

RESEARCH ARTICLE

Enumeration of some wild edible plants used by the Galo tribe of Lower Siang District of Arunachal Pradesh, India

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Abstract

The Galo tribe of Arunachal Pradesh is reported to be rich in traditional food knowledge. Present study deals with traditional uses of wild edible plants (WEP) species popularly harvested and used among the Galo tribe of Lower Siang district of Arunachal Pradesh. Ethnobotanical investigation involving 56 local residents of age group ranging between 25-85 years from 25 villages of Gensi and Sibe circles have unveiled 100 species of wild edible plants belonging to 83 genera and 55 plant families. The herbaceous species were found to be dominant which is followed by trees, shrubs and climbers. These wild edible species have been enumerated with their habit, habitat and types of plant parts harvested by the local residents. The ethnobotanical novelties, local traditional uses of each WEP species for food security, their commercial viabilities and livelihood potential are also reported and discussed.

Keywords: Wild Edible Plants; Food Security; Ethnobotanical Novelties; Livelihood Potential; Galo Tribe; Lower Siang; Arunachal Pradesh

1. Introduction

Arunachal Pradesh is primarily comprising of hills in the lower reaches of the Eastern Himalayas, making it one of the 12th IUCN-recognized Himalayan Biodiversity Hotspot (Myers et al., 2000). This region is renowned for its rich ethnocultural heritage and biodiversity, making it a paradise for ethnobotanists and anthropologists (Mao and Hyniewta, 2000). The state has 28 indigenous tribes coexist together since time immemorial, each with distinct dialects and cultural practices. These tribal communities possess unique traditional knowledge system related to sustainable utilization of wild edible plant resources (Tag et al., 2014). The Galo, a prominent tribal community traces their ancestry through Abo Tani, the great progenitor of human races (Ratan et al., 2016; Barua and Bhattacharyya, 2019), and they are predominantly found settled in the West Siang, Lower Siang, and Leparada districts of Arunachal Pradesh. Their populations are also sparsely distributed in the East Siang and Upper Subansiri districts. The Galo practices tradition agriculture, fishing and hunting as their primary occupation to sustain their livelihood (Baruah and Bhattacharyya, 2019). Apart from using cultivated plants, Galo community have been reported to be rich in traditional knowledge related to utilization of ethnobotanical resources which include wild edible plants. A thorough review of existing literatures have unveiled some ethnobotanical species used by the Galo community for various purposes (Ratan et al., 2016; Singh and Asha, 2017; Wangpan et al., 2019; Gajurel and Doni, 2020). However, there is a lack of information on wild edible plant species with special reference to their traditional utilization for rural food security. Present study enumerated some important wild edible plants found in the Galo dominated region of Lower Siang district of Arunachal Pradesh which shares direct boundary with Demaji district of Assam in the south and Leparada district of Arunachal Pradesh in the north (Figure 1).

2. Materials and methods

2.1. Study Area – local culture, climate and vegetation type

The Lower Siang District of Arunachal Pradesh is situated between the geographical coordinates between 27.8016° North latitude and 94.6037° East longitude covering a total geographical area of 2395.85 km². The district is home to a population of 22,630, with 71.98% of its local residents belonging to the Galo tribe (Anonymous, 2011). Galo are belonging to mongoloid racial stock and traditionally subscribed to Donyi Poloism faith and

belief systems which primarily worships sun and moon, deities of the mountain and rivers, and they belonging to Tibeto-Burman dialect group. Mopin is the main traditional festival of the Galo community which is celebrated in the month of April every year which marks the beginning of spring season and onset of the summer that inspire villagers to start agricultural activities. The climate varies from tropical to sub-tropical types while temperature vary along the altitudinal gradient (15°C in winter and 36°C in summer) ranging from 100 – 1500 m MSL. It receives heavy rainfall from both Northeast and Southwest Monsoon during the month of May – September. The top storey of the tropical and subtropical vegetations are mainly comprises of *Altingia excelsa*, *Albizia procera*, *Ailanthus integrifolia*, *Balakata baccata*, *Phoebe bootanica*, *Duabanga grandiflora*, *Engelhardia spicata*, *Magnolia champaca* ornamented with epiphytic orchids and climbers while middle storey is mostly dominated by *Alnus nepalensis*, *Castanopsis indica*, *Ficus semicordata*, *Magnolia hodgsonii*, *Macranga denticulata*, *Saurauia roxburghii* while ground flora is dominated by *Amomum maximum*, *Ardisia solanacea*, *Hedychium spicatum* etc. (FSAP, 2008) (Figure 1).

2.2. Ethnobotanical survey

An ethnobotanical survey was conducted between December 2022 to February 2023 in the Lower Siang district which comprises of 25 villages located within the Gensi and Sibe circles following the standard field method (Martin, 1995). These villages include Bigi, Bomte, Bumpek, Garu, Yirdum, Gensi, Gensi Headquarters, New Bomte, Takso, and Tatamori in the Gensi circle, and Ditten, Gengi, Kamu, Liduk, Litemori, Lutak, Ossumpuri, Paimori, Ringi, Roma, Sibe, Tango, Taremore, Yachungi and Garuh in the Sibe circle. During field survey, 56 informants (35 male and 21 female) of age group between 25 – 85 years were randomly interviewed through open ended and focused group discussion method, and transect walk in the community forest with key local informants. Ethnobotanical information related to diverse utilization of wild edible plants were systematically recorded in the field notebook and digital photographs were taken for each wild edible plant species reported by the informants.

2.3. Collection, taxonomic identification and preparation of voucher specimen

The voucher specimen bearing field collection No. and date were collected during field survey for herbarium preservation following the standard method (Jain and Rao, 1976). Digital photographs of each species were captured using digital camera (Model No.: Sony CyberShot 16.1 MP DSC-W730). Voucher specimens were identified using standard flora such as *The Flora of British India* (Hooker 1872 – 1897), *Flora of Assam* (Kanjilal et al., 1934 – 1940), *Flora of Lower Subansiri District, Arunachal Pradesh, India* (Pal, 2013), *Flora of Kurung Kumey District, Arunachal Pradesh* (Dash and Paramjit, 2017). The accepted names and global distribution range of the species were verified in POWO (www.plantlistoftheworldonline.com) and the voucher specimens identified were deposited in the Herbarium of Arunachal University (HAU), Department of Botany, Rajiv Gandhi University, Rono Hills, Doimukh, Arunachal Pradesh for future references.

2.4. Enumeration

The species identified were enumerated in alphabetical order. The scientific names, local names in Galo, collection number and date, place name, habit, habitat, and traditional uses of each wild edible plant species contributing to local food security were enumerated.

3. Results

3.1. Taxonomic diversity of wild edible plant species

Present studies have identified and enumerated a total of 100 species of wild edible plants, belonging to 83 genera and 55 plant families used by the Galo tribe of Lower Siang District of Arunachal Pradesh for their local food security (section 3.2). Majority of the species reported were herbaceous (38 species) which is followed by tree (32 species), shrub (21 species), and climbers were reported with 9 species. The types of plant parts harvested were mostly fruits and seeds which is followed by leaves, young shoots, whole plant parts, flowers and tubers which is presented in Figure 2. The colour photo plates of some popularly wild edible plant species used by the Galo tribe of Lower Siang district are presented in Figure 3, 4 and 5.

3.2. Enumeration of wild edible plant species

1. *Acmella paniculata* (Wall. ex DC.) [Asteraceae]

Collection: HAU/PNL-166/08-01-2023/New Bomte/Alt. 630 m
Habit and habitat: Herb; Tropical to Subtropical
Local name: Motum-Marsa
Traditional uses: Whole plant as vegetable.

2. *Alpinia roxburghii* Sweet [Zingiberaceae]

Collection: HAU/PNL-102/20-12-2022/New Bomte/Alt. 540 m
Habit and habitat: Herb; Tropical to Subtropical
Local name: Tabuk-yayuk
Traditional uses: Fruits (seed) edible.

3. *Amaranthus spinosus* L. [Amaranthaceae]

Collection: HAU/PNL-271/13-02-2023/Takso/Alt. 655 m
Habit and habitat: Herb; Tropical
Local name: Gubor-o
Traditional uses: Leaves as vegetable.

4. *Amomum arunachalense* Hareesh & M.Sabu [Zingiberaceae]

Collection: HAU/PNL-150/24-12-2022/New Bomte/Alt. 641 m
Habit and habitat: Herb; Tropical to Subtropical
Local name: Boglok/Jaker
Traditional uses: Fruits (seeds) edible; Inflorescence as vegetable.

5. *Amomum maximum* Roxb. [Zingiberaceae]

Collection: HAU/PNL-123/20-12-2022/New Bomte/Alt. 521 m
Habit and habitat: Herb; Tropical, Subtropical
Local name: Tali
Traditional uses: Seeds edible. Young shoots are consumed as vegetable and can be eaten raw or roasted.

6. *Ardisia solanacea* Roxb. [Primulaceae]

Collection: HAU/PNL-169/08-01-2023/New Bomte/Alt. 620 m
Habit and habitat: Shrub; Tropical to Subtropical
Local name: Apak-choochak/Tamak-choochak
Traditional uses: Fruits and tender shoots edible.

7. *Baccaurea ramiflora* Lour. [Phyllanthaceae]

Collection: HAU/PNL-204/10-01-2023/Gengi/Alt. 440 m
Habit and habitat: Tree; Tropical
Local name: Buri
Traditional uses: Fruits edible.

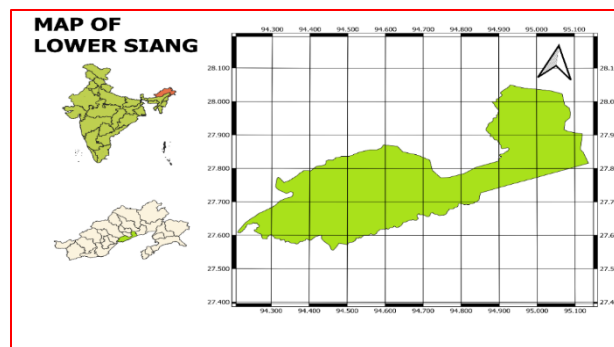


Figure 1. A map showing the study area – Lower Siang District of Arunachal Pradesh

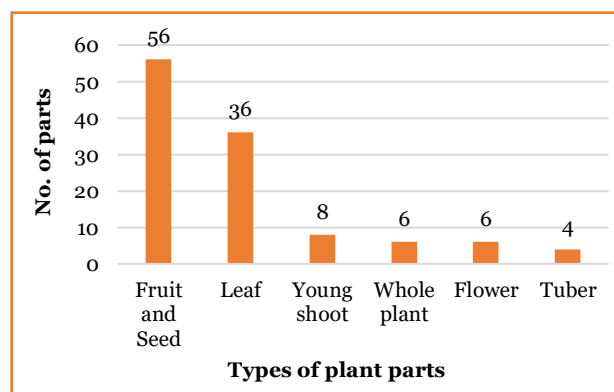


Figure 2. Types of wild edible plant parts harvested and used by the Galo tribe of Lower Siang district of Arunachal Pradesh.

8. *Bauhinia variegata* L. [Fabaceae]

Collection: HAU/PNL-104/20-12-2022/New Bomte/Alt. 553 m
Habit and habitat: Tree; Tropical
Local name: Ogok
Traditional uses: Tender leaves as vegetable; Flowers can be consumed raw(sweet).

9. *Begonia aborensis* Dunn [Begoniaceae]

Collection: HAU/PNL-104/20-12-2022/New Bomte/Alt. 553 m
Habit and habitat: Herb; Tropical to Subtropical
Local name: Bukuchurbu
Traditional uses: Tender leaves as vegetable; peeled stems consumed raw or can be pickled.

10. *Bidens pilosa* L. [Asteraceae]

Collection: HAU/PNL-105/20-12-2022/New Bomte/Alt. 540 m
Habit and habitat: Herb; Tropical to Subtropical
Local name: Tagam
Traditional uses: Leaves as vegetable

11. *Boehmeria penduliflora* Wedd. ex D.G. Long [Urticaceae]

Collection: HAU/PNL-196/10-01-2023/Ringi/Alt. 370 m
Habit and habitat: Shrub; Tropical to Subtropical
Local name: Joju
Traditional uses: Tender leaves as vegetable.

12. *Breynia androgyne* (L.) Chakrab. & N.P.Balacr. [Phyllanthaceae]

Collection: HAU/PNL-133/24-12-2022/Garu/Alt. 532 m
Habit and habitat: Shrub; Tropical to Subtropical
Local name: Gam-o
Traditional uses: Leaves as vegetable.

13. *Canarium strictum* Roxb. [Bursaceae]

Collection: HAU/PNL-210/11-02-2022/Ringi/Alt. 780 m
Habit and habitat: Shrub; Tropical to Subtropical
Local name: Silum/Hilum/Jilum
Traditional uses: Fruits edible.

14. *Cardamine hirsuta* L. [Brassicaceae]

Collection: HAU/PNL-133/24-12-2022/Garu/Alt. 532 m
Habit and habitat: Herb; Tropical to Subtropical
Local name: Orum-Oram
Traditional uses: Leaves as vegetable.

15. *Calamus tenuis* Roxb. [Arecaceae]

Collection: HAU/PNL-135/24-12-2022/Garu/Alt. 632 m



Figure 3. **A.** *Firmiana colorata* (Roxb.) R.Br. [Sterculiaceae]; **B - B2.** *Saurauia roxburghii* Wall. [Actinidiaceae]; **C-C2.** *Sterculia lanceolata* var. *coccinea* (Jack) Phengklai [Sterculiaceae].

Habit and habitat: Scandent shrub; Tropical to Subtropical

Local name: Tare

Traditional uses: Fruits edible.

16. *Castanopsis indica* (Roxb. ex Lindl.) A.DC. [Fagaceae]

Collection: HAU/PNL-133/24-12-2022/Garu /Alt. 578 m

Habit and habitat: Tree; Tropical to Subtropical

Local name: Kora

Traditional uses: Nuts edible; can be consumed raw or roasted.

17. *Castanopsis purpurella* subsp. *purpurella* [Fagaceae]

Collection: HAU/PNL-136/ 24-12-2022/Garu /Alt. 752 m

Habit and habitat: Tree; Tropical to Subtropical

Local name: Enpi

Traditional uses: Nuts edible (raw or roasted).

18. *Castanopsis tribuloides* (Sm.) A.DC. [Fagaceae]

Collection: HAU/PNL-107/20-12-2022/New Bomte/Alt. 521 m

Habit and habitat: Tree; Tropical to Subtropical

Local name: Korbin

Traditional uses: Seeds are edible.

19. *Centella asiatica* (L.) Urb. [Apiaceae]

Collection: HAU/PNL-205/11-02-2023/Gengi/Alt. 320 m

Habit and habitat: Herb; Tropical to Subtropical

Local name: Mani-Muni

Traditional uses: Whole plant as vegetable; can be eaten raw or cooked.

20. *Choerospondias axillaris* (Roxb.) B.L.Burt & A.W.Hill [Anacardiaceae]

Collection: HAU/PNL-206/11-02-2023/Gengi/Alt. 520 m

Habit and habitat: Tree; Tropical, Subtropical

Local name: Belam

Traditional uses: Fruits are edible.

21. *Cinnamomum bejolghota* (Buch.-Ham.) Sweet [Lauraceae]

Collection: HAU/PNL-174/08-01-2023/Takso/Alt. 662 m

Habit and habitat: Tree; Tropical to Subtropical

Local name: Pode/Tej pat

Traditional uses: Leaves are dried and used as condiment or spice.

22. *Cinnamomum tamala* (Buch.-Ham.) T.Nees & C.H.Eberm. [Lauraceae]

Collection: HAU/PNL-222/12-02-2023/New Bomte/Alt. 589 m

Habit and habitat: Tree; Tropical to Subtropical

Local name: Nyipak Tejpat

Traditional uses: Leaves are dried and used as condiment or spice.

23. *Clerodendrum colebrookeanum* Walp. [Lamiaceae]

Collection: HAU/PNL-207/11-02-2023/New Bomte/Alt. 349 m

Habit and habitat: Shrub; Tropical to Subtropical

Local name: Oyin

Traditional uses: Leaves as vegetable.

24. *Crassocephalum crepidioides* (Benth.) S.Moore [Asteraceae]

Collection: HAU/PNL-207/20-12-2022/New Bomte/Alt. 520 m

Habit and habitat: Herb; Tropical to Subtropical

Local name: Modi-jogen

Traditional uses: Leaves as vegetable.

25. *Curculigo capitulata* (Lour.) Kuntze [Hypoxidaceae]

Collection: HAU/PNL-224/20-12-2022/New Bomte/Alt. 610 m

Habit and habitat: Herb; Tropical to Subtropical

Local name: Royek

Traditional uses: Fruits edible.

26. *Deeringia amaranthoides* (Lam.) Merr. [Amaranthaceae]

Collection: HAU/PNL-270/13-02-2023/Takso/Alt. 670 m

Habit and habitat: Scandent shrub; Tropical to Subtropical

Local name: Oko-Libo

Traditional uses: Tender leaves as vegetable.

27. *Dendrocalamus giganteus* Munro [Poaceae]

Collection: HAU/PNL-226/13-02-2023/New Bomte/Alt. 379 m

Habit and habitat: Herb/Shrub; Tropical to Subtropical

Local name: Ehh-eni

Traditional uses: Tender shoots as vegetable; fermented shoots are pickled and also dried and used as spice.

28. *Dillenia indica* L. [Dilleniaceae]

Collection: HAU/PNL-162/28-12-2022/Old Bomte/Alt. 497 m

Habit and habitat: Tree; Tropical to Subtropical

Local name: Champak

Traditional uses: Fruits as vegetable, can be eaten cooked, raw or pickled.

29. *Dioscorea belophylla* (Prain) Voigt ex Haines [Dioscoreaceae]

Collection: HAU/PNL-203/10-01-2023/Gengi/Alt. 386 m

Habit and habitat: Climber; Tropical to Subtropical

Local name: Nginchi

Traditional uses: Roasted or boiled tuber are consumed as food usually eaten as breakfast along with tea.

30. *Dioscorea esculenta* (Lour.) Burkill [Dioscoreaceae]

Collection: HAU/PNL-164/28-12-2022/Old Bomte/Alt. 456 m

Habit and habitat: Climber; Tropical to Subtropical

Local name: Nginke

Traditional uses: Roasted or boiled tuber are consumed as food usually eaten as breakfast along with tea.

31. *Dioscorea pentaphylla* L. [Dioscoreaceae]

Collection: HAU/PNL-137/24-12-2022/New Bomte/Alt. 575 m

Habit and habitat: Climber; Tropical to Subtropical

Local name: Eli

Traditional uses: Roasted or boiled tuber are consumed as food usually eaten as breakfast along with tea.

32. *Diplazium esculentum* (Retz.) Sw. [Aspleniaceae]

Collection: HAU/PNL-215/11-02-2023/Gengi/Alt. 420 m

Habit and habitat: Herb; Tropical to Subtropical

Local name: O-taka

Traditional uses: Tender leaves or fronds as vegetable.

33. *Elatostema sessile* J.R.Forst. & G.Forst. [Urticaceae]

Collection: HAU/PNL-199/10-01-2023/Ringi/Alt. 452 m

Habit and habitat: Herb; Tropical to Subtropical

Local name: Oji

Traditional uses: Leaves as vegetables.

34. *Entada rheedei* Spreng. [Fabaceae]

Collection: HAU/PNL-267/13-02-2023/Old Bomte/Alt. 395 m

Habit and habitat: Lianas; Tropical to Subtropical

Local name: Tache-polo

Traditional uses: Endosperm under the seed is taken out and carefully processed by boiling which are then cooked and consumed as vegetable.

35. *Erigeron canadensis* L. [Asteraceae]

Collection: HAU/PNL-177/08-01-2023/Takso/Alt. 520 m

Habit and habitat: Herbs; Tropical Subtropical

Local name: Dimu-oo

Traditional uses: Leaves as vegetable.

36. *Fagopyrum cymosum* (Trevir.) Meisn. [Polygonaceae]

Collection: HAU/PNL-157/28-12-2022/New Bomte/Alt. 392 m

Habit and habitat: Herbs; Tropical to Subtropical

Local name: Oku

Traditional uses: Leaves as vegetable; Stems (sour) can be taken raw.

37. *Fagopyrum esculentum* Moench [Polygonaceae]

Collection: HAU/PNL-231/12-02-2023/New Bomte/Alt. 430 m

Habit and habitat: Herbs; Tropical to Subtropical

Local name: Oku

Traditional uses: Leaves as vegetable.

38. *Ficus auriculata* Lour. [Moraceae]

Collection: HAU/PNL-138/24-12-2022/New Bomte/Alt. 497 m

Habit and habitat: Tree; Tropical to Subtropical

Local name: Takuk Kukcho-lolo

Traditional uses: Fruits are edible; tender leaves are consumed as vegetable.

39. *Ficus fistulosa* Reinw. ex Blume [Moraceae]

Collection: HAU/PNL-232/12-02-2023/New Bomte/Alt. 501 m

Habit and habitat: Tree; Tropical to Subtropical

Local name: Kuk-chin

Traditional uses: Fruits are edible

40. *Ficus semicordata* Buch.-Ham. ex Sm. [Moraceae]

Collection: HAU/PNL-233/12-02-2023/New Bomte/Alt. 320 m

Habit and habitat: Tree; Tropical to Subtropical

Local name: Takuk

Traditional uses: Fruits are edible.

41. *Firmiana colorata* (Roxb.) R.Br. [Malvaceae]

Collection: HAU/PNL-268/13-02-2023/Old Bomte/Alt. 420 m

Habit and habitat: Tree; Tropical to Subtropical

Local name: Suu-bali

Traditional uses: Seeds edible.



Figure 4.A. *Lepisanthes senegalensis* (Poir.) Leenh. [Sapindaceae]; **B - B2.** *Hodgsonia macrocarpa* (Blume) Cogn. [Cucurbitaceae]; **C-C2.** *Hornstedtia arunachalensis* S.Tripathi & V.Prakash [Zingiberaceae]; **D and D1.** *Alpinia roxburghii* Sweet [Zingiberaceae].

42. *Fissistigma oldhamii* (Hemsl.) Merr. [Annonaceae]
Collection: HAU/PNL-110/20-12-2022/Old Bomte/Alt. 477 m
Habit and habitat: Scandent Shrub; Tropical to Subtropical
Local name: Sobo-wuttum gaalum
Traditional uses: Fruits edible.
43. *Garcinia lanceifolia* Roxb. [Clusiaceae]
Collection: HAU/PNL-194/08-01-2023/Takso/Alt. 498 m
Habit and habitat: Tree; Tropical, Subtropical
Local name: Taktir
Traditional uses: Fruits are edible; young leaves are consumed as vegetable.
44. *Garcinia pedunculata* Roxb. ex-Buch.-Ham. [Clusiaceae]
Collection: HAU/PNL-234/12-02-2023/New Bomte/Alt. 419 m
Habit and habitat: Tree; Tropical to Subtropical
Local name: Liba
Traditional uses: Fruits edible.
45. *Gonostegia hirta* (Blume) Miq. [Urticaceae]
Collection: HAU/PNL-178/08-01-2023/Takso/Alt. 498 m
Habit and habitat: Herb; Tropical to Subtropical
Local name: Oyik
Traditional uses: Leaves as vegetable.
46. *Gynura bicolor* (Roxb. ex Willd.) DC. [Asteraceae]
Collection: HAU/PNL-236/12-02-2023/New Bomte/Alt. 540 m
Habit and habitat: Herb; Tropical to Subtropical
Local name: Isi jogen
Traditional uses: Leaves as vegetable.
47. *Hodgsonia macrocarpa* (Blume) Cogn. [Cucurbitaceae]
Collection: HAU/PNL-146/24-12-2022/Old Bomte/Alt. 340 m
Habit and habitat: Climber; Tropical, Subtropical
Local name: Tatar
Traditional uses: Matured seeds are roasted and consumed.
48. *Hornstedtia arunachalensis* S.Tripathi & V.Prakash [Zingiberaceae]
Collection: HAU/PNL-237/12-02-2023/New Bomte/Alt. 599 m
Habit and habitat: Herb; Tropical, Subtropical
Local name: Belak
Traditional uses: Seeds edible.
49. *Houttuynia cordata* Thunb. [Saururaceae]
Collection: HAU/PNL-158/28-12-2022/New Bomte/Alt. 467 m
Habit and habitat: Herb; Tropical, Subtropical
Local name: Eeh namsu
Traditional uses: Leaves and roots are consumed as vegetable; can be eaten raw or made into paste as chutney.
50. *Hydrocotyle sibthorpioides* Lam. [Araliaceae]
Collection: HAU/PNL-112/20-12-2022/New Bomte/Alt. 420 m
Habit and habitat: Herb; Tropical, Subtropical
Local name: Mani-ao
Traditional uses: Leaves as vegetable.
51. *Lasia spinosa* (L.) Thwaites [Araceae]
Collection: HAU/PNL-240/12-02-2023/New Bomte/Alt. 369 m
Habit and habitat: Herb; Tropical, Subtropical
Local name: Rub-ta/Rubi-ta
Traditional uses: young shoots as vegetable.
52. *Lepisanthes senegalensis* (Poir.) Leenh. [Sapindaceae]
Collection: HAU/PNL-113/20-12-2022/New Bomte/Alt. 589 m
Habit and habitat: Shrub; Tropical, Subtropical
Local name: Tale-rende
Traditional uses: Ripen fruits are edible.
53. *Leucas aspera* (Willd.) Link [Lamiaceae]
Collection: HAU/PNL-241/12-02-2023/New Bomte/Alt. 496 m
Habit and habitat: Herb; Tropical, Subtropical
Local name: Kanchi-patta
Traditional uses: Leaves are consumed as vegetable.
54. *Litsea cubeba* (Lour.) Pers. [Lauraceae]
Collection: HAU/PNL-272/13-02-2023/Takso/Alt. 632 m
Habit and habitat: Tree; Tropical, Subtropical
Local name: Tayir
Traditional uses: Young leaves are consumed as vegetable; Young fruits are consumed raw and matured fruits are dried and made into powder and used as condiment and spice.
55. *Livistona jenkinsiana* Griff. [Arecaceae]
Collection: HAU/PNL-242/12-02-2023/New Bomte/Alt. 410 m
Habit and habitat: Tree; Tropical, Subtropical
Local name: Taek-ekse
Traditional uses: Fruits are consumed raw or can be cooked or pickled.
56. *Maesa indica* (Roxb.) Sweet [Primulaceae]
Collection: HAU/PNL-159/28-12-2022/Old Bomte/Alt. 611 m
Habit and habitat: Shrub; Tropical, Subtropical
Local name: Koko-nini
Traditional uses: Fruits are edible
57. *Mangifera sylvatica* Roxb [Anacardiaceae]
Collection: HAU/PNL-148/24-12-2022/Yirdum/Alt. 789 m
Habit and habitat: Tree; Tropical, Subtropical
Local name: Tagu
Traditional uses: Fruits edible.
58. *Melastoma malabathricum* L. [Melastomataceae]
Collection: HAU/PNL-243/12-02-2023/New Bomte/Alt. 620 m
Habit and habitat: Shrub; Tropical, Subtropical
Local name: Acha-kaya
Traditional uses: Fruits are edible.
59. *Momordica cochinchinensis* (Lour.) Spreng. [Cucurbitaceae]
Collection: HAU/PNL-244/12-02-2023/New Bomte/Alt. 310 m
Habit and habitat: Climber; Tropical, Subtropical
Local name: Bhat karela
Traditional uses: Fruits and young shoots are consumed as vegetable.
60. *Musa balbisiana* Colla [Musaceae]
Collection: HAU/PNL-200/10-01-2023/Ringi/Alt. 389 m
Habit and habitat: Herb; Tropical, Subtropical
Local name: Kolu
Traditional uses: Fruits edible (usually eaten during famine); inflorescence or spadix as vegetable; tender pseudo stems are consumed as vegetable.
61. *Musa sanguinea* Hook.f. [Musaceae]
Collection: HAU/PNL-165/28-12-2022/Old Bomte/Alt. 450 m
Habit and habitat: Herb; Tropical, Subtropical
Local name: Kodok
Traditional uses: Fruits are edible; inflorescence or spadix and pseudo stem are consumed as vegetable.
62. *Mussaenda roxburghii* Hook.f. [Rubiaceae]
Collection: HAU/PNL-114/20-12-2022/New Bomte/Alt. 621 m
Habit and habitat: Shrub; Tropical, Subtropical
Local name: Taksap
Traditional uses: Tender leaves are consumed as vegetable.
63. *Nephelium ramboutan-ake* (Labill.) Leenh. [Sapindaceae]
Collection: HAU/PNL-129/24-12-2022/Garu/Alt. 790 m
Habit and habitat: Tree; Tropical, Subtropical
Local name: Tader
Traditional uses: Fruits edible.
64. *Nephrolepis cordifolia* (L.) C.Presl [Polypodiaceae]
Collection: HAU/PNL-245/24-12-2022/New Bomte/Alt. 790 m
Habit and habitat: Herb; Tropical, Subtropical
Local name: Nyimak-wuttum
Traditional uses: Water containing rhizome are edible
65. *Pseudodissochaeta assamica* (C.B.Clarke) Nayar [Melastomataceae]
Collection: HAU/PNL-247/12-02-2023/New Bomte/Alt. 562 m
Habit and habitat: Shrub; Tropical, Subtropical
Local name: Ako-jalo/ Peko-jalo
Traditional uses: Ripe fruits are edible; tender stems are peeled and can be eaten raw.
66. *Paederia foetida* L. [Rubiaceae]
Collection: HAU/PNL-141/24-12-2022/New Bomte/Alt. 419 m
Habit and habitat: Climber; Tropical, Subtropical
Local name: Eppe-tare
Traditional uses: leaves as vegetable
67. *Persicaria capitata* (Buch.-Ham. ex D.Don) H.Gross [Polygonaceae]
Collection: HAU/PNL-180/08-01-2023/Takso/Alt. 368 m
Habit and habitat: Herb; Tropical, Subtropical
Local name: Amin-taktak (minme)
Traditional uses: Young inflorescence eaten raw; young leaves as vegetable.
68. *Persicaria chinensis* (L.) H.Gross [Polygonaceae]
Collection: HAU/PNL-249/13-02-2023/New Bomte/Alt. 362 m

Habit and habitat: Herb; Tropical, Subtropical

Local name: Amin taktak

Traditional uses: Tender leaves are consumed as vegetable; tender stem can be eaten raw (sour); Fruits are edible.

69. *Persicaria nepalensis* (Meisn.) H.Gross [Polygonaceae]

Collection: HAU/PNL-250/13-02-2023/New Bomte/Alt. 312 m

Habit and habitat: Herb; Tropical, Subtropical

Local name: Amin-taktak(minmik)/yaruk-yare

Traditional uses: Young leaves as vegetable.

70. *Phoebe bootanica* (Meisn.) M. Gangop [Lauraceae]

Collection: HAU/PNL-217/11-02-2023/New Bomte/Alt. 385 m

Habit and habitat: Tree; Tropical, Subtropical

Local name: Sichir/Hichir

Traditional uses: Fruits edible

71. *Phrynium pubinerve* Blume [Marantaceae]

Collection: HAU/PNL-217/20-12-2022/New Bomte/Alt. 417 m

Habit and habitat: Herb; Tropical, Subtropical

Local name: Oko-kokam

Traditional uses: Fruits edible.

72. *Pilea racemosa* (Royle) Tuyama [Urticaceae]

Collection: HAU/PNL-116/20-12-2022/New Bomte/Alt. 412 m

Habit and habitat: Herb; Tropical, Subtropical

Local name: Guge

Traditional uses: Leaves as vegetable.

73. *Piper pedicellatum* C.DC. [Piperaceae]

Collection: HAU/PNL-253/13-02-2023/New Bomte/Alt. 672 m

Habit and habitat: Herb; Tropical, Subtropical

Local name: Raare

Traditional uses: Leaves as vegetable.

74. *Potentilla indica* (Andrews) Th.Wolf [Rosaceae]

Collection: HAU/PNL-181/08-01-2023/New Bomte/Alt. 361 m

Habit and habitat: Herb; Tropical, Subtropical

Local name: Sobo-tapvrere/Isi-riki ahe/Nokli Strawberry

Traditional uses: Fruits edible

75. *Pouzolzia sanguinea* (Blume) Merr. [Urticaceae]

Collection: HAU/PNL-143/24-12-2022/New Bomte/Alt. 399 m

Habit and habitat: Scandent shrub; Tropical, Subtropical

Local name: Osik/yigro-petcha

Traditional uses: Leaves as vegetable.

76. *Rhus chinensis* Mill. [Anacardiaceae]

Collection: HAU/PNL-122/20-12-2022/New Bomte/Alt. 421 m

Habit and habitat: Tree; Tropical, Subtropical

Local name: Tage

Traditional uses: Fruits edible (sour)

77. *Rhynchosyche ellipticum* (Wall. ex D.Dietr.) A.DC.

[Gesneriaceae]

Collection: HAU/PNL-184/08-01-2023/New Bomte/Alt. 352 m

Habit and habitat: Herb; Tropical, Subtropical

Local name: Joko

Traditional uses: Leaves as vegetables.

78. *Rubus alceifolius* Poir. [Rosaceae]

Collection: HAU/PNL-144/24-12-2022/New Bomte/Alt. 510 m

Habit and habitat: Climber; Tropical, Subtropical

Local name: Sote-pachin parin

Traditional uses: Fruits edible

79. *Rubus lucens* Focke [Rosaceae]

Collection: HAU/PNL-257/13-02-2023/New Bomte/Alt. 364 m

Habit and habitat: Scandent shrub; Tropical, Subtropical

Local name: Achin-paarin

Traditional uses: Fruits edible.

80. *Rubus niveus* Thunb. [Rosaceae]

Collection: HAU/PNL-192/08-01-2023/New Bomte/Alt. 870 m

Habit and habitat: Shrub; Subtropical to Temperate

Local name: Kibo-lepuk-leruk

Traditional uses: Fruits edible.

81. *Rubus sumatranus* Miq. [Rosaceae]

Collection: HAU/PNL-258/13-02-2023/New Bomte/Alt. 369 m

Habit and habitat: Shrub; Tropical, Subtropical

Local name: Iki-tumli

Traditional uses: Fruits edible.

82. *Sarcochlamys pulcherrima* (Roxb.) Gaudich.

[Urticaceae]

Collection: HAU/PNL-210/10-01-2023/Ringi/Alt. 369 m

Habit and habitat: Shrub; Tropical, Subtropical

Local name: Joju

Traditional uses: Leaves as vegetable.

83. *Saurauia napaulensis* DC. [Actinidiaceae]

Collection: HAU/PNL-130/24-12-2022/Garu/Alt. 515 m

Habit and habitat: Tree; Tropical, Subtropical

Local name: Enpum

Traditional uses: Fruits edible.

84. *Saurauia roxburghii* Wall. [Actinidiaceae]

Collection: HAU/PNL-259/13-02-2023/New Bomte/Alt. 390 m

Habit and habitat: Tree; Tropical, Subtropical

Local name: Enchii

Traditional uses: Fruits edible.

85. *Saurauia sinohirsuta* J.Q.Li & Soejarto [Actinidiaceae]

Collection: HAU/PNL-193/08-01-2023/New Bomte/Alt. 689 m

Habit and habitat: Tree; Tropical, Subtropical

Local name: Pupu-taksap/ Enchi-chisap

Traditional uses: Fruits edible.

86. *Solanum americanum* Mill. [Solanaceae]

Collection: HAU/PNL-161/28-12-2022/Old Bomte/Alt. 459 m

Habit and habitat: Herb; Tropical, Subtropical

Local name: Orre

Traditional uses: Leaves as vegetables.

87. *Solanum spirale* Roxb. [Solanaceae]

Collection: HAU/PNL-208/10-12-2022/Gengi/Alt. 420 m

Habit and habitat: Herb; Tropical, Subtropical

Local name: Bangko/ Donyi polo nemi

Traditional uses: Leaves and fruits as vegetable.

88. *Solanum torvum* Sw. [Solanaceae]

Collection: HAU/PNL-202/10-01-2023/Gengi/Alt. 365 m

Habit and habitat: Shrub; Tropical, Subtropical

Local name: Hote/sote-baake

Traditional uses: Fruits as chutney or vegetable.

89. *Solanum violaceum* Ortega [Solanaceae]

Collection: HAU/PNL-185/08-01-2023/New Bomte/Alt. 431 m

Habit and habitat: Shrub; Tropical, Subtropical

Local name: Baak-kaada/Baak-kaame

Traditional uses: Fruits as vegetable.

90. *Spondias mombin* L. [Anacardiaceae]

Collection: HAU/PNL-131/24-12-2023/Garu/Alt. 421 m

Habit and habitat: Tree; Tropical, Subtropical

Local name: Dergee/Amora

Traditional uses: Fruits are eaten raw and taken as pickle.

91. *Sterculia lanceolata* var. *coccinea* (Jack) Phengklai

[Malvaceae]

Collection: HAU/PNL-120/20-12-2022/Garu/Alt. 490 m

Habit and habitat: Small tree; Tropical, Subtropical

Local name: Taglam

Traditional uses: Seeds edible

92. *Sterculia villosa* Roxb. ex Sm. [Malvaceae]

Collection: HAU/PNL-120/20-12-2022/Garu/Alt. 321 m

Habit and habitat: Tree; Tropical, Subtropical

Local name: Horgok

Traditional uses: Seeds edible.

93. *Stixis suaveolens* (Roxb.) Baill. [Resedaceae]

Collection: HAU/PNL-145/24-12-2022/New Bomte/Alt. 552 m

Habit and habitat: Shrub; Tropical, Subtropical

Local name: Rokpo-titigali

Traditional uses: Fruits edible

94. *Syzygium kurzii* (Duthie) N.P.Bala [Myrtaceae]

Collection: HAU/PNL-186/08-01-2023/Takso/Alt. 722 m

Habit and habitat: Tree; Tropical, Subtropical

Local name: Penlo

Traditional uses: Fruits edible

95. *Terminalia chebula* Retz. [Combretaceae]

Collection: HAU/PNL-121/20-12-2022/New Bomte/Alt. 412 m

Habit and habitat: Tree; Tropical, Subtropical

Local name: Hilika

Traditional uses: Fruits are edible, can be consumed raw or dried pickle.

96. *Thelypteris nudata* (Roxb.) C.V.Morton [Aspleniaceae]

Collection: HAU/PNL-189/08-01-2023/Takso/Alt. 562 m

Habit and habitat: Herb; Tropical, Subtropical

Local name: Taka-rugra-paka

Traditional uses: Young leaves or fronds as vegetable.



Figure 5. *A. Stixis suaveolens* (Roxb.) Baill. [Resedaceae]; **B. *Castanopsis tribuloides*** (Sm.) A.DC. [Fagaceae]; **C. *Amomum arunachalense*** Hareesh & M.Sabu [Zingiberaceae]; **D. *Choerospondias axillaris*** (Roxb.) B.L.Burt & A.W.Hill [Anacardiaceae]; **E-E1. *Rubus lucens*** Focke [Rosaceae]; **F. *Nephelium ramboutan-ake*** (Labill.) Leenh.[Sapindaceae]; **G-G2. *Elatostema sessile*** J.R.Forst. & G.Forst. [Urticaceae] being sold in the local market by Galo womenfolk; **H. Galo womenfolk in their traditional house**; **I. Local informant with *Begonia aborensis*** Dunn [Begoniaceae]; **J. Scholar in the field collection site.**

97. *Urtica ardens* Link [Urticaceae]

Collection: HAU/PNL-123/20-12-2022/New Bomte/Alt. 368 m
Habit and habitat: Shrub; Tropical, Subtropical

Local name: Poso

Traditional uses: Tender leaves are consumed as vegetable.

98. *Zanthoxylum acanthopodium* DC. [Rutaceae]

Collection: HAU/PNL-214/11-02-2023/New Bomte/Alt. 569 m
Habit and habitat: Shrub; Tropical, Subtropical

Local name: Onyor

Traditional uses: The leaves as vegetable.

99. *Zanthoxylum asiaticum* (L.) Appelhans, Groppo & J.Wen [Rutaceae]

Collection: HAU/PNL-163/28-12-2022/Old Bomte/Alt. 569 m
Habit and habitat: Shrub; Tropical, Subtropical

Local name: Rikom

Traditional uses: The leaves are consumed as a vegetable.

100. *Zanthoxylum rhetsa* (Roxb.) DC. [Rutaceae]

Collection: HAU/PNL-190/08-01-2023/Takso/Alt. 729 m
Habit and habitat: Tree; Tropical, Subtropical

Local name: Onyor/hibe

Traditional uses: The leaves are consumed as a vegetable; dried fruits are used as spice or condiments.

Discussion

Wild edible plants play a vital role in sustenance of rural food and livelihood security as they provide vitamins, carbohydrates, proteins, fats, minerals, and other bioactive secondary metabolites which is essential for growth and development of the body and help in building immunity against various diseases (Jambey et al., 2017; Baruah and Battacharyya, 2019). Galo tribe of Arunachal Pradesh have been reported to be rich in traditional ethnobotanical knowledge system which employs several wild and cultivated plant species for ensuring rural food and livelihood security (Ratan et al., 2016). Earlier studies also reported about sustainability, food and commercial viabilities of some important wild edible plant species such as *Clerodendrum colebrookeanum*, *Gonostegia hirta*, *Dendrocalamus giganteus*, *Dillenia indica*, *Diplazium esculentum*, *Elatostema sessile*, *Fagopyrum cymosum*, *Houttuynia cordata*, *Litsea cubeba*, *Musa sanguinea*, *Pilea racemosa*, *Piper pedicellatum*, *Phoebe bootanica*, *Rhynchoctechum ellipticum* and *Zanthoxylum rhetsa* used by various tribal communities of Northeast India (Saikia et al., 2008; Loxmi et al., 2017; Wangpan et al., 2019; Yanka et al., 2022).

In the present studies, highest number of fruit and seed bearing species of wild edible plants were reported which is followed by leaves, young shoot, whole plants, flowers and tubers. Critical review of literatures (Ratan et al., 2016; Baruah and Battacharyya, 2019; Yanka et al., 2022) also confirmed 12 species namely, *Boehmeria penduliflora*, *Castanopsis tribuloides*, *Curculigo capitulata*, *Erigeron canadensis*, *Ficus fistulosa*, *Firmiana colorata*, *Lepisanthes senegalensis*, *Leucas aspera*, *Nephelium ramboutan-ake*, *Pilea racemosa*, *Pseudodissochaeta assamica*, and *Rubus lucens* reported in present studies to be ethnobotanical novelties as their part harvest, processing methods and applications were found unique and exclusive to the Galo tribe of Arunachal Pradesh.

The fruit and seed-bearing species such as *Alpinia roxburghii*, *Baccaurea ramiflora*, *Castanopsis indica*, *Ficus semicordata*, *Ficus auriculata*, *Rubus niveus*, *Stixis suaveolens*, and *Saurauia roxburghii* were found to be harvested and consumed as carbohydrate sources among the local residents of the Galo community of Lower Siang district. These selected wild edible plant species reported in present studies has the market potential which were found popularly sold in the local market. Previous studies (Ratan et al., 2016; Gajurel and Doni, 2020) also indicated about the marketing and livelihood potential, food and therapeutic values of these ethnobotanically significant species.

Conclusion

Present studies have unveiled some of the significant wild edible plant species used among the Galo tribe living in the Lower Siang district of Arunachal Pradesh. Majority of the plant parts were found to be harvested from herbaceous, shrubs and tree species which bears edible fruits and leafy parts, and they were observed to have marketing potential which could ensure rural food and livelihood security to the local residents. These species were found

to be popularly consumed in fresh form among the local residents due to high carbohydrate, fats and protein contents, and also reported to have deep linkages with traditional cultural practices. The 12 wild edible plant species reported as ethnobotanical novelties in present studies were found to be useful as major sources of vitamins and secondary metabolites, and the utilization knowledge systems were found exclusive to the Galo tribe of Lower Siang district of Arunachal Pradesh. Further biochemical studies could unveil some novel bioactive molecules with nutritional and antioxidant potential effective against oxidative stress, cancer and inflammation.

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Author's contribution

The first author (PNL) has contributed in data generation from the field, taxonomic identification of plant species and preparation of first draft of the manuscript. The second and corresponding author (HT) has contributed in research design, taxonomic authentication, language editing and drafting of the final manuscript.

Conflict of interests

Authors declare that there is no conflict of interests.

References

- Anonymous. 2011. *Statistical Abstract of Arunachal Pradesh*. Directorate of Economic and Statistics, Government of Arunachal Pradesh, Itanagar.
- Baruah U and Bhattacharyya R. 2019. Diverse ethnic food practices of the Galo tribe in Arunachal Pradesh. *Food Science Research Journal* 10 (2): 197-202.
- Dash SS and Paramjit S. 2017. *Flora of Kurung Kumey District, Arunachal Pradesh*. Botanical Survey of India, CGO Complex, Salt Lake City, Kolkata-700064, India. Pp. 5 - 747.
- FSAP. 2008. *Forest Statistics of Arunachal Pradesh*. Department of Environment and Forest, Govt of Arunachal Pradesh, Itanagar.
- Gajurel PR and Doni T. 2020. Diversity of wild edible plants traditionally used by the Galo tribe of Indian Eastern Himalayan state of Arunachal Pradesh. *Plant Science Today* 7 (4): 523–533.
- Hooker JD. 1872-1897. *The Flora of British India*, Vols. 1-7. L. Reeve & Co Ltd, Ashford, Kent. London.
- Jain SK and Rao RR. 1976. *A Handbook of Field and Herbarium Methods*. Today's & Tomorrow's Printers and Publishers, New Delhi.
- Jambey T, Gogoi BJ, Pallabi KH, Tam N and Tag H. 2017. Ethnobotanical appraisal on the wild edible plants used by the Monpa Community of Arunachal Pradesh. *Indian Journal of Traditional Knowledge* 16(4): 626 – 637.
- Kanjilal UN, Das A, Kanjilal PC, Purkaystha C, De RN and Bor NL. 1934 – 1940. *Flora of Assam* (Vols. I – V). Government of Assam, Shillong [Printed by: Prabasi Press, Calcutta].
- Loxmi J, Pallabi KH, Debmalya DP and Tag H. 2017. Ethnobotany and nutritional potential of *Gonostegia hirta* (Blume ex Hassk.) Miq. (Urticaceae) from Arunachal Pradesh, India. *Pleione* 11 (2): 329-335.
- Mao AA and Hynniewta TM. 2000. Floristic diversity of North East India. *Journal of Assam Science Society* 41(4): 255-266.
- Martin GJ. 1995. *Ethnobotany: A Methods Manual*. 1st ed. New York, Chapman & Hall, London. Pp. 1–64.
- Myers N, Russell AM, Cristina GM, Gustavo AB Da Fonseca and Jennifer K. 2000. Biodiversity hotspots for conservation priorities. *Nature* 403(6772): 853 – 858.
- Omern R, Rajiv M and Tag H. 2016. Ethnobotany of the Galo Community of Arunachal Pradesh, India. *Pleione* 10(2): 248-261.
- Pal GD. 2013. *Flora of Lower Subansiri District, Arunachal Pradesh (India)*, Vol. 1 & 2. Botanical Survey of India, CGO Complex, Salt Lake City, Kolkata-700064, India. Pp. 3 - 500.
- POWO. 2023. Plants of the World Online. Royal Botanic Garden, Kew. <https://powo.science.kew.org/>
- Saikia B, Tag H and Das AK. 2008. Diversity of edible species of Dioscoreaceae Plum. ex L. (Dioscoreaceae) from Arunachal Pradesh (India). *Pleione* 2(2): 194 – 197.

Singh AV and Asha H. 2017. Wild edible fruits of Arunachal Pradesh. International Journal of Science, Engineering and Technology 6 (6): 12203-12209.

Tag H, Tsering J, Pallabi KH, Gogoi BJ, Veer V. 2014. Nutritional Potential and Traditional Uses of High-altitude Wild Edible Plants in Eastern Himalayas, India. International Journal of Agriculture, Biosystems Science and Engineering 8 (3): 395-400.

Wangpan T, Nonya C, Chatam L, Tapi T, Jentu G, Phongam T, Sumpam T. 2019. Ethnobotanically significant plants used by the Nocte tribe of Eastern Himalaya. Journal of Bioresources 6 (1): 36-45.

Yanka H, Pallabi KH and Tag H. 2022. Traditional uses of *Solanum* species by the tribal communities of Lower Subansiri district, Arunachal Pradesh, India. Journal of Bioresources 9 (2): 50–52.
<https://doi.org/10.5281/zenodo.8374806>



Figure 6. Local field guide Shri Manya Karlo, Galo resident sharing the traditional utilization knowledge of edible *Hornstedtia arunachalensis* with aromatic fruits rich in sugar content collected from community forest of Garu village, Lower Siang district, Arunachal Pradesh.

