



A Case Study on People's Choice Conservation of Biodiversity in Homesteads of Assam, India

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Abstract

Choice of useful plant species from forests for domestication has been found to start simultaneously with the progress of human civilization since the beginning of cultivation and used to conserve them in particular piece of land near to their habitat. Those habitats may be the outcome of today's homesteads. Now, homesteads are considered as important sites for ex-situ on-farm conservation. Homesteads are also considered, as need base multi-purpose high-density, multi-layered agroforestry cropping systems, which not only mitigate the local needs but also take major part in conservation of biodiversity. Therefore, a study was conducted to determine the role of the homestead in the conservation and management of plant diversity of forests origin in nine selected villages of Jorhat, Sivasagar and Golaghat districts of Assam, India during 2005-2007. More than 393 plant species of 111 families are recorded in the homesteads, which are categorized as timber and non-timber species. Non-timber species are again grouped as food (i.e., fruits, roots stem, leaves and vegetables), fodder, medicinal, spices, aromatic and essential oil, fibers, dyes, beverage and pesticides yielding species. The study implies that several fruit plant species including Areca nut, Banana (*Musa spp.*), Mango (*Mangifera indica*), Jackfruit (*Artocarpus heterophylla*), Citrus spp, Lateku (*Baccauraria sapida*), Poniol (*Flacaurtia catapharacta*), Garcinia spp, Syzygium spp etc and Bamboo spp, Cane spp, and Livingstonia jenkinsiana are major components of homestead agroforestry system. In addition, some of the plant species are found to link with the cultural heritage of the local people. Tea, Aquilaria, Bamboo, Canes and Livingstonia species are recorded as commercially important plant species in their homesteads. Many rare and endangered plant species including orchids are well nourished in homesteads of the locality.

Keywords: Biodiversity, conservation, homestead and plant diversity.

Introduction

It is mentioned from the past evidence that domestication of plant species starts after just the end of nomadic lives and beginning of settled lives almost 12,000 years ago. Since then people started domestication of useful plant species in a new area as they occupy to live in. This begins cultivation and gardening in the homestead. Now people have their homesteads with varieties of useful plant species such as food and fodder, fruit and vegetables, medicinal, aromatic, spices and condiment, beverages and drinks to mitigate local needs and even plant species of commercial importance such as tea, coffee, rubber, bamboo and rattan, ornamental and aesthetic plants etc. Due to increasing trend of population exerts pressure on natural forest stands of their surroundings for exploration and utilisation of resources as a result bioresources and biodiversity begin to culminate day by day. Now, many naturalists advocate to take proper action to reduce and control activities of people on natural forests and to promote and conserve biodiversity^{1,2}. On the other hand, people have their natural tendency to incorporate useful and new plant species in their homesteads. Therefore, a huge amount of biodiversity has been maintained in homesteads that are socio-cultural and economically important to human civilization. However, with time people are losing the interest of domestication of plant resources due to shrinkage

of land area for residential and industrial development of the increasing populations. Assam is situated under Indo-burma megadiversity hotspot. Therefore, the homesteads of the state are also habitat of a large number of plant diversity. In this paper authors attempt for documentation of the existing plant species in the homesteads of nine villages of Jorhat, Golaghat and Sivasagar districts of Assam and categorized them on the basis of their utilizations by the people and assess the traditional contribution of the villagers in the conservation and management of plant diversity with a view for future scientific planning on conservation of biodiversity, better management, value addition the homesteads bioresources.

Material and Methods

The study was conducted during 2005- 2007 in nine villages viz. Veleuguri Adarsha Gaon, Marioni, Jorhat; Koliapani Adarsha Gaon, Teok, Jorhat; Meleng Hudamua Gaon, Jorhat; Sotai Bhokat Gaon, Jorhat; Borbam Gaon, Amguri, Sivasagar; Dhonekhwa Gaon, Gaurisagar, Sivasagar; Halluwa Gaon, Dhekial, Golaghat; Alengmora Gaon, Jorhat and Meleng Purni Gaon, Jorhat of Assam, India. The study areas of these three districts are located in between 21°30' N to 27°15' N latitude and 93°45' E to 95°25' E Longitude. The temperature varies between 9°C to 39°C. The district receives rainfall on an

average at 2244 mm with northwest monsoon contributing a major share. Forty homesteads from each of the nine villages of 0.3-1 acre or more area totaling 450 homesteads are selected randomly for the study. The survey was carried out following method as described by Jain³. The Vertical and horizontal distribution of plant species were recorded and identified with the help of regional and local floras. Questionnaires and other interviews were also used to gather data. Information on plant species utilization aspects is collected through interview. Plant species recorded in the homesteads were categorized as per their traditional use such as timber and non-timber species. Non-timber species were again grouped as food (i.e, fruits, roots stem, leaves and vegetables), fodder, medicinal, spices, aromatic and essential oil, fibres, dyes, beverage and pesticides yielding species etc.

Results and Discussion

Altogether, 393 plant species were recorded belonging to 111 family (table-1). Of which, Fabaceae is found to be largest family with 39 plant species. Among other largest families Euphorbiaceae has 17 plant species, Asteraceae with 15 plant species, Rutaceae and Cucurbitaceae both have 14 species each and Rubiaceae with 11 species; Lauraceae and Moraceae with 10 species each and Verbanaceae and Zingiberaceae each with 9 plant species distributed in the homesteads. Vertical distribution of plant species in different canopy is shown in table-2. Accordingly, six distinctive types of homesteads are categorized on the basis on vertical distribution of plant species in three different canopy formations (table-2). Horizontal distribution of plant species in homesteads were categorized as boundary plantation, courtyard plantation, vegetable garden /Kitchen garden species and Pond vegetation etc. Categorizations of plant species according to their utilization are described below.

Timber wood species: *Dalbergia sisoo*, *Michelia champaca*, *Albizia lebbek*, *Lagerstroemia perviflora*, *Depterocarpus retuses*, *Albizia procera*, *Albizia odoratissima*, *Tectona grandis*, *Tetrameles nudiflora*, *Gmelina arborea*, *Pterospermum lanceaefolium*, *Dysoxylum procerum*, *Mesua ferrea*, *Artocarpus chaplasha*, *Bombax ceiba*, *Anthrocephalus chinensis*, *Adina cordifolia* and *Mansonia dipikae* were recorded from the homesteads were traditionally used as timber by the villagers.

Non Timber plant species: Fuel wood species: Major fuel wood species recorded in the homesteads were *Dysoxylum binecteriferum*, *Melia azadarach*, *Albizia lucida*, *Tamarix dioica*, *Delonex resia*, *Albizia procera*, *Actinodephnae angustifolia*, *Schima wallichii*, *Macaranga denticulata* and *Mallotus sp.* etc.

Human Food: Fruits: More than 60 plants species were recorded under this category, some of them were major fruits and other were minor i.e. *Artocarpus heterophylla*, *Annona squamosa*, *Ananas comosus*, *Aegle marmelos*, *Artocarpus*

lekoocha, *Averrhoa billimbii*, *Baccuaria sapida*, *Emblica officinalis*, *Flacaurtia jangomas* Syn. *Flacaurtia cataphacta*, *Litchi sinensis*, *Purnus persica*, *Purnus domestica*, *Elaegnus latifolia*, *Mangifera indica*, *Musa paradisiaca*, *Musa acuminata*, *Syzygium cersoides*, *Syzygium malaccasis*, *Syzygium jambolina*, *Citrus maxima*, *Citrus aurantium*, *Pisidium guayava*, *Punica granatum*, *Ziziphus mauritiana*, *Artocarpus chaplasha*, *Rhus semialata*, *Garcinia lanceaefolia*, *Garcinia sp*, *Garcinia cowa*, *Garcinia pendunculata*, *Mengifera sylvatica*, *Terminalia cebula*, *Elaeocarpus sp*, *Olea europa*, , *Dilenia indica*, *Morus alba*, *Spondius mengifera*, *Garcinia xanthocymus*, *Pyrenaria barringtoniaefolia*, *Borassus flabellifer*, *Areca catechu*, *Phoenix sysvestris*, *Caryota urens*, *Averrhoa carambola*, *Averrhoa sp*, *Treminalia belerica*, *Mimosops elengi*, *Randia sp*, *Talauma hodgsonii*, *Prunus jenkinsii*, *Roydsia suavcolens*, *Melastoma spp*, *Tamarindus indica*, *Passiflora edulis*, *Moringa oleifera*, *Carrica carandas*, *Carissa billimbi*, *Garcinia oxyphylla*, *Carallia-lucida*, *Carallia integerrima*, *Cephalandra indica* and *Rubus hexagynous* etc.

Roots and Stems: Village people use to take as food in raw or cooked form of the juvenile shoots of *Bambusa Balcooa*, *Dendrocalamus hamiltonii* and *Macocana bacifera*, *Musa sp* and *Calamus spp* rhizome of *Zingiber cassumunar*, tubers of *Dioscoria bulbifera*, *Dioscoria alata*, *Dioscoria esculenta*, *Dioscoria trifida*, roots of *Manihot esculenta*, *Ipomea batatas*, corm of *Colocasia antiquorum*, *Amorphophallus campanulatus*, *Colocasia esculenta* etc.

Leaves: Fresh leaves of the plant species such as *Piper betel*, *Piper longrum*, *Eryngium foetidum*, *Muraya koenigii*, *Barringtonia sp*; juvenile stem tips of *Ipomea aquatica*, tendered leaves/ plant parts of *Azadirachta indica*, *Paederia foetida*, *Pteris critica*, *Perilla ocimoides*, *Cinnamomum tamala* and *Clerodendrum colebrookianum* were found to take as food. Some of them they take in raw, others they boiled or cooked to eat. Cultivation *Thea chinensis* (Tea) was recorded as new component in homesteads for tea leaves trading.

Edible seeds: Seeds of *Artocarpus heterophylla*, *Caesalpinia crista*, *Calamus*, *Caryota urens*, *Areca catechu*, *Areca negensis*, *Pinanga*, *Livingstonia jenkinsiana*, *Nymphaea nauchali*, *Phaseolus lunatus* and *Dolichos biflorus* etc. were recorded as edible seeds by the village communities.

Edible flowers: *Sesbania grandiflora*, *Nyctanthes arboristis* and *Cieba pentagyna* etc were recorded as edible flowers collected from the homesteads.

Fodder: More than 23 plant species were recorded as fodder species from the homesteads. *Albizia procera*, *Bauhinia purpurea*, *Bambusa spp*, *Dalbergia sisoo*, *Artocarpus heterophylla*, *Ficus indica*, *Artocarpus lacoocha*, *Mengifera indica*, *Artocarpus chaplasha*, *Ficus religiosa*, *Morus alba*, *Terminalia chebula*, *Malotus sp*, *Mikania micrantha*, *Pongamia pinnata*, *Ficus indica*, *Musa spp*, *Eichhornia crassipes*,

Lagerstreomia speciosa, *Zyzyphus jujuba*, *Syzygium cumini*, *S. armontam* were traditionally used as major fodder species recorded from the homesteads studied. Among the fodder grasses found in homesteads were *Saccharum spontaneum*, *S. munja*, *Impareta cylindrica*, *Paspalum conjugatum*, *Desmostachya bipinnata*, *Typha elephantine*, *T. angusta*, *Cynodon dactylon* and *Clinogyne dichotoma* etc.

Bamboo: Bamboo species are the major component of the homesteads of Assam. Bamboo species recorded in the studied homesteads were *Bombusa vulgaris*, *Bambusa balcooa*, *Bambusa tulda*, *Bambusa nutans*, *Dendrocalamus hamiltonii*, *Schzostachyum dullooa* and *Melocana bacifera*.

Rattan species: Four rattan species were recorded in homesteads of different study area i.e. *Calamus tenuis*, *Calamus gracilis* *Calamus floribundus* and *C. leptospadix*.

Gums and Resins: Traditionally gum were found to collect by the villagers from *Bauhinia purpurea*, *Albizia lebbek*, *Butea monosperma* etc. Resins also extracted from the plant species found in the homesteads are *Boswellia serrata* and *Canarium resiniferum* etc.

Oil seeds: Seeds of *Mesua ferea*, *Terminalia belerica*, *Pongamia glabra*, *Cocos nucifera* and *Recinus communis* etc were recorded to use for burning in raw or extracting oil and used as substitute of kerosin.

Aromatic and Essential oil: Homesteads of the study area found to occur few aromatic and essential oil yielding plant species such as *Eucalyptus spp*, *Aquilaria agalocha*, *Galophyllum inophyllum*, *Sesamum indicum*, *Gnetum genon*, *Cymbopogon winterianus*, *C. nardus*, *Cymbopogon martini*, *Michelia champaca*, *Cinnamomum camphora* etc.

Fibre Plants: Homesteads of the study area sheltered the fibre yielding plant species such as *Trema orientalis*, *Sterculia villosa*, *Sarcochlamys pulcherima*, *Hibiscus sabdariffa*, *Urena lobata*, *Bombax cieba*, *Typha angustifolia*, *Alpinia spp*, *Boehmeria nevia* and *Cocos nucifera* etc.

Natural Dyes: Natural dyes were traditionally extracted from the fruits of *Bixa orellana*, *Butea parviflora* and barks of *Trema orientalis*; roots of *Morinda angustifolia* and *Butea monosperma*. These natural dyes were recorded for use by the indigenous people in dyeing fibres, clothes and other items.

Spices Plants: *Cinnamomum tamala*, *Cinnamomum zeylenicum*, *Cinnamomum pauciflorum*, *C. camphora*, *Zingiber officinalis*, *Piper nigrum* and *curcuma longa* were recorded as traditional spices for village people.

Medicinal plants: Plant species of medicinal important are recorded in homesteads of the study area were *Acorus calamus*, *Crataeva religiosa*, *Hydnocarpus kurgii*, *Putranjiva roxburghii*,

Galophyllum inophyllum, *Rauwolfia serpentina*, *Saraca indica*, *Withania somnifera*, *Halarrhena antidysenterica*, *Aquilaria malaccensis*, *Embllica officinalis*, *Terminalia cebula*, *Terminalia belerica*, *Spondius pinnata*, *Zingiber officinalis*, *Curcuma longra*, *Costus speciosa*, *Acacia farnesiana*, *Cinnamomum camphora*, *Phoenix montana*, *Aurthum graveyolens*, *Abroma angustha*, *Gmelina arborea*, *Swertia chirata*, *Andographis peniculata*, *Moringa olifera*, *Hibiscus rosasinensis*, *Jatropha curcas*, *Syzygium spp*, *Piper nigrum*, *Punica granatum*, *Ocimum basilicum*, *Tamarindus indica*, *Borassus flabellifer*, *Cinnamomum tamala*, *Datura metal*, *Terminalia arjuna*, *Clerodendrum colebrookianum*, *Murraya koenigii*, *Homonoia riparia*, *Nymphaea lotus*, *Piper betel*, *Butea monosperma*, *Piper longrum*, *Mimosps elengi*, *Adhatoda zeylanica*, *Glycorrhiza glabra*, *Saraca indica*, *Solanum khasianum*, *Euphorbia nerifolia*, *Cassia fistula*, *Paederia foetida*, *Centella asiatica*, *Perilla ocimoides*, *Azadirachta indica*, *Hautonia cordata*, *Hiptage madablota*, *Sapindus detergens*, *Tinospora cordifolia*, *Alocacia indica*, *Hodgsonia macrocarpa*, *Achrasma loroglossum*, *Costus speciosus*, *Alpinia allughas*, *Magnolia phenocarpa*, *Zanthoxylum hamiltonianum*, *Zanthoxylum oxyphyllum*, *Zanthoxylum budruna*, *Zanthoxylum rhetsa*, *Glycomis pentaphyla*, *Euphorbia nerifolia*, *Cissampelos pareire* *Jussia repens*, *Euryale ferox*, *Cinnamimum verum*, *Cinnamomum pauciflorum*, *Vitex negundo*, *Diospyros embryopteris*, *Drymeria cordata*, *Eclipta alba* *Stellaria medica*, *Aschasma lorglossum*, *Alternenthera sessilis*, *Bacopa monieri*, *Hydrocotyle rotundifolia* *Protulaca olerecea* and *Leucus linifolia* etc. These plant species were recorded for traditional use as medicine for treatment and cure of various ailments of both human and animals of their localities.

Pesticides from plants: More than hundred plant species of the homesteads are mentioned to have insecticidal and pesticidal properties. Some of them were recorded from the homesteads of the study area and said traditional botanical resources were bark of *Milletia pachycarpa*, tendered plant of *Parthenium sp*, *Eupatorium odoratum*, *Ageratum conyzoides*; *A. haustonianum*, fruit of *Citrus maxima*, leaves and seed kernel oil of *Melia azadarach* and *Azadirachta India* etc.

Others: Aesthetic and Ornamental Plants: Homesteads were found to landscape for beautification by the owners with many aesthetic and ornamental plant species. Some of such important plant species recorded in different homesteads surveyed were *Delonix regia*, *Bauhinia variegata*, *Averrhoa carambola*, *Azadirachta indica*, *Caesalpinia pulcherima*, *Butea monosperma*, *Calamus viminalis*, *Crataeva nurvala / religiosa*, *Mimosops elengi*, *Borassus flabellifer*, *Livinstonia jenkinsiana*, *Polyalthia longifolia*, *Eucalyptus spp*, *Acacia auriculiformis*, *Pongamia glabra*, *Phoenix sysvestris*, *Areca catechu*, *Tamarindus indica*, *Gravellia robusta*, *Cocos nucifera*, *Boehmeria nivea*, *Ficus benghalensis*, *Tregets erecta*, *Chrysanthemum morifolium*, *Dahlia variabilis*, *Gladiolus grandifolia*, *Calendula officinalis*, *Petunia hybrida*, *Phlox*

drummondii, *Althaea rosea*, *Bougainvillia spp*, *Polyanthes tuberosa*, *Zinnia elegans* and , *Impatiens balsamin* etc.

hexagynous, *Cephalandra indica*, *Carallia integerrima*, *Garcinia cowa*, *Garcinia oxyphylla*, *Carallia-lucida*, *Garcinia xanthocymus*, *Carissa carandas*, *Carissa billimbi*, *Mengifera sylvatica* are rare/ endangered plant species. *Gnetum gnemon* and *Gnetum ula* are endemic plant species of the region which were recorded from in the homesteads with very scanty distribution.

Endemic, Rare and endangered Plants: *Aquilaria malaccensis*, *Baccaurea sapida*, *Flacourtia cataphracta* syn. *Flacourtia jangomas*, *Rhus semialata*, *Bursera serreta*, *Olea europa*, *Prunus jenkinsii*, *Talauma hodgsonii*, *Rubus*

Table-1
Name of the families with number of plant species recorded from the homesteads

Family name	Species no.	Family name	Species no.	Family name	Species no.
Acanthaceae	6	Cyperaceae	3	Phyllanthaceae	1
Acoraceae	1	Dilleniaceae	1	Piperaceae	7
Amaranthaceae	6	Dioscoreaceae	6	Plumbaginaceae	1
Amaryllidaceae	1	Dipterocarpaceae	2	Poaceae	6
Anacardiaceae	2	Ebenaceae	1	Polemoniaceae	1
Andropogoneae	1	Elaeocarpaceae	1	Polygonaceae	2
Annonaceae	2	Euphobiaceae	17	Polypodiaceae	3
Apiaceae	4	Fabaceae	39	Portulacaceae	2
Apocyanaceae	4	Fagaceae	1	Ranunculaceae	1
Aquifoliaceae	1	Flacourtiaceae	1	Rhamnaceae	2
Araceae	5	Gnetaceae	1	Rhizophoraceae	2
Araliaceae	1	Guttiferae	5	Rosaceae	5
Araucariaceae	1	Hypoxidaceae	1	Rubiaceae	11
Arecaceae	2	Iridaceae	1	Rutaceae	14
Aristolochiaceae	2	Lamiaceae	8	Salicaceae	1
Asclepiaceae	2	Lauraceae	10	Sapindaceae	2
Astereaceae	15	Liliaceae	6	Sapotaceae	2
Anthericaceae	1	Loranthaceae	1	Saururaceae	1
Athyriaceae	1	Lythraceae	2	Schisandraceae	1
Balsaminaceae	1	Magnoliaceae	3	Scrophulariaceae	5
<i>Bambusaceae</i>	4	Malvaceae	8	Simaroubaceae	1
Barringtoniaceae	1	Mansoniacae	1	Solanaceae	6
Basellaceae	1	Marantaceae	1	Sterculiaceae	3
Begoniaceae	2	Marseliaceae	1	Theaceae	2
Bombacaceae	1	Melastomaceae	1	Thelypteridaceae.	1
Bromeliaceae	1	Meliaceae	3	Thymelaeaceae	1
Buddleiaceae	1	Menispermaceae	2	Tiliaceae	2
Burseraceae	1	Molluginaceae	1	Ulmaceae	1
Caesalpinaceae	11	Moraceae	10	Urticaceae	4
Cannabinaceae	1	Moringaceae	1	Verbanaceae	9
Cannaceae	1	Musaceae	4	Vitaceae	2
Capparidaceae	1	Myrtaceae	7	Woodsiaceae	1
Caricaceae	1	Nyctagiacae	2	Zingiberaceae	9
Caryophyllaceae	2	Oleaceae	1		
Chenopodiaceae	3	Orchidaceae	2		
Combretaceae	3	Oxalidaceae	3		
Commelinaceae	1	Pandanaceae	2		
Convolvulaceae	4	Papaveraceae	1		
Crassulaceae	1	Papilionaceae	3		
Cupressaceae	1	Passifloraceae	1		
Curcubitaceae	14	Pedaliaceae	1		

Table-2
Vertical distribution of plant species of homesteads

Type of Homesteads	Distribution of plant species in canopy		
	Over story	Middle story	Lower story
Type-I	<i>Albizzia lebbeck</i> , <i>Albizzia procera</i> , <i>Lagerstroemia perviflora</i> , <i>Dalbergia sisoo</i> , <i>Anthrocephalus chinensis</i> , <i>Megifera indica</i> and <i>Bombax ceiba</i> , <i>Areca catechu</i> and <i>Bamboo spp.</i> etc.	<i>Aegle marmelos</i> , <i>Syzygium malaccasis</i> , <i>Averrhoa billimbii</i> , <i>Litchi sinensis</i> , <i>Morus alba</i> , <i>Baccuaria sapida</i> , <i>Pisidum guyava</i> , <i>Musa spp.</i> , <i>Glycomis pentaphyla</i> and <i>Vitex negundo</i> etc	<i>Citrus spp.</i> , <i>Anonas comosus</i> , <i>curcuma longra</i> , <i>Zingiber officinalis</i> , <i>Impareta cylindrica</i> , <i>Paspalum conjugatum</i> , <i>Colocasia spp.</i>
Type-II	<i>Bambusa balcooa</i> , <i>Bambusa nutans</i> , <i>Bambusa tulda</i> , <i>B. pollida</i> , <i>Tectona grandis</i> , <i>Gmelina arborea</i> , <i>Artocarpus hetrophylla</i> , <i>Areca catechu</i> <i>Caryota urens</i> , etc.	<i>Garcinia sp p</i> , <i>Cinnamomum tamala</i> , <i>Musa spp.</i> , <i>Cinnamomum zeylenicum</i> , <i>Pisidum guyava</i> and <i>Musa spp.</i> <i>Purnus persica</i> , <i>Purnus domestica</i> , <i>Carallia-lucida</i> , & <i>Carica papaya</i> etc	<i>Costus speciosa</i> , <i>Anonas comosus</i> , <i>Citrus spp</i> <i>Sesamum indicum</i> , <i>Gnetum genon</i> <i>Clerodendrum coleobrookianum</i> , <i>Colocasia spp.</i>
Type-III	<i>Depterocarpus retuses</i> , <i>Schima wallichii</i> , <i>Adina cordifolia</i> , <i>Mesua ferrea</i> , <i>Pterospermum lanceaefolium</i> , <i>Bamboo spp.</i> <i>Artocarpus chaplasha</i> , <i>Spondius mengifera</i> , <i>Syzygium spp.</i> <i>Michelia champaca</i> , <i>Litsea spp.</i> etc	<i>Aquilaria agallocha</i> , <i>Carallia spp.</i> , <i>Citrus spp.rcinia spp.</i> <i>Rhus semialata</i> , <i>Musa sp</i> , <i>Carica papaya</i> ,	<i>Pteris critica</i> , <i>Perilla ocimoides</i> , <i>Ipomea batatas</i> <i>Paederia foetida</i> , <i>Citrus spp.</i> , <i>Anonas comosus</i> , <i>curcuma longra</i> , <i>Zingiber officinalis</i>
Type IV	<i>Bamboo spp.</i> , <i>Areca catechu</i> , <i>Actinodephnae angustifolia</i> , <i>Dysoxylum binecteriferum</i> , <i>Mallotus sp.</i> , <i>Syzygium spp.</i> , <i>Saraca indica</i> , <i>Crataeva religiosa</i> , <i>Terminalia belerica</i> , <i>Livinstonia jenkinsiana</i> , <i>Cocos nucifera</i> , <i>Artocarpus heterophylla</i> , <i>Carallia-lucida</i> ,	<i>Syzygium spp.</i> , <i>Calamus spp</i> , <i>Musa sp</i> , <i>Citrus spp.</i> , <i>Averrhoa carambola</i> , <i>Carica papaya</i> , <i>Caryota urens</i> , <i>Sesbania grandiflora</i> , <i>Nyctanthes arboristis</i> , <i>Cinnamomum tamala</i> ,	<i>Colocasia antiquorum</i> , <i>Ipomea batatas</i> , <i>Muraya koenigii</i> , <i>Pteris critica</i> , <i>Perilla ocimoides</i> , <i>Clerodendrum spp</i> , <i>Bacopa monieri</i> , <i>Hydrocotyle rotundifolia</i> <i>Protulaca oleracea</i> and <i>Leucus linifolia</i>
Type V	<i>Bamboo spp.</i> , <i>Areca catechu</i> , <i>Megifera indica</i> , <i>Baccuaria sapida</i> , <i>Embllica officinalis</i> , <i>Artocarpus heterophylla</i> , <i>Azadiracta indica</i> , <i>Cassia nodosa</i> , <i>Pterospermum lanceaefolium</i> , <i>Dysoxylum procerum</i> , <i>Schima wallichii</i> , <i>Elaeocarpus sp</i> , <i>Aquilaria agallocha</i> , <i>Cassia seamea</i> , <i>Piper betel</i> , <i>Piper longram</i>	<i>Thea assamica</i> , <i>Anonas comosus</i> <i>Musa spp.</i> , <i>Citrus spp.</i> , <i>Garcinia spp</i> , <i>Manihot esculenta</i> , <i>Nyctanthes arboristis</i> , <i>Cinnamomum spp.</i> , <i>Pisidum guyava</i> , <i>Glycomis pentaphyla</i>	<i>Zingiberer officinalis</i> , <i>Curcuma longra</i> , <i>Lycopersicum spp.</i> , <i>Colocasia</i> , <i>Pteris critica</i> , <i>Perilla ocimoides</i> , <i>Ipomea batatas</i> <i>Paederia foetida</i> <i>Clerodendrum coleobrookianum</i> , <i>Bacopa monieri</i> , etc.
Type VI	<i>Alienthus excelsa</i> , <i>Heteropenex fragans</i> , <i>Menihot esculenta</i> , <i>Morus alba</i> , <i>Lisea monopetela</i> , <i>Aquilaria agallocha</i> & <i>Bamboo spp</i> , <i>Azadirachta indica</i> , <i>Areca catechu</i> ,	<i>Ricinus communis</i> , <i>Citrus spp.</i> , <i>Nyctanthes arboristis</i> , <i>Cinnamomum tamala</i> , <i>Musa sp</i> , <i>Carica papaya</i> ,	<i>Zingiberer officinalis</i> , <i>Curcuma longra</i> , <i>Lycopersicum spp.</i> , <i>Colocasia</i> , <i>Pteris critica</i> , <i>Perilla ocimoides</i> , <i>Ipomea batatas</i> <i>Paederia foetida</i> , <i>Clerodendrum spp.</i> , <i>Bacopa monieri</i> , etc.

Conclusion

The study reveals that a considerable number of plant species are sheltered in the homesteads by the owner villagers and used to take benefits from them while utilizing this biodiversity and

consequently, conserve them with their own choice generation after generation. They have developed unique traditional agro techniques and management practices for conservation of these plant species. Simultaneously, they become experienced with

valuable knowledge in processing, harvesting, storage technology and eventually adding products out of these bioresources⁴. Therefore, further extensive study is needed to document all these indigenous knowledge. The homesteads are described as suitable land of *in-situ* conservation of many plant species⁵. Plant species grown in the homesteads reported to use in various cultural and religious festivals of different ethnic groups of Assamese society⁶. Similar report on use of hundreds of plant species of the homesteads are mentioned to have insecticidal and pesticidal properties and phyto-pesticides to control agricultural pests⁷⁻⁹. Moreover, people of this locality used many plant species available in the homesteads for treatment and cure of disease¹⁰⁻¹². Presently, while questioning the owner of the homesteads some of them are found more interested in income generating commercial plantation such as tea, Agarwood (*Aquilaria malaccensis*) and even bamboo instead of multicropping system prevailing in homesteads. This may happen to be a serious threat to the biodiversity that traditionally conserved in homesteads in near future. Therefore, scientists, researchers and naturalists have to give priority in bioprospecting and value addition of the other homesteads resources for better income generation and to conserve biodiversity of the homesteads. The existing plant species having medicinal value are collected homesteads or from natural habitat used up by indigenous tribes in Assam^{13,14}. Research on these medicinal plant species recorded in homesteads of Assam may give new drug molecules as in *Cassia fistula*¹⁵. Plant species planted and maintained generation wise in the homesteads are traditional need based as revealed in this study and may be a major part of total phytodiversity of the region. Therefore, in present day global market situation there is a need to make people conscious about the importance of the biodiversity they conserved in homesteads.

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