

Status, Distribution And Socio-Cultural Uses Of Some Selected Home Garden Plants Of Upper Assam, Northeast India

P. Saikia

Centre for Environmental Sciences, Central University of Jharkhand, Brambe-835205, Ranchi, Jharkhand, India,
Corresponding author: Email: purabi.saikia83@gmail.com; Cell: +91-95467-57398

M. L. Khan

Department of Botany, Dr. Hari Singh Gour Central University, Sagar - 470003, Madhya Pradesh, India

Introduction

Homegarden is an efficient, highly rationale, ecologically and socio-economically sustainable agroecosystem that can sustain basic community needs without environmental deterioration (Fernandes and Nair 1986; Landauer and Brazil 1990). Traditional homegardens play a vital role in cultural festivals or religious activities and it provides their owners with culturally important materials. Some plants found in homegardens have no other value apart from a cultural one (Huai et al., 1998). In some cases, every component of the homegarden has special cultural meaning and value (Trinh et al., 2003). Species distribution in homegarden is often determined by a combination of environmental, cultural, socio-economic factors and market demands (Fernandes and Nair, 1986; Albuquerque et al., 2005). The cultivation of different crops in homegardens is regarded as a strategy of farmers to diversify their subsistence and cash needs. Inhabiting Assamese people of upper Assam are rich in cultural activities and maintain traditional homegardens for the supply of different household needs. Although, owners manage diversity, not as deliberate effort to conserve biodiversity but in their diversification of species and resource management fulfill diverse livelihood needs. The most commonly cultivated homegarden plants of upper Assam are Agar (*Aquilaria malaccensis* Lam.), Betel nut (*Areca catechu* L.), Bamboo (*Bambusa* spp.), Banana (*Musa* spp.), Mango (*Mangifera indica* L.) and Jackfruit (*Artocarpus heterophyllus* Lam.). Besides their daily sustenance, these plants have unique cultural importance and also contributed a lot to the household economy. In this paper, we attempted to discuss the status, distribution and different cultural utilities of the above mentioned six selected plants in homegardens of upper Assam.

Materials and methods

Study site

The study was conducted in 135 randomly selected homegardens of 27 villages located in Jorhat and Golaghat

districts of upper Assam, Northeast India (25°48' to 27°10' N and 93°17' to 94°36' E) (Figure 1). Geographic location and number of homegarden studied per village are enumerated in Table 1. The site is located in the central part of Brahmaputra Valley covering an area of 6391 km². It is surrounded by Sibsagar and Dibrugarh districts on the east, Nagaon and Karbi Anglong districts on the west, Lakhimpur and Sonitpur districts on the north and the bordering state of Nagaland on the south. Total number of villages of Jorhat and Golaghat districts is 855 and 1089 with population density of 354 and 236 per km² respectively (Census of India, 2001). The common indigenous communities of this area are Kuch, Kalita, Brahmin, Keot, Ahom, Sut, Missing, Chutia, Kachari, Bodo and teagarden worker. The population comprises predominantly by Hindus followed by Muslims and Christians. Economy is mainly agro-based comprising rice, tea and sugarcane as major economic crops. The climate of the region is of typical tropical type having distinct hot and humid summer (34.0°C during June-July) and cool winter (10.0°C during December-January). The mean annual rainfall of Golaghat and Jorhat districts ranged between 1200 mm and 1900 mm, however, its distribution over time and space is not uniform. Maximum precipitation occurs during July-August and minimum during November-December. The relative humidity remains very high throughout the year.

Vegetation analysis

Study was conducted in 135 selected homegardens of twenty seven villages (16 from Golaghat and 11 from Jorhat district) of Jorhat and Golaghat districts of upper Assam during 2007-2010. All the homegardens and villages were selected randomly and in each village two to fifteen homegardens were studied with an average of five homegardens per village. Vegetation was studied using quadrat method covering a minimum of 30% area in each homegarden. Random quadrats of 10m x 10m size were laid for trees and within the same 10m x 10m quadrat, one 5m x 5m quadrat for shrubs and two 1m x 1m quadrats for herbs were laid in the studied homegardens. Girth at breast height (1.3 m above ground) of all the

individual trees were recorded during the study. Plant species were identified on the basis of vernacular names, published field inventories, floras and consulting available herbaria of the region. Herbarium specimens were collected and deposited in the Department of Forestry, North Eastern Regional Institute of Science and Technology, Arunachal Pradesh. Information regarding socio-cultural uses of homegarden plants was collected through interviewing the homegarden owners by interactive questionnaires according to Vogl et al. (2004).

Data analysis

Quantitative analysis of vegetation was done following Misra (1968). Importance Value Index (IVI) was computed by summing up relative density, relative frequency and relative dominance. The species richness was calculated by using the method 'Margalef's index of richness' (Dmg) (Magurran 1988)

$$Dmg = (S-1) / \ln N$$

where, S = Total number of species.

N = Total number of individuals.

The Shannon-Wiener Diversity Index (Shannon and Wiener 1963) was calculated from the IVI values using the formula given by Magurran (1988).

$$H = - \sum_{i=1}^s p_i \ln p_i$$

where, p_i is the proportion of the IVI of i th species and the IVI of all the species (n/N).

Concentration of Dominance was assessed by Simpson's Index (Simpson 1949).

$$CD = \sum_{i=1}^s (p_i)^2$$

where, p_i is the same as for the Shannon-Wiener information function.

Evenness index was calculated from Shannon-Wiener Diversity Index using the formula

$$E = H' / H'_{\max}$$

where, H' is Shannon-Wiener Diversity Index and $H'_{\max} = \ln S$ (where, S = total number of species)

The ratio of abundance to frequency was used to interpret the distribution pattern of the species (Whitford 1949). The ratio of abundance to frequency indicates regular

distribution if below 0.025, random distribution between 0.025 and 0.05 and contagious if >0.05 (Curtis and Cottam 1956).

Results

Status and distribution

Altogether 323 plant species with different household as well as socio-cultural uses were recorded from the homegardens of upper Assam. Agar, Betel nut, Bamboo, Banana, Mango and Jackfruit were the most common homegarden plants with highest density cultivated by almost all the owners of studied homegardens of upper Assam for their contribution to the daily household needs. Out of these six plants, Agar was the most common constituent of floristic composition and found in 100% of the studied homegardens followed by Betel nut (97%) and Banana (88%) (Figure 2). In terms of density, Agar (1443 individuals ha^{-1}) was the most dominant component followed by Bamboos (1426 individuals ha^{-1}) and Betel nut (554 individuals ha^{-1}) in the studied homegardens of upper Assam. Similarly, frequency of occurrence was also highest of Agar (98%) which was followed by Betel nut (74%) and Mango (36%). On the other hand, Bamboos were found most abundant (95.5) followed by Betel nut (7.5) in the homegardens where it presents. Density, frequency, abundance, basal area, IVI and abundance to frequency ratio of all these six species are presented in Table 2. The ratio of abundance to frequency indicated contagious distribution of all the species in homegardens of upper Assam except (Mango) *M. indica* which showed random distribution with abundance to frequency ratio of 0.049. All other community characteristics of the study sites are mentioned in Table 3. In the present study, we recorded a total of five different Banana species (*Musa acuminata* Colla., *M. balbisiana* Colla., *M. calosperma* F. Muell., *M. paradisiaca* L. and *Musa* sp.) and four Bamboo species (*Bambusa balcooa* Roxb., *B. tulda* Roxb., *B. pallida* Munro. and *B. nutan*) in the studied homegardens of upper Assam.

Socio-cultural uses

Each and every homegarden plants have certain uses because homegardens are agroforestry systems where plant species were cultivated according to the choice and needs of the household owners. Different plant species has different utilities according to their constituent elements. Besides the main household utilities, here we mentioned some socio-cultural uses of six selected homegarden plants of upper Assam.

Agar

Agar is a most common cash crops cultivated by the owners for their economic upliftment. People of upper Assam

cultivated this plant in the boundaries of the homegarden to enhance the aesthetic beauty of their homegardens. According to some respondent agaru has some medicinal properties also and wood is used to treat a range of diseases from fever to gastric. Because of the high commercial values, management of *A. malaccensis* in homegardens of upper Assam is often used as an indicator of high social and economic status of the owner.

Betel nut

Betel nut is cultivated in the homegardens as other most important cash crops. Assamese people used it as a masticator and it is a tradition to offer *Pan-tamul* (Betel leaves and raw Betel nut) to guests after tea or meals. It has a variety of uses during religious and marriage ceremonies among the Assamese people. To invite guests to any religious or wedding receptions by offering Betel nut with Betel leaves is a tradition of Assam.

Bamboo

Bamboos are important construction material and cultivated by Assamese people in their homegardens for commercial purposes also. It is an integral part of the cultural, social and economic traditions of Assam and plays an important role in the lives of Assamese people. It is used in many ways, for housing, fencing, agricultural implements, basketry, and even as fuelwood and the leaves used as fodder. Young bamboo shoots used to prepare different food items including pickles in their own traditional style.

Banana

Banana is one of the most important fruit plant cultivated by Assamese people in their homegardens for both household consumption as well as commercial purposes. Different parts of Banana used for different purposes. Banana flower, young shoots and fruits of *M. paradisiaca* are used as vegetable. Assamese people used different parts of Banana tree in different medicinal purposes. Flower, stem and vegetable fruit is good source of Iron and Potassium. Utensils prepared from Banana sheath and leaf is used as plates and also in some religious and wedding ceremonies. Dry midrib of Banana leaves are used in preparation of mat which is used in different religious functions for sitting during '*Mantra Paath*'.

Jackfruit

This plant is cultivated mainly for its fruits. Young fruits are also used as vegetable and for the preparation of pickles. Seeds are used by inhabitant of Assam as substitute vegetable of potato and also as chutney in their

own traditional way. It is also a good timber species and used for furniture and different construction purposes. Jackfruit has some medicinal properties also and used against diarrhea and heart problems.

Mango

Mango is cultivated mainly for its fruit. It is also a good timber species and used for different construction purposes from furniture to agricultural implements and also as fuelwood. Different parts of the mango tree are used in different purposes. During weddings, Mango leaves are used to decorate archways and doors in Assamese houses. Small twigs of Mango plant used as fuelwood during '*Hum Jagya*' of Assamese Hindu marriages. Unripe fruits used for the preparation of pickles and chutney and ripe one used in jam and jelly. Young leaves and fruits are also used in different medicinal purposes from diarrhea, dysentery to external injuries.

Discussion

Homegardens support local biodiversity conservation through indigenous species' integration as part of farming system and they also contribute to household economy. Traditional homegardens may be considered as a possible approach to increase livelihood security and poverty reduction, thereby providing incentives for forest conservation. High floristic diversity (323 plant species) of studied homegardens of upper Assam signifies homegarden as a storehouse of plant genetic resources. Dispersal limitation is an important ecological factor for controlling species distribution pattern (Hubbell et al., 1999). Present study reported contagious distribution of all the plant species except Mango in the studied homegardens of upper Assam. Contagious distribution of all the species irrespective of their habit in all the studied homegardens of northeast India was also reported by Sahoo et al. (2010).

The basic objectives for maintaining homegarden is to ensure availability of multiple products such as food, fuelwood, vegetables, fruits, fodder, medicines besides generating income and employment (Soemarwoto, 1987; Hoogerbrugge and Fresco, 1993; Kumar and Nair, 2004). Different plants are grown in homegardens for different reasons and homegarden plant composition provides an ample of uses and products. The broad diversity of homegarden plants satisfies various needs, such as oil, beverage, shampoo, shade, construction materials, timber, bre and has ornamental, religious, ceremonial and socio-cultural uses as well. Homegarden products are primarily consumed by the household members, but occasionally surpluses are sold in the local market or given away to family, friends or neighbours. People of upper Assam cultivated homegarden plants mainly for household consumption and sometimes, they used to sell the surpluses in the nearby market for income generation or distributed to the relatives or

neighbours. Similarly, in Barak Valley, Assam, villagers plant trees mainly for household consumption and income (Das and Das, 2005). In Bangladesh also, plants were mainly cultivated by farmers to generate income and for the purpose of household consumption in the form of fruits, firewood, etc. (Salam et al. 2000). The most marketable species with high commercial value were the most frequently occurring species found in the studied homegardens of upper Assam. Fifanou et al. (2011) also reported six different marketable species including Mango as the most frequently occurring species in their study on traditional agroforestry systems and biodiversity conservation in Benin, West Africa.

Homegarden reflects the wisdom of traditional culture that evolved and passed from generation to generation. The major factor for species selection in the homegardens is the value and utility of the main products (Gajaseni and Gajaseni, 1999). Agar (A. malaccensis) was the most dominant component of homegardens of upper Assam and found in all the studied homegardens with highest density and frequency. On the other hand, Musa spp. and M. indica were recorded from all the surveyed homegardens of Bangladesh because of the multipurpose uses of these plants (Millat-e-Mustafa et al., 1996). The high economic potential of Agar acts as a coercion factor for cultivation of the species in the homegardens. Management of Agar in homegardens is often used as an indicator of social status. Das and Das (2005) also observed an increasing interest towards the cultivation of the plant among the villagers of Barak Valley, Assam. Konyak Nagas also successfully cultivated the plant in homegardens of Nagaland (Ramakrishnan et al., 1996). Mango, Jackfruits, Bananas were important fruit plants cultivated in more than 70% studied homegardens of upper Assam mainly for household consumption and also for different socio-cultural uses. Banana, Jackfruit and Mango along with Taro, Yam, Coconut and Durian were also reported as important crops in the homegardens of Swidden, Southeast Asia by Pelzer (1978). In Thailand homegardens, Banana was planted for early products such as fruit, young edible flowers, and leaves (Gajaseni and Gajaseni, 1999). Bamboo is an important construction material and cultivated by the owners for income generation. Similarly, Betel nut also cultivated for both income generation and household consumption and it was found in 97% of the studied homegardens as it has different cultural uses in the day to day life of Assamese people. In conformity with the present report, Das and Das (2005) also reported predominance of Betel nut, Bananas and Bamboos in the studied homegardens of Barak Valley, Assam because of its commercial importance. They also reported pure stands of Betel nut, Bananas and Bamboos in their studied homegardens. Bananas and Bamboos cultivation become a new craze throughout Assam. More

and more educated unemployed rural youth are cultivating these plants in commercial scale and earning a good amount of money. Therefore, different species of Bananas and Bamboos become a major constituent of homegarden floristic composition of upper Assam.

Conclusions

Homegardens of upper Assam harbour a great diversity of plants with multiple uses. The knowledge and use of plants in different cultural, religious and social activity is still very much alive among the people of upper Assam despite gradual socio-cultural transformation. In addition to providing nutritional and food security, homegarden is an additional source of income for the household owners. Higher density and frequency of Agar, Betel nut, Bamboos, Bananas, Mango and Jackfruit implies a greater awareness by the homegarden owners of upper Assam on the need to augment income through introduction of species with multiple uses and market demands. This study suggests that quite apart from the relative economic dependence of the owner on homegardens, one of the predisposing factors in deciding the structure and species composition of homegardens is the inheritance of traditional knowledge on socio-cultural uses of plants and their products. Therefore, the management plan should focus on the biodiversity including rare/endangered species like A. malaccensis for this agro forestry system in order to safeguard the overall diversity of homegardens.

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Religion and British Politics

An recent instance of how the Church of England indirectly influences politics in India has come to my notice. At a provincial conference of the U.P. Indian Christians held at Cawnpore on the 7th Novembers, 1934, the Chairman of the Reception Committee, Mr.E.V.David, said; "As Christians we are bound by our religion to loyalty to the Kind, who is the Defender of our Faith." Inevitably that meant support of British imperialism in India. Mr.David further expressed his sympathies with some of the views of the 'die-hard' Conservative elements in England in regard to the I.C.S., the police, and the whole proposed constitution, which, according to them, might endanger Christian missions in India.

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