through both market and non-market perspectives. Non-market perspectives are personal consumption and dietary benefits simply as a healthy diet from fresh produce. Market perspective includes the sale of agro forestry products. For cultural aspect, homestead agro forestry also has important cultural values to the local people where some products are often given as a gift and play a critical role in building and maintaining social networks, others are used and considered for many functions such as religious ceremonies [14].

Homestead and woman

Women are the backbone of the development of rural and national economies. They comprise 43% of the world's agricultural labor force, which rises to 70% in some countries.

In Africa, 80% of the agricultural production comes from small farmers, who are mostly rural women. Women comprise the largest percentage of the workforce in the agricultural sector, but do not have access and control over all land and productive resources [15].

Home gardens throughout the tropics are operational farm units that occupy a portion of the homestead land, engage family labor, particularly women and children, and sustain high agricultural production. It is very intensively cultivated to grow and raise a wide variety of plant and animal species utilizing primarily household female and child labor. The primary production goal here is to meet household consumption demand, although farmers often sell small portions of their consumption stock to meet social needs. In the their review of the survey results from Bangladesh, Cambodia and Nepal, A. Talukder [17].

showed that for almost three-quarters (73%) of the households in Homestead Food Production (HPF) villages in these countries, the majority of HPF, including deciding what type of garden practice to use at the homestead, were managed by women. This suggests that women were the likely decision-makers regarding the use of the income earned by selling garden produce [18].

Because of their small size and biodiversity, home gardens do not require much labor input at a time but they involve the continuous year-round monitoring and nurture of plants and animals. Family members provide most of these small labor inputs and work in home garden when they are not performing non-home garden farming, off-farm work, and other household tasks (women), and also during after-school hours (children). Gender plays an important role in home garden farming. For the most part, women and children manage the home garden as it occupies an integral part of their activity space. In near-landless and smallholder households, women and children perform more 80% of farming tasks, including species selection, field preparation, sowing, planting, weeding, irrigation, spraying, and harvesting in addition to raising poultry and livestock, while the men in addition maintain the tree crops and shrubs. Homestead also provides the opportunity of employment for a large number of laborers especially for the women. Farm women should be encouraged more to participate in homestead agro-forestry as a means of their income generation, stronger voice in family decision making process, etc. Extension services should be provided and training should be given to the rural women by the government and non-government agencies/ organization to encourage the rural women folk for practicing homestead agro-forestry [20].

Conclusion and Recommendations

This review paper attempted to characterize the homestead gardening in small farming systems in developing countries. We explored the literature related to this field and tried to discuss the topic into six sections which are food security, agro ecology services, agricultural growth, socioeconomic benefits and gender. In all points of discussion, we found that homestead gardening played a vital role in small households from its existence. Homestead practitioners got many benefits from services and products provided by home gardens. With these benefits, they have improved their lifestyle socially and economically. Food security in small households' families is no longer a big problem to them due to the production of different commodities such as fruits, vegetables, grains and animal products (eggs, meat and milk). Agriculture has been improved due to the intercropping practices and use of composts produced locally. The availability of trees in the home gardens contributed significantly to the improvement of soil by producing biomass and facilitating water retention. Services gained by home gardens were discussed and we found that they are extremely valuable by the smallholder farmers. Some of them include biodiversity services (nutrient cycling, carbon sequestration, pest regulation, pollination and sustain agricultural productivity), natural habitats for conservation and recreation, medicines, climate stabilization and aesthetic and cultural amenities. The evidence for socio and economic development is the high level of wellbeing and income generation in family's members of small farmers (education of children, good health, saving and credits and investing in other income-generating activities such as seeds, seedlings, animals). In this review, we found that women are called to be fully employed in the homestead due to different activities supposed to be accomplished every day (planting, maintaining crops and feeding animals) and it is said that women are the best performers in homestead gardening. Our review paper confirms the valuable function of homestead gardening for the development of small farming systems and we recommend all developing countries and local or international stakeholders involved in agriculture and related livelihoods systems at deferent level of intervention to take into consideration this practice which may be an agricultural extension model "Homestead farming model" to be implemented by the concerned countries.

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