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RESEARCH ARTICLE

Identification, Documentation and Utilization of Wild Green Leafy Vegetables from Tribal Region of Nashik District

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ABSTRACT

From many years ago the tribal peoples commonly used numbers of wild leafy vegetables all over the world. Peth and Surgana are well known tribal region from Nashik district. The tribal community from that region was partially or fully dependent on the wild green leafy vegetables to complete their nutritional need. In present study from selected tribal region of Nashik district, a total 61 traditionally used wild green leafy vegetables was identified. Among 61 species, with respect to families Amaranthaceae, Fabaceae and Asteraceae were found to be largest family of wild leafy vegetables with 22 species. Presently because of modernization in agricultural practices, negligence of uncultivated plants, less awareness, illiteracy and sudden environmental changes the naturally grown wild leafy vegetables source was limited. So present study was focused on the identification and conservation of these species for future need.

Keywords: Amaranthaceae, Asteraceae, Fabaceae, Nashik District, Nutritional need, Traditionally, Tribal community, Wild leafy vegetables

INTRODUCTION

India is one of the leading countries for the population and fortunately, India has highest number of vegetarians in the world where 40% of its population depends on vegetables and other plant foods for fulfilling their essential nutritional requirements. Studies have shown that vegetarians are less susceptible to disease and live longer, healthier and having stronger immunity (Sahu *et al*., 2020). Majority of Indians was practiced traditional farming from many years ago. But at present increased population and its food demand was not satisfactory. So, for increased food quality and quantity there is modern techniques was evolved like gene modification, plant breeding, tissue culture etc. The farmer was satisfied with that technique and they get maximum production and money. But no one think about the natural nutritional value of plants. The health and nutrition of expanding world populations are major upcoming challenges especially in developing countries. Only the tribal community was conserved and used natural resources in daily routine to complete their needs like food, medicine (Chavan and Jondhale, 2021).

Presently Nashik tribal belt is less infected with covid-19 infection because of strong immunity and life style of the tribals. Tribal and nature has long connection from ancient time and they used various wild plant resources daily from forest, cultivated area and waste land, kitchen garland as traditional food system. Wild leafy vegetables are one of the rich sources of vitamin, amino acid, mineral, protein, iron, antioxidant and fiber etc. (Banerjee *et al*., 2015). The Nutritional value of these greens is twenty times more than in other vegetables (Sudha and Mathanghi, 2012) and 71.4% constitutes Herbs being the primary source of leafy vegetables followed by 14.3% each constitutes trees and climbers (Panda *et al*., 2015). Many wild leafy vegetables are available commonly throughout the year but some are available only seasonally. Mostly availability of wild leafy vegetable more in rainy season as compare to winter and summer. Tribes are illiterate but have accurate knowledge about the use of wild plants. They used wild leafy vegetable by raw or by cooked method and making healthy and delicious dishes.

Nashik is a western hilly district of Sahyadri region and historically, mythologically, socially and culturally important city in the North West part of Maharashtra in India. It is also famous historical place having 15 tehsils like Nashik, Satana, Malegaon, Peth, Surgana, Egatpuri, Trambakeshwar, Chandwad, Devala, Dindori, Kalwan, Sinnar, Yeola, Niphad and Nandgaon. About 24 % of the population of the district is tribal. Among these Peth and Surgana has major tribal region in Nashik district. At present major tribes of this area was Bhil, koli Mahadev, Hindu kokna, Varli and Thakur. We selected these areas for study because the soil condition of Surgana and Peth resembles with konkan. In modern era the peoples from developed cities not heard, seen and taste the nutritional rich uncultivated wild leafy vegetables and lack of knowledge especially on the nutritive value of these green leafy vegetables among the public in general is the main drawback in their lower consumption (Ashok kumar CK et al. 2013). So many researchers reported wild food plants from India (Thakur et al, 2017, Panda et al, 2015, Aryal et al, 2018, Sahu and Ekka 2021), Maharashtra (Deshpande *et al*., 2015, Reddy, 2012, Mahadkar and Jadhav, 2013, Dr. Sangita Dandwate, 2017, Satvi and Marathe, 2018, Samudra SM, 2018, Kiran *et al*., 2019, Deshpande *et al*., 2019) and particularly from Nashik district (Patil and Patil, 2000, Gavit *et al*., 2017, Jondhale *et al*., 2018, Kuvar and Shinde, 2019, Chavan and Jondhale, 2021). But there is less information about only wild green leafy vegetables now, so present study focused on identification, documentation and its utilization of only green leafy vegetables from Nashik district particularly Peth and Surgana taluka.

MATERIAL AND METHODS

Study Area

This study was carried out in tribal region of Nashik district specially Peth and Surgana (Figure 1). Among 15 tehsils, we selected only 2 tehsil Peth and Surgana because of resemblance of soil and high tribal population area. Surgana is situated at 80 km North of Nashik city towards Gujrat border. The taluka compress nearby 26,000 hectors of forest land on other side Peth taluka is situated 54 km to the west of Nashik district with 21693.832 hector forest area. This area includes three seasons like summer, winter and monsoon. Both study regions consist of dry deciduous forest receive very high rain fall and rich in biodiversity with varying environmental conditions, which is ideal for growth of a variety of plants. In Peth taluka the major forest area occupies by Sawal ghat and Kotambi ghat and Nanashi-bare ghat in Surgana taluka. Peth and Surgana has major ethnic communities-Bhil, Koli Mahadev, Hindu Kokna, Thakur and Varli. These tribal communities collect a large variety of edible and other useful wild plants (leafy vegetables) from the forest, cultivated area and surrounding waste lands.

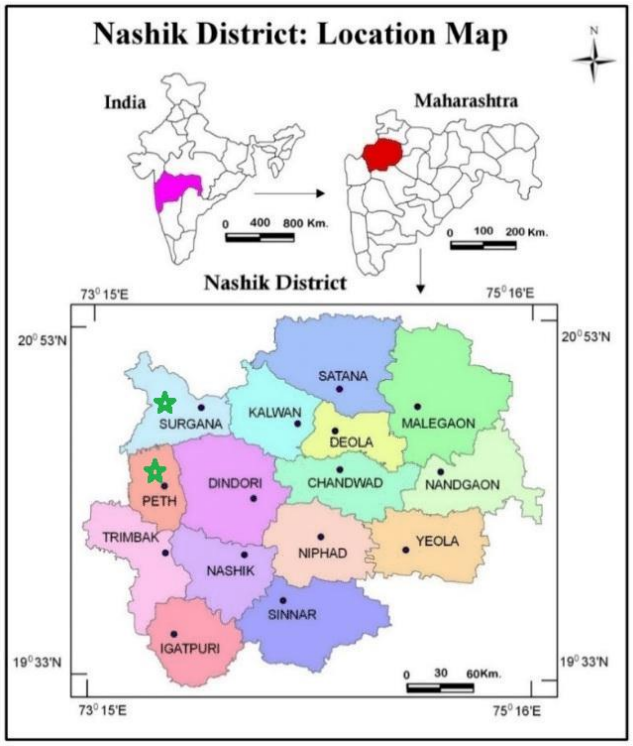

Figure 1: Map of India, Maharashtra and particularly Nashik district map ✿ showing study region.

METHODOLOGY

The method used in this study were designed for collecting traditional information on the diversity and use of wild green leafy vegetables locally used by tribal people of Peth and Surgana. Before conducting the survey, the prior information consent was obtained from the interview by explaining the aim of the study. Field survey was conducted every season in the forest, market, farm, wasteland and ghats of tribal and rural area of Peth and Surgana taluka from 2019 to 2021.

The required data was collected through discussions and interviews with forest officers, dwellers, farmers, local tribal and rural peoples and students. The collected wild green leafy vegetables were identified with the help of flora of Maharashtra and flora of Nashik and repeated inquiries of old tribal peoples. In every season we visited to local market for the upgrade the knowledge of these plants and photography.

We interact with the many people for confirmation of its local name, recipe style and method of consumption. We collect the data about the habit, habitat, local name, locality, season, availability period, methods of collection and consumption. The collected data were listed in table with respect to botanical name, local name, family, habit, edible parts, consumption and frequency of use.

RESULTS AND DISCUSSION

A major part of Nashik district is tribal and supports considerable biodiversity. The peoples particularly from Peth and Surgana region are traditionally dependent on the wild green leafy vegetables for food purpose since ancient time. These vegetables are chemical free having natural good properties with various nutrients. A large variety of such wild vegetables was sold in the market and many working peoples of cities interested to take. This study emphasized the rich wild green leafy vegetable diversity and traditional knowledge of using method by tribal community.

In this present study total 61 wild green leafy vegetable species belonging to 28 families have been collected, identified and documented from Peth and Surgana tribal region of Nashik. Among these Amaranthaceae, Fabaceae and Asteraceae were found to be the largest families with 22 species (Figure 2).

The detailed information regarding botanical name, local name, family, habit, edible part, consumption and frequency of use has been elaborated in Table 1. Herbaceous plants make up the highest proportion of edible green leafy vegetable with 47 species, followed by tree with 7 species and shrub and climber followed by 4 and 3. Wild green vegetables used by tribal peoples through collection, preparation and preservation technique. Most of the tribal people depend on wild leafy vegetables than the cultivated ones.

Many wild leafy vegetables were used for medicinal purposes as well. They are mostly picked during their visits to various places such as, home gardens, forest, crop fields and watercourses for grazing the animals, collecting fuel and fodder, tending the crop fields or collecting water etc. Plants are usually collected in vegetative stage, when the leaves are young and fresh (Sahu and Ekka, 2021).

The ethnic communities in India use over 10, 000 wild plant species for meeting their primary health care, food and material requirements. Among them nearly about 3, 900 wild plant species were used as food as per recent study conducted by the Ministry of Environment and Forest (MoEF, 2010) Govt. of India, New Delhi, under the "All India Coordinated Research Project on Ethnobiology". Leafy vegetables being nutrient dense and incredibly healthy in nature, blessed with an array of photochemical, anti-oxidant, vitamins and minerals like beta-carotene, lutein, and zeaxanthin, Tocopherols and polyphenols, vitamin A, C, K, Ca, Fe and P, K, Na, Zn respectively. These nutrients and chemicals help in age-related problems, protect against coronary heart diseases and cancer, obesity, hypertension and insomnia (Sahu *et al*., 2020, Misra and

Misra, 2014, Sudha and Mathangi, 2012). Similarly, green leafy vegetables are rich in a pigment called chlorophyll which helps in cleansing the blood enhance oxygen transport, balancing body pH and increases the production of red blood cells thus termed as energizing superfood for boosting cognitive and immune functions. (Sahu *et al*., 2020).

In present study Amaranthaceae family shows more variety of green leafy vegetables like *Achyranthes aspera*, *Alternanthera sessilis*, *Amaranthus paniculatus*, *Amaranthus roxburghianus*, *Amaranthus spinosus* and *Amaranthus viridis*. Several *Amaranthus* leafy vegetable species that have ethnobotanical, medicinal, and culinary importance, and exist both in wild and cultivated forms in native kitchen gardens, wasteland and farm etc. So many researchers reported composition of nutrients, pigments, antioxidant, vitamins and minerals, dietary fibre, nutritional and agronomic traits of *Amaranthus*. This report showed *Amaranthus* species wasrich inphytochemicals. (Steyn *et al*., 2001, Sarker *et al*., 2015, 2018, 2020).

Leaves of all wild green leafy plants consumed either raw or as various preparation such as vegetables (include boil, fry and stream), chutney or pan masala etc. Some wild edible green vegetables like *Abrus precatorius*, *Cicer arietinum*, *Cymbopogon martini* and *Murraya koenigii* are either consumed when they are available or they are stored and consumed throughout the year. Edible parts (leaves) of plants need to be dried for storage and for making chutney, dry masala etc.

Some species are available seasonally and some are available throughout the year. Further, 41 species are commonly available whereas 20 are rare. Forest is the home for the majority of wild leafy green vegetables like *Heracleum grande*, *Celosia argenta*, *Sauromatum venosum*, *Ariopsis peltate*, *Chlorophytum tuberosum*, *Guizotia abyssinica*, *Cleodendrum seratum*, *Commelina benghalensis*, *Lagerstroemia parviflora*, *Launaea procumbens*, *Schrebera swietenioides* etc. These are widely consumed green leafy vegetables in the tribal regions. Also, these wild edibles tend to possess a much lower caloric content and glycemic index compared to commercially cultivated vegetables, thereby offsetting the negative effects of both malnutrition and obesity (Darkwa and Darkwa, 2013). This, therefore, further advances the case that micronutrientrich traditional plants should be brought back to present day diets to enhance the vitamin and mineral status among the population (Kahane *et al*., 2013).

The older tribal people conserve the wild biodiversity by live in or around the forest area. But now these days the young generation live in village or city for education, farming, service and business work. In coming days, we are going to face the problem of health and nutrition crisis where the healthy and nutritious wild edibles are going to help us to overcome these challenges (Chavan and Jondhale, 2021). So, there is urgent need to reduce exploration on large scale and aware to conservation of these species for future as traditional source of healthy food.

CONCLUSION

The present findings concludes that total 61 wild green leafy vegetables identified and documented from Peth and Surgana tribal region of Nashik district in order to sustain their life. These community used wild green leafy vegetables as a food. These vegetables provide food as well as other nutritional component like vitamins, minerals,

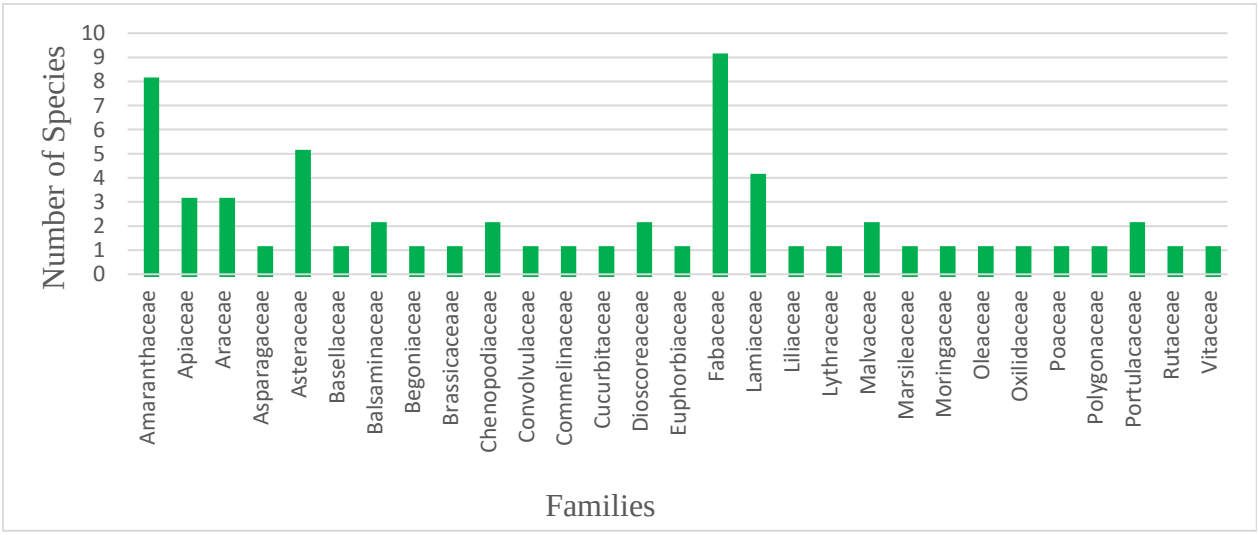

Figure 2. Family wise distribution of wild leafy vegetables in the study region.

antioxidants to stay fit and healthy. But due to recent modernization in agriculture practice, illiteracy, deforestation, urbanization and less awareness the traditional knowledge about wild food plant will be extinct. Present study helps to conserve the wild food species and find the alternative of healthy food source

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Table 1: List of wild green leafy vegetables from tribal region of Nashik district

Sr No.	Botanical Name	Local Names	Family	Habit	Edible Parts	Consumption	Frequency of Use
1.	*Abrus precatorius* L.	Gunj	Fabaceae	Shrub	Leaves	Leaves eaten as raw or used in pan masala	Rarely
2.	*Achyranthes aspera* L.	Aaghada	Amaranthaceae	Herb	Leaves	as vegetable	Rarely
3.	*Acmella paniculata* (Wall.ex DC.) R.K. Jansen.	Akkal-kara	Asteraceae	Herb	Leaves	as vegetable	Rarely
4.	*Alternanthera sessilis* L.	Tandulka	Amaranthaceae	Herb	Leaves	as vegetable	Commonly
5.	*Amaranthus paniculatus* L.	Lalmath	Amaranthaceae	Herb	Leaves	as vegetable	Commonly
6.	*Amaranthus roxburghianus* H.W. Kung	Sarambal	Amaranthaceae	Herb	Leaves	as vegetable	Rarely
7.	*Amaranthus spinosus* L.	Kate math	Amaranthaceae	Herb	Leaves	as vegetable	Commonly
8.	*Amaranthus viridis* L.	Math	Amaranthaceae	Herb	Leaves	as vegetable	Commonly
9.	*Ariopsis peltate* Nimmo.	Tera/Khadakteri	Araceae	Herb	Young leaves	as vegetable	Rarely
10.	*Asparagus racemosus* willd.	Shatavari	Asparagaceae	Herb	Leaves	as vegetable	Rarely
11.	*Basella alba* L.	Mayalu	Basellaceae	Climber	Leaves	as vegetable	Commonly
12.	*Bauhinia purpurea* L.	Kohrul	Fabaceae	Tree	Leaves	as vegetable	Commonly
13.	*Bauhinia racemose* Lam.	Bahava	Fabaceae	Tree	Young leaves	as vegetable	Commonly
14.	*Begonia crenata* Drynad.	Ambada	Begoniaceae	Herb	Leaves/Entire plant	Eaten raw/as vegetable	Commonly
15.	*Brassica juncea* (L.) Czern.	Mohari	Brassicaceae	Herb	Leaves	as vegetable	Commonly
16.	*Catharanthus tinctorius* L.	Kardai	Asteraceae	Herb	Leaves	as vegetable	Commonly
17.	*Celosia argentea* L.	Kurdu	Amaranthaceae	Herb	Leaves	as vegetable	Commonly
18.	*Chenopodium album* L.	Chakwat	Chenopodiaceae	Herb	Leaves	as vegetable	Commonly
19.	*Chenopodium murale* L.	Chilni bhaji	Chenopodiaceae	Herb	Leaves	as vegetable	Commonly
20.	*Chlorophytum tuberosum* (Roxb.) Baker	Dombali	Liliaceae	Herb	Leaves	as vegetable	Rarely
21.	*Cicer arietinum* L.	Harbhara	Fabaceae	Herb	Leaves	as vegetable	Commonly
22.	*Cleodendrum seratum* L. Moon.	Bharangi	Lamiaceae	Shrub	Young leaves	as vegetable	Commonly
23.	*Colocasia esculanta* (L.) Schott.	Alu	Araceae	Herb	Leaves	as vegetable/ wadi	Commonly

24.	*Commelina benghalensis* L.	Kena	Commelinaceae	Herb	Leaves	as vegetable	Rarely
25.	*Corchorus olitorius* L.	Chunch	Malvaceae	Herb	Leaves	as vegetable	Rarely
26.	*Crotalaria juncea* L.	Taag	Fabaceae	Shrub	Leaves	as vegetable	Rarely
27.	*Cymbopogon martini*. Roxb.	Gavatichaha	Poaceae	Herb	Leaves	Leaves use in Tea	Commonly
28.	*Digera muricata* (L). Mart	Matala/Ran Aghada	Amaranthaceae	Herb	Leaves	as vegetable	Rarely
29.	*Dioscorea. Sp.*	Lunda	Dioscoreaceae	Herb	Leaves	as vegetable	Rarely
30.	*Dioscorea oppositifolia* L.	Chaiken	Dioscoreaceae	Climber	Leaves	as vegetable	Rarely
31.	*Diplocyclo spalmatus* (L.) C. Jeffrey	Shankar vel/ Shivlingi	Cucurbitaceae	Climber	Leaves	as vegetable	Rarely
32.	*Flueggea leucopyrus* Willd.	Pichrun	Euphorbiaceae	Shrub	Leaves	as vegetable	Commonly
33.	*Guizotia abyssinica* (L.f.) Cass.	Khurasni	Asteraceae	Herb	Leaves	as vegetable	Commonly
34.	*Heracleum grande* (Dalz. & Gibson) Mukhop	Baphali	Apiaceae	Herb	Leaves	as vegetable	Commonly
35.	*Hibiscus cannabanis* L.	Ambadi	Malvaceae	Herb	Leaves	as vegetable	Commonly
36.	*Impatiens balsamina* L.	Terda	Balsaminaceae	Herb	Leaves	as vegetable	Rarely
37.	*Impatiens inconspicua*Benth. Ex Wight &Arn.	GulabiTerda	Balsaminaceae	Herb	Leaves	as vegetable	Rarely
38.	*Ipomoea aquatica*. Forsk	Nali	Convolvulaceae	Herb	Leaves	as vegetable	Commonly
39.	*Lagerstroemia parviflora* Roxb.	Bondara	Lythraceae	Tree	Leaves	as vegetable	Commonly
40.	*Launaea procumbens* (Roxb)	Pathri	Asteraceae	Herb	Leaves	as vegetable	Commonly
41.	*Leea indica* (Burm.f.) Merr.	Dinda	Vitaceae	Herb	Leaves	as vegetable	Commonly
42.	*Marselia quadrifolia* L.	Zarzuri	Marsileaceae	Herb	Leaves	as vegetable	Rarely
43.	*Mentha viridis* L.	Pudina	Lamiaceae	Herb	Leaves	Chutney/Pulav	Commonly
44.	*Moringa oleferia* Lam.	Shevga	Moringaceae	Tree	Leaves	as vegetable	Commonly
45.	*Murraya koenigii* L.	Kadipatta	Rutaceae	Tree	Leaves	as vegetable/ Chutney	Commonly
46.	*Ocimum tenuiflorum* L.	Ran tulas	Lamiaceae	Herb	Leaves	Leaves are eaten raw or used in preparation of Ayurvedic kadha or tea	Commonly
47.	*Oxalis corniculata*. L.	Tipani,ambushi,	Oxalidaceae	Herb	Leaves	as vegetable	Rarely
48.	*Peucedanum graveolens* L.	Shepu	Apiaceae	Herb	Leaves	as vegetable.	Commonly
49.	*Portulaca oleracea* L.	Ghol	Portulacaceae	Herb	Leaves	as vegetable	Commonly
50.	*Portulaca quadrifida* L.	Chighal	Portulacaceae	Herb	Leaves	as vegetable	Commonly
51.	*Raphanus sativus* L.	Mula	Brassicaceae	Herb	Leaves	as vegetable/	Commonly

						Chutney	
52.	*Rotheca serrata* L.	Bharangi	Lamiaceae	Herb	Young leaves	as vegetable	Commonly
53.	*Rumex vesicarius* L.	ambat chukka	Polygonaceae	Herb	Young leaves	as vegetable	Commonly
54.	*Sauromatum venosum* (Dryand.Ex.Aiton) Kunth	Loti	Araceae	Herb	Leaves	as vegetable	Commonly
55.	*Senna tora* (L.) Roxb.	Torota/ Takala	Fabaceae	Herb	Young leaves	as vegetable	Rarely
56.	*Schrebera swietenioides.*	Mokha	Oleaceae	Tree	Leaves	as vegetable	Commonly
57.	*Senna occidentalis* (L.) Link.	Ran-takala	Fabaceae	Herb	Young leaves	as vegetable	Rarely
58.	*Smithia conferta* J.E. Smith.	Kaula	Fabaceae	Herb	Young leaves	as vegetable	Commonly
59.	*Tamarindus indica* L.	Chinch	Fabaceae	Tree	Young leaves	Eaten as raw	Commonly
60.	*Trachyspermum ammi* (L.) Sprague	Ova	Apiaceae	Herb	Young leaves	Leaves used to prepare bhaji, chutney and eaten as raw	Commonly
61.	*Xanthium strumarium* L.	Lepadi	Asteraceae	Herb	Young leaves	as vegetable	Commonly