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A survey on wild vegetable plants used in the Southern Eastern Ghats

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Abstract

Aim: To identify and document the different wild vegetable plant species used and their pattern of utilization by the forest fringe village peoples.

Study design: Open-ended questionnaire survey

Place and duration of the study: Study was carried out in the forest fringe villages near by Cauvery wildlife sanctuary situated in the Hanur taluk, Chamaraja Nagara district, Karnataka during the year 2021-2022.

Methodology: Three fringe villages of the forest area were surveyed with questionnaire, plants were identified and the data was compiled.

Results: A total of 23 different plant species belongs to 16 families and 21 genera were used as wild vegetables. Herbs alone constituted 44 per cent of total plants consumption. Leaves were the mostly used part of a plant in that area of the plants used, nine plant species were very commonly used, eight species were commonly used and six species were rarely used. Further, local people collected maximum number of plants from the agriculture fields. Maximum number of edible plants in the study area was available in the rainy season.

Conclusion: Wild edible plants can strengthen nutritional security of forest fringe villages and easily accessible from agricultural and abandoned land provides most of the plant collects.

Keywords: Wild edibles, Weeds, Ethnobotany, Nutritional security, Food security

1. Introduction

Vegetables are the major sources of minerals, vitamins, micronutrients and dietary fibres to humans. WHO recommends consumption of at least 400 grams of fruits and vegetables every day to improve overall health and reduce the risk of certain non-communicable diseases [1]. India holds the second position in the production of vegetables in the world [2]. But still, meeting everyday requirement of people is major challenge. Children and maternal malnutrition in India are responsible for 15 per cent of India's total disease burden [3]. Furthermore, insufficient intake of fruit and vegetables is estimated to cause around 14% of gastrointestinal cancer deaths, about 11% of ischemic heart disease deaths and about 9% of stroke deaths globally [4].

The term "wild" refers to those plants that grow without being cultivated [5]. Approximately 30,000 edible plant species have been identified, of which more than 7,000 plant species have been used in the history of humanity to meet food needs [6]. However, people around the world use limited portion of edible plants, currently less than 150 species are commercially cultivated for food around the globe. Of these, only four plant species *viz.*, rice, wheat, maize and potato accounts for 60% of the human energy supply [7].

Wild Food Plants (WFP) often contain more than one nutrient [8]. WFP are thus a significant source of vitamins, minerals, fiber, carbohydrate, and proteins [9], and also serves as a staple food and offers an alternative source of cash income [10]. Throughout the world, and more especially in developing countries, wild plants make an important contribution to the life of local communities as WFPs play an important role in ensuring food security and improve the nutrition in the diets of many people in developing countries [11, 12].

For instance, during times of critical food shortage consumers of wild edible plants can diversify food sources, mitigate malnutrition, and generate alternative incomes. Wild foods are often accessible when main crop harvests fail and provide a variety of nutritional benefits with minimal processing. They are extremely important during natural catastrophes like droughts, as well as during famines brought on by market fluctuations, political unrest and military conflicts [13]. Moreover, WFPs are potential plant species for domestication and provide valuable genetic traits for developing new crops through breeding and selection [14]. They can also serve as sources of income in poor communities [12].

The use of wild plants as food is an integral part of the culture and tradition of many indigenous communities around the world. Indians have been consuming wild vegetables for thousands of years, but unfortunately, people lost track somewhere at the dawn of modern era. Tribal people and rural Indians still value these wild vegetables. These plants mainly grow in forests, wilderness, edges of farmlands, and barren fields naturally and are utilized by the local people. Majority of wild vegetable plants are medicinal plants. They have nutritional or therapeutic value due to the presence of biologically active compounds. Several studies supports that some of these foods, as part of an overall healthful diet, have the potential to delay the onset of many age-related diseases as they contain anti-oxidants and

many wild edibles were found to be rich in anti-oxidants [15]. Despite of all the advantages of WFP, studies on this aspect is limited and there is a need to assess the potentiality of these bio resources for utilization at the time of food scarcity or crop failure. Further, the same may be used for producing value added products. Hence, the present survey was carried out with the objectives of enlisting different wild plant species food, mode and pattern of utilization and local availability of the plants.

2. Materials and Methods

2.1 Study area

The present survey was undertaken during the year 2020-21 in the fringe villages of Cauvery Wildlife sanctuary *i.e.*, Bandalli, Shagya, Halagapura in the southern part of Eastern Ghats situated in the Hanur taluk, Chamaraja Nagara district, Karnataka (Figure 1). People are mainly dependent on agriculture, partly on animal husbandry in the studied area. The average altitude of the district is 658.58 m AMSL and the area is prominently covered with reddish-brown forest soil. It receives an average annual rainfall of 753.7 mm (KSNDDMC-Karnataka State Natural Disaster Monitoring Centre, 2019) with an average number of rainy days 67 in a year. The mean maximum and minimum temperature of the studied district varies between 34 °C and 16.4 °C, respectively.

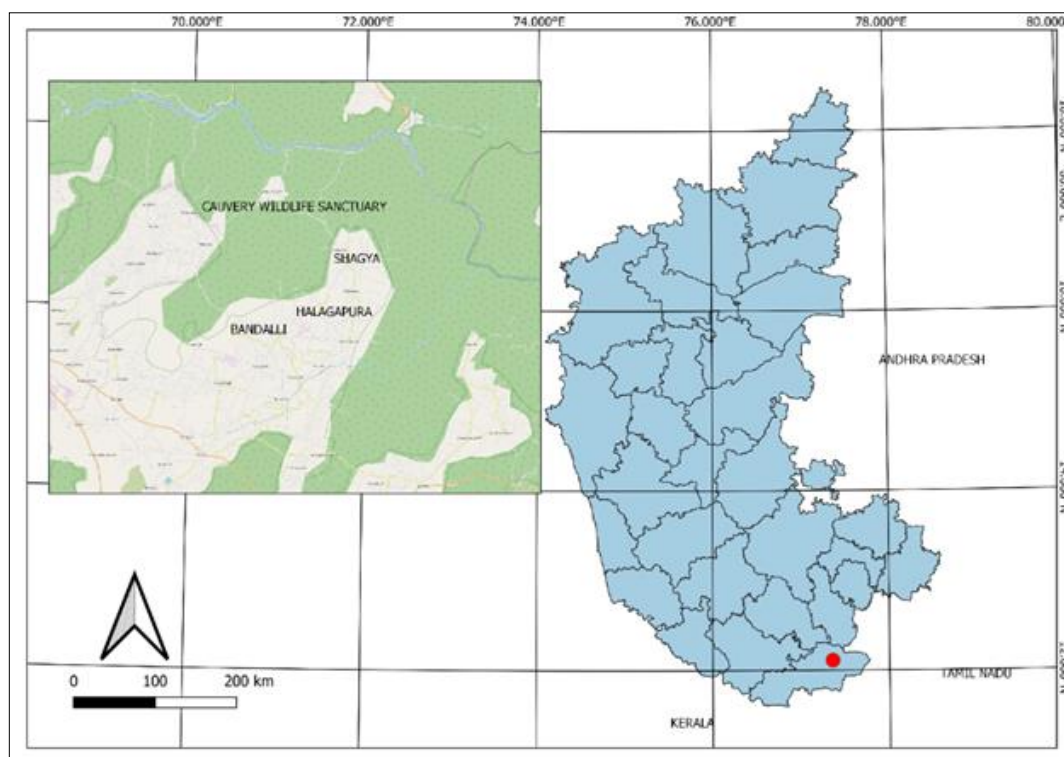


Fig 1: Map showing the fringe villages of Cauvery Wildlife Sanctuary in the southern Eastern Ghat region

2.2 Methodology

To acquire information on wild edible plants, frequent interaction and discussions were made with 30 local villagers of forest fringe villages, ten people each from Bandalli, Shagya, Halagapura villages from August to October months of 2021. The questionnaire was prepared for the collection of data such as village name, date of visit, address of respondent, age, vernacular names, botanical name, mode of consumption, utilization pattern, part(s) used, Available season and place of collection. Live specimens along with photographs were also taken for identification. Plant identification was made referring

to field guides, experts and authentic websites. Further, the frequency of utilization of each plant was categorised as rarely used (*), Moderately used (**) and Very commonly used (***)

3. Results and Discussion

Wild vegetables constitute a significant part of local people's diet in the studied area. Even with the availability of commercial vegetables varieties, local people prefer to use wild vegetables because it is cheaper, nutritious and authenticated source. The details of wild vegetables used by the local people, collection and utilization details are described in Table 1.

Table 1: Wild vegetables used by the local people and their utilization and availability details

SL. No	Vernacular name (Kannada)	Scientific name	Common name	Family	Habit	Part(s) used	*Mode of consumption	Seasonal availability	Frequency of Utilisation	Place of Collection	Availability at market
1	Seege	<i>Acacia concinna</i>	Shikakai, Soap-pod, soap pod wattle	Mimosaceae	Climber	Leaves, flowers, fruits,	Chutney, sambhar	Rainy season	*	Forest areas	No
2	Honagone	<i>Alternanthera sessilis</i>	Sessile joyweed	Amaranthaceae	Herb	Leaves	Sambhar	All around the year	***	Agriculture land	Yes
3	Keere	<i>Amaranthus viridis</i>	Green Amaranth, Pigweed	Amaranthaceae	Herb	Leaves, tender shoot	Sambhar, palya	All around the year	***	Agriculture land	Yes
4	Halasu	<i>Artocarpus heterophyllus</i>	Jackfruit	Moraceae	Tree	Seed	Curry, sambhar	Rainy season	**	Agriculture tree	Yes
5	Bayee basale	<i>Basella alba</i>	Indian spinach, Red vine spinach	Basellaceae	Creeper	Leaves	Curry	All around the year	***	Fences	Yes
6	Kaare	<i>Canthium coromendalicum</i>	Coromandel Canthium	Rubiaceae	Shrub	Tender leaves, fruits	Sambhar	Rainy season	**	Forest and its fringes	No
7	Anne	<i>Celosea argentea</i>	Silver Cockscomb, White Cockscomb	Amaranthaceae	Herb	Leaves	Sambhar, palya	All around the year	***	Agricultural land	No
8	Kadu chakotha	<i>Chenopodium album</i>	goosefoot, manure weed	Amaranthaceae	Shrub	Leaves	Sambhar and palya	Rainy season	**	Abandoned land	No
9	Narale	<i>Cissus quadrangularis Linn</i>	devil's backbone	Vitaceae	Vine	Tender stem	Chutney, hapalla making	All around the year	*	Along fence	No
10	Thonde	<i>Coccinia grandis</i>	Ivy Gourd	Cucurbitaceae	Climber	Unripe fruits	Curry, palya	All around the year	**	Along fence	No
11	Kiru bidiru	<i>Dendrocalamus strictus</i>	Male bamboo	Poaceae	Grass	Tender shoots	Pickle, curry	Rainy season	**	Forest areas	Yes
12	Gorji	<i>Digera muricata</i>	False Amaranth	Amaranthaceae	Herb	Tender Leaves	Sambhar, palya	All around the year	***	Agricultural land	No
13	Pundaga	<i>Hibiscus sabdariffa L.</i>	Jamaican sorrell	Malvaceae	Shrub	Calyx, tender leaves and stem, seeds	Salad, chutney	Rainy season	*	Agriculture land	No
14	Menthe	<i>Mentha arvensis</i>	Mentha	Lamiaceae	Herb	Leaves	Salad, chutney	All around the year	***	Backyard gardens	Yes
15	Huli hunase	<i>Oxalis corniculata</i>	Yellow Sorrel	Oxalidaceae	Herb	Leaves	Salads, cooked as a potherb with other milder flavored greens or used to give a sour flavor to other foods	All around the year	*	Agriculture land (moist cool areas)	No
16	Dodda patre	<i>Plectranthus amboinicus</i>	Indian borage	Lamiaceae	Herb	Leaves	Chutney, Flavouring agent	All around the year	**	Backyard gardens	Yes
17	Goni	<i>Portulaca oleracea</i>	Green Purslane, duckweed, little hogweed	Portulacaceae	Herb	Whole plant	Sambhar	All around the year	***	Agriculture land (moist cool areas)	No
18	Musta, Neer boddi	<i>Rivea hypocreteriformis</i>	Midnapore Creeper	Convulvulaceae	Climber	Tender leaves	Sambhar	Rainy season	*	Forest, Abandoned land	No
19	Agase	<i>Sesbania grandiflora L.</i>	Agathi	Leguminoseae	Tree	Leaves, Flowers, Seeds and Tender pods	Palya, sambhar	All around the year	**	Agriculture land	Yes
20	Belagulike	<i>Solanum nigrum</i>	Black Nightshade	Solanaceae	Herb	Leaves, flowers, fruits,	Sambhar	All around the year	***	Agriculture land	Yes
21	Sunde	<i>Solanum torvum</i>	Turkey berry	Solanaceae	Shrub	Unripen fruits	Sambhar	Rainy season	***	Abandoned area, Fringes of forest	No
22	Nella gull kayee	<i>Solanum Xanthocarpus</i>	Gull kayi	Solanaceae	Herb	Unripen fruits	Sambhar	All around the year	*	Abandoned land	No
23	Amate mara	<i>Spondius pinnata</i>	Wild mango	Anacardiaceae	Tree	Unripen fruits	pickle, Chutney preparation,	Rainy season	**	Agriculture land	No

*Mode of consumptions: Chutney-semi-liquid kind of recipe for dipping roti; Palya-Kind of cooked salad; Hapalla (Kannada)-Papad

3.1 Diversity of Species

In the present survey, a total of 23 plant species belonging to 16 families and 21 Genera were reported to be collected by the local people as vegetables. Amaranthaceae family members (5 species) are widely used by local people, followed by Solanaceae (3) and Lamiaceae (2), rest of the families recorded

one species each (Figure 2).

The plants recorded, herbs contribute 44 per cent of the plant's life forms, followed by shrubs with 18 per cent, trees and climbers recorded with each of 13 per cent. However, four per cent each was contributed by creeper, grass and vine (Figure 3).

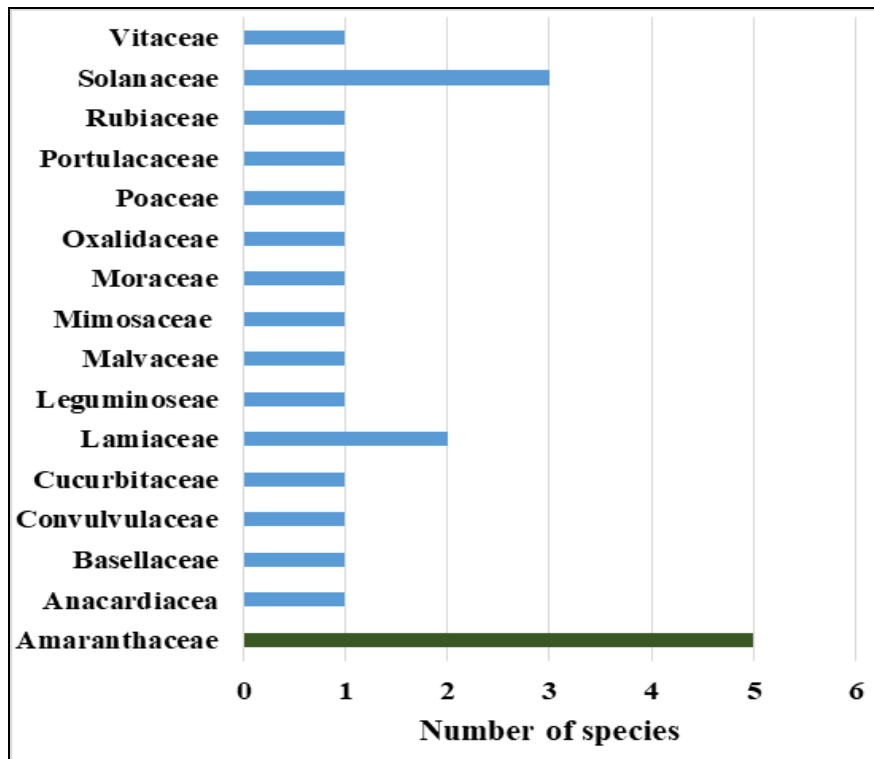


Fig 2: Distribution of wild vegetables in various families

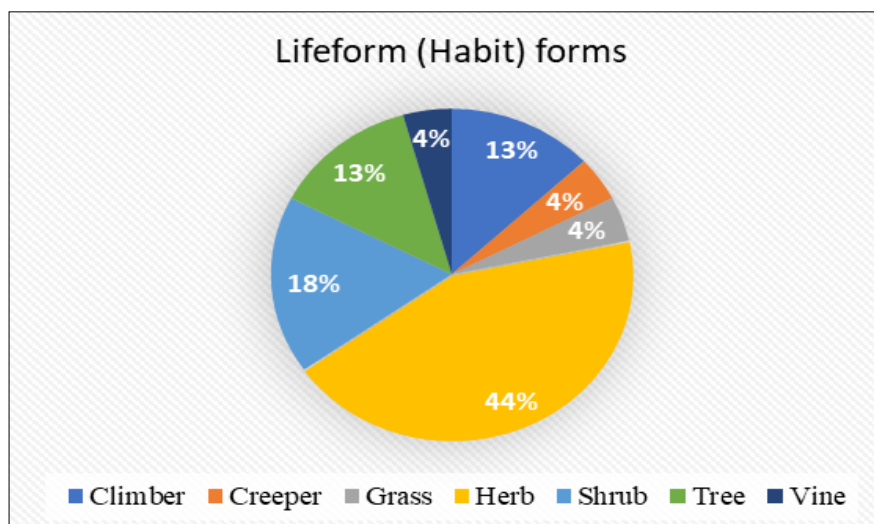


Fig 3: Distribution of wild vegetables in various habit forms

3.2 Utilization and Consumption of plants

The whole plant cannot be used for cooking or edible, only particular parts plants are utilized. Among the enlisted plants, leaves were more predominantly used part in the local cuisine, followed by fruit. *Portulaca oleracea* (Goni soppu) is the only plant which is completely used as a leafy vegetable (entire above ground part is used). Among the 23 plants, nine species (39 per cent of species) were used very commonly and frequently; eight species were (34 per cent of species) moderately used and the remaining six species (27 per cent of species) namely *Acacia concinna*, *Cissus quadrangularis*, *Hibiscus sabdariffa*, *Oxalis corniculata*, *Rivea hypocreteriformis* and *Solanum Xanthocarpus* were rarely used. Collected plants were used in preparation of various kinds of recipes like sambhar, palya, curry, pickle, chutney, happalla (Papad) and salad. Most of the plants reported in the study were used in the preparation of sambhar.

3.3 Availability of plants

Local people collect maximum number (11) of the plants from agricultural lands and the remaining wild vegetables were collected from various other places namely, forests, abandoned land, backyard gardens, etc. Only three species namely *Acacia concinna*, *Canthium coromendalicum* and *Dendrocalamus strictus* were mainly available in the forest areas. Among the plants recorded, 14 plants are available throughout the year; during the rainy season, additional nine plants are being collected by local collectors. Further, only nine species were found to be available in local markets which are *Alternanthera sessilis*, *Amaranthus viridis*, *Artocarpus heterophyllus*, *Basella alba*, *Dendrocalamus strictus*, *Mentha arvensis*, *Plectranthus amboinicus*, *Sesbania grandiflora* and *Solanum nigrum*. Rest of them were not sold in local markets. The current survey showed that 23 different plant species belonging to 16 families and 21 genera were used by local

people as wild vegetables. Natural vegetation of the area and traditional knowledge of local people drives the intensity and extent of utilisation of wild edible plants. Similar kinds of works carried out in the evergreen forests of Arunachal Pradesh, where the Digaru Mishmi tribe use 57 species belonging to 22 different families as edible plants [16]. In the moist deciduous forest of Hassan, Karnataka, local people use 75 wild edible fruit species belonging to 40 families and 60 genera for food and 15 selected species of them were categorized as not so common [17].

Most of the plants (44 per cent) recorded in the study were herbs, this fact was already proven in the previous studies. An assessment by Konsam and associates [18] in Manipur also stated that highest proportion of edible plants in the survey are herbaceous plants. Similarly, herbs constitute 60 per cent of wild edible plants in the Kumrat Valley of Pakistan [19] and more than 90 per cent in the Singhbhum district, Jharkhand [20]. Further, the present survey also showed that leaf is the most used part in the wild edible plants during the preparation of food by the local people as it is already recorded by Baro *et al.* [21] from Assam.

Nine species of wild vegetables were used very commonly in the surveyed area; while, six species were rarely used. It is attributed to various factors like difficulty in collection (*Solanum xanthocarpus* due to the presence of spines on leaves and stem), reduced availability (*Acacia concinna*, *Hibiscus sabdariffa* and *Rivea hypocreteriformis*), limited use (*Cissus quadrangularis* as it used only in papad (happalla) making). Sambar is a famous recipe of South India, which is the most essential part of lunch and dinner in the local diet. Hence, most of the respondents use maximum number of wild edible plants in sambhar preparation.

Local people gather more edible plants from the farm fields which are easily accessible and where WEP's are grown as weed thus, farm owners encourage their collection from the field (Figure 4). Maximum number of plants were available in the rainy season; while, 14 species were available throughout the year restricted to the moist areas of the locality. So, the diet of local people in the rainy season is nutrient rich with a lot of wild leafy vegetables.

a) *Alternanthera sessilis*b) *Cissus quadrangularis*c) *Solanum torvum*d) *Coccinia grandis*e) *Celosea argentea*f) *Hibiscus sabdariffa*

Fig 4: Wild edible plants used by local people grown in agricultural and abandoned areas

A large number of wild edible plants (60 per cent) were not available in local markets due to lack of popularity and collection. Local people use to collect wild vegetable plants for subsistence; however, few wild plants like, bamboo shoots are collected commercially, which has good local market and fetches a good price. In a similar kind of study in the natural forest of Makawanpur district (Nepal), only 26 species out of 89 vegetable species were found available in markets [22].

4. Conclusion

Wild vegetable constitutes a significant portion of the local people's plate. As most of the population in the study area is dependent on agriculture, wild edible plants were collected in the leisure time obtained in agricultural work, especially by women agriculture labors and herdsman in the forest mainly for subsistence. The present study highlighted the availability of various WEP in the study area and opened room for further scientific and analytical research which necessitated for nutritional security of the country.

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6. Competing Interests

Authors have declared no competing financial or non-financial or personal interests that could have appeared to influence the work reported in this paper.

7. Authors' Contributions

Gunaga RP and Manojkumar designed the study. Manojkumar carried out fieldwork and prepared draft manuscript. Sankanur MS, Sinha SK and Ahlawat TR analysed and finalised the manuscript. All the authors read and approved the final manuscript.

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