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Understanding Homegarden in Household Food Security Strategy: Case Study Around Jimma, Southwestern Ethiopia

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Abstract: The biophysical and socioeconomic contributions of homegarden agroforestry practices are well appreciated throughout the world. This is particularly more relevant in tropical region as homegardens have been a way of life for century in the region. The present study tries to examine homegarden agroforestry practices and evaluate their significance towards household food security strategy in southwestern Ethiopia. A total of 98 homegardens (11%) were randomly selected for the study. A combination of complete plant inventory and interview were used to collect data. The result showed that the size of homegarden ranged from 0.01-1 ha with mean 0.15 ha. About 99% of the assessed homegarden were established on open areas in response to getting more food and cash to support family. *Enset ventricosum*, avocado, cabbage, maize, coffee, *Catha edulis* and banana were the most cultivated crops in the homegarden. The relative household income contribution of homegarden was found about 44.5%. *Catha edulis* and avocado accounted for about 72.6% of the homegarden income contribution. Income from homegarden increased an average household income from 2100-3784.11 Ethiopian Birr. A paired t testing result showed that the difference in average annual income of household due to homegarden was significant ($t = 8.119$, $df = 97$, $p = 0.000$). The present study revealed that contribution of homegarden goes beyond gap filling. Economic important crops dominated the homegarden. Some households were getting much benefit from their homegardens. Paying due attention to homegarden development has significant role in addressing household food security in the future.

Key words: Agroforestry, homegarden, cash crops, livelihood, household income, food security

INTRODUCTION

Homegardens are traditional agroforestry systems with complex structure and multiple functions (Das and Das, 2005). Smallholder farmers cultivate different crops in the homegarden as a strategy of livelihood diversification which helps to stabilize their sustenance (Abebe *et al*., 2010). Nair (2008) report indicates that homegarden agroforestry is an age old and time-tested land use approach that makes the best use of nature's goods and services.

These land uses approach have attracted the research attention since late 1970's (Kumar and Nair, 2004; Das and Das, 2005; Nair, 2008). Although, the recorded reports on homegardens are not globally exhaustive (Maroyi, 2009), the biophysical and socioeconomic contributions of homegarden agroforestry practices are well appreciated throughout the world (Mendez, 2001; Kumar and Nair, 2004). This is particularly more relevant in tropical region where homegarden agroforestry practices have been a way of life for century for smallholder farmers (Kumar and Nair, 2004). To this effect homegarden agroforestry has been considered as one of the best land use option (Kumar, 2006; Akinnifesi *et al*., 2010) that helped smallholder farmers to support their family (Kalaba *et al*., 2009).

These homegardens are evolved either through growing food crops in the forests or establishing tree crop production systems on arable lands (Kumar, 2006). Moreover, the homegarden agroforestry systems reflect the wisdom of the traditional culture and ecological knowledge of the local community (Kumar and Nair, 2004; Tangjang and Arunachalam, 2009).

Smallholder farmers in southwestern Ethiopia have an experience of homegarden agroforestry for ages (Bishaw, 2009; Abebe *et al*., 2010). However, empirical study on homegarden agroforestry practices around Jimma is insufficient. As a result, less attention has been given to homegarden development towards addressing household food security. This study tries to examine homegarden agroforestry practices and evaluate their significance towards household food security strategy.

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MATERIALS AND METHODS

The study site description: The study was conducted at 14 km from Jimma town. Jimma town is found at 352 km from Addis Ababa in southwestern Ethiopia. The study site is located between 36°00' and 37°00'N of latitude and 7°00' and 8°00'E of longitude. The area receives annual rainfall between 1200 and 2800 mm. The temperature ranges between 11.8 and 28.8°C. The altitude of the area is about 2000 m.a.s.l. The total population of the area is about 5440. The total household number of the area is about 888. The study area has the highest populated density in Jimma zone. Agriculture is the means of the livelihood of the people. Most agricultural producers are subsistence farmers with smallholding. Coffee is the most important cash crop in the area. Maize, teff, sorghum, pulses and root crops are the major crops grown in the area. Perennial crops dominate the homegarden in the area.

Methods: The research was carried out between March-July 2010. A combination of complete plant inventory and interview were used to collect data. Complete plant inventory was done to document plants in homegarden.

Information on household characteristics, purpose of homegarden practices and annual income from homegarden were collected through household interview. Semi structured and structured type of questionnaire was used for the interview. The total number of the households in the study area was 888. From which 98 (11%) homegardens were randomly selected for the study. Data was analyzed using descriptive statistics and paired t-testing. Assumption of normality was checked before running paired t-test. SPSS version 16 was employed for data analysis.

RESULTS AND DISCUSSION

Household characteristics: The study result showed that the mean family size of the sampled household was 6. Household that belongs to poor and medium household categories outnumbered the rich household category by 93%. The landholding size of the sampled households ranged from 0.1-7 ha with mean 1.09 ha. About 62% of the households owned a land <1.09 ha. Household land use categories were identified as homegarden, coffee farm, cultivated land and eucalyptus woodlot. About 45% of the households owned homegarden, coffee farm, cultivated land and eucalyptus woodlot. About 94% of the households owned homegarden, coffee farm and cultivated land. The size of homegarden ranged from 0.01-1 ha with mean 0.15 ha. About 73% of the homegardens sizes were <0.15 ha (Table 1). Das and Das (2005) reported homegarden size that ranged from 0.02-1.2 ha with an average 0.3 ha from Barak valley, India. Kabir and Webb (2009) also reported the land with 0.27 ha used for homestead from southwestern Bangladesh. Tynsong and Tiwari (2010) reported 0.075 ha as average size of homegarden from Meghalaya, India.

Table 1: Summary of household characteristics

Characteristics	N	Min.	Max.	Mean	Valid percent
Family size	98	2.00	12	~6.00	-
≤6	68	-	-	-	69.4
>6	30	-	-	-	30.6
Wealth status	98	-	-	-	-
Rich	6	-	-	-	6.7
Medium	38	-	-	-	42.7
Poor	45	-	-	-	50.6
Land holding size (ha)	98	0.10	7	~1.09	-
≤1.09	-	-	-	-	62.4
>1.09	-	-	-	-	37.6
Homegarden area (ha)	95	0.01	1	~0.15	-
≤0.15	-	-	-	-	72.6
>0.15	-	-	-	-	27.4
Household land use categories	98	-	-	-	-
Homegarden (%)	-	-	-	-	100.0
Coffee farm (%)	-	-	-	-	93.6
Eucalyptus woodlot (%)	-	-	-	-	44.9
Cultivated land (%)	-	-	-	-	93.6

Fig. 1: Partial view of homegarden at study site

Characterization of homegarden: Homegarden in the study area was found quite distinct from other land uses. Homegarden at glance was dominated by *Enset ventricosum* (Fig. 1). However, the closer the homegarden, the more number of species were seen in the homegarden. Origin and development of homegarden in the study area was found having similar pattern of development and purposes. From 98 selected homegardens, 99% were established on open areas (cultivated land and grazing land). The intention of the homegarden development was

Table 2: Categories of homegarden development and their current uses

Characteristics	Years	Frequency	Valid percent
Duration			
Minimum	4	-	-
Maximum	35	-	-
Categories			
After 10 years	-	13	15.3
Between 10 and 20	-	31	34.7
Before 20 years	-	54	52.0
Total	-	98	100.0
Homegarden uses			
Source of food	-	11	11.2
Source of cash	-	27	27.6
Source of food and cash	-	60	61.2
Total	-	98	100.0

to get more cash and food to support the family. Development of these homegardens was started 35 years ago. About 52% of the assessed homegardens were developed before 20 years ago. Majority of households (61.2%) mentioned homegarden as source of both cash and food (Table 2). This study agrees with Kumar (2006) report that homegardens are evolved through establishing tree crop production systems on arable lands. Homegardens are described based on their structure, composition and arrangement.

Arrangements of the components are deliberate in most homegardens (Mendez *et al*., 2001). However, investigation on arrangements of the components in the homegarden was found haphazard. There was no specific niche for specific crop was found in the homegarden. As a result, it is difficult to relate component arrangement in the homegarden to practical knowledge of farmers on specific requirement of crops in the homegarden. This is partly explained farmers need more time in accumulating practical knowledge as most of the cultivated crops in the homegarden are exotic species. Table 3 shows the result of plant assessment in 98 homegarden. Complete plant inventory results showed totaling 23 different cultivated crops were identified in homegarden.

The most cultivated crops in the homegarden were *Enset ventricosum*, avocado, cabbage, maize, coffee, *Catha edulis* and banana. *Enset ventricosum*, avocado, cabbage, maize, coffee, *Catha edulis* and banana were found in 98, 92, 84, 80, 78, 76 and 54% of assessed homegarden, respectively. Usually, these crops were cultivated in the homegarden for consumption and sale. However, the purpose of cultivating specific crop was quite different among households. Majority of the households were cultivating avocado (56.7%) and *Catha edulis* (63.5%) in the homegarden for sale. Coffee (58.7%) and vegetables were cultivated in the homegarden for consumption.

In Sidama southern Ethiopia coffee was cultivated in homegarden for cash (Abebe *et al*., 2010). However, farmers around Jimma had coffee farm for cash and

Table 3: Plant inventoried, frequency distribution and their purpose of production

			Purpose of production (%)		
Plants	Frequency (N = 98)	Cases (%)	Sale	Consumption	Both
Avocado	91	92.9	56.7	10.0	33.3
Banana	53	54.1	1.8	58.2	40.0
Wild custard apple	12	12.2	8.3	75.0	16.7
Peach	4	4.1	Nil	100.0	Nil
Mango	14	14.3	Nil	78.6	21.4
Orange	6	6.1	Nil	100.0	Nil
Papaya	11	11.2	Nil	81.8	18.2
Guava	11	11.2	Nil	66.7	33.3
Apple	5	0.6	20	40.0	40.0
Catha edulis	75	76.5	63.5	9.5	27.0
Enset ventricosum	96	98.0	4.4	38.3	57.4
Coffee	77	78.6	8.0	58.7	33.3
Cabbage	83	84.7	1.2	87.7	11.1
Hot pepper	20	20.4	Nil	90.0	10.0
Maize	79	80.6	Nil	98.7	1.3
Onion	29	29.6	Nil	89.7	10.6
Potato	3	3.1	Nil	100.0	Nil
Pulses	12	12.1	Nil	92.3	7.7
Pumpkin	17	17.3	Nil	84.8	15.2
Taro	39	39.8	Nil	87.5	12.5
Sugar cane	28	28.6	17.9	46.4	35.7
Sweet potato	2	2.0	Nil	100.0	Nil
Spices	11	11.2	Nil	90.0	10.0

Table 4: Number of plants species recorded per homegarden and their relative proportion

Species number per homegarden	N	Min.	Max.	Mean	Valid percent
4	1	4	13	8.13	1.02
5	7	-	-	-	7.14
6	13	-	-	-	13.27
7	21	-	-	-	21.43
8	16	-	-	-	16.33
9	11	-	-	-	11.22
10	17	-	-	-	17.35
11	9	-	-	-	9.18
12	2	-	-	-	2.04
13	1	-	-	-	1.02
Total	98	-	-	-	-

usually coffee cultivated at homegarden was used for consumption. Within homegarden the number of species per homegarden ranged from 4-13 where the mean was 8. About 7 species per homegarden were recorded in most assessed homegardens. About 4 species per homegarden and 13 species per homegarden were not common in most homegardens (Table 4). Previous research on number of species in homegarden varied considerably. For examples, Kabir and Webb (2009) reported 419 species of plants with an average of 34 species per household across 402 homegardens from Bangladesh.

Mendez *et al.* (2001) reported a total of 324 species with nine different uses from Nicaragua. Tynsong and Tiwari (2010) reported 197 plants species with an average of 89 plant species per homegarden from North-East India on homegarden 750 m^2. Abebe *et al.* (2010) reported 78 cultivated crops within 44 homegardens from Sidama

Table 5: Cultivated crops in homegarden viz. monthly products distribution

Crop type	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.
Apple	-	Yes	Yes	-	-	-	-	-	-	-	-	-
Avocado	Yes	-	-	Yes	Yes	Yes	Yes	Yes	-	Yes	Yes	Yes
Banana	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pulses	Yes	Yes	Yes	-	-	-	-	-	-	Yes	Yes	Yes
Cabbage	Yes	Yes	Yes	Yes	Yes	-	-	-	-	-	Yes	Yes
Catha edulis	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Peach	-	-	-	-	Yes	Yes	Yes	-	-	-	-	-
Coffee	Yes	Yes	Yes	Yes	-	-	-	-	-	-	-	-
Pumpkin	Yes	Yes	Yes	Yes	Yes	Yes	-	-	-	Yes	Yes	Yes
Enset ventricosum	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wild custard apple	Yes	Yes	-	-	-	-	-	-	-	Yes	Yes	Yes
Hot pepper	Yes	Yes	Yes	Yes	Yes	-	-	-	-	-	Yes	Yes
Maize	Yes	Yes	Yes	-	-	-	-	-	-	-	-	-
Mango	-	-	-	Yes	Yes	Yes	Yes	-	-	-	-	-
Onion	-	-	-	-	-	-	-	-	-	Yes	Yes	Yes
Orange	Yes	Yes	Yes	-	-	-	-	-	-	-	-	-
Papaya	Yes	Yes	Yes	Yes	Yes	-	-	Yes	Yes	-	-	-
Sugar cane	-	-	Yes	Yes	Yes	Yes	-	-	-	-	-	-
Spice	Yes	Yes	Yes	Yes	Yes	Yes	-	-	-	Yes	Yes	Yes
sweet potato	-	-	Yes	Yes	Yes	Yes	-	-	-	-	-	-
Taro	-	Yes	Yes	Yes	Yes	Yes	-	-	-	-	-	-
Guava	Yes	Yes	Yes	Yes	Yes	Yes	-	-	-	-	Yes	Yes
Products types												
Minimum	1	1	1	1	1	1	1	1	1	1	1	1
Maximum	7	7	8	6	6	4	4	3	3	5	7	7
Average	4	4	~5	~3	~4	~3	~3	2	2	3	4	4

southern Ethiopia with 16 as an average number of species per farm. Olajide-Taiwo *et al.* (2010) reported 36 planted species in homegarden from Ibdan, Oyo state. Maroyi (2009) reported 69 plant species with 9 different uses from Nhema, Zimbabwe. The total number of species and average number of species per homegarden in the present study was less compared to the previous report. The assessment result shared the same opinion with Abebe *et al.* (2010) regarding the occurrence of *Enset ventricosum* in all homegardens.

Olajide-Taiwo *et al.* (2010) also reported different cultivated crops ranging from fruit trees, vegatbles, spices and food crops in homegarden from Ibadan, Oyo state.

Homegarden to household food security: Assessment of food security status of the household result showed that 88.8% of the household were found food secured throughout the year. Nevertheless, for 84.5% of the households (n = 98), the production they produced was sufficient only for 10 months to feed their family. Household food security strategy analysis result showed that smallholder farmers in the study area attained food security through own production and purchasing from local market. In this regard, smallholder farmers in the study area highly appreciated the significance of their homegarden towards attaining food security. About 96.9% of the households said the impact of homegarden on improving their livelihood was high. Table 5 shows the benefit of homegarden throughout the year. Some of the cultivated crops in the homegarden like *Enset ventricosu*, cabbage and pulses were critical in July and August in filling shortage of food at household level. Cash obtained from avocado and *Catha edulis* was found to help household to purchase grain from local market. The study result also showed that there was at least one obtainable product from homegarden throughout the year. The finding agrees with Ndaeyo (2007) report that homestead ensured continuous production and utilization throughout the year. The report strongly indicated that homestead farms are contributing to food security in southern Nigeria. Olajide-Taiwo *et al.* (2010) also reported homegarden as an easy source of fresh food. The relative household income contribution of homegarden was about 44.5% (maximum = 14735, mean = 1683.17) of the total household income. *Catha edulis* and avocado accounted for about 72.6% of the homegarden income contribution. About 34.7% of the total households had an income from homegarden >1683.17 Ethiopian birr (Table 6).

Although, household needed more food crops for consumption, maize was the most staple food crops in the study area. On the average 1000 kg year^{-1} was calculated as the total quantity of grain required to support an average family size of 6. Considering the price of maize at the time of assessment, the average income (1683.17 Ethiopian birr) from homegarden enabled households to purchase 935 kg of maize. Income from homegarden increased an average household income from 2100-3784.11 Ethiopian Birr. A paired t-testing result showed that the difference in average annual income of household due to homegarden was significant (t = 8.119, df = 97, p = 0.000).

Table 6: Household relative income from homegarden, contributor crops and household category

Characteristics	N	Minimum	Maximum	Mean	Proportion (%)
Household Income (ETB year^{-1})	98	-	-	-	-
Total income	-	0	19000	3784.11	-
Income from homegarden	-	0	14735	1683.17	44.5
Income from homegarden (ETB year^{-1})	98	0	-	1683.17	100.0
Catha edulis	-	0	5340	654.18	38.9
Avocado	-	0	9735	568.05	33.7
Others	-	-	3200	460.94	-
(Sugar cane, *Enset ventricosum*, etc.)	-	-	-	-	27.4
Household category					
<mean (1683.18)	64	-	-	-	65.3
>mean (1683.18)	34	-	-	-	34.7

*ETB = Ethiopian Birr

The present study agrees with many previous researches finding on significance of homegarden to household food security. For examples, Olajide-Taiwo *et al*. (2010) report from Ibadan, Oyo state showed that homegarding increased family supply. Maroyi (2009) report from Nhema, Zimbabwe indicated homegarden as important for poor households to overcome adversity and meet basic needs. Tynsong and Tiwari (2010) finding from Meghalaya, India showed that homegarden contributed 7% of the total household income.

Ndaeyo (2007) report from southeastern Nigeria showed the remarkable contribution of homestead farm to food security. Bassullu and Tolunay reported 34.5% as the share of the income obtained from traditional homegardens in the rural areas of Isparta regions within the annual income. The present finding of the share of income from homegarden 44.5% within the range of 6.6-55.7% reported by Soemarwoto (1987) as the share of the income obtained from homegardens in total income.

CONCLUSION

The present study is the first attempt to conduct study on homegarden in the study area. The foregoing discussions revealed that homegarden of the study area were practiced in response to food security. The contribution of homegarden goes beyond gap filling. Economic important crops dominated the homegarden. Some households were getting much benefit from their homegardens. Paying due attention to homegarden development has significant role in addressing household food security in the future.

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