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Diversity and Seasonal Availability of Potential Wild Edible Plants from Vidarbha Region of Maharashtra State, India

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A B S T R A C T

Wild edible plants (WEPs) are the species that are neither cultivated nor domesticated, but available from their natural habitat and used as a source of food. Use of wild edibles is diminishing at fast pace but it is clear that in many parts of the world the use of wild edibles is still prevalent. Consumption of wild edibles is a major source of vitamins and micro-nutrients for people using only vegetarian diets rich in carbohydrates. The present study deals with the study of diversity and seasonal availability of WEPs and documented 147 species of wild edible plants belonging to 66 families and it reveals information about various edible parts of different species which includes corms, tubers, leaves, flowers, fruits and seeds, which are consumed by tribes and local people. All these plants are common in rural and forest area of Vidarbha region of Maharashtra. Majority of thespecies belongs to the families are Caesalpiniaceae, Fabaceae, Amaranthaceae, Araceae, Rubiaceae, Convolvulaceae, Cucurbitaceae, Dioscoreaceae, Tiliaceae, Anacardiaceae, Bignoniaceae, Combertaceae, Euphorbiaceae, Malvaceae, Moraceae. Collection and utilization of wild edible plants provide seasonal food security and become source of income to the tribes and local people.

Introduction

Wild edible plants (WEPs) refer to species that are neither cultivated nor domesticated, but available from their natural habitat and used as sources of food (Beluhan and Ranogajec, 2010). Wild edible plants have since ancient times, played a very important role in human life; they have been used for food, medicines, fibre and other purposes and also as fodder for domestic animals (Kanchan, 2011). Various studies have found wild edible plants are the potential source of nutrition while in many cases is more nutritious than the conventionally eaten crops (Grivetti and Ogle, 2000). India is the second largest human populations in this planet, 68.8% of the population is living in the rural areas (Census, 2011). Most rural communities depend on the resources which are available in nature, including wild edible plants to meet their food needs in periods of food crises, in addition to added food supplements (Rashid, 2008).

Food insecurity, on the other hand, is a situation of "limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways", according to the United States Department of Agriculture (USDA). Attaining food security is a matter of prime importance for India where more than one third of its population is estimated to be absolutely poor, and as many as one half of its children have suffered from malnourishment over the last three decades (Ittyerah, 2013).

WEPs are gathered for food, nutrition and livelihoods by different cultures around the world. These plants are gathered from varied habitats from natural forests, agricultural fields to human disturbed areas such as roadsides and wastelands. Forest forms the most important source of wild foods for rural households and forest inhabitants. Among some indigenous people utilization of WEPs is integral component of their culture. Various studies have found wild edible plants are potential source of nutrition while in many cases are more nutritious than conventionally eaten crops (Grivetti and Ogle, 2000). Besides food and nutrition, utilization of WEPs as coping strategies during scarcity is prevalent, particularly in developing countries where food insecurity is more acute. Diversity of plant foods consumed provides nutritional diversity and also food during famine or scarcity of favoured foods (Hatloy *et al.*, 1998). Potential of WEPs in providing source of income and livelihoods in rural settings is acknowledged around the world (Dutta, 2012).

Traditional knowledge exists worldwide in all communities covering varied areas including health, agriculture and natural resource management. In case of the developing world Africa and Latin America are also rich in traditional knowledge but they are to be found by and large only as oral traditions. Asia in general and India in particular have a distinction that traditional knowledge is found not just as oral tradition but also as classical literature that is written down with its own theoretical framework and with a clear exposition of the basic principles of world views (Nene, 2012). There are reports on wild food plants used during famine in Indian conditions (Nene, 2004; Balkundi, 1998). In some areas local food produce is hardly sufficient to meet about two thirds of local requirements. Thus for about four months in each year some of its unfortunate inhabitants have to migrate to the neighbouring cities and remaining people are obliged to subsist on a starvation diet.

These people use many plants, occurring naturally in neighbouring forests, as supplementary food which alone enables them to carry on with their half-starved existence. For that we should document the existing wild edible, which in turn helps in other people could get to know about the edible plants around them. Earlier work on wild edible plants from many parts of Maharashtra like Nasik, Amravati, Buldhana, Kolhapur, Chandrapur, Jalgaon, Akola and Nagpurwere carried out by Patil and Patil, (2000), Bhogaonkar *et al.*, (2010), Kshirsagar *et al.*, (2012), Mahadkar and Jadhav (2013), Joshi *et al.*,(2013), Reddy, (2012), Patil and Patil, (2012), Jadhav *et al.*, (2011), Patil and Tale, (2018), Thakre and Srinivasu (2012) and Kamble *et al.*, (2013).

Materials and Methods

The present study was conducted in Vidarbha region of Maharashtra, to identify and document the wild edible plants and their habit, habitat, local availability, season of availability etc. for the period of 2015-16. A gist of Vidarbha region is given below to know about the region.

Study region

Vidarbha is the eastern region of the Indian state of Maharashtra, comprising Nagpur Division and Amravati Division (Plate 1). It occupies 31.6% of the total area and holds 21.3% of the total population of Maharashtra. Vidarbha is located right at the heart of the Indian Union occupying 97,426 sq. km. area between 19^0 05' to 21^0 47' North latitude and 75^0 59' to 79^0 11' East longitude. Vidarbha shares its boundary with the state of Madhya Pradesh towards the north, Chattisgarh in the east, Andhra Pradesh in the south and Nasik and Aurangabad administrative division of Maharashtra state in the west. Geographically, Vidarbha lies in the fertile plateau between Melghat in the Satpura range in the north and Balaghat in the Ajantha Range in the south. This area is also known as Payanghat. Rich with bounties of nature Vidarbha consists of the Amravati and Nagpur administrative division of Maharashtra. Amravti division comprises of five districts – Buldhanana, Akola, Washim, Yamatwal besides Amravati district. The Nagpur division comprises of six districts – Wardha, Bhandara, Gondia, Chandrapur, Gardchiroli besides Nagpur district. In all, Vidarbha represents eleven districts. It is the rich biodiversity and varying geographical conditions have been ideal for growth of variety of plants of Vidarbha. Broadly the vegetation can be divided into evergreen forests, deciduous forests and thorny scrub forests, makes it all season availability of wild edible plant resources in this region.

Field survey conducted for documentation of WEPs

Field survey was conducted through interview, using questionnaire and focal group discussions were made involving traditional medicine practitioner, forest department people and old knowledgeable persons. Interactions with the tribal people about the collection and uses of WEPs from the forest. Special efforts were made to involve women in the exercise, self-help groups (SHG) of women help a lot to document the WEPs. Identification of WEPs is by their local name and availability of different wild edible plants and collection of different parts in different months of the year. All the available information was recorded and a documentation of WEPs was done in required format and analysed using Excel-Stat.

Results and Discussion

WEP resource of Vidarbha region

The present study documented 147 species of wild edible plants belonging to 66 families. As other studies like, Reddy *et al.,* (2012) documented 61 species of WEPs in Chandrapur district, Deshpande *et al.,* (2015) recorded 73 WEPs belonging to 42 families which are used by Rajgond tribes of Vidarbha region, Patil and Patil (2012) mentioned in his work that there are 43 endangered WEPs are there in Jalgaon district, Bhogaonkar*et al.,* (2010) documented 42 WEPs belonging to 23 families in Melghat forest area of Amravti district and Patil and Tale (2018) documented 20 WEPs used by local people in Akola district.

The detailed analysis of their taxonomic group revealed 147 species, belong to 66 families (Table 1). With respect to families, Caesalpiniaceae shared the largest proportion by consisting of 10 species and followed by Amaranthaceae and Fabaceae with 8 species, Araceae and Rubiaceae with 6 species, Cucurbitaceae and Tiliaceae with 5 species, Anacardiaceae, Combretaceae, Convolvulaceae, Malvaceae, Mimosaceae and Rhamnaceae 4 species each, Dioscoreaceae and Euphorbiaceae with 3 species, these are

the top fifteen families having highest number of WEP species.

WEPs are available in different life forms. In the present study shows that the largest proportion of wild edible species were in the form of tree i.e.48 species (32.7%), followed by herbs 44 species (29.9%), shrubs 28 species (19%), climbers 23 species (15.6%), palm 2 species (1.4%), Aquatic plant and grass one species each (0.7%) respectively which is illustrated in the figure 1. The major consumed wild edible plant part is fruits24% and leaves 23%, then followed by whole plant and flowers with 10% each, seeds 8%, pods 7%, tuber 5%, root 4%, shoot 3%, gum and bulbs with 2% each, bark 1.4%, stem 0.68%, which is illustrated in the figure 2. The tribes and local village people consume wild tubers, rhizomes and corms either in raw or baked or boiled or roasted form. Some of the edible parts like, leaves and fruits are also eaten raw, other parts like, tender shoots, flowers, leaves, pods, fruits, etc. and whole plant which are used as vegetable and as well as medicinal purposes. Efforts were also made to explore the nutritive potential of some wild edible tubers, rhizomes, leafy vegetables and wild fruits which supplement several nutrients particularly calcium and carotenoids. Such unconventional wild edible plants are sources of fats, proteins, rich source of micro-nutrients and trace elements (Nilegaonkar *et al.,* 1985; Kulkarni *et al.,* 2003; Kulkarni, 2006).

Seasonal availability and Occurrence of WEPs in different localities

In the Vidarbha region, the availability of WEPs is seen all over the year (Figure 3). The peak season of available of WEPs is in the rainy season (June to October) in the different habitats. Majority of the WEPs are herbaceous and short duration climbers are available for human consumption. The reason for the availability of WEPs throughout the year is, one or the other species of wild edible plants show their presence in different seasons and producing different edible parts from them, for example, *Annona squamosa* produces fruit from December to May, *Mangifera indica* produces fruit from March to June, *Syzygium cumunii* produces fruit from June to August, *Terminalia catappa* produces fruit from August to October, *Limonia acidissima* produces fruit from November to December, likewise one or other edible parts are available throughout the year. Besides providing good source of nutrients available in different seasons of the year, these species also provide ecological security as they are disease resistant, grow in diverse climates and habitat and ensure sufficient production even in adverse conditions. The production potential of different species and sustainable harvest of useful parts can boost the local economy. Similar type of study was done by Deshpande *et al.,* (2015).

The occurrence of WEPs in Vidarbha region was classified into 11 different localities. The representation of species were maximum in forest area (70 %), followed by waste land (21 %), village (15 %), road side and kitchen garden 14% each, field boundaries (12 %), water body (10 %), marshy area and pond boundaries 5 % each, agriculture field and densely forest area 3% each, which is illustrated in the figure 4. Forest is the home for the majority of WEPs. In the Vidarbha region waste lands and road side places are also contributing for food source by the presence of edible plants species there. Most of the villagers and tribal people, in their kitchen garden they grow vegetables, tubers, beans and chillies, etc. (Kulkarni and Kumbhojkar, 1993).

Table.1 Potential WEPs diversity documented in Vidarbha region

Sl. No.	Species	Family	Local name	Habit	Habitat	Season	Edible parts
1	*Abelmoschus ficulneus* (L.) Wight &Arn.	Malvaceae	Kasturi	Herb	2	Sept – Mar	WP
2	*Abelmoschus manihot* (L.) Medik	Malvaceae	Ran bhendi	Herb	2, 6	Sept – Feb	B, R, Fl., L
3	*Abrus precatorius* L.	Fabaceae	Gunj	Climber	11	Oct – May	L, Fl.
4	*Acacia concinna* (Willd.) DC.	Mimosaceae	Shikakai	Climber	1, 3, 2	Sept – Dec	Sh., P, L
5	*Acacia nilotica* (L.) Willd.	Mimosaceae	Baval, Babool	Tree	1, 4, 9, 3, 2	TOY	B, P, G, S, L
6	*Acacia Senegal* (L.) Willd.	Mimosaceae	Goradiyo, Baval	Tree	1, 4, 2, 3	TOY	L, G, P
7	*Aegle marmelos* L. Correa	Rutaceae	Bel	Tree	11	Mar – June	Fr.
8	*Agave vera-cruz* Mill.	Agavaceae	Ghaypat	Shrub	2,4, 1	TOY	Fl.
9	*Alangium salviifolium* (L.f.) Wangerin	Alanginaceae	Ankol	Tree	6	Mar – Oct	Fr.
10	*Alocasia macrorhiza* (L.) G.Don.	Araceae	Dhopa	Herb	7, 3	TOY	L, Rh.
11	*Amaranthus cruentus* L.	Amaranthaceae	Rajgira, Tandulga	Herb	5	June – Oct	WP
12	*Amaranthus paniculatus* L.	Amaranthaceae	Rajgira	Herb	5, 1	TOY	WP
13	*Amaranthus tricolour* L.	Amaranthaceae	Taduljira, Lal mat	Herb	5	June – Feb	WP
14	*Amarantus spinosus* L.	Amaranthaceae	Kale-math	Herb	2, 1	TOY	L, R
15	*Amarantus viridis* L.	Amaranthaceae	Tanduliya	Herb	5, 1	TOY	WP
16	*Amarphophallus paeonifollius*(Densst) Nicolson	Araceae	Gavathisuran	Shrub	1, 5	June – Oct	T
17	*Ammannia baccifera* Linn.	Lythraceae	Aginbuti	Herb	7, 8	June – Oct	L
18	*Amorphophallus campanulatus*(Roxb.) Blume	Araceae	Suran	Shrub	1, 5	June – Oct	Rh.
19	*Amorphophallus konkanensis*Hett.	Araceae	Bhasmakanda	Herb	1	June – Oct	L, T
20	*Andrographis paniculata*Wall.	Acanthaceae	Kadukirayata	Herb	11	June – Feb	WP
21	*Anethum graveolens*L.	Apiaceae	Shepu	Herb	5	TOY	WP
22	*Annona reticulata*L.	Annonaceae	Sitafal	Tree	4, 3	Dec – May	Fr.
23	*Annona squamosa*L.	Annonaceae	Sitafal	Tree	1, 4, 3	Dec – May	Fr.
24	*Anogeissus latifolia* (DC.) Wallich	Combertaceae	Dhawda	Tree	1	Apr – Dec	G
25	*Aristolochia indica* L.	Aristolocaceae	Ishwari	Climber	1	June – Feb	Fl.
26	*Asparagus racemosus*Willd.	Asparagaceae	Shatavari	Herb	2, 1	June – Jan	WP
27	*Atriplex hortensis* L.	Amaranthaceae	Chandanbatva	Shrub	1	TOY	WP

28	*Azadiracta indica*A. Juss.	Meliaceae	Nimboni	Tree	1, 4, 3	Mar – May	Fr. S
29	*Basella rubra*Linn.	Basellaceae	Bacchalikoora	Climber	5	TOY	L
30	*Bauhinia perpurea*L.	Caesalpiniaceae	Kanchan	Tree	1, 5	Jan – Mar	L, Fl.
31	*Bauhinia racemosa*L.	Caesalpiniaceae	Apta	Tree	1, 6	Mar – July	L, Sh., Fl., P
32	*Bauhinia vahlii* Wight &Arn.	Caesalpiniaceae	Chamul	Tree	1	Apr – Oct	P, S
33	*Bauhinia variegate* L.	Caesalpiniaceae	Kanchan, Kanaraj	Tree	1, 6, 2	Nov – Mar	Sh., Fl. L
34	*Begonia crenata*Dryand.	Begoniaceae	Kapru, Khadak-ambadi	Herb	9, 7	Aug – Nov	L
35	*Boerhavia diffusa* L.	Nyctaginaceae	Ghetuli	Herb	4, 1, 2	Aug – Dec	WP
36	*Bombax ceiba* L.	Bombacaceae	Katesavar	Tree	1, 3	Feb – Apr	L, Fl.
37	*Borassus falbellifer* Linn.	Arecaceae	Tadi	Palm	1, 4, 6, 2	Nov – May	Fr.
38	*Boswellia serrata* Roxb.	Burseraceae	Dhupali, Salai	Tree	1	Feb – Jun	Fr., Fl., S
39	*Brassica compestris* Linn.	Crucifereae	Mustard, Kali Mohari	Herb	3	Nov – Apr	P
40	*Bridelia retusa* (L.) A.Juss.	Euphorbiaceae	Kakai, Asana	Tree	1, 11	TOY	R
41	*Buchanania lanzan* Spreng.	Anacardiaceae	Charoli	Tree	1	Apr – May	Fr., S
42	*Cannavalia gladiate* (Jacq.) DC.	Fabaceae	Chemmakaaya	Climber	1, 5	Apr – Oct	Fr.
43	*Canthium coromandelicum* (N.Burm.) Alst.	Rubiaceae	Karbit	Shrub	1	Mar – Oct	Fr.
44	*Canthium parviflorum* Lamk	Rubiaceae	Katbor	Shrub	1, 4	Apr – Aug	Fr. L
45	*Capparis zeylanica* L.	Capparaceae	Vaghati, Orkali	Climber	1	Mar – May	Fr.
46	*Cassia fistula* L.	Caesalpiniaceae	Bahava	Tree	1, 6, 4	May – Jun	Fl., P
47	*Cassia mimoesides* L.	Caesalpiniaceae	Lajari	Herb	1	Aug – Dec	P
48	*Cassia occidentalis* Linn.	Caesalpiniaceae	Marha, Bacca	Shrub	1	Aug – Dec	WP
49	*Cassia tora* L.	Caesalpiniaceae	Takala, Tarota	Shrub	2, 3, 1	Aug – Dec	Sh., L, Fl., P, S
50	*Celosia argentia* L.	Amaranthaceae	Kurdu	Herb	8	June – Feb	L
51	*Ceropegia bulbosa* Roxb	Asclepiadaceae	Suparikanda	Climber	1	June – Feb	T
52	*Chenopodium album* L.	Chenopodiaceae	Chakvath	Herb	1, 2	TOY	Sh., L
53	*Chlorophytum tuberosum*(Roxb.) Baker	Liliaceae	Shevalikardi, Longdabhaji	Herb	1	Jun – Sept	T, L
54	*Citrullus colocynthis*(L.) Schrad.	Cucurbitaceae	Kadu-indravani	Climber	7, 2	May – Oct	WP
55	*Clerodendrum seratum*L. Moon	Verbenaceae	Bharangi	Shrub	1, 4, 6	Oct –May	L, Fl.
56	*Coccinia grandis*(L.) Voigt.	Cucurbitaceae	Tondali	Climber	3, 1	Dec – Apr	Fr.
57	*Colocasia esculenta*L.	Araceae	Kochai	Herb	5, 8, 7, 9	Sept – Nov	L, T
58	*Commelina benghalensis*L.	Commelinaceae	Kena	Herb	4, 7	June – Oct	L
59	*Corchorus capsularis*L	Tiliaceae	Chunch	Herb	3	Mar – May	L

60	*Cordia dichotoma*Forst.	Boraginaceae	Bhokar	Tree	1, 7	Nov – Feb	Fr.
61	*Costus speciosus*(Koen) J.E. Smith.	Zingiberaceae	Harduli	Herb	1	June – Oct	T
62	*Crotalaria juncea*L.	Fabaceae	Boru	Shrub	1, 10	July – Sept	L, S
63	*Curculigo orchioides*Gaertn.	Hypoxidaceae	Kali Musali	Herb	1	June – Oct	T
64	*Dendrocalamus strictus*(Roxb.) Nees.	Poaceae	Vaste	Grass	1	June – Oct	Sh.
65	*Dentella repens*(L.) J.& G.	Rubiaceae	Kadubhaji	Herb	8	June – Feb	L
66	*Digeramuricata*(L.) Mart.	Amaranthaceae	Gitana, Getna	Herb	5, 2, 1	June – Oct	L
67	*Dioscorea belophylla*(Prain) Voigt.	Dioscoreaceae	Kadu-karand	Climber	1, 5	TOY	T
68	*Dioscoreabulbifera*L.	Dioscoreaceae	Dukkar-kand	Climber	1, 5	Sept – Oct	T, Fl.
69	*Dioscoriapentaphylla*L.	Dioscoreaceae	Shendvel	Climber	1, 5	July – Sept	Fl., T
70	*Diospyrosmelanoxylon*Roxb.	Ebenaceae	Tembhurni	Tree	1, 11	Mar – Sept	Fr., R, S
71	*Diplocyclospalmatus*(L.) C.Jeffrey	Cucurbitaceae	Ghungarubhaji, Shivling	Climber	1, 3	Aug – Feb	WP
72	*Drimiaindica* (Roxb.) Jessop	Liliaceae	Rankanda	Herb	1	MS	B, L
73	*Emblicaofficinalis*Gaertn	Euphorbiaceae	Awala.	Tree	1	Nov – Feb	Fr.
74	*Emilia sonchifolia*(Linn.) DC.	Asteraceae	Makka	Herb	10, 2, 6	TOY	L, Sh.
75	*Ensetesuperbum*(Roxb.) Cheesuran	Musaceae	Chaveni, Raankel	Herb	1, 6	TOY	R, L, Fl., Fr.
76	*Ficusbenghalensis*L.	Moraceae	Wad	Tree	1, 3, 2, 4	TOY	B, L
77	*Ficusracemosa*L.	Moraceae	Umbar	Tree	2, 3, 4, 1	Feb – July	Fr.
78	*Ficusreligiosa*L.	Moraceae	Pimpal	Tree	1, 4, 2, 3	TOY	L
79	*Flacourtiaindica*(Burm.f.) Merr.	Flacaurtiaceae	Karai	Shrub	1	Dec – July	Fr.
80	*Glycosmispentaphylla*(Retz) DC.	Rutaceae	Ban Nimbu	Climber	1	Nov – May	Fr.
81	*Grewiaabutilifolia*W. Vent.	Tiliaceae	Vern, Tel Chhopdi	Shrub	1, 6	May – Oct	Fr.
82	*Grewiaasiatica*L.	Tiliaceae	Goyalipala	Shrub	1	Feb – Mar	Fr.
83	*Grewiasclerophylla*Roxb.	Tiliaceae.	Joddhaman	Shrub	1	Sept – Jan	Fr.
84	*Grewiatilifolia*Vahl.	Tiliaceae	Dhaman	Tree	1	May –Sept	Fr.
85	*Hibiscus cannabinus*L.	Malvaceae	Aambadi	Shrub	5, 3	TOY	L, Fl., S
86	*Holarrhenapubescens* Wall.	Apocynaceae	Pandhrakuda	Shrub	1	Nov – Feb	Fl., P, L, S
87	*Indigoferaglandulosa*Wendl.	Fabaceae	Barbath	Herb	1, 10	June – Feb	L
88	*Ipomoea aquatca*Forssk.	Convolvulaceae	Karembua	Climber	8, 7, 9, 3	June – Feb	WP
89	*Ipomoea muricata*(L.)Jacq.	Convolvulaceae	Bhovara	Climber	8, 7, 9, 3	June – Feb	Fr.
90	*Ipomoea turbinata*Lag.	Convolvulaceae	Gariya	Climber	8, 7, 9, 3	June – Feb	Fl.
91	*Lanneacoromandelica*(Houtt.) Merr.	Anacardiaceae	Moi, Shemat	Tree	1	Feb – Apr	L, Fr.
92	*Lantana camara*L.	Verbanaceae	Ghaneri	Shrub	1, 2, 3, 4	TOY	Fr. L
93	*Leeaasiatica*(L.) Ridsdale	Leeaceae	Deenda	Shrub	1	Mar – Nov	L

94	*Limoniaacidissima*L.	Rutaceae	Kavanth, Kaithbael	Tree	10	Nov – Dec	Fr.
95	*Madhucalongifolia*(Koen.) Mac.	Sapotaceae	Moha	Tree	1, 9	Dec – July	Fr.
96	*Maesaindica*(Roxb.) DC.	Myrsinaceae	Atki, Arngen	Shrub	1	Sept – May	L, Fr.
97	*Mangiferaindica*L.	Anacardiaceae	Aam	Tree	1, 5	Mar – June	L, Fr.
98	*Manilkarahexandra*(Roxb.) Dub.	Sapotaceae	Khirni	Tree	1	Dec – Apr	Fr.
99	*Menthaviridis*Linn.	Lamiaceae	Pudina, Mint	Herb	1, 3, 5	TOY	WP
100	*Momordicadioica*Roxb.	Cucurbitaceae	Katwal, Kartoli	Climber	6, 1	June – Nov	WP
101	*Morindacitrifolia*L.	Rubiaceae	Noni	Shrub	1, 3, 5	TOY	R, L, Fr.
102	*Morindapubescens*J.E.Sm.	Rubiaceae	Bartondi, Nonifal	Tree	4	Mar – May	Fr.
103	*Moringaoleifera*Lam.	Moringaceace	Shevga	Tree	5, 3, 6	TOY	L, P, S
104	*Mucunapruriens*(L.) DC.	Fabaceae	Khajkoyali.	Climber	1, 7	June – Oct	P
105	*Nelumbonucifera*Gaertn.	Nelumbonaceae	Kamal	Climber	7, 8	TOY	WP
106	*Olaximbricata*Roxb.	Olacaceae	Aratpari	Shrub	3	TOY	L
107	*Opuntiaelatior*Mill.	Cactaceae	Phadyanivadung	Shrub	1, 2, 6	Aug – Jan	Fr.
108	*Oroxylonindicum*(L.) Vent.	Bignoniaceae	Tetu	Tree	1	Feb – Mar	P, Fl.
109	*Oryzarufipogon*Griff.	Poaceae	Devbhat, Tharsod	Herb	6	Sept – Jan	S
110	*Oxalis corniculata*L.	Oxalidaceae	Tinpatti, Ambushi	Herb	1, 8	TOY	L, Fr.
111	*Oxalis dehradunensis*Raiz.	Oxalidaceae	Dun Ambushi	Herb	1, 5	TOY	L
112	*Phoenix sylvestris*(L.) Roxb.	Arecaceae	Sindi	Palm	1, 6, 9	Mar – May	Fr.
113	*Phyllanthusamarus*Schum and Thonn	Euphorbiaceae	Bhuiavala	Herb	2	June – Feb	Fr.
114	*Physalis minima* L.	Solanaceae	Ran-popti, chirboti	Herb	2, 6, 4	TOY	Fr.
115	*Pithecellobiumdulce*(Roxb.) Benth.	Mimosaceae	Chichbilai	Tree	1, 3	June – Oct	B, L, P, S
116	*Plumbagozeylanica*L.	Plumbaginaceae	Chitrak	Shrub	1, 2, 9	TOY	L
117	*Portulacaoleracea*Linn.	Portulacaceae	Gholbhaji	Herb	10	TOY	WP
118	*Portulacaquadrifida*L.	Portulacaceae	Ranghol	Herb	2, 4	TOY	WP
119	*PuerariaTosa*(Roxb.) DC.	Fabaceae	Davankanda, Pithana	Climber	1	TOY	T
120	*Rhynchosia minima* (L.) DC.	Fabaceae	Chipali.	Climber	2	June - Feb	P
121	*Riveahypocrateriformis*(Desr.)Choisy.	Convolvulaceae	Phaangi	Climber	6, 1	Dec – Feb	L, Fl.
122	*Rumexvesicarius*L.	Polygonaceae	Aambadchuka	Herb	1	TOY	WP
123	*Schleicheraoleosa*(Lour.) Oken.	Sapindaceae.	Kusumb	Tree	1	Mar – June	L, Fr.
124	*Scilla hyacinthine* (Roth.) Mc.	Liliaceae	Kapuskanda,	Herb	1	June – Oct	T

	Bride.		Shakkarkanda				
125	*Semecarpusanacardium*L.	Anacardiaceae	Bibba, Billava	Tree	1	May – July	Fr.
126	*Sennahirsuta*(L.) H.S.Irwin&Barneby	Caesalpiniaceae	Karuthagarai, Thagarai	Shrub	1	Sept – Dec	L
127	*Sesbaniagrandiflora*(L.) Pers.	Fabaceae	Hatga	Tree	1, 6, 2,	Nov – May	L, Fl., P
128	*Smilax sp.*	Smilacaceae	Ram datum	Shrub	1	June – Feb	WP
129	*Solenaamplexicaulis*(Lam.) Gandhi	Cucurbitaceae	Gometi.	Climber	7	June – Oct	Fr.
130	*Sterculiaurens*Roxb.	Malvaceae	Kawali, Kandol	Tree	1, 2	TOY	G, S
131	*Syzygiumcumunii*(Linn.) Skeels.	Myrtaceae	Jambhul	Tree	1, 3, 4	June – Aug	Fr.
132	*Taccaleontopetaloides*(L.) O. Ktze.	Taccaceae	Devkand, Varade	Herb	1, 2	Apr – Oct	T
133	*Tamarindusindica*Linn.	Caesalpinnacea e	Chincha	Tree	1, 4, 6	TOY	WP
134	*Tamilnadiauliginosa*(Retz.) Triveng and Sastry	Rubiaceae	Pendhar.	Tree	1	Aug – Mar	Fr.
135	*Terminaliabellirica (Gaertn.)* Roxb.	Combertaceae	Behda	Tree	1	Nov – Feb	Fr., S
136	*Terminaliacatappa*L.	Combertaceae	Janglibadam	Tree	1	Aug – Oct	Fr., L, B
137	*Terminaliacuneata*Roth.	Combretaceae	Arjun	Tree	1, 7	Nov – June	Fr.
138	*Theriophonumindicum*(Dalz.) Engler	Araceae	Undirkani	Herb	1	June – Oct	L, St.
139	*TrapaNatans*Linn.	Trapaceae	Shingada	Aquatic Plant	7	Mar – May	S
140	*Tricodesmaindicum*(L.) Lehm	Boraginaceae	Phopati	Herb	4	June – Feb	Fr.
141	*Woodfordiafruticosa*(L.)Kurz.	Lythraceae	Dowari, Dhayti	Shrub	10, 5	Jan – Apr	L, Fl., Fr., G
142	*Wrightiatinctoria*(Roxb.) R.Br.	Apocynaceae	Kala Kuda	Tree	1	Mar – June	Fl.
143	*Xanthium indicum*L.	Asteraceae	Ghagara	Shrub	2, 1	Nov – Feb	Fr.
144	*Ziziphusglaberrima*(Sedgw.) Sant.	Rhamnaceae	Goti	Tree	1, 2	Mar – May	Fr.
145	*Ziziphusjujuba*Mill.	Rhamnaceae	MotaBor	Tree	1, 2	Oct – Mar	Fr.
146	*Ziziphusmauritiana* Lam.	Rhamnaceae	Bor	Tree	1, 2	Dec – Mar	Fr.
147	*Zizipusoenoplia*Linn. Mill	Rhamnaceae	Yeroni	Tree	1	Nov – May	Fr.

Note: Habitat >1-forest area, 2-waste land, 3-village, 4-road side, 5-kitchen garden, 6-forest boundaries, 7-water bodies, 8-marshy area, 9-pond boundaries, 10-agriculture field, 11-densely forest area. Edibleparts > Fr.-fruits, L-leaves, WP-whole plant, Fl.-flower, S-seeds, P-pods, T-tuber, R-root, Sh.-shoot, B-bulb, G-gum, Rh.-rhizome, B-bark, St-stem

Fig.1 Life form wise Distribution of WEPs in the study region

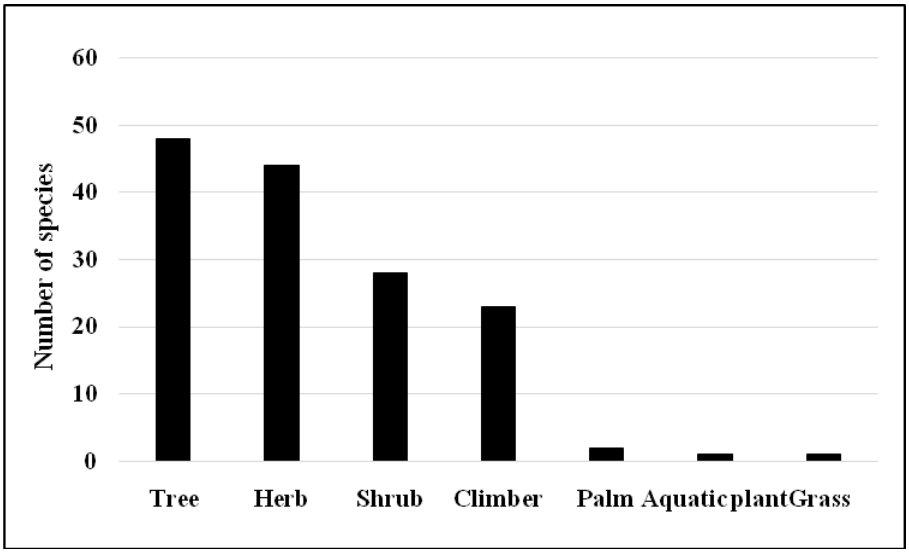


Fig.2 Plant parts used as edible in study region

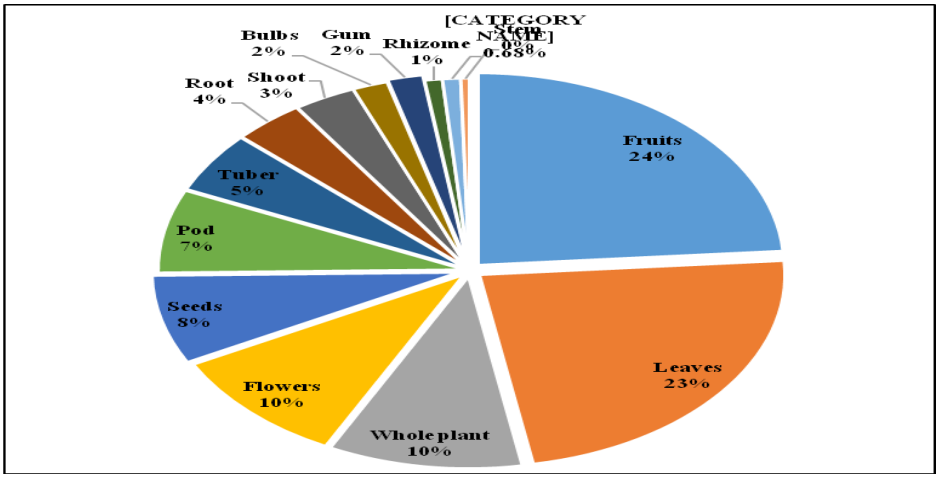


Fig.3 Availability of wild edibles in the study region

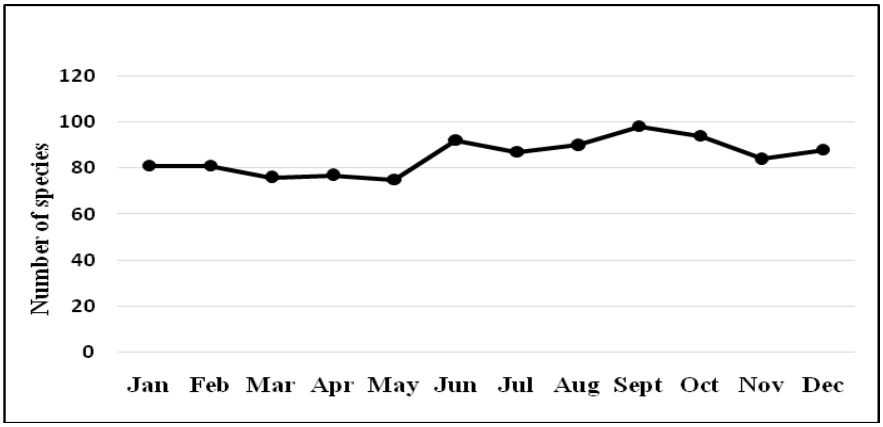


Fig.4 WEPs located in different habitats

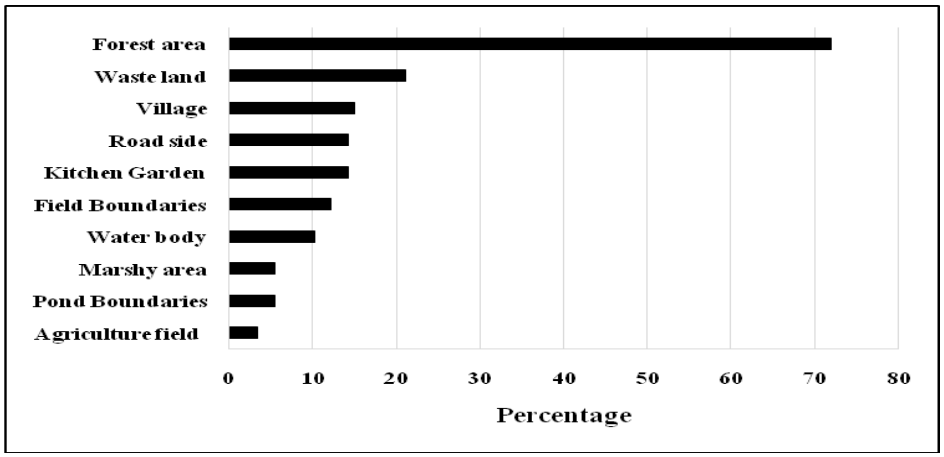
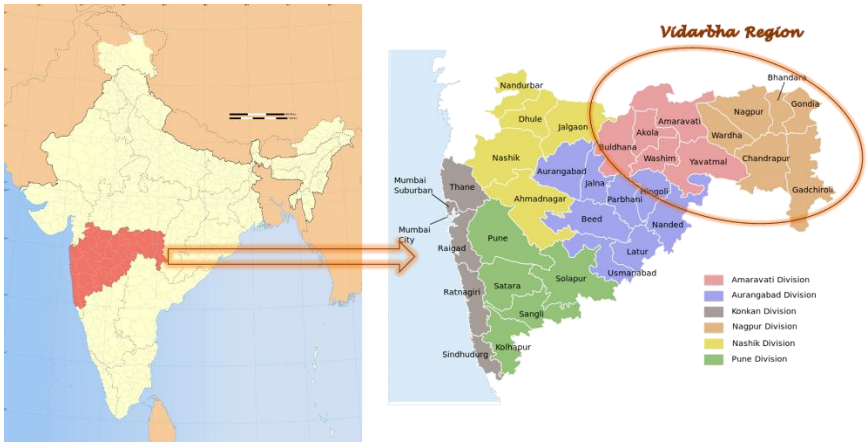


Plate.1 Study area



In conclusion, wild species and intra-species biodiversity have key roles in global food security. Use of wild edible vegetables is diminishing at fast pace but it is clear that in many parts of the world the use of wild vegetables is still prevalent. Wild edible plants documentations show their various adaptability to all kinds of ecosystem and seasonal availability. Wild edible plants are available during food crisis period. Wild edible plants are in par with cultivated plants in terms of seasonal food security and nutritional security by availing themselves throughout the year in various forms. Hence, there is a need to preserve traditional knowledge as well as conserve these genetic resources mostly those of wild relatives of crop plants.

Future Line of Study

Intensive research must be encouraged on Where? When? And How much? of wild edible plants is required for cultivating commercially. Biodiversity questions and/or prompts need to be included in food consumption surveys to evaluate the wild edible plants performance. Documentation of existing wild edible plants and protection of their habitat in the nature. Acquiring nutrient

data on existing biodiversity needs to be a prerequisite for decision making in GMO work and cultivar promotion. Reforestation work of wild edible plants must be encouraged. Valuation of wild edible plants in different ecosystem. Empowering wild edible plants collection, processing and value addition. Developing technologies for processing and value addition of wild edible plants. There is an urgent need of Food forest to meet the food requirement and also nutrition security for increasing population.

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