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Planting Fruits and Vegetables in Homegarden as a Way to Improve Livelihoods and Conserve Plant Biodiversity

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Abstract: Multi-story cropping systems are used to grow fruits and vegetables in rural homegardens, and it has been argued that they are crucial for the food and nutrition safety of rural populations. They also are considered as refuges for a number of plant species, and as one way to reduce pressure on the surrounding ecosystem by providing resources such as food, fiber, and firewood to farmers on their own farmland. This study was conducted to assess the contribution of fruits and vegetables in homegardens to household livelihoods and biodiversity conservation in the Yayo biosphere reserve in southwestern Ethiopia. The role of fruits and vegetables was evaluated for 96 households that were selected randomly from both fruit and vegetable users and only vegetable-user strata. To collect socioeconomic data, semi-structured interviews, direct observation, and focus group discussions were employed. A complete enumeration of plant species was done for diversity assessment in 48 homegardens from four kebeles (the smallest administrative unit in Ethiopia) in the Yayo and Hurumu districts and analyzed using descriptive statistics, Chi-square, independent t-test, and one-way ANOVA. The results indicated the highest plant diversity, with a total of 76 species identified from 38 families. Fruit and vegetable users were found to harbor more diversity in their homegardens compared to only vegetable-user homegardens. Homegarden size correlated significantly with species richness. Fruits and vegetables in homegardens were found to considerably contribute to household food consumption and total annual income independent of wealth categories. We also found a significant negative relationship between fruit and vegetable use and forest product harvesting, indicating the reduction of pressures on nearby forest ecosystems. This study supports the idea that fruits and vegetables contribute to biodiversity conservation directly as the entity of homegarden agrobiodiversity and indirectly through minimizing households' demand for forest harvesting by providing food and generating income. Nevertheless, fruits and vegetables were not contributing at their full potential, which was mainly due to disease problems, pests, and a lack of better market access. Therefore, further research and interventions are needed to help farmers confront these challenges affecting fruit and vegetable production and productivity.

Keywords: homegarden; Yayo; Hurumu; species; household; Yayo biosphere

1. Introduction

The continued deterioration of natural resources and ecosystems has become a serious threat to both ecological systems and agricultural production [1]. Additional negative impacts on the local population are expected due to a loss of biodiversity and ecosystem services [2]. Biodiversity is important for ecosystems to recover from environmental shocks [3], as well as their regeneration and maintenance [4], and ultimate agricultural productivity [5]. Even though the causes of biodiversity loss are numerous, high population density [6] and unsustainable agriculture [7] take the lion's share. One way to improve biodiversity conservation is to adopt agricultural practices that integrate agricultural production and biodiversity conservation [8] such as agroforestry. Agroforestry can play a major role in conserving and enhancing biodiversity levels on farms as well as the landscape level in both tropical and temperate regions of the world [9,10].

Conventional, especially, industrial agriculture depends strongly on expensive inputs (e.g., pesticides and fertilizer), which are often not affordable for poor farmers and harm the environment [11,12]. Therefore, economically productive and biodiversity-friendly agricultural approaches such as agroforestry are considered promising strategies to provide sufficient agricultural returns for the local population while maintaining a high level of biodiversity at the local farms. Thus, increasing livelihood options through agroforestry practice also enhances biodiversity conservation [13]. Multi-story cropping (hereafter used interchangeably with homegarden agroforestry) is a type of agroforestry that is characterized by a combination of crops, fruit trees, vegetables, and livestock [14]. Homegarden agroforestry is a more diverse and low-input sustainable system than industrial agriculture [15], and has the potential to alleviate resource-use pressure on conservation areas [16].

The UNESCO registered Yayo biosphere reserve combines wild coffee forests and agricultural areas [17], but biodiversity has been declining as a result of population growth and increasing land-use pressure [2]. Traditional hunting that uses forest fire as a mechanism to chase hiding animals, forest product harvesting such as forest honey harvesting, the extension of coffee plantations to the buffer and core zone, and agricultural expansion are among the main threats to the biosphere reserve.

In this study, we investigate the potential contribution of growing fruits and vegetables in homegardens to biodiversity conservation in order to provide livelihoods, food, and material for the local population, and as a consequence reduce pressures on the surrounding protected areas. Even though many studies have been conducted in the field of homegarden agroforestry [18–20], to the best of our knowledge, this is the only study that specifically addresses fruits and vegetables' contributions to biodiversity conservation. The results may contribute to the design of efficient biodiversity conservation strategies that consider the livelihood status of the local community.

2. Materials and Methods

2.1. The Study Area

The study was conducted in the Yayo biosphere reserve located in the Ilu Abba Bora Zone of the Oromia National Regional State in Southwestern Ethiopia. It is located about 560 km from Addis Ababa toward the west, and 38 km from Mettu town toward the east. The biosphere reserve lies between 8°21′–8°26′ N latitude and 35°45′–36°3′ E longitude (Figure 1) within an altitudinal range between 1200–2000 m.a.s.l [21]. Hurumu and Yayo Woreda have an average annual rainfall of about 1600 mm, an average temperature of 23 °C, and an elevation range between 1160–2580 m.a.s.l [22].

The study was conducted in four kebeles: two from the Yayo district, namely Wabo and Bondo Megala, and two from the Hurumu district, namely Wangegne and Gaba. These kebeles were selected due to the widespread practice of fruit and vegetable production, and their vicinity to the biodiversity reservoir.

A total of 154,300 residents currently live in the Yayo biosphere reserve, and mainly rely on agriculture [23], with 65,000 people living in the Yayo Woreda and about 53,000 in the Hurumu Woreda according to estimations of the central statistical agency of Ethiopia [24].

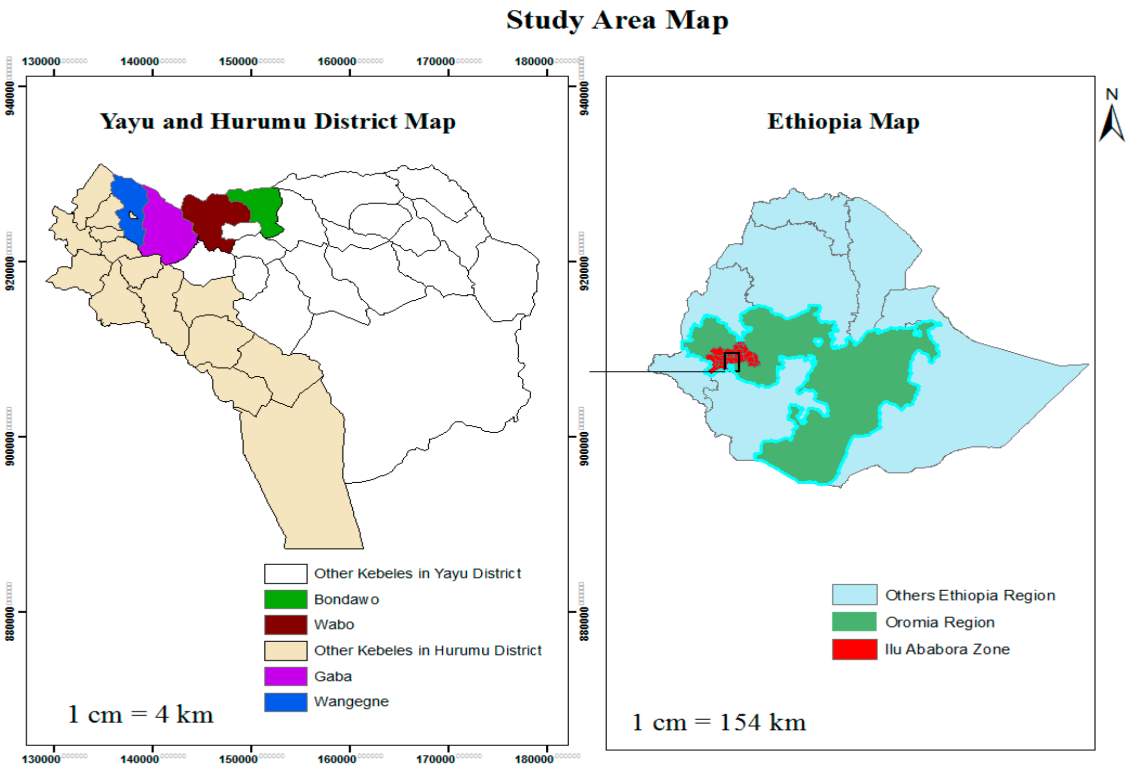

Figure 1. Map of study area; Yayo and Hurumu Woreda.

2.1.1. Household Selection

A stratified random sampling technique was employed to select households (HHs) from the area based on their habit of using fruits and vegetables in their homegarden agroforests (HGAF). Kebele administrators and development agents (DAs) were used as key informants (KI) and helped identify HHs growing fruits and vegetables, and those HHs growing vegetables only. Preliminary surveys of HHs were used to confirm gardening practices as identified by the KI.

24 HHs were randomly selected from fruit and vegetable users (FVU) and from vegetable-only users (VOU) for each kebele. In total, 96 HHs from the four kebeles of the two woredas were sampled.

2.1.2. Household Survey Methods

Data about the contribution of fruits and vegetable use to the livelihoods of the farmers were collected using semi-structured questionnaires, focus group discussions (FGD), and personal observation (Appendix A). The questionnaire was originally prepared in English and translated to Afaan Oromo, which is the native language in the study area. However, the interviews were conducted in Amharic if a respondent was more familiar with it. Respondents were required to rank the contribution of fruits and vegetables to their household food consumption. The role of fruits and vegetables in income generation was assessed for three different wealth classes (poor, medium, and rich), which were grouped based on criteria such as land holding size, number of livestock, and the level of coffee production. Sample household heads were required to estimate the annual income from the different income sources for the year 2015.

In order to assess the role of fruits and vegetables in reducing forest harvesting pressure, sample respondents were asked whether they harvest forest, and if they said no, why they chose not to harvest products from the forest.

Two FGDs containing six to 10 people were conducted in each kebele to support and cross-check the information given by an individual respondent and obtain important information that was not covered by the individual questionnaires.

2.1.3. Biodiversity Inventory Methods

For species inventory data, complete enumeration was carried out in sample homegardens to assess plant diversity, frequency, and density (Figure 2). A total of 48 plots were sampled, of which 24 and 24 were FVU and VOU, respectively.

(a) HGAF in Wabo Kebele in Yayo

(b) HGAF in Gaba Kebele in Hurumu

(c) HGAF in Wangegne Kebele in Hurumu

(d) AF in Bondo-magela Kebele in Yayo

Figure 2. Sample Pictures illustrating Homegarden Agroforestry System in Yayo and Hurumu Districts.

Identification and nomenclature of the species follow the flora of Ethiopia and Eritrea, and other common references [25–30]. In addition to this, the Natural Database for Africa (NDA) was used in plant species identification.

The Shannon Wiener diversity index and Sorenson similarity and dissimilarity indices were calculated to assess plant diversity. The Shannon index (H') was used to quantify the relative abundance of the different species (Equation (1)). This index has a high sensitivity to sample size, and gives more weight to rare species [31]:

$$H' = -\sum_{(n=1)}^{\infty} p_i(lnp_i) \tag{1}$$

where p is the proportion of individuals of a particular species (n) divided by the total number of individuals (N).

Species evenness (E) expresses how evenly the individual species of the community are distributed (Equation (2)):

$$E = H'/H_{max} \quad (2)$$

here $Hmax = ln\ S$, lnS is the natural logarithm of species richness. Species evenness ranges from zero to one, with zero indicating no evenness, and one indicating a complete evenness. In order to measure the similarity or dissimilarity of the different sampled communities, Sørensen similarity coefficients (SC) were calculated (Equation (3)):

$$S_s = \frac{2C}{2C + S1 + S2} \quad (3)$$

where C is the number of species that the two communities have in common, $S1$ is the total number of species found only in community 1, and $S2$ is the total number of species found only in community 2.

Additionally, the relative frequency and density were calculated for each species except those that were in their dormant state during data collection, making it difficult to count individuals.

2.2. Data Analysis

Microsoft Excel 2016 and the Statistical Package for Social Science (SPSS), Version 20 were used for statistical data analysis, including the descriptive statistics and Pearson correlation coefficients of household demographic variables and socioeconomic characteristics.

The average household incomes of different sampling groups were compared using an independent t-test analysis and one-way ANOVA with the related Tukey post hoc test.

In addition, the Chi-square test was used to estimate the dependency between interview responses, wealth classes, and the ranking of fruits and vegetables' contribution to household food consumption, as well as between forest harvesting and the use of fruits and vegetables.

3. Results and Discussions

3.1. Plant Diversity Assessment of Homegardens

All of the surveyed homegardens were between 8–69 years old, and had a size ranging between 200–1250 m^2. A total of 76 species were recorded and identified in the sample homegardens with a maximum number of 31 and a minimum of eight species recorded in fruit and vegetable user households' homegardens (Table 1). This result is smaller than the maximum number of species (51) reported for homegardens from Benin, a West African country [32]. Out of the 38 families identified, the five most frequent families were Euphorbiaceae, Fabaceae, Lamiaceae, Rutaceae, and Myrtaceae. In total, 13 fruit species, which accounted for 17.1% of the total species and eight (10.52%) vegetable species were found in the homegardens of the study area. Similarly, the same numbers of fruit species (13) were reported by another study on homegardens of Bangladesh [18], while 31 fruit species were found in the homegardens of northern Thailand [33].

Table 1. Maximum, minimum, and average number of species found in the homegardens (HG) of fruit and vegetable users (FVU) and vegetable-only users (VOU).

User Groups	Max. No. of Species in Sample HG	Min. No. of Species in Sample HG	Average No. of Species in Sample HG	Shannon Diversity Index (H')	Species Evenness
FVU	31	11	15.85	3.30	0.81
VOU	21	8	15.00	2.88	0.68

Plant diversity of the FVU (H' = 3.30) was significantly higher than VOU homegardens (H' = 2.88, $p < 0.05$, Table 1). This result is in line with another study [14] conducted in the Jabithenan district, Northwestern Ethiopia, who found that homegarden agroforestry is more diverse than non-tree based homegardens. Sorenson's similarity indicated that 84% of plant species were similar for both FVU and VOU homegardens.

The result of the overall Shannon Wiener diversity index value that was calculated was 3.15. This result indicated that the homegarden system of the study area was characterized by high species evenness and richness.

The species evenness that was calculated was higher for FVU ($E = 0.81$) than for VOU ($E = 0.68$) (Table 1), indicating a more even distribution in FVU homegardens.

While we found no correlation between species richness and the age of the HG owner or the age of the HG, the HG size was significantly correlated to plant species richness, with a higher species richness in larger than in smaller-sized homegardens ($p < 0.01$) (Figure 3). This might be because smallholder farmers tend to focus on fewer species of larger value and allocate more of their land to food crops, while large holders can afford to include different types of plant species, including fruits.

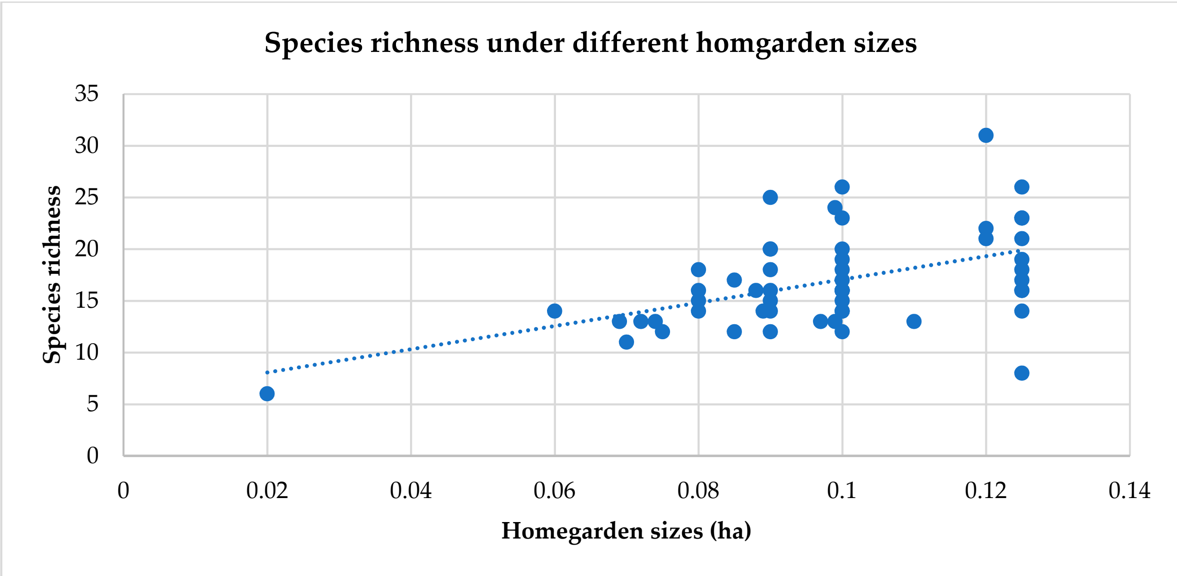

Figure 3. Relationships between homegarden size and species richness.

We attribute this to the tendency of large HG owners to grow fruit trees, while households with smaller HGs prefer to cultivate annual vegetables, which take a much shorter period of time to reach the harvesting period than fruit trees. About 71% of the VOU respondents considered the small size of their homegarden a reason for not growing any fruit (Figure 4). This result is in line with the conclusion from Degnet [22], stating that poorer families with less land holdings tend to have smaller homegardens, and as a consequence lower levels of diversity. The increase in species richness with increasing homegarden size was also reported by other studies on homegardens [19].

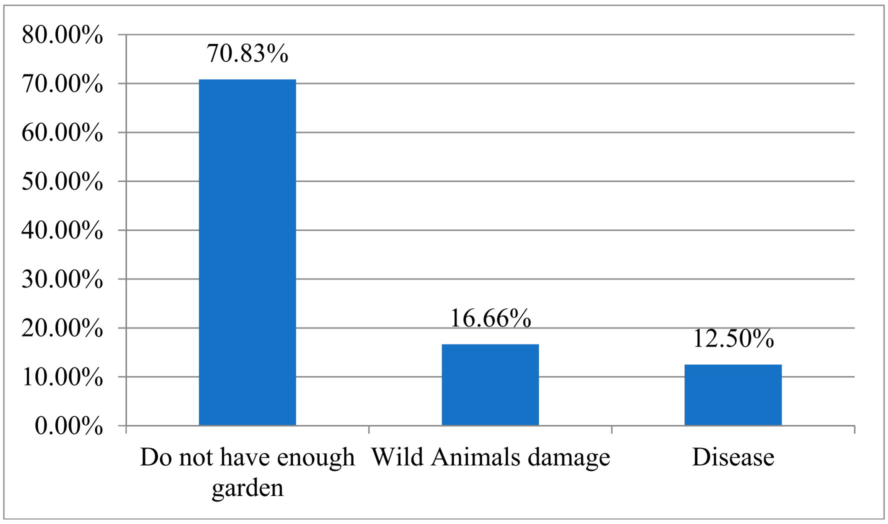

Figure 4. Given reasons for not growing any fruit in the home garden.

3.2. The Contribution of Fruits and Vegetables to Livelihoods

Most questionnaire respondents indicated that fruits and vegetables are contributing to their food safety, with 55.56% of respondents ranking the importance of fruits and vegetables in the households' food intake as high, 32% ranking their importance as medium, and 12.34% ranking their importance as low.

Regardless of their wealth status, the respondents named fruits and vegetables as an important contributor to overall household food consumption and as particularly important for the food security of children in times of other crop shortages (two-tailed Chi-square test $p = 0.66$, $X^2 = 2.38$, df = 4). This result is in line with a study conducted in northwestern Ethiopia [14], which stated that fruits play an important role in improving household nutritional security for at-risk populations, particularly women and children, especially during times of famine. Based on the existing literature, [34] Deribe drew the conclusion that vegetables and fruits contribute considerably to nutrition and food security.

Apart from work as an employee, we identified coffee, maize, Khat (*Catha edulis* (Vahl) Forssk. ex Endl.), livestock, fruits, and vegetables as major income sources in the study area.

The results indicated that coffee is the major source of income for all wealth categories, accounting for 52.43%, 68.27%, and 65.01% of the mean annual income for rich, medium, and poor households, respectively. This result confirms previous studies [17,19] highlighting coffee as the major cash crop in the area, followed by khat.

Wage was the second most important, while livestock was the least important income source for poor households. Income from maize, khat, and livestock was lower for poor households than for medium and rich households, but wage income was higher for poor households than medium-wealth households. This might be due to the tendency of poor households to engage more often in wage labor or off-farm activities to overcome their income shortage.

The sale of fruits and vegetables contributed on average 7% to the total income, contributing to a significant difference between the income of households with and without the marketing of fruits and vegetables ($p < 0.01$). However, the importance of the income from fruits and vegetables varied across the different wealth classes, with only 4.09% of rich, 7.12% of the medium wealthy, and 12.7% of poor farmers considering them important. Overall, we found fruits contributing more income than vegetables across all of the wealth classes, making up 7.58% of the mean total annual income of poor households and 2.41% of rich households (Table 2). Income from vegetables remained rather low, at 2.88% for rich households and 1.68% for poor households.

Table 2. Percentage share of income from different income sources for wealth categories.

Wealth Category	Fruit (%)	Vegetables (%)	Fruits and Vegetables (%)	Wage (%)	Livestock (%)	Coffee (%)	Maize (%)	*Khat* (%)
Rich	2.41	1.68	4.08	9.89	4.37	52.43	11.96	17.27
Medium	4.24	2.88	7.12	4.94	3.54	68.27	8.22	7.91
Poor	7.58	5.12	12.7	8.09	2.78	65.01	7.07	4.35

While income from fruits did not differ significantly between the kebeles (F = 0.46, df = 3, $p = 0.708$), income from vegetables was significantly lower in the Wabo and Bondo kebeles (406.25 $\pm$ 125.6) than the Gaba and Wangegne kebeles ($p < 0.05$). Accordingly, there was no significant difference within the same district in terms of fruit and vegetable income, but there was a significant difference between the two districts (Yayo and Hurumu). In other words, the Hurumu district received more annual income from fruits and vegetables than the Yayo district. This might be a direct result of the observed higher prevalence of vegetables and the availability of small-scale irrigation systems in the Hurumu district. In addition to this, there is a relatively better market access in the two kebeles of Hurumu, which is mainly due to the short distance to the markets of Hurumu and Metu.

Our results indicated that fruits and vegetables have the potential to contribute substantially to household livelihood. However, different challenges might limit the full productive potential of the homegardens.

Plant diseases, pests, and associated fruit abortions were the most important problems reported by 39.6% of the respondents during individual interviews and FGDs (Table 3). Citrus leaf and fruit spot, fruit rot, anthracnose, and bacterial soft rot were the most commonly reported fruit and vegetable diseases affecting fruits such as mango, papaya, lemon, kashmir, and vegetables such as cabbage, pepper, tomato, and potato. Similar diseases and pest problems have been reported, e.g., in the Kafa zone of southwestern Ethiopia [35]. Farmers often employ traditional farming practices such as the application of ashes and the removal of infected fruits and branches to manage diseases and pests. However, chemical treatments, including the application of insecticides, pesticides, or other more sophisticated and ecological integrated pest management strategies are lacking.

Table 3. Reported problems for low fruit and vegetable income with user groups.

No.	Reported Problem	Frequency	Percent	Rank
1	Wild animal damage	19	19.8%	3
2	Disease problem	38	39.6%	1
3	Market access problem	16	16.7%	4
4	Wild animals and disease problem	23	24.0%	2
	Total	96	100%	

Wildlife damage was another important challenge for growing fruits and vegetables; it was highlighted by 19.8% of the respondents (Table 4). Monkeys and birds feed on fruits and cause physical damage to fruit trees, which in turn causes a yield reduction for the following years. The study Zewudie [36] also reported crop destruction by wild animals in Yayo and Hurumu, and emphasized that a substantial portion of the crops of the area is usually damaged by wild animals such as bush pigs, Columbus baboons, and other monkeys. Personal observation also confirmed this situation in the area.

Table 4. The relationship between growing fruits and vegetables in a homegarden and forest harvesting.

	Do You Harvest Products from the Forest?	
	Yes (%)	**No (%)**
FVU	11.7	71
VOU	88.3	29
Total	100	100

Market access was considered to be a major challenge by about 16.7% of the respondents (Table 3), including markets for buying supplies and selling their products. Due to these challenges, farmers are often discouraged from cultivating fruits and vegetables. Similar findings were also reported by Katja [37], who argued that poor market access encouraged subsistence-orientated production. In addition, as it was also discussed in Tefera [38], low market return and access may also cause farmers to grow only a few cash crops; we can see this in the study area in terms of coffee and khat expansion, which in turn has a negative impact on the biodiversity of homegardens. However, for poor farmers, fruits and vegetables may provide an important source of food and nutrition security, even under difficult conditions for marketing this product. Other studies have confirmed our results and reported that agricultural products other than coffee and honey are less marketed and mostly consumed at the household level [39].

3.3. Effects of Homegardens on Household Forest Dependence and Nature Conservation

About 37.5% of respondents confirmed that they regularly harvest different forest products to meet their household needs such as fuel wood, forest coffee, fibers, and spices. Forest coffee and firewood were the two most important forest products harvested (63.9%) for local households, followed by spices and lianas (16.7%).

However, the majority of forest resource-dependent households (88.2%) were VOU households. This might be a consequence of the higher income and food security of fruit-growing households compared to other households. FVU relied significantly less on forest products than VOU, and showed significantly lower levels of nearby forest harvesting ($r = -0.566$, $p < 0.01$).

The majority (76.04%) of the respondents indicated that the planting of trees in their homegarden was a direct consequence of the declaration of the biosphere reserve and the resulting shortage of fuel wood, construction, and fencing materials. They also reported using fruit and other trees in their homegardens as a source for food, timber, and firewood, which replaced the most important products harvested from the forest. Our results indicate the importance of homegardens, specifically of fruit trees, to alleviate pressures from nearby forests as a source for wood, fiber, and other forest products.

The study Utpal [40] from Canada reported that the distance of a village from the next forest site highly affected the utilization of timber or non-timber products as a result of increasing time requirements and work force to collect the products with increasing distance. In this study, only 18.33% of respondents indicated that the long distance was their reason for not harvesting products from the forest, while the majority (61.66%) agreed that they substitute forest products with resources from their own farms. Only a minority of respondents reasoned that the forest is legally protected (10%) or that the resources can be accessed through local markets or sharing with their neighborhood (10%). This result indicates the important role of agroforestry systems in minimizing pressure on protected areas and natural forests. The main objective of the protection of the biosphere reserve is to maintain biodiversity and decrease the pressures exerted by the local community in the natural areas. It also encourages the sustainable use of natural resources without adversely affecting the biosphere reserve. However, food and income shortages have forced local communities to harvest natural forests and violate protected areas.

The results in this study highlight the important role of fruits and vegetables in plant biodiversity conservation and household livelihoods in terms of food and income generation. Fruits and vegetables have the potential to provide both food and income, thereby substituting resources that were previously harvested from natural forests. Therefore, an extension of the fruit and vegetable production in homegardens may have the potential to lower the pressures on natural forests, thereby improving the sustainable use of biodiversity in the biosphere reserves.

4. Conclusions and Recommendation

In this study, the contributions of fruits and vegetables in homegardens to biodiversity conservation and household livelihood were assessed. Plant diversity was identified and calculated in sampled homegardens growing fruits and vegetables, and homegardens growing only vegetables. It was found that the plant diversity was more diverse in fruit and vegetable homegardens than solely vegetable homegardens. Plant species' richness was not determined by the age of the HG owner and the age of the HG, but rather by the size of the homegarden. The study also shows a positive correlation between fruits and vegetables growing homegarden, and plant diversity.

The contribution of fruits and vegetables to household livelihood was also assessed, and it was found that fruits and vegetables in the homegarden highly contribute to the household's food requirement and income generation. However, most fruit and vegetable products are consumed at home and are less marketable. A comparison was done on both the contributions of fruits and vegetables to the household total annual income among the three different wealth categories. The results indicated that low-income households benefit more from growing fruits and vegetables in their homegardens than rich households.

The result revealed the direct and indirect contribution of fruits and vegetables in home gardens to biodiversity conservation. The direct contribution is that fruit and vegetable species that are cultivated in the homegardens themselves are the objects of plant diversity. The indirect role arises from the result: fruits and vegetables substantially contribute to household livelihood. Consequently, forest-dependent low-income households may reduce their use of forest products, thereby reducing pressure on forest biodiversity. In line with this, we found a negative correlation between fruit and vegetable use and forest product harvesting.

The results of this study indicated that growing fruits and vegetables in homegardens can play an important role in household livelihoods and biodiversity conservation. Nevertheless, fruits and vegetables are not contributing to the livelihood at their full potential due to limiting factors existing in the area such as the lack of an appropriate market, diseases, and insect and animal pests. The implementation of appropriate policy measures and interventions are of crucial importance to realize the benefits of fruit and vegetable growing in homegardens to supply fruit and vegetable varieties that are less prone to insect pests and diseases. Knowledge transfer about appropriate and integrated pest management measures can also bring a substantial change to farmers' livelihood. Additionally, the market access of fruit and vegetable growers needs to be improved. Market chain analysis may also help enhance farmers' profits from their fruit and vegetable supplies, thereby increasing the positive effects for their livelihoods.

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Conflicts of Interest: The authors declare no conflicts of interest.

Appendix A

Table A1. Plant species identified in Yayo and Hurumu districts.

No.	Local Name	Scientific Name	Family Name	Growth Habit	Use
1	Abrango (O)	*Brassica carinata* A. Br.	Brassicaceae	Herb	Vegetable
2	Abukado (A)	*Persea americana* Mill.	Lauraceae	Tree	Edible fruit
3	Adami (O)	*Euphorbia abyssinica* Gmel.	Euphorbiaceae	Tree	Live fence
4	Akurater (A)	*Glycine max* L.	Fabaceae	Bush	Edible grain
5	Ambebesa (O)	*Albizia gummifera* Gmel.	Fabaceae	Tree	Timber
6	Ananas	*Ananas comosus* L.	Bromeliaceae	Herb	Edible fruit
7	Anfare (O)	*Nuxia congeta* R.Br.	Loganiaceae	Tree/shrub	Live fence
8	Apple	*Malus domestica* Borkh	Rosaceae	Tree	Edible fruit
9	Bakkanisa (O)	*Croton macrostachyus* Del.	Euphorbiaceae	Tree	Medicinal, timber
10	Bay bay (O)	*Nerium oleander* L.	Apocynaceae	Shrub	Live fence
11	Bekeri (O)	*Cordia monoica* Roxb.	Boraginaceae	Shrub	Household tool, shade
12	Besobila (O)	*Ocimum basilicum* L.	Lamiaceae	Herb	Spice
13	Birbisa (O)	*Podocarpus falcatus* Mirb.	Podocarpaceae	Tree	Timber
14	Buna (O)	*Coffea Arabica L.*	Rubiaceae	Shrub	Stimulant
15	Buri/(A, O)	*Manihot esculenta* Crantz.	Euphorbiaceae	Shrub	Vegetable
16	Burtukana (O)	*Citrus sinensis* L.	Rutaceae	Shrub/tree	Edible fruit
17	Chada (O)	*Euphorbia tirucalli* L.	Euphorbiaceae	Shrub/tree	Live fence
18	Khat	*Catha edulis* (Vahl) Forssk. ex Endl.Qulqal	Celastraceae	Shrub	Stimulant
19	Dafe (O)	*Phaseolus lunatus* L.	Fabacea	Liana	Edible grain
20	Damakase	*Ocimum lamiifolium Hochst. ex. Benth.*	Lamiaceae	Shrub	Medicinal
21	Dhumuga (O)	*Justicia schimperiana* (Hochst. ex Nees) T. Anders.	Acanthaceae	Shrub	Medicinal
22	Dinblala (O)	*Nepeta azurea* R.	Lamiaceae	Herb	Spice, medicinal

Table A1. *Cont.*

No.	Local Name	Scientific Name	Family Name	Growth Habit	Use
23	Ebicha (O)	*Vernonia amygdalina* Del.	Asteraceae	Shrub	Forage, timber
24	Endodi (A)	*Phytolacca dodecandra* L'Her.	Phytolaccaceae	Shrub	Medicinal
25	Enset (A)	*Ensete ventricosum* Welw.	Musaceae(E.edule)	Herb	Edible, forage
26	Erd (A)	*Curcuma domestica* Valeton	Zingiberaceae	Herb	Spice
27	Geesho (A)	*Rhamnus prinoides* L' Herit.	Rhamnaceae	Shrub/tree	Beverage input, household tool
28	Gishta (A)	*Annona senegalensis* Pers.	Annonaceae	Shrub	Edible fruit
29	Godere (O, A)	*Colocasia esculenta* (L.) Schott	Araceae	Herb	Vegetable
30	Gora (O)	*Rubus genus* (*Rubus* spp.)	Rosaceae	Shrub	Edible and live fence
31	Grar (A)	*Acacia abyssinica* Hochst.	Fabaceae	Tree	Timber, medicinal
32	Gravila	*Grevillea robusta* R.	Proteaceae	Tree	Timber
33	Guatmala	*Tripsacumandersonii* J.	Poaceae	Grass	Forage
34	Harangema (O)	*Caesalpiniadecapetala* (Roth) Alston	Fabaceae	Shrub	Live fence
35	Jijimbila (O)	*Zingiber officinale* Roscoe	Zingiberaceae	Herb	Spice
36	Kazmir (A)	*Casimiroa edulis* La Llave	Rutaceae	Tree	Edible fruit
37	Key abeba (A)	*Euphorbia cotinifolia* L.	Euphorbiaceae	Shrub	Live fence
38	Key bahrzaf (A)	*Eucalyptus camaldulensis* Dehnh.	Myrtaceae	Tree	Timber
39	Kororima (A)	*Aframomumcorrorima* (Braun) Jansen	Zingiberaceae	Herb	Spice
40	Kulkual (A)	*Opuntia ficus-indica* L.	Cactaceae	Shrub	Live fence
41	Lokko (O)	*Diospyros abyssinica* (Hiern) F. White	Ebenaceae	Tree	Timber
42	Lolchisa (O)	*Diospyros scabra* (Chiov.) Cufod.	Ebenaceae	Tree	Timber, shade
43	Lomii (A)	*Citrus aurantiifolia* (Christm.) Swingle	Rutaceae	Shrub/tree	Edible fruit
44	Mango	*Mangiferaindica* L.	Anacardiaceae	Tree	Edible fruit
45	Merge Urga (O)	*Cymbopogon citratus* (DC.) Stapf.	Poaceae	herb	Ornamental
46	Muziferenji (O)	*Musa acuminate* Colla	Musaceae	Herb	Edible fruit
47	Muzii (O)	*Musa x-paradisiaca* L.	Musaceae	Herb	Edible fruit
48	NechBahrzaf	*Eucalyptus globulus* Labill.	Myrtaceae	Tree	Timber
49	Papaya	*Carica papaya* L.	Caricaceae	Tree	Edible fruit
50	Qariya (A)	*Capsicum annuum* L.	Solanaceae	Herb	Vegetable
51	Qiltu (O	*Ficusthonningii* Blume	Moraceae	Shrub/tree	Shade
52	Qobo (O)	*Ricinus communis* L.	Euphorbiaceae	Shrub/tree	Household tool
53	Qodo (O)	*Myrtuscommunis* L.	Myrtaceae	Shrub	Medicinal
54	Reji (O)	*Vernonia auriculifera* Hiern.	Asteraceae	Shrub/tree	Household tool
55	Rigaraba (O)	*Brideliamicrantha* (Hochst.) Baill.	Euphorbiaceae	Tree	Fodder (leave)
56	Sarte (O)	*Dracaena steudneri* Engil.	Dracaenaceae	Shrub	Forage
57	Sespaniya	*Sesbaniasesban* L.	Fabaceae	Shrub/tree	Crops shade
58	Shenkora (A)	*Saccharum officinarum* L.	Poaceae	Herb	Vegetable
59	Shiferaw (A)	*Moringa stenopetala* (Bak. f.) Cuf.	Moringaceae	Tree	Medicinal
60	Sigametbesha (A)	*Rosmarinus officinalis* L.	Lamiaceae	Shrub	Spice
61	Skuardinich (A)	*Ipomoea batatas* L.	Convolvulaceae	Herb	Vegetable
62	Sufii (O)	*Helianthus annuus* L.	Asteraceae	Forb	Edible grain
63	Tambo (O)	*Nicotiana tabacum* L.	Solanaceae	Herb	Medicinal, Stimulant
64	Tenadam (A)	*Rutachalepensis* L.	Rutaceae	Herb	Medicinal
65	Tid (A)	*Cupressus lusitanica* Mill.	Cupressaceae	Tree	Timber
66	Tikurinchet (A)	*Prunus Africana* (Hook.f.) Kalkm.	Rosaceae	Tree	Timber
67	Timatim (A)	*Lycopersiconesculentum* Mill.	Solanaceae	Herb	Vegetable
68	Turungo (O)	*Citrus medica* L.	Rutaceae	Shrub/tree	Edible fruit
69	Urgessa (O)	*Premnaschimperi* Engl.	Lamiaceae	Shrub	-
70	Vetiver	*Chrysopogonzizanioides* L.	Poaceae	Grass	Forage, erosion control
71	Wodessa (O)	*Cordia africana* Lam.	Boraginaceae	Tree	Timber
72	Wolensu (O)	*Erythrina abyssinica* Lam. ex DC.	Fabaceae	Tree	Live fence
73	Yam	*Dioscoreacayenensis* Lam.	Dioscoreaceae	geophyte	Vegetable
74	Zenbamba (A)	*Phoenix reclinata* Jacq.	Arecaceae	Tree	Household tool
75	Zeytuna (A)	*Psidium guajava* L.	Myrtaceae	Tree	Edible fruit
76	Zihonsar (A)	*Pennisetum purpureum* Schumach.	Poaceae	Grass	Forage

Key: A = Amharic language; O = Afaan Oromo.

Appendix B

Table A2. Species frequency, relative frequency, density, and relative density.

No.	Species Name	Frequency	Relative Frequency (%)	Density (ha^{-1})	Relative Density (%)
62	*Acacia abyssinica* Hochst.	8	0.52	1.15	0.09
66	*Aframomumcorrorima*	5	0.32	3.57	0.29
28	*Albizia gummifera*	22	1.42	7.37	0.6
57	*Ananas comosus*	10	0.64	5.07	0.41
52	*Annona senegalensis*	11	0.71	1.5	0.12
32	*Brassica carinata*	20	1.29	35.37	2.88
74	*Bridelia micrantha*	1	0.06	0.46	0.04
38	*Caesalpinia decapetala*	19	1.23	-	-
46	*Capsicum annuum*	14	0.9	166.71	13.59
19	*Caricapapaya*	27	1.74	8.64	0.7
23	*Casimiroa edulis*	23	1.48	4.38	0.36
2	*Catha edulis*	59	3.8	194.59	15.86
9	*Chrysopogon zizanioides*	40	2.58	-	-
41	*Citrus aurantiifolia*	17	1.1	3.34	0.27
60	*Citrus medica*	9	0.58	1.27	0.1
29	*Citrus sinensis*	21	1.35	4.72	0.38
1	*Coffea arabica*	83	5.35	238.48	19.44
21	*Colocasia esculenta*	27	1.74	-	-
22	*Cordia Africana*	25	1.61	5.65	0.46
68	*Cordia monoica*	5	0.32	3.57	0.29
30	*Croton macrostachyus*	21	1.35	4.49	0.37
75	*Cupressus lusitanica*	1	0.06	0.23	0.02
50	*Curcuma domestica*	13	0.85	11.52	0.94
69	*Cymbopogon citratus*	5	0.32	1.38	0.11
73	*Dioscorea cayenensis*	1	0.06	-	-
64	*Diospyros abyssinica*	6	0.39	0.81	0.07
67	*Diospyros abyssinica*	5	0.32	1.15	0.09
27	*Dracaena steudneri*	22	1.42	5.18	0.42
8	*Ensete ventricosum*	40	2.58	28.92	2.36
24	*Erythrina abyssinica*	23	1.48	15.78	1.29
16	*Eucalyptus camaldulensis*	31	2	23.27	1.9
76	*Eucalyptus globulus*	1	0.06	0.35	0.03
71	*Euphorbia abyssinica*	4	0.26	0.58	0.05
25	*Euphorbia cotinifolia*	23	1.48	23.27	1.9
7	*Euphorbia tirucalli*	41	2.64	-	-
54	*Ficus thonningii*	11	0.71	1.27	0.1
61	*Glycine max*	9	0.58	5.07	0.41
40	*Grevillea robusta*	18	1.16	4.95	0.4
59	*Helianthus annuus*	10	0.64	3	0.24
43	*Ipomoea batatas*	16	1.03	-	-
14	*Justicia schimperiana*	36	2.32	4.15	0.34
53	*Lycopersicon esculentum*	11	0.71	13.82	1.13
56	*Malus domestica*	10	0.65	1.27	0.1
5	*Mangifera indica*	42	2.72	16.47	1.34
58	*Manihot esculenta*	10	0.64	5.3	0.43
36	*Moringa oleifera*	19	1.23	3.57	0.29
10	*Musa acuminate*	39	2.51	43.66	3.56
4	*Musa x-paradisiaca*	44	2.84	47.24	3.85
49	*Myrtus communis*	13	0.85	8.99	0.73
65	*Nepeta azurea*	5	0.32	2.3	0.19
31	*Nerium oleander*	21	1.35	3.34	0.27
37	*Nicotiana tabacum*	19	1.23	8.99	0.73
72	*Nuxia congeta*	2	0.13	0.46	0.04
33	*Ocimum basilicum*	20	1.29	8.76	0.71
18	*Ocimum lamiifolium*	29	1.87	5.88	0.48
26	*Opuntia ficus-indica*	23	1.48	-	-
48	*Pennisetum purpureum*	14	0.9	17.86	1.46
6	*Persea Americana*	41	2.64	14.4	1.17

Table A2. *Cont.*

No.	Species Name	Frequency	Relative Frequency (%)	Density (ha^{-1})	Relative Density (%)
35	*Phaseolus lunatus*	19	1.23	4.26	0.35
51	*Phoenix reclinata*	13	0.84	3.34	0.27
47	*Phytolacca dodecandra* L'Her.	14	0.9	6.8	0.55
63	*Podocarpus falcatus*	7	0.45	0.92	0.08
70	*Premna schimperi*	4	0.26	0.58	0.05
45	*Prunus Africana*	15	0.97	3.8	0.31
44	*Psidium guajava*	15	0.97	3	0.24
12	*Rhamnus prinoides*	38	2.45	18.89	1.54
11	*Ricinus communis*	38	2.45	13.25	1.08
34	*Rosmarinus officinalis*	20	1.29	6.22	0.51
55	*Rubus genus*	11	0.71	-	-
3	*Ruta chalepensis*	46	2.97	21.2	1.73
20	*Saccharum officinarum*	27	1.74	81.68	6.66
17	*Sesbania sesban*	30	1.93	10.71	0.87
39	*Tripsacum andersonii*	18	1.16	-	-
13	*Vernonia amygdalina*	38	2.45	10.94	0.89
15	*Vernonia auriculifera*	32	2.06	16.13	1.31
42	*Zingiber officinale*	17	1.1	-	-
Total		**1551**	**100**		**100**

Appendix C

Table A3. Correlations Table A1.

		Age of Respondents	Number of Household Members	Land Size of the Sample Household	Age of Homegarden	Use of Fruits and Vegetables	Distance from Forest	Harvest of Products from Forest	Total Income
Age of respondents	Pearson Correlation	1	0.248 *	0.221 *	0.488 *	−0.196	0.143	0.154	0.071
	Sig. (2-tailed)		0.015	0.030	0.000	0.056	0.165	0.133	0.493
	N	96	96	96	96	96	96	96	96
Number of household members	Pearson Correlation	0.248 *	1	0.115	0.229 *	−0.119	−0.086	0.050	0.172
	Sig. (2-tailed)	0.015		0.264	0.025	0.248	0.403	0.627	0.093
	N	96	96	96	96	96	96	96	96
Land size of the sample household	Pearson Correlation	0.221 *	0.115	1	0.135	−0.247 *	0.079	0.213 *	0.572 **
	Sig. (2-tailed)	0.030	0.264		0.190	0.015	0.446	0.037	0.000
	N	96	96	96	96	96	96	96	96
Age of homegarden	Pearson Correlation	0.488 **	0.229 *	0.135	1	−0.071	0.092	0.085	−0.066
	Sig. (2-tailed)	0.000	0.025	0.190		0.491	0.374	0.408	0.523
	N	96	96	96	96	96	96	96	96
Use of fruits and vegetables	Pearson Correlation	−0.196	−0.119	−0.247 *	−0.071	1	−0.008	−0.405 **	−0.107
	Sig. (2-tailed)	0.056	0.248	0.015	0.491		0.940	0.000	0.299
	N	96	96	96	96	96	96	96	96
Distance from forest	Pearson Correlation	0.143	−0.086	0.079	0.092	−0.008	1	0.087	−0.021
	Sig. (2-tailed)	0.165	0.403	0.446	0.374	0.940		0.398	0.837
	N	96	96	96	96	96	96	96	96
Harvest of products from forest	Pearson Correlation	0.154	0.050	0.213 *	0.085	−0.405 **	0.087	1	0.100
	Sig. (2-tailed)	0.133	0.627	0.037	0.408	0.000	0.398		0.332
	N	96	96	96	96	96	96	96	96
Total income	Pearson Correlation	0.071	0.172	0.572 **	−0.066	−0.107	−0.021	0.100	1
	Sig. (2-tailed)	0.493	0.093	0.000	0.523	0.299	0.837	0.332	
	N	96	96	96	96	96	96	96	96

* Correlation is significant at the 0.05 level (two-tailed). ** Correlation is significant at the 0.01 level (two-tailed).

Table A4. Correlation Table A2.

		Homegarden Size	Age of Homegarden	Age of Respondents	Number of Species Found in the Homegarden	User or Non-User
Homegarden size	Pearson Correlation	1	−0.072	−0.085	0.368 **	−0.106
	Sig. (two-tailed)		0.486	0.412	0.000	0.302
	N	96	96	96	96	96
Age of homegarden	Pearson Correlation	−0.072	1	0.488 **	0.057	0.121
	Sig. (two-tailed)	0.486		0.000	0.579	0.239
	N	96	96	96	96	96
Age of respondents	Pearson Correlation	−0.085	0.488 **	1	−0.043	0.110
	Sig. (two-tailed)	0.412	0.000		0.681	0.285
	N	96	96	96	96	96
Number of species found in the homegarden	Pearson Correlation	0.368 **	0.057	−0.043	1	−0.264 **
	Sig. (two-tailed)	0.000	0.579	0.681		0.009
	N	96	96	96	96	96
User or non-user	Pearson Correlation	−0.106	0.121	0.110	−0.264 **	1
	Sig. (two-tailed)	0.302	0.239	0.285	0.009	
	N	96	96	96	96	96

* Correlation is significant at the 0.05 level (two-tailed). ** Correlation is significant at the 0.01 level (two-tailed).

References

1. Balana, B.B.; Mathijs, E.; Muys, B. Assessing the Sustainability of Forest Management: An Application of Multi-Criteria Decision Analysis to Community Forests in Northern Ethiopia. *J. Environ. Manag.* **2010**, *91*, 1294–1304. [CrossRef] [PubMed]
2. NCCB (Network Creation and Capacity Building in Yayu Biosphere). *Yayu Biosphere in Brief*; NCCB (Network Creation and Capacity Building in Yayu Biosphere): Addis Ababa, Ethiopia, 2014; pp. 1–6.
3. Sunderland, T. Food Security: Why Is Biodiversity Important? Sécurité Des Aliments: Pourquoi La Biodiverstiré Est-Elle Importante? Seguridad Alimentaria: ¿por Qué Es Importante La Biodiversidad? *Int. For. Rev.* **2011**, *13*, 266–274.
4. Khasa, P.D.; Dancik, B.P. Sustaining Tropical Forest Biodiversity. *J. Sustain. For.* **1997**, *4*, 1–31. [CrossRef]
5. Humphries, C.J.; Williams, P.H.; Wright, R.V. Measuring Biodiversity Value for Conservation. *Annu. Rev. Ecol. Syst.* **1995**, *26*, 93–111. [CrossRef]
6. Musotsi, A.A.; Sigot, A.J.; Onyango, M.O.A. The Role of Home Gardening in Household Food Security in Butere Division of Western Kenya. *Afr. J. Food Agric. Nutr. Dev.* **2008**, *8*, 378–388. [CrossRef]
7. FAO (Food Agricultural Organization). *Ethiopia's Forest Resource Level Submission to the UNFFCC Ethiopia*; FAO (Food Agricultural Organization): Addis Ababa, Ethiopia, 2016.
8. Mohan, S.; Nair, P.R.; Long, A.J. An Assessment of Ecological Diversity in Homegardens: A Case Study from Kerala State, India. *J. Sustain. Agric.* **2007**, *29*, 135–151. Available online: http://jsa.haworthpress.com (accessed on 9 June 2018). [CrossRef]
9. Coomes, O.T.; Ban, N. Cultivated Plant Species Diversity in Home Gardens of an Amazonian Peasant Village in Northeastern Peru. *Econ. Bot.* **2004**, *58*, 420–434. [CrossRef]
10. Jose, S. Agroforestry for Conserving and Enhancing Biodiversity. *Agrofor. Syst.* **2012**, *85*, 1–8. [CrossRef]
11. Horrigan, L.; Lawrence, R.S.; Walker, P. Review How Sustainable Agriculture Can Address the Environmental and Human Health Harms of Industrial Agriculture. *Environ. Health Perspect.* **2002**, *110*, 445–456. [CrossRef] [PubMed]
12. Shiva, V. *The Violence of Green Revolution: Third World Agriculture, Ecology and Politics*; Zed Books LTD: Penang, Malaysiam, 1993.
13. Dahlquist, R.M.; Whelan, M.P.; Winowiecki, L.; Polidoro, B.; Candela, S.; Harvey, C.A.; Wulfhorst, J.D.; McDaniel, P.A.; Bosque-Pérez, N.A. Incorporating Livelihoods in Biodiversity Conservation: A Case Study of Cacao Agroforestry Systems in Talamanca, Costa Rica. *Biodivers. Conserv.* **2007**, *16*, 2311–2333. [CrossRef]
14. Linger, E. Agro-Ecosystem and Socio-Economic Role of Homegarden Agroforestry in Jabithenan District, North-Western Ethiopia: Implication for Climate Change Adaptation. *SpringerPlus* **2014**, *3*, 1–9. Available online: http://www.springerplus.com/content/3/1/154 (accessed on 23 May 2018). [CrossRef] [PubMed]
15. Kumar, B.M.; Nair, P.R. The Enigma of Tropical Homegardens. *Agrofor. Syst.* **2004**, *61*, 135–152. [CrossRef]
16. Muhammed, N.; Masum, M.F.H.; Hossain, M.M.; Chakma, S.; Oesten, G. Economic Dependence of Rural People on Homestead Forestry in Mymensingh, Bangladesh. *J. For. Res.* **2013**, *24*, 591–597. [CrossRef]
17. Gole, T.W. *Vegetation of the Yayu Forest in SW Ethiopia: Impacts of Human Use and Implications for in Situ Conservation of Wild Coffea Arabica L. Populations*; Ecology and Development Series; Cuvillier: Göttingen, Germany, 2003; Volume 10, p. 171.
18. Ali, A.M.S. Homegardens in Smallholder Farming Systems: Examples from Bangladesh. *Hum. Ecol.* **2005**, *33*, 245–270. [CrossRef]
19. Abebe, T.; Sterck, F.J.; Wiersum, K.F.; Bongers, F. Composition and Density of Trees and Shrubs in Agroforestry Homegardens in Southern Ethiopia. *Agrofor. Syst.* **2013**, *87*, 1283–1293. [CrossRef]
20. Kebebew, Z.; Urgessa, K. Agroforestry Perspective in Land Use Pattern and Farmers Coping Strategy: Experience from Southwestern Ethiopia. *World J. Agric. Sci.* **2011**, *7*, 73–77.
21. Woldegeorgis, G.; Wube, T. A Survey on Mammals of the Yayu Forest in Southwest Ethiopia. *J. Sci.* **2012**, *35*, 135–138.
22. Abebaw, D.; Virchow, D. The Microeconomics of Household Collection of Wild Coffee in Ethiopia: Some Policy Implications for In-Situ Conservation of Coffea arabica genetic diversity. *Communal Areas Manag. Program. Indig. Resour.* **2003**, *27*, 1–21.

23. UNESCO (United Nations Educational, Scientific and Cultural Organization). *World Network of Biosphere Reserves 2010: Sites for Sustainable Development*; UNESCO (United Nations Educational, Scientific and Cultural Organization): Paris, France, 2010.
24. CSA (Central Statistical Agency Ethiopia). *Central Statistical Agency Ethiopia*; Population Projection of Ethiopia for All Regions at Wereda Level from 2014–2017; CSA (Central Statistical Agency Ethiopia): Addis Ababa, Ethiopia, 2013.
25. Hedberg, I. Flora of Ethiopia and Eritrea. In *The Biodiversity of African Plants*; The National Herbarium, Addis Ababa University: Addis Ababa, Ethiopia, 1989; Volume 3, pp. 1–659.
26. Hedberg, I. Flora of Ethiopia and Eritrea. In *The Biodiversity of African Plants*; The National Herbarium, Addis Ababa University: Addis Ababa, Ethiopia, 1997; Volume 6, pp. 1–586.
27. Hedberg, I. Flora of Ethiopia and Eritrea. In *The Biodiversity of African Plants*; The National Herbarium, Addis Ababa University: Addis Ababa, Ethiopia, 2000; Volume 2, pp. 1–532.
28. Hedberg, I. Flora of Ethiopia and Eritrea. In *The Biodiversity of African Plants*; The National Herbarium, Addis Ababa University: Addis Ababa, Ethiopia, 1995; Volume 2, pp. 1–456.
29. Hedberg, I. Flora of Ethiopia and Eritrea. In *The Biodiversity of African Plants*; The National Herbarium, Addis Ababa University: Addis Ababa, Ethiopia, 2003; Volume 4, pp. 1–352.
30. Tesemma, A.B. *Useful Trees and Shrubs of Ethiopia: Identification, Propagation and Management for 17 Agroclimatic Zones*; World Agroforestry Centre, East Africa Region: Nairobi, Kenya, 2007.
31. Negash, M.; Yirdaw, E.; Luukkanen, O. Potential of Indigenous Multistrata Agroforests for Maintaining Native Floristic Diversity in the South-Eastern Rift Valley Escarpment, Ethiopia. *Agrofor. Syst.* **2012**, *85*, 9–28. [CrossRef]
32. Gbedomon, R.C.; Fandohan, A.B.; Salako, V.K.; Idohou, A.F.R.; Kakaï, R.G.; Assogbadjo, A.E. Factors Affecting Home Gardens Ownership, Diversity and Structure: A Case Study from Benin. *J. Ethnobiol. Ethnomed.* **2015**, *11*, 56. [CrossRef]
33. Withrow-Robinson, B.; Hibbs, D.E. Testing an Ecologically Based Classification Tool on Fruit-Based Agroforestry in Northern Thailand. *Agrofor. Syst.* **2005**, *65*, 123–135. [CrossRef]
34. Deribe, H.; Adugnaw, M. Review on Contribution of Fruits and Vegetables on Food Security in Ethiopia. *J. Biol. Agric. Healthc.* **2016**, *6*, 49–58.
35. Kebede, M. Survey of Insects and Diseases of Fruit Crops in SNNPR: In the Case of Kafa Zone. *J. Biol.* **2015**, *5*, 73–82.
36. Tulu, Z.J. *Institutions, Incentives and Conflict in Coffee Forest Use and Conservation: The Case of Yayo Forest in Iluu Abba Bora Zone, Southwest Ethiopia*; Bonn University: Bonni, Germany, 2009.
37. Kehlenbeck, K.; Maass, B.L. Crop Diversity and Classification of Homegardens in Central Sulawesi, Indonesia. *Agrofor. Syst.* **2004**, *63*, 53–62. [CrossRef]
38. Mekonen, T.; Giday, M.; Kelbessa, E. Ethnobotanical Study of Homegarden Plants in Sebeta-Awas District of the Oromia Region of Ethiopia to Assess Use, Species Diversity and Management Practices. *J. Ethnobiol. Ethnomed.* **2011**, *11*, 64. [CrossRef] [PubMed]
39. Senbeta, F.; Gole, T.W.; Denich, M.; Kellbessa, E. Diversity of Useful Plants in the Coffee Forests of Ethiopia. *Ethnobot. Res. Appl.* **2013**, *11*, 49–69.
40. Kumar, U. Impacts on Livelihood. *Can. Cent. Sci. Educ.* **2012**, *2*, 96–114.