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Research Article

Documentation of *wild edible* fruits of north maharashtra

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Abstract

This paper reports an *ethnobotanical* investigation performed during 2017-2020 to collect, identify and document information on the *wild edible fruits* traditionally used by tribal and rural communities of North Maharashtra, specially Nashik, Nandurbar, and Dhule district. 55 *wild edible fruit* species are documented used by tribal and rural peoples traditionally as a food. Collected species belong to 25 families and *Cucurbitaceae*, *Fabaceae*, *Moraceae*, and *Phyllanthaceae* emerge as the largest families. Analysis of collected information revealed that 29 species are consumed as *raw fruits*, 26 species as vegetables, 2 species as both raw and vegetables, 5 species as pickles, 1 species as a soft drink. 37 species are commonly used and 29 species are sold commercially in the local market as food. Study shows that *wild edible fruits* are highly nutritious and playing a significant role in the sustainable development of the tribal regions since from a long time. But due to less *awareness*, loss of vegetation and fast erosion of traditional knowledge many species are on the line of rarity. The study helps to conserve those *wild food* species and cultivate on large scales, to uplift their economical status and sustainable management in near future.

Keywords: *Wild edible fruits*, traditional knowledge, north maharashtra, nutritional value.

INTRODUCTION

India is one of the twelve mega-diversity in the world. The western part of North Maharashtra falls within the Western Ghats and is considered to be tr species of *wild plants*. The number of wild edible plants is used by tribal and rural peoples of North Maharashtra to meet their nutritional and economical demand since from a long time. Various parts of these plants such as fruits, seeds, tubers, shoots, etc. are consumed safely by them. These plants not only provide a cheap source of food but also several other useful products like medicine, fodder, fiber, dyes, etc. *Wild edible fruits* contain a significant level of biologically active components and have been used as medicinal agents (Sathyavathi et al., 2014). Fruits are a rich source of fiber, vitamin-C, sugar, water, and many other nutrients (Moitreyee, 2015). Several types of fruits are collected from forests and sold in local markets by some

tribal and rural peoples to earn the money (Kumar, 2019). Though there are many *wild edible fruits* in this region that fulfill the nutritional and economical demands, there is no proper method of collection, improvement, and *agro-techniques* for these valuable food resources. Traditional knowledge is considered to be the basis for their utilization (Shaheen et al., 2017). Presently, traditional health-related knowledge about WEPs and their uses are fastly eroding as a consequence of *socio-economical* and land-use changes (FAO 2020; Bhogaonkar et al., 2010). Meagre work has been done on the identification and documentation of *wild edible* fruit species from tribal and rural regions of North Maharashtra as per literature survey. Hence the present study was made to explore, identification and documentation of wild edible plants used by the tribal and rural communities of North Maharashtra, which will help to conserve those plants for future generations and traditional knowledge before whipping out.

MATERIALS AND METHODS

Study area

This study is carried out in the North Maharashtra region, specially Nashik, Nandurbar, Dhule district. This region is situated on the northern side of the Indian state of Maharashtra. It occupies 18.65% of the total area and holds 16.53% of the total population of Maharashtra. Region contains largest 41.24% tribal population of the total tribal population of Maharashtra. Aborigines are inhabited in this region such as *Bhil*, *Bhil Garsia*, *Kokna*, *Kokni*, *Kukna*, *Dongar Koli*, *Gamit*, *Gamta*, *Gavit*, *Pardi*, *Warli*, *Tadvi*, *Advichincher*, etc.. Most of the forest area is located in two main mountain ranges of North Maharashtra. The range of Western Ghat stretches from north to south across the western portion while the Satpura range stretches from east to west across the northern portion of North Maharashtra. The total forest area is 9.23 lakh hectares which are 16.07% of the total geographical area of the region. It consists of tropical dry deciduous forest. Temperature varies between 12°C to 46°C. Rainfall is not uniform all over the region.

Western hilly regions receive very high rainfall (2600 mm) as compared to other parts of the region (700 mm). North Maharashtra has a tropical climate, with three distinct seasons: very hot and dry summer (March-May), Monsoon (June-September), cool and dry Winter (October-February). It is rich in biodiversity and varying geographical conditions have ideal for the growth of a variety of plants of North Maharashtra. Many wild edible fruit plants existing naturally in forest, cultivated, and wastelands of the region.

METHODOLOGY

Field survey was conducted in the forest, tribal and rural areas of North Maharashtra for the period of 2017-2020. The data was collected through discussions and interviews with tribal and rural peoples. The plant specimens were collected, and identified with the help of *Flora of Maharashtra*, *Flora of Nashik District* and experts in the field of taxonomy. It was confirmed by repeated inquiries in different seasons. All the available information was documented in tabulated form with respect to their botanical name, habit, edible parts, season of availability, methods of consumption, etc Plate 1.



Plate 1. local tribe peoples sell wild edible fruits on the side of the road.

STATISTICAL ANALYSIS

Documented information was analyzed using Microsoft Excel.

RESULTS AND DISCUSSION

WEPs resource of Nashik District

The present study documented 55 species of *wild edible fruits* in the study region Table 1. Several studies had done on exploring the WEPs from North Maharashtra and

the northern part of Western Ghats. Patil et al., (2000) documented 36 wild edible plants of which 13 are fruits from the Nashik district. Kshirsagar et al., (2012) recorded 46 species of WEPs in the entire Dhule, Jalgaon, Nandurbar district and bordering villages of Nashik districts of North Maharashtra. Recently Jadhav et al. (2015) presented a checklist of 159 WEPs of which 77 are fruit species from Northern Western Ghats of Maharashtra. Kuvar & Shinde (2019) recorded 64 WEPs out of which 29 species are used as fruits by kokni tribe of the Nashik district.

Table 1: List of WEF species used by tribal and rural communities of the study region.

Sr no	Botanical name	Local name	Family	Edible parts	Methods of consumption	Habit	Seasonal availability period	Frequency of use	sold in local market
1	<i>Spondias pinnata</i> (L.f.) Kurz	Ambada	Anacardiaceae	Fruits, seeds	Eaten raw	Tree	Dec.- July	Commonly used	Yes
2	<i>Anacardium occidentale</i> L.	Kaju	Anacardiaceae	Fruits-thalamus	Eaten raw	Shrub	Feb.- May	Commonly	Yes
3	<i>Semecarpus anacardium</i> L.	Bibba	Anacardiaceae	Fleshy thalamus and dry seeds	Eaten raw	Tree	Jan.- May	Rarely used	No
4	<i>Annona reticulata</i> L.	Ramphal	Annonaceae	Ripe fruits	Eaten raw	Tree	Jan.- April	Commonly	Yes
5	<i>Annona squamosa</i> L.	Sitaphal	Annonaceae	Ripe fruits	Eaten raw	Tree	Aug.- Dec.	Commonly	Yes
6	<i>Carissa carandas</i>	Karvand	Apocynaceae	Young and Ripe fruits	ripe fruits as raw; young fruits pickled	Shrub	April- June	Commonly	Yes
7	<i>Wrightia tinctoria</i> R.Br.	Kala Kuda	Apocynaceae	Young pods	As vegetable	Tree	April- Sept.	Rarely	No
8	<i>Radermachera xylocarpa</i> (Roxb.) K. Schum.	Kher-sheng	Bignoniaceae	Pod	Pod as vegetable; Part without seeds as pickled	Tree	Aug.-Nov.	Rarely	No
9	<i>Oroxylum indicum</i> (L.) Vent.	Tetu	Bignoniaceae	Pod	As vegetable	Tree	Aug.- Nov.	Rarely	No
10	<i>Cordia dihotoma</i> Forst.F	Bhokar	Boraginaceae	Unripe and ripe fruits	Unripe fruits as pickles; ripen fruits as raw	Tree	March- June	Commonly	Yes
11	<i>Garuga Pinnata</i> Roxb.	Kakad	Burseraceae	Fruits	As raw and pickles	Tree	Feb.- Aug.	Rarely	No
12	<i>Opuntia elatior</i> Mill.	Nivdung	Cactaceae	Fruits	Eaten raw	Shrub	Feb.- May	Rarely	No
13	<i>Capparis deciduas</i> (Forssk.) Edgew	Kair	Capparaceae	Unripe and ripe fruits	Ripe as raw ; Unripe as pickled	Tree	Feb.-March	Rarely	No
14	<i>Capparis zeylanica</i> L.	Vagheti	Capparaceae	Fruits	As vegetable	Climber	May- Aug.	Commonly	Yes
15	<i>Terminalia bellirica</i> (Gaertn.)Roxb.	Beheda	Combretaceae	Fruits	Eaten as raw in small quantity	Tree	Aug.- Dec.	Commonly	No
16	<i>Momordica dioica</i> Roxb.ex Willd.	Kartule	Cucurbitaceae	Young fruits	As vegetable	Climber	July- Nov.	Commonly	Yes
17	<i>Cucumis setosus</i> L.	Mek	Cucurbitaceae	Fruits	Eaten raw or as vegetable	Climber	July- Nov.	Commonly	Yes
18	<i>Solena amplexicaulis</i> (Lam.) Gandhi	Gometi	Cucurbitaceae	Fruits	as vegetable	Climber	Sept. - Nov.	Rarely	No
19	<i>Cucumis sativus</i> L.	Large kakdi	Cucurbitaceae	Fruits	Eaten raw	Climber	Nov.- March	Commonly	Yes
20	<i>Mukia maderaspatana</i> L.	Chirati/ Chibud/ Gaygoyar	Cucurbitaceae	Ripe fruits	Eaten raw	Climber	June- Oct.	Rarely	No

21	<i>Cucurbita maxima</i> Duchesne	Bhopla	Cucurbitaceae	Fruits	As vegetable	Climber	Aug.- Feb.	Commonly	Yes
22	<i>Coccinia grandis</i> L.	Tondali	Cucurbitaceae	Young fruits	Eaten raw or as vegetable	Climber	July- Dec.	Commonly	No
23	<i>Diospyros melanoxylon</i> Roxb.	Temburni	Ebenaceae	Ripe fruits	Eaten raw	Tree	Feb.- May	Commonly	No
24	<i>Canavalia gladiata</i> (Jacq.DC.)	Abai	Fabaceae	Pods	As vegetable	Herb	Throughout the year	Commonly	Yes
25	<i>Lablab purpureus</i> (L.) Sweet	Wal Papdi	Fabaceae	Pods	As vegetable	Climber	Aug.- March	Commonly	Yes
26	<i>Mucuna pruriens</i> (L.) DC	Khaajkuriri	Fabaceae	Pods	As vegetable	Climber	Sept.- Jan.	Commonly	Yes
27	<i>Pithecellobium dulce</i> (Roxb.)	Ingraji chinch	Fabaceae	Pods	Eaten raw	Tree	Jan.- May	Commonly	Yes
28	<i>Sesbania grandiflora</i> (L.) Pers.	Hadga	Fabaceae	Young pods and flowers	As vegetable	Tree	Sept.- April	Commonly	Yes
29	<i>Tamarindus indica</i> L.	Chinch	Fabaceae	Leaves and ripe fruits	Eaten raw.	Tree	Jan.- May	Commonly	Yes
30	<i>Abelmoschus ficulneus</i> (L.) Wight & Arn.	Ranbhendi	Malvaceae	Fruits	As vegetable	Herb	Aug.- Dec.	Commonly	Yes
31	<i>Sterculia guttata</i> Roxb.	Kukar	Malvaceae	Seeds	Eaten roasted	Tree	Jan.- June	Rarely	No
32	<i>Sterculia urens</i>	Kandol	Malvaceae	Seeds	Eaten roasted	Tree	Dec.- May	Rarely	No
33	<i>Ficus hispida</i> L.f.	Bhui umber	Moraceae	Ripe fruits	Eaten raw	Tree	Jan.-July	Rarely	No
34	<i>Ficus racemosa</i> L.	Umbar	Moraceae	Unrip and ripe fruits	Unripe fruits as vegetable; ripe eaten raw	Tree	Dec.- May	Commonly	No
35	<i>Ficus religiosa</i> L.	Pimpal	Moraceae	Ripe fruits	Eaten raw	Tree	Dec.- May	Rarely	No
36	<i>Morus alba</i> L.	Tuti	Moraceae	Ripe fruits	Eaten raw	Shrub	Feb.- May	Commonly	Yes
37	<i>Moringa oleifera</i> Lam.	Shevga	Moringaceae	Pods and flowers	Eaten boiled or vegetables; flowers as vegetable	Tree	Throughout the year	Commonly	Yes
38	<i>Ensete superbum</i> (Roxb.) Cheesman	Raankel/ Kawder	Musaceae	Young unripe, ripe and stem	Unripe fruits and stem as vegetable; ripe eaten raw	Shrub	June - Dec.	Commonly	Yes
39	<i>Syzygium cumini</i> (L.) Skeels	Jambhul	Myrtaceae	Ripe fruits	Eaten raw	Tree	March- June	Commonly	Yes
40	<i>Bridelia retusa</i> (L.) Spreng.	Asana	Phyllanthaceae	Ripe fruits	Eaten raw	Tree	Jan.- April	Rarely	No
41	<i>Phyllanthus acidus</i> (L.) Skeels	Rai-awala/ Chota awala	Phyllanthaceae	Fruits	Eaten raw	Tree	Aug.- Jan.	Commonly	Yes
42	<i>Phyllanthus amarus</i> Schumach. & Thonn.	Bhuiavali	Phyllanthaceae	Fruits	As vegetable	Herb	Aug.- Jan.	Rarely	No
43	<i>Securinega virosa</i>	Pithoni	Phyllanthaceae	Ripe fruits	Eaten raw	Shrub	April- Oct.	Rarely	No
44	<i>Flacourtia indica</i> (Burm.f.) Merr	Ghugu- rval	Salicaceae	Ripe fruits	Eaten raw	Tree	Dec.-June	Commonly	No
45	<i>Madhuca longifolia</i> (J.Koenig ex L.) J.F.Macbr.	Moha	Sapotaceae	Ripe fruit wall, seeds and flowers	Ripe fruits wall is used as vegetable; oil extracted from seeds is used as cooking oil by most of the tribes. Dried flowers are used as raw material for alcohol fermentation	Tree	Jan. - May	Commonly	Yes
46	<i>Solanum anguivi</i> Lam.	Chechurde	Solanaceae	Ripe fruits	As vegetable	Herb	July - Nov.	Commonly	Yes

47	<i>Physalis minima</i> L.	Chiranbhot/ Kapalphodi	Solanaceae	Fruits	Eaten raw or vegetable	Herb	Throughout the year	Commonly	No
48	<i>Lantana camera</i> L.	Gantura	Verbenaceae	Ripe fruits and leaves	Eaten as raw and Leaves as vegetable	Shrub	Nov.- May	Commonly	No
49	<i>Ziziphus jujuba</i> Mill.	Bor	Rhamnaceae	Fruits	Eaten raw	Tree	Oct. - March	Commonly	Yes
50	<i>Ziziphus rugosa</i> Lamk.	Toran	Rhamnaceae	Fruits	Eaten raw	Shrub	April - May	Commonly	Yes
51	<i>Meyna laxiflora</i> Robyns.	Alu, Huloo	Rubiaceae	Ripe fruits	Eaten raw	Shrub	April - May	Commonly	Yes
52	<i>Tamilnadia uliginosa</i> (Retz.)Tirveng.&Sastr.	Pendhara	Rubiaceae	Ripe fruits	Eaten raw	Tree	Aug. - Oct.	Commonly	No
53	<i>Catunaregam spinosa</i> (Thunb.) Tirveng	Gela	Rubiaceae	Fruits	As vegetable	Tree	July - Dec.	Rarely	No
54	<i>Aegle marmelos</i> (L.) Correa	Bel	Rutaceae	Ripe fruits	Eaten raw or used in soft drink	Tree	March - June	Commonly	No
55	<i>Limonia acidissima</i> L.	Kavath	Rutaceae	Ripe fruits	Eaten raw	Tree	March - Aug.	Commonly	Yes

The detailed analysis of their taxonomic group revealed 55 species, belong to 25 families and *Cucurbitaceae* and *Fabaceae* shared the largest proportion by consisting of 7 and 6 species respectively (Detail illustrated in the figure 3). WEFs are available in different life forms. Present study shows that largest proportion of WEF species were in the forms of trees Figure 1.

Modes of consumption

Different communities have different modes of consumption across the North Maharashtra They consumed traditionally through appropriate means of collection, preparation and preservation techniques. WEFs are consumed in various ways. Many mature fruits are consumed as raw while young fruits are consumed as vegetables and pickles. Study shows that Most of the species are eaten as raw and vegetable, etc. (Detail illustrated in the Figure 2).

Availability of WEPs

In North Maharashtra , the availability of WEFs is seen all over the year. The reason for the availability of WEPs throughout the year is, different species grow in different seasons. For example, *Annona reticulata*, *Bridelia retusa*, *Morus alba* produces fruits from January to March, *Ziziphus rugosa*, *Meyna laxiflora*, *Carissa carandas* produces fruits from April to May, *Capparis zeylanica* produces fruits from June to July, *Momordica dioica*, *Cucumis setosus* produces fruits from August to September, *Ziziphus jujube*, *phyllanthus emblica*, *Solanum anguivi*, *Canavalia gladiata*,

Annona squamosa produces fruits from October to December, likewise one or other edible parts are available throughout the year. In this way WEPs providing a healthy source of nutrients throughout the year. The peak season of availability of WEFs is the Summer season (March to May), followed by winter and monsoon (Detail in Table 1 and Figure 4).

Different Habitats

The occurrence of WEFs species of North Maharashtra was classified into seven different localities. The present study shows that the largest proportion of WEFs were found in forest. So, Forest is the home for the majority of WEF species (Figure 5).

Need of Bioprocessing

Despite the nutritional importance, most of the WEPs are underutilized due to a lack of awareness and bioprocessing techniques. Out of 55 species, the following species are sold in the local markets. These species are restricted to specific local markets only and have not been reported in the markets of urban areas (Table 1). The need is to increase the awareness towards nutritional potential of WEPs for sustainable development and empowerment of tribal regions Figures 6 &7.

Threat and Challenges to Wild Edible Fruit Species

The survey revealed several threats to wild plant species. The rapid erosion of the traditional knowledge is one of the major threat, as these knowledge is considered to be the

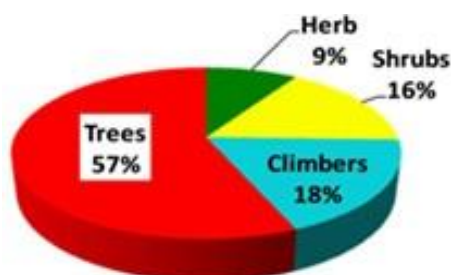


Figure 1. Life forms of WEF species in the study region.

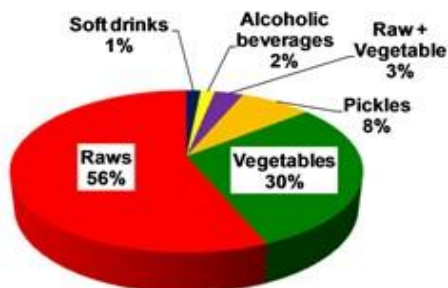


Figure 2. Mode of consumptions of WEF species in the Study region.

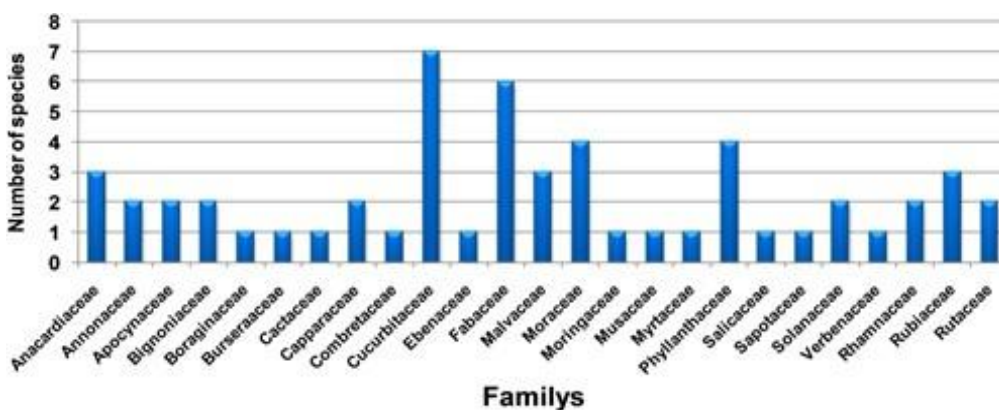


Figure 3. Family wise distribution of WEF species in the study regions

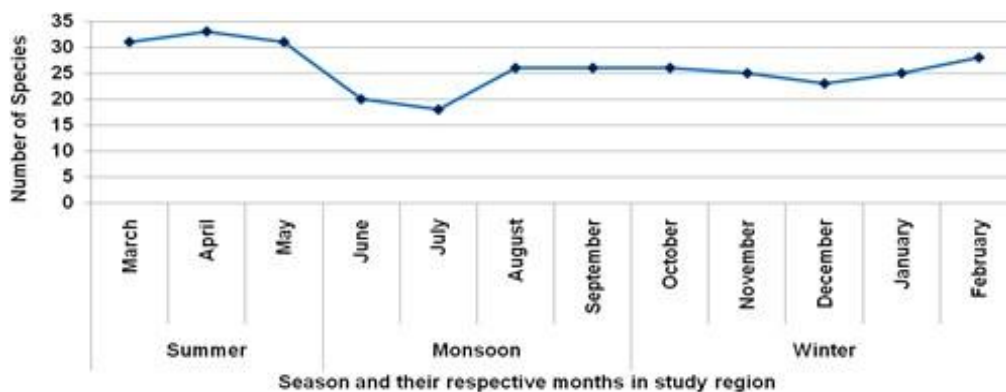


Figure 4. Availability of WEFs in the study regions.

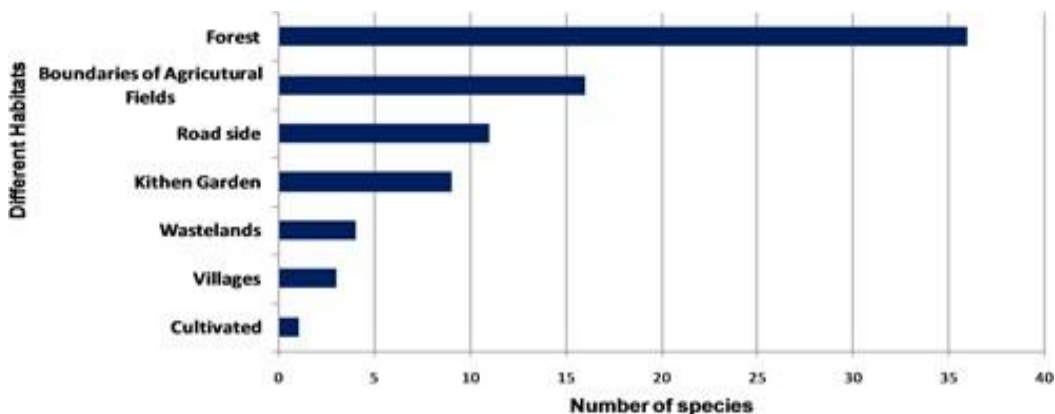


Figure 5. WEFs Located in different habitats in the study region

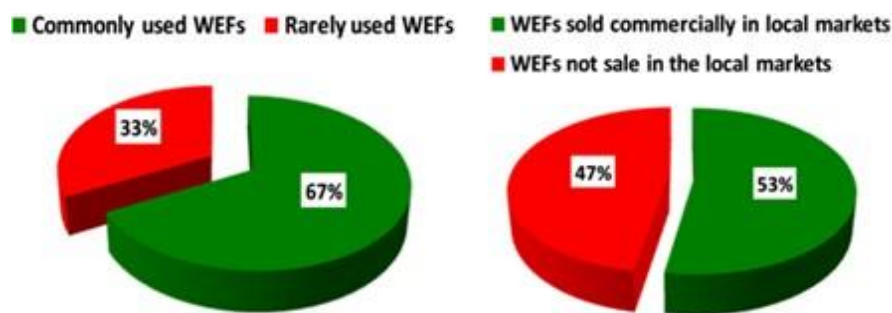


Figure 6. Comparative study of WEF species in the study region.



Figure 7. Study area.

basis for their utilization. Due to socio-economic changes younger generations are not showing interest to carry out this knowledge practically. Another threat is loss of vegetation and utilization of land for cash crops which causes loss of these valuable food resources from their natural habitat. The biggest challenges are to acquire and conserve the amorphous nature of this traditional knowledge. Lack of traditional knowledge and scientific information is depriving these plants from being used completely.

CONCLUSION

Present work defines diversity of wild edible fruit species across the North Maharashtra. Present data helps in the conservation and management of WEF species. Efforts are needed to create awareness towards the use of WEFs to enhance the demand. Increase demand will encourage people to increase the area under cultivation for sustainable development and empowerment of local communities.

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