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2017-2020: 3.98

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RARE, ENDANGERED, THREATENED AND ENDEMIC (RET & E) PLANT SPECIES IN TRADITIONAL KHAMPTI HOMESTEADS OF NAMSAI DISTRICT, ARUNACHAL PRADESH

P. HAZARIKA*[1], CLERISSA HANDIQUE[1] AND PROTUL HAZARIKA[2]

[1] CHEMISTRY AND BIOPROSPECTING DIVISION, RAIN FOREST RESEARCH INSTITUTE, JORHAT-785001, ASSAM, INDIA.

[2] FOREST ECOLOGY AND CLIMATE CHANGE DIVISION, RAIN FOREST RESEARCH INSTITUTE, JORHAT-785001, ASSAM, INDIA.

***Corresponding author's e-mail*: hazarikapaug08@gmail.com**

ABSTRACT:

A survey of rare, endangered, threatened and endemic plant species present in the homesteads of 15 Khampti community villages of Namsai district was done during 2019-2020.The objective of the study was to know the extent of conservation of RET & E species in the traditional Khampti homesteads and to evaluate the traditional uses of those species for why those species were being sheltered in their homesteads. The study documented 48 threatened plant species from their homestead gardens belongs to 35 plant families. Most importantly, among them 4 species were critically endangered, 6 were endangered, 1 data deficient, 1 rare and another 1 plant species was extinct in wild. Apart from that 18 plant species were near to threatened and 12 plant species were vulnerable. Of these plant species 39 were utilized for traditional medicine and other 9 were edible, timber or fuel wood species. As such home gardens of Khampti community have been playing a vital role by sheltering and by virtue conservation RET & E species.

KEYWORDS: *Traditional homesteads, Rare, Endangered, Threatened and Endemic plant species.*

INTRODUCTION:

The Homestead or home gardens were the 1st step towards habitat development by human being with gradual culmination of nomadic life. Homesteads are nothing but an area surrounding to a house and was assumed to create by the human being at the event of adoption of cropping system near about 12000 years ago or more. Since then homesteads are being played important role by fulfilling the basic needs of human society and develop with many inclusions of various components with time and has direct linkage with the cultural and biological evolution of ethnicity. The present day homesteads are also outcome of old aged residential landforms at household level composed of agricultural crops with forestry species such as food, fruit, vegetables, medicinal, aromatic, spices and condiment, beverages and drinks, timber, fuel wood, fodder etc and plant species of commercial important such as tea, coffee, rubber, bamboo and rattan, ornamental and aesthetic plants etc (Bhat et al., 2014; Hazarika et al., 2003). Thus, a considerable extent of biodiversity has been conserved by the people in their homesteads that are socio-cultural and economically important to human civilization (Hazarika et al., 2014; Hazarika et al., 2021; Smith et al., 2006). Consequently, home garden represents as traditional agroforestry system and is a significant area of integration of important components utilizing accumulated traditional knowledge and experiences for the livelihoods for self-sustaining to family and community & local needs with ecological and even economical traditions (Leiva et al., 2002; Roy et al., 2013; Kabir et al., 2020).

In India total numbers of plant species recorded so far were 47,513(Singh & Dash, 2014). However, International Union for Conservation of Nature (IUCN) has evaluated only a total of 2093 plant species, of which 1524 were least concern(LC) and 98 were data deficient(DD). As per evaluation of IUCN, 475 plant species of Indian continental and enlisted as threatened in the Red List (2020/2) of 85 were Critically Endangered (CR), 182 are Endangered (EN) and 147 are Vulnerable (VU), 50 are near threatened species. Apart from that 48 RET plant species were reported to occur in Arunachal Pradesh (Paul et al., 2015).

Arunachal Pradesh is also rich in endemic flora as it is under the “cradle of flowering plants” (Takhtajan, 1969) and "Hindustan Centre of origin of crop plants" (Vavilov, 1951). In the checklist of Endemic Plants of Arunachal Pradesh, 2013 it is found to have 220 endemic plant species. Although such data are available but there is no study on the RET &E plant species which are being conserved in the homesteads by the people indeed for their needs. Therefore this study attempts to document such plant species and would try to find out the reason for which these plant species have been being sheltered and conserved by evaluating their traditional uses.

STUDY AREA:

The survey was done to document RET species in homesteads of Khampti tribe in Namsai district, Arunachal Pradesh during 2019 to 2020. Namsai district is located in between latitude 27°30' to 27°55'N and longitude 95° 52' to 96° 20' E and sharing border with Lohit and Changlang towards the east; Assam to the West; Lohit and Assam towards the North, and the south border adjoins Changlang district (Fig-1). The climate is warm and temperate. The rainfall in summers has much more than the winter. The average annual temperature is 22.8°C. Average annual precipitation is 2728 mm. High quantity of rainfall (750-800 mm) is recorded during July-August with a relative humidity of 80%. An average maximum summer temperature 25° C and minimum winter temperature is 10° C.

MATERIAL AND METHODS:

Data collection

A survey was conducted in 15 Khampti villages of Namsai district i.e. Old Mohong, New Mohong, Lathao, New Lathao, Sulungtoo, Pathar Gaon, Piyong II, Kherem, Mankao, Marua Camp, Manphaiseng, Manmow, Wagon Pathar, Jenglai, and Wenko. Randomly selected 15 homesteads of each of the 15 Khampti villages were surveyed to record the plant species available in their homesteads. The objective of the study was clearly explained to the homesteads owner. Information of edible plant species, parts used for different purposes were recorded, the associated indigenous knowledge etc were collected with the interview by a semi structured questionnaire with prior informed consent (PIC) from the homestead owner. The rare, endangered and endemic plant species found in their homestead were photographed along with the useful parts.

The rare, endangered, threatened and endemic plant species available in their homesteads were taxonomically authenticated with the help of standard Flora of Assam (Kanjilal et al. 1934 – 1940) and Flora of Arunachal Pradesh (Hajra et al., 1996; Chowdhery et al., 2009), and Flora of Lower Subansiri (Pal, 1993). Consulted the threatened status referred by CAMP, IUCN plants list, Threatened Species of India Listed in IUCN Red list, Checklist of Threatened Plants of Arunachal Pradesh and discussed specific research situation. The accepted scientific names were verified in the website www.theplantlist.org and www.plantsoftheworldonline.org.

RESULTS AND DISCUSSIONS:

A 48 numbers of rare, engendered, threatened and endemic plant species were sheltered by the Khampti homesteads (Fig 2). During the documentation survey of 48 RET& E plant species occur in homesteads belongs to 35 families, their scientific and local names, habit, traditional use are presented in the table 1. Among them *Albizia arunachalensis*, *Garcinia lanceifolia*, *Kaemferia*

galanga, *Livistona jenkinsiana*, *Picrorhiza kurroa*, *Saraca ashoca* are endangered plant species in IUNC plant list. It is a known fact that these endangered plant species are at high risk of extinction if happens to be an unexpected and fast decline in their population. Such decline may also happen due to loss of their required and prevailing habitat. Critically endangered plant species were in homesteads are *Aquilaria malaccensis*, *Tinospora cordifolia* and *Hydnocarpas kurzii* and *Kaemferia galanga*. These critically endangered plant species fond in the homesteads must have to look into immediate conservation strategies so as protect further declination of their population. Likewise, *Justicia gendarussa* is reported as extinct in wild found in Khampti homesteads. The Khampti homesteads were also detected as a conservation spot of a numbers of endemic plant species such as *Aquilaria malaccensis*, *Phlogachanthus thyrsiflorus*, *Pilea trinerea* and *Rubus ghanakantae*. Apart from the above *Phoenix dactylifera* L. is a rare non native plant species cultivated by the Khampties in their homesteads. Vulnerable plant species were *Acorus calamus*, *Aegle marmelos*, *Blumea balsamifera*, *Bombax ceiba*, *Cinnamomum tamala*, *Clerodendron colebrookianum* , *Dioscorea deltoidea* , *Eleagnus latifolia*, *Flemingia strobilifera*, *Homalomena aromatica* and *Phyllantus acidus*. The homesteads of Khampti villages also found to occur 18 plant species which are near to threatened. They were *Alstonia scholaris* , *Andrographis paniculata*, *Asparagus racemosa*, *Averrhoa carambola*, *Azadirachta indica*, *Benincasa hispida*, *Cucurbita pepo*, *Garcinia pendunculata*, *Gardenia angusta*, *Gardenia jasminoides*, *Hydrocotyl sibthorpioides*, *Kalanchoe pinnata*, *Litchi chinensis*, *Litsea gluctinosa*, *Melia azedirach*, *Ricinus communis*, *Zanthoxylum armatum* and *Zingiber officinalis*. Data also depicted that of 48 RET & E plant species 39 plant species were recorded to use for traditional medicine and other 9 were either edible or use for timber and fuel wood purposes (Table-1). As such the plant species which were mainly use only for traditional medicine may lose the interest of the community people due to increased popularity with time of modern medical systems.

The study of threatened plant species in Arunachal Pradesh was reported many workers and government agencies (Paul et al., 2015; ENVIS, 2020, Nayar and Sastry, 1990). Paul et al (2015) described about 48 Rare Endangered, Threatened and Endemic plant species from Arunachal Pradesh in general. However, the study on plant species that have been sheltered or cultured in the homesteads by the community is rare and not even reported. This study may also help to further determine the cause of concern to become critically endangered, endangered, vulnerable and near to threatened species. Further they study also focus on endemic plant species are on service of the Khampti community too.

CONCLUSION:

The traditional Khampti community of Namsai district, Arunachal Pradesh in their homesteads has been conserving RET & E plant species which are not only purely purposive but also have direct link with their culture, food habit and other socio-economic and ecological condition. However, awareness needs to be created about the status of their plant species so that they may take necessary care for these threatened plant species. This work would certainly help to the community and the researchers for future planning to protect these plant species and their sustainable utilization.

CONFLICT OF INTEREST:

Authors do not have any conflict of interest

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Table 1 Threatened plant species of India recorded in the homesteads of Khampti villages of Namsai district, Arunachal Pradesh (after Nayar & Sastry, 1990)

(DD- data deficient; En- Endemic; R- Rare;CR- Critically endangered; EN- Endangered; T- Threatened; NT- Near threatened)

Sl No.	Species Name & Family	Khampti/ Local name	Habit/ habitat	Ecological ststus	Traditional use
1	*Acorus calamus* L Fam: Acoraceae	Sam pu/ Sabbhu /Bos	Herb/ planted	VU	Medicinal: Leaf juice is used to treat epilepsy and stomach problem. Roo t juice taken snake bites.
2	*Aegle marmelos* (L.) Corrêa ex Roxb. Fam: Rutaceae	Bel	Tree/ planted	VU	Ripe fruit edible, root extract use to treat dysentery
3	*Albizia arunachalensis* Sahni et Naithani Fam: Mimosaceae	sau koroi	Tree/ planted	En, R and T	Wood use as timber & fuel wood
4	*Alstonia scholaris* R.Brown. Fam: Apocyanaceae	Motongke / Sotiyana	Tree/wild	NT	Medicinal: water extracted from bark used for cough, anti malarial, gastrointestinal and latex use for treatment of boil in skin. Wood use as timber
5	*Andrographis paniculata* Wall.ex. Nees Fam: Acanthaceae	Hirota /Kalmegh	Herb/ cultivated	NT	Plant extract use as vermifuse, liver tonic and anti diabetes
6	*Aquilaria malaccensis* Lam. Fam: Thymelaeaceae	Tun nam sasa/ Sachi Gosh	Tree/ planted	CR/ En/ CITES sp.	Used in asthma, digestive, and for fragrance.
7	*Asparagus racemosa* Willd Fam: Liliaceae	Sottish sora/ Satmul	Climber/ planted	NT	Water extract of tuber use as appetizer, also for treatment of recurrent cough.
8	*Averrhoa carambola* L. Fam: Oxalidaceae	Me phung/ Kurangi/ Kordoi	Tree/ planted	NT	Fruit edible, use to make pickle, juice use as drink, water extract of leaves use as liver tonic.
9	*Azadirachta indica* A..Juss.	Mahaneem	Tree/ planted	NT	Leaves are used as vegetable; Dry leaves liquor use as appetizer,

Sl No.	Species Name & Family	Khampti/ Local name	Habit/ habitat	Ecological ststus	Traditional use
	Fam: Meliaceae				antimalaria, vermifuse.
10	*Benincasa hispida* (Thunb.) Cog. Fam: Cucurbitaceae	Maipawl/ Kumura	climber/ cultivated	NT	Use as vegetable,
11	*Blumea balsamifera* (L.) D.C Fam: Asteraceae	Yanang	Herb/ wild	VU	Tender plant & leaves use as vegetable; use for treatment of diarrhea in children and stomach trouble
12	*Bombax ceiba* L. Fam: Bombacaceae	Mai liu/ Simolu	Tree/ wild	VU	Wood use as timer & fuel wood, fruit silk use for making pillow, extract gum from bark to treat dysentery, fresh flower eaten as vegetable
13	*Cinnamomum tamala* Nees & Eberm. Fam: Lauraceae		Tree / cultivated	VU	Leaves use as spice; control diarrhea, Fresh leaf paste apply to relief fever
14	*Clerodendron colebrookianum* Walp . Fam: Verbenaceae	Patak khai /Helle Yasak /Nefafu	Shurb/ wild	VU	Boiled tender shoot use as vegetable, water extract of leaves use to control high blood pressure.
15	*Cucurbita pepo* L. Fam: Cucurbitaceae	Ma pak kham /Rongalau	climber/ cultivated	NT	Fruit use as vegetable, seeds use as vermifuse
16	*Dioscorea deltoidea* Wall. ex Griseb. Fam: Dioscoreaceae	Kukur tarul	climber/ cultivated	VU	Tubers are used to cure relief from snake bite.
17	*Eleagnus latifolia* L. Fam: Eleagnaceae	Mu lot /Mirika Tenga	Climbing Shrub/planted	VU	Fruit edible, use to make pickle,
18	*Flemingia strobilifera* (L.) W.T.Aiton Fam: Fabaceae	Makhioti	Shrub/ planted	VU / NT	Decoction of leaves use to treat malaria
19	*Garcinia lanciefolia* Roxb. Fam: Clusieaceae	Rupohi Thekera	Shrub/ planted	EN	Fruit edible, eaten as chutney, prickle.
20	*Garcinia pendunculata* Roxb. ex Buch._ Ham Fam: Clusieaceae	Mannang/ Mhahau /Bor thekera	Tree/ planted	NT	Medicinal: Dry fruit juice use for dysentery and urinary troubles. Fruit eaten; use for making pickle;
21	*Gardenia angusta* (L) Merr. Fam: Apocynaceae	Tagar	Shrub/ planted	NT	Tender twig use as tooth brush for prevention of dental caries
22	*Gardenia jasminoides* J.Ellis Fam: Apocynaceae	Tagar phul	shrub /planted	NT	Flower for fragrance
23	*Homalomena aromatica* (Roxb.)	Suanpa /Gandh-	Herb	VU	Rhizome and petiole edible; cure impotency , paste of raw leaf

Sl No.	Species Name & Family	Khampti/ Local name	Habit/ habitat	Ecological ststus	Traditional use
	Schott. Fam: Araceae	Kochu			is applied to relief joint pain
24	*Hydnocarpas kurzii*(King) Warb. Fam: Achariaceae	Makhapong /Salmugra	Tree/wild	CR	Seed extract use in treatment of leprosy, bark decoction as general tonic and skin and internal disorder.
25	*Hydrocotyl sibthorpioides* Lam. Fam: Apiaceae	Panang on/ Saru manimuni	Herb/wild	NT	Whole plant edible; water extract fresh plant use to treat chest pain, debility, stomach disorder.
26	*Justicia gendarussa* Burm.f. Fam: Acanthaceae	Jatrasidhi	Shrub/ planted	Extinct in wild	Decoction of leaves use to treat bronchitis, inflammation , vaginal discharges
27	*Kaemferia galanga* Linn. Fam: Zingiberaceae	Ban hom/ Wan hom / Gathion	Herb/planted	CR	Rhizome extract use to treat skin infection, use for marriage festival
28	*Kalanchoe pinnata* (Lam.) Pers Fam: Crassulaceae	Yapong/ Dupor tenga	Herb/ planted	NT	Leaf extract use to treat jaundice and liver disorder, kidney stone and urinary trouble.
29	*Oroxylum indicum* (L.) Vent. Fam: Bignoniaceae	Bhatghila	Tree/ wild	VU	Extract of stem bark and roots use to treat jaundice, cough, diarrhea, and heart pain. Bark use to extract black dye.
30	*Litchi chinensis* Sonn. Fam: Sapindaceae	Lichu	Tree/ planted	NT	Fruit edible,
31	*Litsea gluctinosa* (Lour) Robinson Fam: Lauraceae	Baghnala	Tree/ wild	NT	Bark burnt to make ash and ash applied to treat skin boil, fuel wood
32	*Livistona jenkinsiana* Griff. Fam: Arecaceae	Tongko /Tokow	Tree/ planted/En	EN	Leaves use for roofing; Seeds eaten; paste of young leaves with *Murraya keonigi* treat for diarrhea.
33	*Melia azedirach* L. Fam: Meliaceae	Ghora neem	Tree/ planted	NT	Use as fuel wood, leaves use as pesticides
34	*Phlogachanthus thyrsiflorus* Nees. Fam; Rubiaceae	Mochomkhum /Titaphul	Shrub/ planted	En	Dried/ fresh inflorescences as vegetable
36	*Phoenix dactylifera* L. Fam: Arecaceae	Khejur	Tree/ planted	R	Fruit edible
35	*Phyllantus acidus* (L.) Skeels. Fam: Phyllanthaceae	Por Amlokhi	Tree/ planted	EN/VU	Fruit edible, eaten raw and chutney, pickle, treat for gonorrhoea, Jaundice
37	*Picrorhiza kurroa* Royle Fam: Scrophulariaceae	Kutki	Shrub/ wild	EN	Decoction of root used in jaundice, fever and liver disorder.
38	*Pilea trinerea* Wall. Fam: Urticaceae	Rambodusak	Herb/ wild	En	Decoction of leaves use to treat stomach disorder. Pain and cancer

Sl No.	Species Name & Family	Khampti/ Local name	Habit/ habitat	Ecological ststus	Traditional use
39	*Pogostemon benghalensis* (Burm. f.) O. Kuntze Fam: Lamiaceae	Ya kin phit/ Suklati	Herb/ planted/ escapices	DD	Boiled leaf soup consumed during chest and stomach pain.
40	*Rhyncostylis retusa* (L.) Fam: Orchidaceae	Kopu phul	Epiphyte	EN	Flower aesthetic, leaves extract use to take bath for treatment of rickets
41	*Ricinus communis* L. Fam: Euphorbiaceae	Ton kong/ era	Shrub/ cultivated	NT	Leaves use to relieve muscle pain; Rear endi silk, Seed oil use as purgative.
42	*Rubus ghanakantae* Sm. Fam: Rosaceae	Jetulipoka	Climber/ wild	En	Fruit eaten when ripped,
43	*Saraca ashoca* (Roxb.) de Wilde Fam: Fabaceae	Asoka	Tree/ planted	EN	Water extract of stem bark is use for treatment of fever and cold and gynecological problem
44	*Terminalia chebula* Retz. Fam: Combretaceae	Manaa/ Silikha	Tree/ planted	VU	Fruit edible; bark use to extract blue dye, bark and leaf extract used to treat diarrhea of childern
45	*Tetrastigma obovatum* Gagnep. Fam: Vitaceae	*Ya enka*	Climber/ wild	En	Rarely eaten as vegetable,
46	*Tinospora cordifolia* (Willd.)Miers Fam: Menispermaceae	Hak yungha /Amor lota	Climber/ wild	CR	Water extract of dry stem powder use for treatment of gastric, urine trouble , typhoid.
47	*Zanthoxylum armatum* DC. Fam: Rutaceae	Mekat /Masala pat	Shrub / planted	NT	Leaves in raw, dried use as chutney. Fruits chewed for treatment of stomach pain and indigestion
48.	*Zingiber officinalis* Roscoe. Fam: Zingiberaceae	Hing/Khing /Ada	Herb/ cultivated	NT	Rhizome use as spice/ condiment.

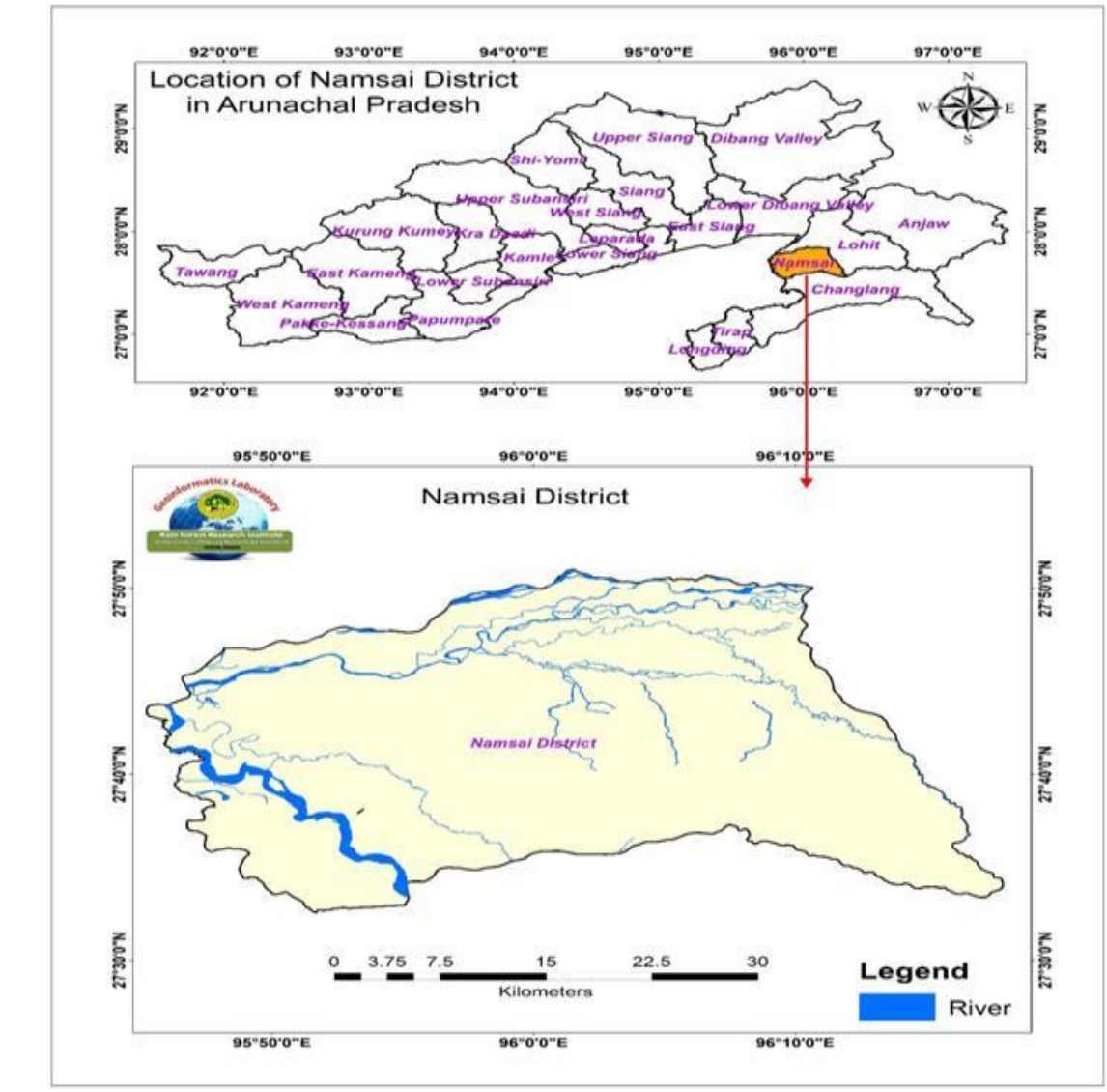

Fig. 1: Location Map of Namsai district, Arunachal Pradesh

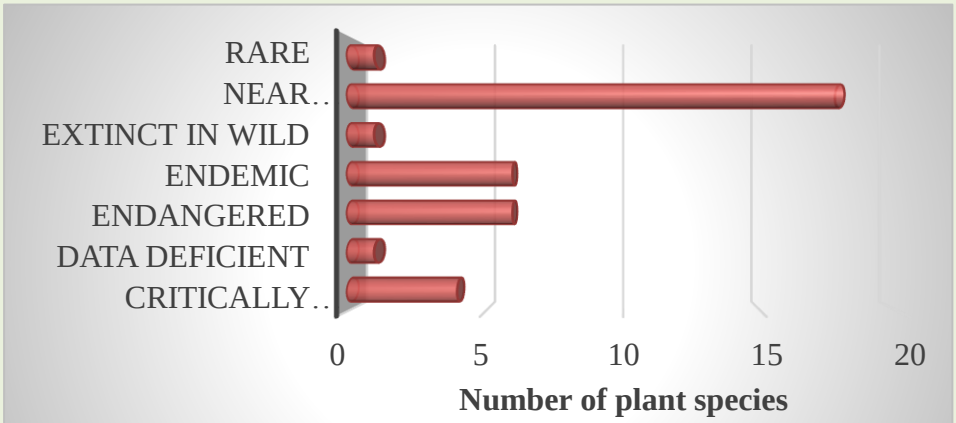

Fig. 2: Status of threatened plant in homesteads of Khampti tribe, Arunachal Pradesh

Phlogachanthus thyrsiflorus *Phyllantus acidus* *Pogostemon benghalensis* *Oroxylum indicum*

Acorus calamus *Zanthoxylum armatum* *Blumea balsamifera* *Flemingia strobilifera*

Garcinia pendunculata *Garcinia lanciefolia* *Aquilaria malaccensis* *Livistona jenkinsiana*

Hydnocarpas kurzii *Rhyncostylis retusa* *Tinospora cordifolia* *Clerodendron colebrookianum*

Fig. 3: Photographs of a few Rare, Endangered, Threatened and Endemic plant species from homesteads of Khampti tribe, Namsai district, Arunachal Pradesh