RESEARCH ARTICLE

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

1Smita. P. Chavan, 2Avinash. S. Jondhale

1,2Dept. of Botany, A.C.S. College, Karanjali, Peth, Nashik-422208, Maharashtra, India

*Corresponding Author: smitachavan15@gmail.com

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 hectares 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.
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

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.
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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 was rich in phytochemicals. (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, Chlorophyllum tuberosum, Guizotia abyssinica, Cleodendrum serratum, 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, etc.
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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| 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       | Leaves as vegetable | Rarely           |
| 3.    | Acmella paniculata (Wall.ex DC.) R.K. Jansen. | Akkal-kara | Asteraceae   | Herb   | Leaves       | Leaves as vegetable | Rarely           |
| 4.    | Alteranthera sessilis L.       | Tandulka    | Amaranthaceae | Herb   | Leaves       | Leaves as vegetable | Commonly         |
| 5.    | Amaranthus paniculatus L.      | Lalmath     | Amaranthaceae | Herb   | Leaves       | Leaves as vegetable | Commonly         |
| 6.    | Amaranthus roxburghianus H.W. Kung | Sarambal   | Amaranthaceae | Herb   | Leaves       | Leaves as vegetable | Rarely           |
| 7.    | Amaranthus spinosus L.         | Kate math   | Amaranthaceae | Herb   | Leaves       | Leaves as vegetable | Commonly         |
| 8.    | Amaranthus viridis L.          | Math        | Amaranthaceae | Herb   | Leaves       | Leaves as vegetable | Commonly         |
| 9.    | Aroepis peltate Nimmo.         | Tera/Khadakteri | Araceae   | Herb   | Young leaves | Leaves as vegetable | Rarely           |
| 10.   | Asparagus racemosus willd.     | Shatavari   | Asparagaceae | Herb   | Leaves       | Leaves as vegetable | Rarely           |
| 11.   | Basella alba L.               | Mayalu      | Basellaceae  | Climber | Leaves      | Leaves as vegetable | Commonly         |
| 12.   | Bauhinia purpurea L.           | Kohrul      | Fabaceae     | Tree   | Leaves       | Leaves as vegetable | Commonly         |
| 13.   | Bauhinia racemose Lam.         | Bahava      | Fabaceae     | Tree   | Young leaves | 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       | Leaves as vegetable | Commonly         |
| 16.   | Catharanthus tinctorius L.     | Kardai      | Asteraceae   | Herb   | Leaves       | Leaves as vegetable | Commonly         |
| 17.   | Celosia argentea L.            | Kurdu       | Amaranthaceae | Herb   | Leaves       | Leaves as vegetable | Commonly         |
| 18.   | Chenopodium album L.           | Chakwat     | Chenopodiaceae | Herb   | Leaves       | Leaves as vegetable | Commonly         |
| 19.   | Chenopodium murale L.          | Chilni bhaji| Chenopodiaceae | Herb   | Leaves       | Leaves as vegetable | Commonly         |
| 20.   | Chlorophytum tuberosum (Roxb.) Baker | Dombali   | Liliaceae    | Herb   | Leaves       | Leaves as vegetable | Rarely           |
| 21.   | Cicer arietinum L.             | Harbhara    | Fabaceae     | Herb   | Leaves       | Leaves as vegetable | Commonly         |
| 22.   | Cleodendrum seratum L. Moon.  | Bharangi    | Lamiaceae    | Shrub   | Young leaves | Leaves as vegetable | Commonly         |
| 23.   | Colocasia esculanta (L.) Schott. | Alu         | Araceae      | Herb   | Leaves       | Leaves as vegetable/ wadi | Commonly         |
|   | Scientific Name                  | Common Name | Family       | Type       | Part Used | Consumption     |
|---|---------------------------------|-------------|--------------|------------|-----------|-----------------|
|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   | 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 cannabinis 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.| Leuca 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       | Apioideae    | 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        |
| No | Species                           | Common Name | Family       | Type   | Part Used | Utilization         |
|----|----------------------------------|-------------|--------------|--------|-----------|---------------------|
| 52 | Rotheca serrata L.               | Bharangi    | Lamiaceae    | Herb   | Young leaves | Chutney 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 |