

## RESEARCH ARTICLE

# ACCESSING THE STATUS OF HOMEGARDEN AND ITS FUNCTIONAL CATEGORY IN ITAHARI SUB-METROPOLITAN MUNICIPALITY, NEPAL

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## ARTICLE DETAILS

### Article History:

Received 05 May 2020  
Accepted 10 June 2020  
Available online 11 June 2020

## ABSTRACT

Home garden, the name itself clarifies its meaning any garden that is belonging to home which can be anywhere at the front, behind, or in any fallow land. The reason why home garden and its diversity were studied is get access to the ethnobotanical study of the species and knowledge among people regarding the home garden could be more lighten up. A survey was conducted from October (2019) to January (2020). Among the surveyed fifty households, the type of home garden dominated was front type ranging from 45-700m<sup>2</sup> whose management and diversity were changing as per the gender. Altogether of 108 species were collected in a home garden belonging to 45 families, 34 species were found to be common. The representative families Leguminosae and Asteraceae rank on top followed by Moraceae, Brassicaceae, Poaceae, and so on. Despite the result concluding the most diversified crops, the home garden of Sunsari district itself carries a wider range of diversity from fruits, vegetables, spices to economically useful species like ornamental plants and fodders. With the studies and knowledge accounted, it can be concluded that pursuing a home garden not only revalues our health and environment but also preserves a hundred ages of traditions.

## KEYWORDS

Shannon wiener index, Gharbagaincha, Conservation, Nutritional plant, Front garden.

## 1. INTRODUCTION

A home garden is a microenvironment composed of multi-species, multi-storied, and multi-purpose plants close to the homestead as a front garden, backyard garden, side-yard garden. The diversity of species is higher in homegarden making the structure complex and increasing the function of the garden. Home garden is nothing but simply the systematic name of fallow land in home which are best known for the time utilization and also the plant conservation.

Home garden formerly known as gharbagaincha in Nepal is one of the main sources of the daily nutritional requirement of peoples in rural and urban areas (Gautam et al., 2009; Khanal et al., 2019). Homegarden comprises of a diversity of crops ranging from food and nutritional value crop to medicinal plants and tree crops (Semu, 2018). 60% of the family requirements for fruits, vegetables, and spices are being obtained from the home garden (Gautam et al., 2009).

Nowadays, home gardens are getting importance for conserving genetic diversity and exploring the ethnobotanical importance of home gardens (Kumar et al., 2019). Indigenous knowledge is vital for sustainable agro-biodiversity where the knowledge is lost at an incredible rate (Semu, 2018).

A home garden is also the chief component providing ecosystem services (Vineeta et al., 2019). Ecological diversity of home gardens is measured in the form of diversity index, Shannon wiener index, Simpson's index, species richness, evenness, and many more (Magurran, 2004; Newbery, 1995; Peet, 1974).

Shannon Weiner index is used to interpret the diverse richness of the study area. Higher values of the Shannon Wiener index result in higher diversity, however in most of the ecological studies values greater than 4 is very rare and most study area comprises of value 2.8-3 (Gautam et al., 2009). Homegarden studies in different regions have reported the diversity of crops ranging from 88- 342 number of species (Gautam et al., 2009).

This study also focuses on documenting the species diversity of the study area and its functional category use in people's daily life. Also, the relationship of a demographic factor with crop diversity is identified and presented in the paper along with a conservation strategy.

## 2. METHODOLOGY

### 2.1. Study area

Itahari sub-metropolitan municipality lies in the Sunsari district of Province no. 1, Nepal. Itahari shares its border with Biratnagar in the south and Dharan in the north serving as a junction point of Mahendra highway and Koshi highway. Itahari is divided into 26 wards for the proportionate development of the town. The study area thus selected for the study is ward no. 04 (figure 1).

Ward no. 04 is the most diverse area of municipality with peoples of all types of ethnicity. It also had a greater number of home gardeners and involved in farming as a primary occupation too. Geographically, Itahari lies in coordinates 26°39'57.3"N 87°16'49.1"E. description of the study area is as shown in table 1.

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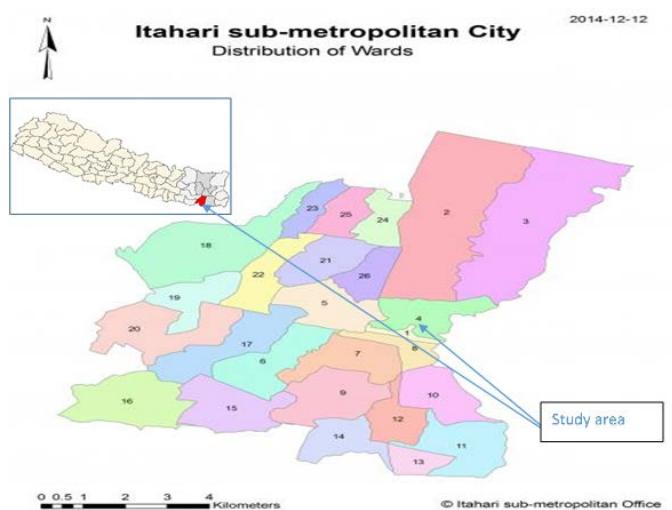
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**DOI:**  
10.26480/ees.02.2020.85.91

**Table 1: Details of the study area**

Description	Values	References
Eco-zones	Eastern terai (lowland area)	(Gautam et al., 2009)
Altitude (masl)	110	(Shrestha & Shrestha, 2019)
Population	140,517	(CBS, 2015)
Average number of member in a family	4.2	(CBS, 2015)
Number of households	33,794	(MOPE, 2017)
Average temperature(°C)	24.6°C	(Climate-Data.org," n.d.)
Annual precipitation (mm)	1891 mm	(Climate-Data.org," n.d.)



**Figure 1:** Map of Itahari Sub-Metropolitan Municipality showing study area (Anonymous, n.d.)

## 2.2. Research design, sampling size, and data collection

A random sampling survey was conducted using the non-replacement technique and semi-structured open-ended and close-ended questionnaires were prepared for conducting an interview. Key informant survey (KIS) was conducted from 23<sup>rd</sup> October (2019)- 17<sup>th</sup> January (2020). Also, the information relating to the use pattern of home garden species and their diversity was obtained with the help of open-ended questionnaires. Before conducting the survey, pre-testing of the questionnaire was done in 10 households to identify the necessary changes to be made in the questionnaire for data collection. The sampling size was adjusted to 50 households and was selected randomly. Data collection includes the household survey and the field study of home gardens of the corresponding respondents. The entire home garden was observed during the study laying in quadrants (Semu, 2018) and necessary data for plant population and species found in the home garden were recorded using the procedures of Yamane et al. (2018).

## 2.3. Data analysis

Data entry was done in Ms Excel 2016, Data analysis was done using IBM SPSS 20 for descriptive analysis and Past 4.0.1 (Hammer et al., 2001) was used for calculating the diversity index like Shannon Wiener index, simpson1-D, species richness, evenness, the effective number of species in a home garden.

The Shannon-wiener index is the most commonly used diversity indicator in plant communities, and it takes a value of zero when there are only one species in a community, and a maximum value, when all species are present in equal abundance. Biodiversity of a given locality is commonly recorded by the Shannon Wiener index and evenness measure (Newbery, 1995; Peet, 1974). Peet (1974) explained that the effective number of species can be calculated by using the exponential value of the Shannon diversity index.

$$H = \sum_{i=1}^S -(p_i * \ln p_i)$$

where; H = the Shannon index; Pi = fraction of the entire population made of species i; S = number of species encountered;  $\sum$  = sum from species to species and ln= natural logarithm to the base e

(log).

Simpson Index compares the number of species to the total population of a given area. Simpson's index (D) measures the probability that two individuals selected randomly from a sample which belongs to the identical species (*or some category other than species*) (Semu, 2018). Also, Simpson 1-D is the measure of diversity which reveals that higher the value of 1-D higher is the sample diversity and value lies between 0 and 1.

$$D = \sum (n/N)^2$$

Where n= total number of particular species; N = total number of all species sampled; D= Simpson index.

Magurran (2004) explained evenness measure as  $E = H/H_{max}$  i.e. the ratio of observed diversity to maximum diversity.

## 3. RESULTS AND DISCUSSIONS

### 3.1. Socio-economic information

During the survey, 52% of the respondents were male and the rest 48% were females among the 50 randomly selected respondents. The locality was found to be covered by Brahmins, Janajatis, and Chhetri's as 42%, 24%, and 34% respectively.

The average age of the respondents was found to be 43.8 with a minimum of 19 and a maximum of 72 years old respondents. The literacy rate was found to be 94% and 6% are illiterate.

And the majority of the were found to be involved in the business as their primary occupation. Only 28% of the respondents were found to be involved in farming, 18% were found to be servicemen, 44% were involved in business and 10% were found to be involved in other types of works like purohit, labors, teachers and so on. 52% of the males were found to be family head, however, only 42% of males have ownership of the land. According to CBS (2015), the Females ratio is higher than that of males which are contrasting to our study, and also the observed literacy rate of our study area is far higher than that of the study report. Details of the socioeconomic characteristics of respondents are as shown in table 1.

**Table 2: socioeconomic characteristics of respondents**

Gender (%)	
Male	52
Female	48
Ethnicity (%)	
Brahmin	42
Chhetri	34
Janajati	24
Education (%)	
Illiterate	6
Primary	30
Secondary	48
University	16
Age groups (%)	
Below 25	14
25-35	16
36-50	44
51-51+	26
Family head (%)	
Male	52
Female	48
Land ownership (%)	
Male	48
Female	52
Total landholding (mn± se) in M <sup>2</sup>	353.808± 42.43
Size of the home garden (mn± se) in M <sup>2</sup>	117.94± 16.168
Average family size	4.36± 0.206

Source: field survey, 2020.

### 3.2. Size of a home garden, species richness, diversity indices

Among the surveyed households, the majority of them have a home garden as a front garden ranging from 45- 700m<sup>2</sup>. respondents with an average

area less than 70m<sup>2</sup> were found to have a limited number of species dominated by ornamental plants and with fewer species of vegetables. Gautam et al. (Gautam, Sthapit, et al., 2009) reported the size of the home garden ranging from 99-1605m<sup>2</sup> which is similar to the present findings of the study. Also, Sunwar et al. (2006) reported the size of the home garden ranging from 402-434m<sup>2</sup> on average. A total of 108 species belonging to 45 families was reported during the study. Khanal et al. (2019) reported 106 species from katahari RM and higher diversity of crops (172-342) has been reported by (Gautam et al., 2009) in Nepal with 24 key species.

The value of the Shannon Weiner index ranges from 1.5-3.5, however value greater than 4 is rare in ecological studies (Kerekhoff, 2010; Magurran, 2004), and has been reported by Neelamegam et al. (2015) in Kerala. Diversity indices as mentioned in table 3 infers that the Shannon Weiner index for all crops was found to be 3.535 (found highest in vegetables and lowest in cash crops) which is highest of the typical value range of 1.5-3.5. Khanal et al. (2019) also reported that Shannon Weiner index 2.99 with higher biodiversity among species. Effective number of species in the study area was found to be 34 which infers that, among 108 species 34 species are common (3 species of cereals, 9 species each of fruits, ornamentals, fodder, and legumes and oilseed crops, 4 species of medicinal plants, 14 species of vegetables, 1 species each of cash crop and spices). There is an increase in the effective number of species with an increase in the Shannon Weiner index (Daly et al., 2018). Moreover, Evenness was recorded high in fodder (75.34%) and lowest in spices (27.12%).

**Table 3: Diversity indices of species reported from Itahari**

Factor	Shannon Weiner index (H)	Even ness (E)	Simpson 1-D	Effective number of species
All crops	3.535	0.3298 (32.98)	0.9314	34.295
Cereals	1.203	0.666 (66.6)	0.6301	3.330
Ornamental	2.2217	0.5403 (54.03)	0.8504	9.222
Medicinal plants	1.467	0.4818 (48.18)	0.7121	4.336
Fruits	2.224	0.6602 (66.02)	0.86	9.244
Fooder	2.282	0.7534 (75.34)	0.8715	9.796
Vegetables	2.642	0.5616 (56.16)	0.905	14.014
Spices	0.4868	0.2712 (27.12)	0.2224	1.62
Cash crops	0.07158	0.5371 (53.71)	0.02666	1.04
Legumes and oil seed crops	2.259	0.7365 (73.65)	0.8766	9.57

Modified from Khanal et al., (2019). figures in the parenthesis indicate the percentage

### 3.3. Management of home garden species

Management of home garden species involves different intercultural operations like weeding, training, and pruning of plants. The diversity of plants was recorded high in the home garden managed by females ( $\chi^2 = 20.295$  at p-value 0.05). Khanal et al. (2019) reported that females cultivate more plants in the home garden than that of males. Also, the management of crop species for the functional category was found to be affected in the home garden as per gender. Female managed home garden was dominated by vegetables, ornamental plants, and medicinal plants whereas, male managed home garden dominates the fruit and fodder plants followed by, vegetables, and medicinal plants. Pearson test of correlation between socio-economic characteristics and the number of species in a home garden is as shown in table 4. A strong positive correlation was observed in several species reported with a total size of garden (0.833) and the size of the home garden (0.833) at p-value 0.01. However, a weak and negative correlation was observed between age and education (-0.659). Most of the people were found to protect the diversity of plants in the local community by collecting their seeds from their home garden, also propagation of ornamental plants was found to be done mainly by stem cuttings and fewer of the respondents also explained that they are multiplying the fruits species number by air layering especially in litchi and citrus. Exchange of the preserved seed among the neighbor was

found to be a common event in the study area which helps to made uniformity in species distribution in a home garden in the study area and a higher number of species per garden.

**Table 4: Pearson test of correlation between socio-economic characteristics and the number of species reported.**

	age	Education	Total land	Size of home garden	Number of species reported
Age	1				
Education	-0.659**	1			
Total land	0.119	-0.199	1		
Size of home garden	0.134	-0.101	0.0864**	1	
Number of species reported	0.028	0.013	0.664**	0.833**	1

\*\*indicates correlation is significant at 0.01 level (two-tailed)

### 3.4. Functional Category of Plants Around Sunsari District

The kind of plants that we accumulate in homegarden during the survey, found to be carrying many functional uses. Further, the information that we got access during the survey period we categorized them as nutritional supply, spices, medicinal plants, and ornamental plants as per the use-value reported by most of the respondents. Usage of plants for different purposes from nutritional to medicinal value and some of them as fodder and timber has also been reported by Semu (2018) in the home gardens of Ethiopia.

#### 3.4.1. Nutritional Supply from Home Gardens

One of the easiest ways of ensuring access to a healthy life is consuming healthy food, the plants cultivated in homegarden were suggested to be an important source of nutrition supplement to the respondents. Mainly the home garden is pretty dominated by plants like vegetables and fruits also followed by cereal crops fulfilling more than 75% of the diet. Homegarden owner's emphasis on preserving the established traditions suggested the impact of the home garden on their day to day life which led to improving household food security. 58 plants were reported for high nutritional value in the study area which was categorized as vegetables, fruits, oilseed crops, pulses, cereals, as per the uses. The details of nutritional plant are presented in (table 5.)

#### 3.4.2. Medicinal plants from home gardens

Traditional agricultural practices are more common in the study area due to which peoples attitude towards medicinal plant is same from a long decade ago. Very commonly used 9 medicinal plants have been reported from the study area (table 7.). Among them, amala and ghiukumari (aloe) are the most commonly used species. The use of the medicinal plant at the household level and its preservation in homegarden has been reported by Thapa et al., (2020). Also, most of the findings for the usage of plants in medicinal purpose and curing of ailments are similar, maybe due to similar culture and traditions to that of Thapa et al., (2020).

#### 3.4.3. Ornamental plants

Since a long ago, the importance of ornamentals in the home garden is of great importance as they convey some religious value in society and are also attractive to nature. A total of 17 ornamentals plants have been reported and all of them have some religious values. The list of ornamental plants in the study area is presented in (table 6.)

#### 3.4.4. Spices, Condiments, and Other plants reported from home garden

These are the plants with minimum abundance but are of high importance in the rural life of peoples in the study area. These plants constitute fodder plants, plants for timber, and fuels, some of the high religious value plants. Among them, *Ficus religiosa* and *Ficus benghalensis* are being worshipped by Hindu communities and a marriage ceremony is to be conducted when they get mature. Thus, when there is peepal there's also Barr and vice-versa. The diversity of spices and condiments and other plants like fodder tree, religious value plant, and plant for timber are presented in (table 8 and table 9).

**Table 5:** Nutritional plants reported from the study area

S. No.	Common name	Family	Scientific name	Plant habit	Use of plant
1.	Mango	Anacardiaceae	<i>Mangifera indica</i> L.	Tree	Fruit
2.	Litchi	Sapindaceae	<i>Litchi chinensis</i> L.	Tree	Fruit
3.	Jackfruit	Moraceae	<i>Artocarpus heterophyllus</i> L.	Tree	Fruit, vegetable
4.	Banana	Musaceae	<i>Musa paradisiaca</i> L.	Herb	Fruit, vegetable
5.	Papaya	Caricaceae	<i>Carica papaya</i> L.	Herb	Fruit
6.	Strawberry	Rosaceae	<i>Fragaria x ananassa</i>	Forb/ herb	Fruit
7.	Watermelon	cucurbitaceae	<i>Citrullus lanatus</i> (Thunb)	Creepers	Fruit
8.	Guava	Myrtaceae	<i>Psidium guajava</i> L.	Tree	Fruit
9.	Dragon fruit	Cactaceae	<i>Hylocereus undatus</i> (Haw.) Britton& Rose	Climbing habit	Fruit
10.	Grapes	Vitaceae	<i>Vitis vinifera</i> L.	Climbing habit	Fruit
11.	Coconut	arecaceae	<i>Cocos nucifera</i> L.	Tree	Fruit
12.	Citrus	Rutaceae	<i>Citrus sinensis</i> L.	Tree	Fruit
13.	Pomegranate	Lythraceae	<i>Punica granatum</i> L.	Shrub	Fruit
	Areca nut	Arecaceae	<i>Areca catechu</i> L.	Tree	Fruit
14.	Lentil	Leguminosae	<i>Lens culinaris</i> L.	Herb	Pulses
15.	Kidney bean	leguminosae	<i>Phaseolus vulgaris</i> L.	Creepers	Pulses
16.	Chick pea	Leguminosae	<i>Cicer arietinum</i> L.	Herb	Pulses
17.	Pigeon pea	Leguminosae	<i>Cajanus cajan</i> (L.) Millsp.	Shrub	pulses
18.	Black gram	Leguminosae	<i>Vigna mungo</i> L.	Herb	Pulses
19.	Green gram	Leguminosae	<i>Vigna radiate</i> L.	Herb	Pulses
20.	Khesari	leguminosae	<i>Lathyrus sativus</i> L.	Herb	Pulses
21.	Groundnut	Leguminosae	<i>Arachis hypogaea</i> L.	Herb	oil
22.	Mustard	Brassicaceae	<i>Brassica</i> sp.	Herb	Oil
23.	Soyabean	Leguminosae	<i>Glycine max</i> (L.) Merr.	Herb	Oil
24.	Rapeseed	Brassicaceae	<i>Brassica</i> sp.	Herb	Oil
25.	Sesamum	Pedaliaceae	<i>Sesamum indicum</i> L.	Herb	Oil
26.	Filunge	asteraceae	<i>Guizotia abyssinica</i> L.	Herb	
27.	Sunflower	Asteraceae	<i>Helianthus annus</i> L.	Herb	Oil
	Linseed	Liliaceae	<i>Linum usitatissimum</i> L.	Herb	Oil
	Pea	Legumionaseae	<i>Pisum sativum</i> L.	Creepers	Pulses and vegetable
28.	Amaranthus	Amaranthaceae	<i>Amaranthus albus</i> L.	Herb	Vegetable
29.	Potato	Solanaceae	<i>Solanum tuberosum</i> L.	Herb	Vegetable
30.	Cauliflower	Brassicaceae	<i>Brassica oleracea</i> var <i>botrytis</i> L.	Herb	Vegetable
31.	Cabbage	Brassicaceae	<i>Brassica oleracea</i> var <i>capitata</i> L.	Herb	Vegetable
32.	Raddish	Brassicaceae	<i>Raphanus raphanistrum</i> L.	Herb	Vegetable
33.	Carrot	Apiaceae	<i>Daucus carota</i> L.	Herb	Vegetable
34.	Fenugreek	Legumionasae	<i>Trigonella foenumgraceum</i> L.	Herb	Vegetable
35.	Palungo	Chenopodiaceae	<i>Spinaceae oleracea</i>	Herb	Vegetable
36.	Chenopodium	Chenopodiaceae	<i>Chenopodium album</i> L.	Herb	Vegetable (leaf)
37.	Parwal	Cucurbitaceae	<i>Trichosanthes dioica</i> Roxb.	Climbers	vegetable
38.	Brinjal	Solanaceae	<i>Solanum melongena</i> L.	Herb	Vegetable
39.	Rayo	Brassicaceae	<i>Brassica juncea</i> L.	Herb	Vegetable
40.	Bittergourd	Cucurbitaceae	<i>Momordica charantia</i> L.	Herb	Vegetable
41.	Lauka	Cucurbitaceae	<i>Lagenaria siceraria</i> (Molina) Standl.	Climbers	Vegetable
42.	Iskus	Cucurbitaceae	<i>Sechium edule</i> (Jacq.) Sw.	Climbers	Vegetable
43.	Pumpkin	Cucurbitaceae	<i>Cucurbita moschata</i> Duch (Noir.)	Creepers	Vegetable
44.	Winter bean	fabaceae	--	Climbers	Pulses
45.	Tomato	Solanaceae	<i>Solanum lycopersicum</i> L.	Herb	Vegetable
46.	Cucumber	Cucurbitaceae	<i>Cucurbita sativus</i> L.	Vines	vegetable
47.	Colocasia	Araceae	<i>Colocasia</i> sp.	Herb	Vegetable
48.	Yam	Dioscoreaceae	<i>Dioscorea spp</i>	Herb	Vegetable
49.	Drumstick	Moringaceae	<i>Moringa oleifera</i> L.	Tree	Vegetable
50.	Wheat	Poaceae	<i>Triticum aestivum</i> L.	Herb	Cereal
51.	Maize	Poaceae	<i>Zea mays</i> L.	Herb	Cereal
52.	Barley	Poaceae	<i>Hordeum vulgare</i> L.	Herb	Cereal
53.	Buckwheat	Polygonaceae	<i>Fagopyrum esculentum</i> L.	Herb	Cereal
54.	sugarcane	Poaceae	<i>Saccharum officinarum</i> L.	Herb	Fruit
55.	cherry	Rosaceae	<i>Prunus avium</i> L.	Tree	Fruit



**Table 6: Diversity of Ornamental plants**

No.	Common name	Scientific name	Family	Habit
1.	Orchid	---	Orchidaceae	Herb
2.	Phillipines orchid	<i>Denderobuim sp.</i>	Orchidaceae	Herb
3.	Rose	<i>Rosa indica</i> L.	Rosaceae	Shrub
4.	Carnation	<i>Dianthus caryophyllus</i>	Caryophyllaceae	Herb
5.	Chrysanthemum	<i>Chrysanthemum indicum</i>	Asteraceae	Herb
6.	Dahlia	<i>Dahlia sp.</i>	Asteraceae	Herb
7.	Bryophyllum	<i>Bryophyllum sp.</i>	Crassulaceae	Herb
8.	Khursani ful	<i>Achania malvaviscus</i> L.	Malvaceae	Shrub
9.	Christmas tree	--	pinaceae	Tree
10.	Thuja	Thuja sp.	Cupressaceae	Shrub
11.	Gladiolus	<i>Gladiolus gandavensis</i> L.	Iridaceae	Herb
12.	Poinsettia	<i>Euphorbia pulcherrima</i> L.	Euphorbiaceae	Herb
13.	Marigold	<i>Tagetes erecta</i> L.	Asteraceae	Herb
14.	Poppy flower	<i>Papaver rhoeas</i> L.	Papaveraceae	Herb
15.	Geranium	<i>Geranium sp.</i>	Geraniaceae	Herb
16.	Hibiscus	<i>Hibiscus rosa-sinensis</i>	Malvaceae	Herb
17.	Juniper	<i>Juniperus communis</i> L.	Cupressaceae	Shrub

**Table 7: Diversity of Medicinal Plants**

No.	Common name	Family	Habit	Scientific name	Plant parts used	Medicinal uses
1.	Amala	Euphorbiaceae	Tree	<i>Phyllanthus emblica</i> L.	Roots, seeds	Jaundice, asthma, bronchitis, laxative
2.	Ghiu kumari	Liliaceae	Succulents	<i>Aloe vera</i> (L.) Burm.f.	leaves	Cooling effect, used against piles
3.	Panchaule	Orchidaceae	Herb	<i>Dactylorhiza hataqiree</i> (D.Don) Soó	root	Dysentery, diarrhoea chronic fever
4.	Tulasi	Labiatae	Herb	<i>Ocimum tenuiflorum</i> L.	Leaves, seeds	Antipyretic, cough cold
5.	Neem	Meliaceae	Tree	<i>Azadirachta indica</i> A.Juss.	Leaves, barks	Antidandruff uses, skin problem remedies
6.	Gandhe	Asteraceae	Herb	<i>Ageratum conyzoides</i> (L.) L.	leaves	Treatment in cuts and injuries
7.	Coconut	Arecaceae	Tree	<i>Cocos nucifera</i> L.	fruit	Lowers the rate of heart diseases, reduces belly fat
8.	False daisy	Asteraceae	Herb	<i>Eclipta prostrata</i> (L.) L.	Fruit	Fever, liver tonic, wounds, skin infections
9.	Calotropis	Apocyanaceae	Herb	<i>Calotropis gigantea</i> (L.) Dryand.	Leaves, fruits	Diabetes, migraine, muscle pain

**Table 8: Diversity of Spices and Condiments species**

No.	Common name	Scientific name	Habit	Family	Plant parts used
1.	Onion	<i>Allium cepa</i> L.	Herb	<u>Amaryllidaceae</u>	Chopped bulbs
2.	Garlic	<i>Allium sativum</i> L.	Herb	<u>Amaryllidaceae</u>	Chopped bulbs
3.	Chili	<i>Capsicum annum</i> L.	Herb	Solanaceae	Dry pods along with seeds
4.	Turmeric	<i>Curcuma longa</i> L.	Herb	Zingiberaceae	Tuberous rhizome
5.	Coriander	<i>Coriandrum sativum</i> L.	Herb	<u>Apiaceae</u>	Fresh leaves and dried seeds
6.	Curry leaves	<i>Murraya koenigii</i> (L.) spreng	Shrub	Rutaceae	Fresh leaves
7.	Tejapatta	<i>Cinnamomum tamala</i> (Buch.-Ham.) T.Nees & Eberm.	Tree	Lauraceae	Bark, leaves
8.	Pudina	<i>Mentha spicata</i> L.	Herb	lamiaceae	Fresh leaves

**Table 9:** Other crop diversity with multiple uses

S.n	Common name	Scientific name	Habit	Family	Uses
1.	Napier	<i>Pennisetum purpureum</i> Schumach.	Herb	Poaceae	Fodder
2.	Sisam	<i>Dalbergia sisoo</i> (roxb.)	Tree	Legumionasae	Fodder and as a fuel
3.	Bakaini	<i>Melia azedarach</i> L.	Tree	Meliaceae	Fodder and fuel
4.	Neem	<i>Azadirachta indica</i> L.	Tree	Meliaceae	Fodder and also medicinal value plant
5.	Bayar	<i>Ziziphus mauritiana</i> Lam.	Tree	Rhamnaceae	Fruit and fodder
6.	Pithari	<i>Trewia nudiflora</i> var. <i>dentata</i> Susila & N.P.Balacr.	Tree	Euphorbiaceae	Fodder
7.	Asare	<i>Lagerstroemia reginae</i> Roxb	Tree	Lythraceae	Fodder and ornamentals
8.	Mulberry	<i>Morus alba</i> L.	Tree	Moraceae	Fodder
9.	Bamboo	<i>Phyllostachys nigra</i> (Lodd. ex Lindl.) Munro	--	Poaceae	Fodder
10.	Badahar	<i>Artocarpus lakoocha</i> Roxb.	Tree	Moraceae	Fodder
11.	Bar	<i>Ficus benghalensis</i> L.	Tree	Moraceae	Religious value
12.	Peepal	<i>Ficus religiosa</i> L.	Tree	Moraceae	Religious value
13.	Swami	<i>F. benjamina</i> L.	Tree	Moraceae	Religious value
14.	Titepati	<i>Artemisia vulgaris</i> L.	Herb	Asteraceae	Medicinal value and religious value
15.	Gurjo	<i>Tinospora cordifolia</i> (Thunb.) Miers	Climbers	Menispermaceae	Fodder
16.	Dumri	<i>Ficus racemosa</i> L.	Tree	Moraceae	Fodder

#### 4. CONCLUSION

Home garden not only supports or reutilizes the time and land of the people but also the home garden is a promising approach to ensuring household food security. The home garden is on the farm itself where mixed cropping approaches produce multiple crop species with an enormous purpose. In the context of agrobiodiversity conservation home garden plays a vital role in engaging people and making use of their knowledge on it. From day to day needed vegetables and fruits to less abundance but with high importance persuing condiments, fooders and medicinal plants home garden is assimilating every possible component to increase local food security as well as building the food system stronger and healthier. Household garden contributes to the household economy as well as to their species richness by increasing the diversity index. Study areas conclude not only the food security problem, but a home garden is also fixing the other important task i.e. women empowerment. During their leisure time women could make up their work more useful and meaningful and the result getting is aiding them mentally, emotionally and also financially. We know the importance and beneficial reasons for the existence of home garden; the main agenda should primarily focus towards the mechanism of its protection and also towards its continuation for not being extinct. Also, proper policy should be stepped up to promote and conserve the home garden diversity.

#### 5. DECLARATIONS

##### 5.1 Fundings

There are no fundings granted for this research.

##### 5.2 Competing interests

The authors do not have any type of competing interests.

##### 5.3 Data availability

Primary data were available through field surveys conducted by authors and for literature review, secondary information was accessed through open access journals and websites.

##### 5.4 Authors Contribution

The authors have a significant role in manuscript preparation and conducting surveys.

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