A Study on Contribution of Home Gardens for Household Food Security with Special References to Intermediate Zone, Sri Lanka

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ABSTRACT

Home garden is one of the agro forestry systems having mixed cropping of annual and perennial crops which are important sources of food, fuel, timber, shade, and many other products. In village level, the stability of household food security is primarily based on their home gardens. In Sri Lanka, home gardening is an age-old practice in various parts of the country including Intermediate low country. The Intermediate low country home garden is different from other home garden systems mostly in terms of the variety of plant grown depending on season, soil and locality. A study was carried out in six Grama Niladari (GN) Divisions in Intermediate zone with the objectives of examining crop diversification and the availability of annual food supplement for family nutrition. One hundred fifty village level home gardens from Kariyamaditha GN (IL1b), Dambethalawa

GN (IL1b) from Ambilipitiya, Pathegama east(IL1a) and north (IL1a) GN divisions from
Matara, Kubalgama GN (IM2a) and Silogama GN (IM2a) from Balangoda in Intermediate zone were taken using simple random sampling. SPSS 17.0 and Microsoft Excel 2010 were used for data presentation.

According to the sample survey, it was revealed that less intensively managed home gardens are found in low country, Sri Lanka. 22 species of fruit bearing trees, 28 species of vegetables crops, 17 species of herbs, 13species of timber trees, 06 types of cereals are grown in these home gardens. Some of these crops are somewhat distinct from Kandyan home gardens and also from another GN Divisions even within the intermediate low country zone. Instead of these crop species, animal husbandry is practices in some home gardens which increase the availability of various food products from them. 40% home gardens are used for family consumption while 60% home gardens are used for both family consumption and market. With the exception of the month of October and December, productions from these home gardens are distributed throughout the year. This study highlights that the importance of giving continues incentives and identification of potentials of these home gardens for increase production and better returns are essentials to minimize the village level household food security.

Keywords: Home garden, household food security, Intermediate low country. mixed cropping, village level.

Introduction and research problem/issue

Based on the widely accepted definition of the World Food Summit (1996), food security is achieved when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life (Thibbotuwa, 2004). Food security stability at national level depends on the domestic food production and the country's capacity to meet import requirements from the international markets (Tennakon A, 2010). Most of the countries are ensured their stability of food security through imports. This is totally risk for developing countries including Sri Lanka. According to the Tennakon A. (2010), the increase in international food and fuel prices within the recent past has increased the food and fuel bill without a corresponding increase in export revenues and has worsened the capacity for meeting Sri

Lanka's import requirements. This affects the stability of food security at both national level and household level. Household stability of food security, in contrast to national level stability, depends on the smoothness of the flow of income, which is often a function of the sources of household income (Tennakon A., 2010). In village level,

the stability of household food security derives on their income from employment or agriculture. People who are highly depend on agriculture remains at a risk level in their stability of food supplement. Even in a single crop failure creates instant food security for the entire households. In this context, continuously management of home gardens are mitigated the household food insecurity at some extent.

Home gardens is almost a common practice to plant trees around habitations, courtyards, wells, threshing yards and in fields in every region of the country. The trees are planted for fruits, wood, seeds, flowers, shade etc. they are planted as they are beautiful to look at. They harbor different kinds of birds and other animals (Dwivedi A.P., 2001). Home gardens can be identified as one of the agro forestry practices in Sri Lanka. In agro forestry there is ample scope for a piggyback approach to the combination of long term sustainability benefits with short and medium term productivity gains in cleverly designed systems, such as contour hedgerows of multipurpose trees that provide erosion control along with yields of valued products (MacDicken K.G. and Vergara N., 1990). Land use combining agriculture, forestry and livestock rearing are taken place widely in village level home gardens when comparing to the urban areas. In Sri Lanka, most of the rural people have enough physical resources like land, fertile soil and water to flourish their home gardens throughout the year. Home gardens which are maintained properly provide more benefits from economic cash crops and the subsistence products. The end result is a better level of living and quality of life for dwellers.

The variety of crops like perennial and non perennial crops provides the seasonal foods for householders. Because, different types of yields supply in different seasons and it surely determine the household food security yearly. It helps to improve families' nutritional supplement. Such as, minerals, fiber, vitamins, carbohydrates, proteins as a nutrient to the family. Furthermore, continues supplement of foods fulfill the requirements of energy, medicines, some flavors for food preparation and preservation. Therefore, properly maintain home gardens supply the balance diet for householders throughout the year. Not only from crop productions, but also from animal husbandry like hens, cattle and goats provides essential nutrition for householders. Accordingly, home gardens support the household food security by providing diversified crops and milk yields seasonally that ensure the nutritional and energy supplement for the family.

In Sri Lanka, Kandyan Home garden system and Low country home garden system are identified as agro forestry practices. Kandyan home garden can be identified in wet zone while low country home garden can be seen in wet, Intermediate and dry zone, Sri Lanka. The intermediate zone receives a mean annual rainfall between 1750 to 2500 mm, with a short and less prominent dry season. As low temperature is an important climatic factor affecting plant growth in the Wet and Intermediate zones of Sri Lanka (Survey Department Sri Lanka, 2007). Based on many decades of research, Sri Lanka is divided in to 24 agro ecological regions within major climatic zones in Sri Lanka based on rainfall and elevation. It has been observed that rainfall, elevation and soil play an equally important role in particular farming system of a region. According to the agro ecological zones in Sri Lanka, the Intermediate zone consists of 20 agro ecological zones including

5 agro ecological sub regions in Intermediate low country. According to the Survey Department of Sri Lanka (2007), coconut, paddy, mixed home gardens, export agricultural crops etc. can be identified in this zone.

Most of the researchers have paid more attention towards the Kandyan home garden system while there was less attention towards low country home gardens system. Therefore, this study was focused to study the sustainability

of the intermediate zone low country home gardens for household food security focusing crop diversification and annual food supplement from home gardens' productivity.

Today, the world faces a challenge of ensuring that millions of households living in poverty have access to enough food to maintain a healthy life. Food insecurity is a household situation, not an individual situation. Hunger and malnutrition are also consequences of the food insecurity. Sri Lanka is no longer in the "alarming" category according to the Global Hunger Index (GHI). This shows that Sri Lanka's food security at national level has improved significantly. But according to estimations, it was revealed that 4.7 million people are undernourished by 2015 especially including rural people. Therefore, it is important to see if national food availability has sufficiently ensured access to food at the village level household. In this case, the development of home gardens is important to families because they provide sustenance and income throughout the year from the diversity of crops. This helps to mitigate the risk of food insecurity in each household in some extent. Therefore, this study was focused to identify the sustainability of village level home gardens for food security in Intermediate low country zone.

Research Methodology

Both primary secondary data were used for this study. Questionnaire survey was the main data collection method used to collect data and information on villages. Two-sub region of Intermediate low country zone were selected naming IL1b and IL1a using snowball sampling method. 100 home gardens from Kariyamaditha GN (IL1b), Dambethalawa GN (IL1b) of Hambanthota District, Pathegama east(IL1a) and north (IL1a) GN divisions of Matara District in Intermediate low country were taken using simple random sampling.

In addition, observation was done to identify the arrangement of home gardens in each GN division. Data was analyzed by using SPSS 17.0 software package. Percentage distribution method was employed for data presentation.

Results and Findings

When study the home gardens, land size is very significant. Because it helps to determine how far householders used land for their maximum benefits. Similarly, majority of the home gardens' land size in Pathegama east and north are small having less than half acres (54%). When consider about maintains of the home gardens, majority of the holdings are maintained by using family labor. Some of the home gardens of Dambethalawa and Pathegema north are maintained by using hire labors only. It was recorded as 16% in

Dambethalawa and 4% in Pathegama north. 28%, 32%, 4% and 4% of total holdings following in Kariyamadiththa, Dmbethalawa, Pathegama east and north are maintained by using both family labors and hire labors.

The sitting of the plants is rather haphazard in this zone like Kandyan home gardens. There are no home gardens composed of homogeneous plots of a single species; diversity and frequency are the outstanding features. Under the large trees, various types of fruit trees are grown. According to the survey, 22 species of fruit bearing trees are identified in the study area. Likewise, common fruit crops of each GN division are banana *(Musa)* (66%), mango (*Mangifera indica)* (78%), pineapple *(Ananas comosus) (36%)*, papaya (*Carica papaya) (36%)*, rambutan

(*Nephelium lappaceum*) (22%), cashew (Anacardium occidentale) (17%), pear (*Pyrus*) (39%), rose apple (*Syzygium samarangense*) (20%), orange (*Citrus reticulate*) (25%), divul (*Limonia acidissima*) (18%), delum (*Punica granatum*) (6%), sweet lemon (*Citrus reticulate*) (23%) and katu anoda (7%). Uguressa (*Flacourtia indica*) (8%), avocado (5%), beli (7%), veralu (3%), lowi (1%), kabaranka (5%), komadu (4%), kakiri (2%) and siyablala (9%) are sparely distributed in intermediate low country home gardens. According to responders, it was revealed that mango, rose apple and siyabala were planted for both fruits and shade of the gardens. In addition to the fruit trees, householders have grown Margosa (31%), akeshiya (3%), albesia (8%), kottamba (10%), mara (1%) and pihimbiya (1%) as shade trees in their home gardens.

According to the survey, it was revealed that commonly fruits are highly available in the Intermediate low country home gardens in May and April. 81% of owners said that fruits were available in April while 78% of owners said that fruits could be seen in their gardens in May. However, the figure 02 shows that, there is a significant variation of the available months of fruits yield within the four GN Divisions. According to the survey, it was revealed that fruits are available in April, May, June, July, September, March and February in Pathegama east and north GN Divisions. But in Kariyamaditthta and Dambethalawa GN Divisons, fruits are available in February, March, April, May and June.

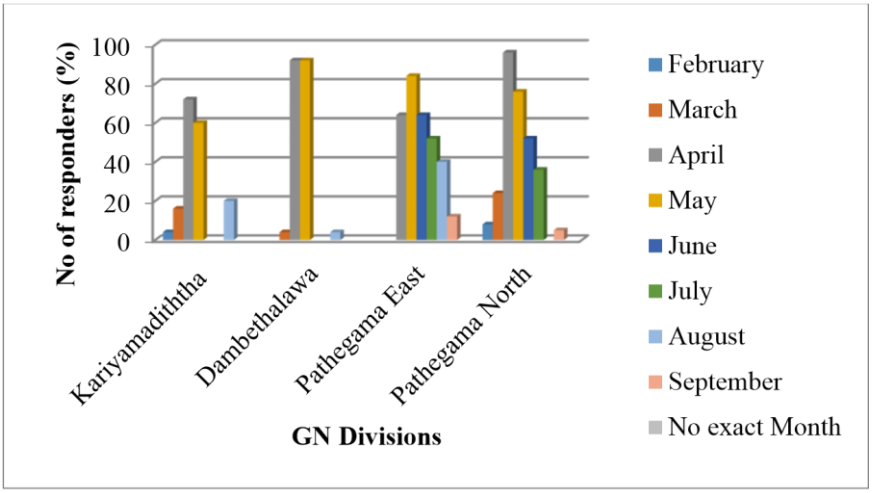

Figure 02: Months of fruits Yields received from the home gardens
Sources: Field survey, 2016

28 species of vegetables crops in this zone are grown depending on season, soil and locality. It provides different kinds of goods for householders. Common vegetable crops are ma karal *(Vigna unguiculata) (35%)*, bandakka *(Abelmoschus esculentus) (13%)*, del *(Artocarpus Altilis) (40%)*, wambatu *(Solanum macrocarpon) (14%)*, manioc *(Manihot esculenta) (27%)*, ela batu (Solonum Indica) (15%) and kathurumurunga *(Sesbania grandiflora) (13%)*.

Kathurumurunga is planted as a vegetable crop and it is a soil enriching species as well. Long Bean or Ma karal is common vegetable which native to Asian countries and widely cultivated in Sri Lanka. The pods are use as a cooking vegetable and leaves are use as a mix leaf vegetable. Most of these vegetables have carbohydrates, fat, protein, vitamins, minerals and other constituents like water. As well most of are ayurvedic plants like ela batu, thibbatu, karawila etc. roots, leaves, bark and seeds of some of these vegetables are used for ayurvedic purposes.

The household uses compost and chemical fertilizers for vegetable growth. Green chili *(Capsicum)(23%),* tomato (*Solanum lycopersicum)(5%),* vael ala*(Colocasia nymplimfolia)(5%),* karawila*(Momordica charantia L.)(4%),*

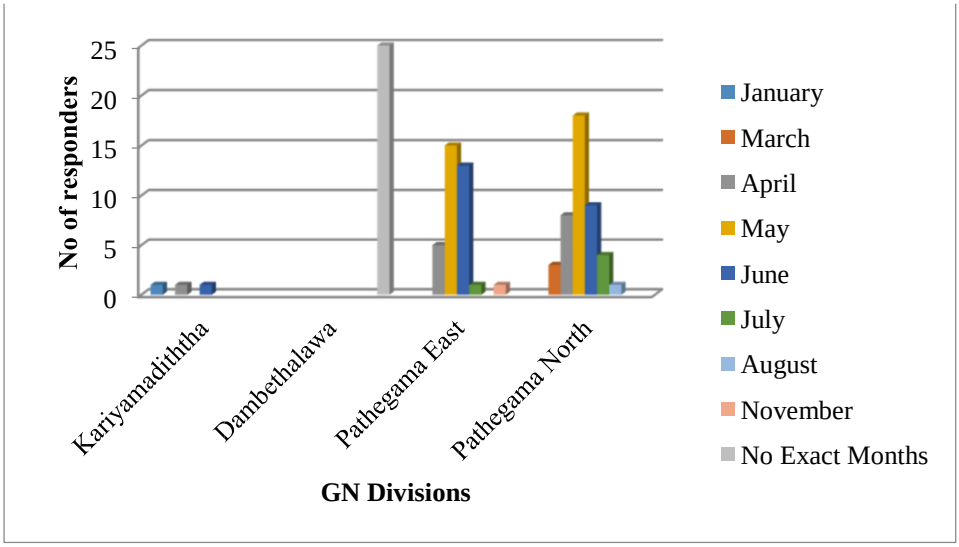

Figure 03: Months of Vegetables received from the home gardens

kohila*(Lasia Spinosa)(2%),* malu miris(*Capsicum annuum)(5%),* pathola*(Luffa acutangula)(4%),* kiri ala(27%), hulankiriya(19%), bathala(32%), dambala(21%), pumpkin(*Cucurbita maxima)(12%),* cucumber*(Cucumis sativus)(3%),* thibbatu*(Solanum torvum)(10%),* labu*(Lagenaria siceraria)(4%),* Putuwala ala(3%), atu kakiri*(Cucumis melo)(1%),* gahala*(Colocasia esculenta)(3%),* murunga*(Moringa oleifera)(3%),* innala*(Plectranthus rotundifolius) (1%)* and watakolu*(Luffa acutangula)(1%)* are sparely distributed in these home gardens.

Continues supply of food is important for household food stability. Various kinds of vegetables are grown depending on the rainy season in Pathegama east and north GN Divisions. Such as May, June, July, August and November. While Kariyamadiththa and Dambethalawa GN Divisions settlers have cultivated vegetables using water supply not depending on rainy season. The survey revealed that they have no clear idea regarding the yield of months for vegetables that they have cultivated. They told that there is no any exact time period for the vegetable yields because they have cultivated crops using water supply.

Sources: Field survey, 2016

17 species of herbs can be found in this region and 2 of them are common for each GN Divisions. Those are betel *(Piper betle) (67%)* and turmeric *(Curcuma domestica) (27%* Polpala *(Aerva lanata (23),* ranawara (*Cassia auriculata) (17%),* babila*(rhombifolia) (16%),* inguru piyali *(Kaempferia galangal) (6%),* nika *(Vitex negundo L) (7%),* adathoda*(Adhatoda vasica) (8%),* thebu *(Costus speciosus)(3%),* tel erandu*(communis) (4%),* hathawariya *(Asparagus racemosus) (7%),* komarika *(Aloe vera) (20%),* hadun *(Chloroxylon swietenia) (9%),* aththora *(Cassia alata) (12%),* coffee *(Arabica) (1%),* monarakudumbi *(Vernonia cinerea) (8%)* thebu *(2%),* iramusu *(Hemidesmus indicus) (6%)* are sparely distributed in this region. In addition, gotu kola (Centella asiatica) (43%), mukunuwanna (24%), nivithi (19%), thampala (20%), kankun (15%), sarana (5%), asamodagam (2%) are grown and cultivated in some home gardens for family consumption.

According to the survey, it was revealed that 13species of timber crops types were planted in this region Jack fruit *(Artocarpus heterophyllus) (100%),* mahogany *(Swietenia mahagoni)* (37%) and teak *(Tectona grandis) (54%)* were planted widely in this zone. Jack fruit, being the most critical food item, plays an important role in household food security at household level. Jack fruit and coconut can be identified as the multipurpose tree species in home gardens in this zone. Attoniya *(Alstonia macrophylla) (17%),* kaluwara *(Diospyros ebenum) (3%),* akeshiya (4%), sapu *(Magnolia champaca) (2%)* and damaniya *(Turnera diffusa) (5%)* are planted in Pathegama east and north for timber. Burutha *(Chloroxylon swietenia) (11%),* nadun (*Pericopsis mooniana) (4%),* mara *(Albizia lebbeck) (5%),* liyan *(Homalium zeylanicum) (9%)* and halmilla *(Berrya cordifolia) (2%)* are sparely grown in this zone.

Curry leaves (Murraya koenigii) (88%), rampe (Pandanus latifolia*) (79%),* sera (Cymbopogon citrates) (19%), iguru (29%), sadikka (3%) and karabunati (Syzygium dromaticum) (13%) are planted in these home gardens. Gradually, the backyard patch is dominated by these shrubs and crops. Curry leaves and rampe are widely distributed in this zone than other spices. Those are used for household consumption.

Plantation crops such as coconut *(Cocos nucifera),* pepper and cinnamon *(Cinnamomum dubium)* are planted in the periphery of the home gardens. The survey revealed that 31%, 52% and 2% of the total householders have planted following coconut, pepper and cinnamon for market basis. In addition, banana (2%), kawpi (3%), mun (4%), vambatu (1%), tobacco (2%), betel (11%), pineapple (1%), ma karal (1%), cinnamon (2%) and Jack fruits (1%) are planted by the householders for earn some money. Most of the home gardens in Kariyamadiththa and Dambethalawa contribute much to the household economy than Pathegama east and north GN Divisions. Most of are in Pathegama east and north GNs paid less attention for the market based crop production from their home gardens. Because they have another forms of employments.

According to the survey, it was revealed that 06 types of cereals are planted in Kariyamadiththa and Dambethalawa GN Divisions while no one has grown cereals in Pathegama east and north. 40%, 60%, 52%, 40%, 9% and 4% of home gardens are cultivated following maize, kawpi, mun, wheat, peanut and kurakkan in Kariyamaditha and Dambethalawa GN Divisions. Except the home gardens, most of the setters have other cultivation lands which provide the economic benefits for them. 22%, 6%, 6%, 16%, 6%, 6% and 2% of settlers in Kariyamadiththa and Dambethalawa GNs are cultivated following kurakkan (*Eleusine coracana),* cowpea (Vigna unguiculata), mun, banana, pepper, maize (*Zea mays*) and peanut in other lands for earn money without depending on the home gardens cultivations. 6% and 4% of settlers in this zone are cultivated following coconut and cinnamon in other lands. 38% of setters in Pathegama east and north have rain fed cultivated paddy fields which are cultivated in Yala season. In some home gardens, crops trees are mixed with livestock. Animals such as chicken, cattle and goats are reared in some household. Eggs and milks are used to get household nutrients. In each GN divisions, cattle raring can be seen. According to the survey, goats raring can be seen only in Dambethalawa GN. It was recorded as 4%. As well, an only cattle rearing was recorded as home garden live stock. It was recorded as 8%. 28%, 32% and 20% of total house holdings are reared cattle for milk following Kariyamadiththa, Dambethalawa and Pathrgama north. Chicken are reared in Kariyamadiththa (24%), Dambethalawa (12%) and Pathegama north (8%) for eggs. There is a significant difference can be identified regarding the benefits of the home gardens. 100% and 96 % of home gardens following Kariyamadiththa and Dambethalawa are used for both family consumption and market. In Pathegama east and north, majority of the home gardens are used for only family consumption. It was 80% and 76% of total home gardens following in Pathegama east and north.

Conclusions, implications and significance

The mixed gardens can be identified as production of the home gardens in Intermediate zone is diversified. It is somewhat different from Kandyan home gardens. Both wet and dry zone crop species are grown in this zone. When comparing the Kandyan forest gardens, number of cereals and drought resistance species are planted in these home gardens using family support or/and hire labors. Products include vegetables, spices, leaves, fruits, timber, shade, fuel and fodder. These species are able to thrive in the home garden system. Most of the householders are used family labor for maintain the home gardens. Both perennial and non perennial crops are grown in each home garden. Home gardens vary in their species composition depending on the location. Instead of these crop species, animal husbandry is practices in some home gardens which increase the availability of various food products from them. Like milk and eggs. However, with the exception of the month of October and December, productions from these home gardens are distributed throughout the year.

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