

Studies on ethnomedicinal plant diversity at daund tehsil, Pune, Maharashtra

Samudra, S.M.¹ and Shinde H.P.^{2*}

¹Department of Botany, K.G. Kataria College, Pune, Maharashtra.

²Department of Botany, K.V. N. Naik Arts Commerce and Science College, Nasik, Maharashtra.

Abstract

India is rich in biodiversity and considered to be a storehouse of medicinal plants. The diversity of indigenous and endemic medicinal plants has contributed a lot to the practice of herbal/traditional medicines by local tribal communities. It has been observed that valuable information about the diverse ethno medicinal plant species located at the particular area is accumulated traditionally at the local herbal healers or medicine men “Vaidu” by whom; this valuable information is hardly shared with others, due to which the vast treasure of ethnomedicinal knowledge is eroding gradually, also triggered by modernization, rapid socioeconomic changes etc. As a part of participatory efforts towards creating awareness about medicinal utilities of plants and need of conservation; a periodic survey was carried out in and around Daund tehsil to record the diversity of ethnomedicinal plant species along with their medicinal utilities. Total 74 plant species were identified and enlisted for their medicinal values to cure several diseases like gynaecological ailments, asthma, cold, cough, dysentery, jaundice, piles, skin diseases etc. including plant species like *Aegle marmelos*, *Boerhavia diffusa*, *Caralluma adscendens* var. *fimbriata*, *Chrozophora rottlerin*, *Citrulus colocynthis*, *Glossocardia bosvallea*, *Macrotyloma uniflora*, *Sesamum laciniatum*, *Vernonia anthelmintica* etc. The present work aimed to highlight not only the diversity of ethnomedicinally important plant species but also their potential utilization as resources in a conservation perspective.

Keywords: Ethnomedicinal diversity, Daund.

INTRODUCTION

India ranks sixth among 12 mega diversity countries in the world and is treasure for endemic medicinal plants. (Myers et.al. 2000). The entire Western Ghats (Sahyadris) is considered as a major genetic reserve with an enormous biodiversity of ancient lineage. The use of plants with pharmaceutical properties has received increased interest nowadays from both homeopathic and allopathic branches. The diversity of indigenous and endemic medicinal plants has contributed a lot to the practice of herbal/traditional medicines by local tribal communities. The Indian systems of medicine have been a part of the culture & tradition of India down the centuries. The ‘Sushruta Samhita’ attributed to Sushruta in the 6th century BC described over 700 medicinal plants. More than 9000 plant species are found to be used for health care in India under folk and codified Indian medical systems.

Earlier, (Razi 1952; Santapau 1951, 1957; Vartak 1953, 1960) have contributed flora of Poona and neighbouring district

including regions like Torna fort, Katraj ghat etc. Similarly; (Chopra et al. 1956, 1958; Mitra, Jain 1991 and Nair, Mohan 1998) have provided a glossary of Indian medicinal plants. (Jain et al. 1973, 1994) published the use of medicinal plants among certain Adivasis in India and gave a list of major medicinal plants of India. Many valuable herbal drugs have been discovered by knowing that particular plant was used by ancient folk healers for the treatment of some kind of ailment (Ekka & Dixit, 2007). The presence of drug residues results in development of drug resistant microorganism that are difficult to treat and the world is looking for safer herbal alternatives (Nisha. 2008). Medicinal plants play an important role in public health, especially in developing countries, where it is believed that the intense utilization of plants with therapeutic action does not lead to intoxication (Mossi et. al. 2009; Jagtap et.al. 2020). Similarly; Indian council of medicinal research has prepared a Database on ethnomedicinal plants of Western Ghats (Kholkunte, 2008). The use of participatory methods in ethnobiological studies has grown overtime and become an important tool

in these studies (Sieber 2010). Herbal traditional methods have been developed through many experiences of many generations (Zingare. 2012). Though the geographical area cover of the country represents about 2.4% of the world's total landmass, it harbours a total of 47,513 plant species (Singh & Dash, 2014; Arisdason & Lakshminarasimhan; 2019). Ethnobotanical explorations and documentation indicate that more than 7000 species have been used for human food at some stage in human history (Grivetti and Ogle 2000). But this important knowledge is slowly diminishing day by day due to invasion of alien cultures. (Lokhande; 2020).

Nearly 18,000 species of flowering plants that account almost 11% of the total plant species in the world. (Singh et.al. 2015). An exploration of known and unknown ethnomedicinal flora with an objective of its effective utilization can be viewed as a promising resource for the welfare of local people and mankind to the large extent. (Wagh et.al. 2018; Shinde et.al. 2018).

Pharmaceutical and herbal industries require information about adequate supply of crude drugs, their proportion, formulations, doses, effectivity etc. which are being fulfilled mostly through the local traditional practitioners. However; this may lead to problems of authenticity of material used, problems of quality of materials, wastage during transport and time gap between collection and medicine preparation.

Also; during the last decade; places like Daund tehsil; located near to megacity like Pune; having an enormous expansion in industries especially pharmaceutical industries. Due to this; there is an increasing pressure on diversity of endemic medicinal plants from these regions.

Latest research has shown that over 70% of the medicinal plant collections involve destructive harvesting because of the use of parts like roots, bark, wood, stem and the whole plant in case of herbs. This poses a definite threat to the endemic medicinal plant species as well as to the diversity of medicinal plants studies which has an enormous scope in years to come. The present investigation was attempted so as to collect and document valuable information about diversity of ethnomedicinal plant species used by local people in and around the Daund tehsil; as it was observed that there is very little or no work has been done on diversity of ethnomedicinal plants specifically from Daund tehsil (Figure 1).

METHODOLOGY

Study Area

Daund tehsil lies in Pune district and situated on the bank of Bhima river. The river Bhima and its tributary rivers Mula-Mutha are dominating drainage pattern in study region. Besides an urban centre; it comprises 102 villages (Figures 2 and 3). The dry mixed deciduous forest pocket covers the board western part of the area. It is famous for rich ethno-floristic diversity along north-eastern side. It has remained inhabited to certain extent by the local inhabitants for certain needs and necessities. The people here utilize medicinal plants to cure human diseases. The present ethno-medico-botanical studies were carried out at the various regions of Daund tehsil with the help of field visits, questionnaire and group discussion during the period from 2019 to 2020. The plant specimen collected from the region were properly processed for herbarium (Jain



A.



B.



C.



D.



E.



F.

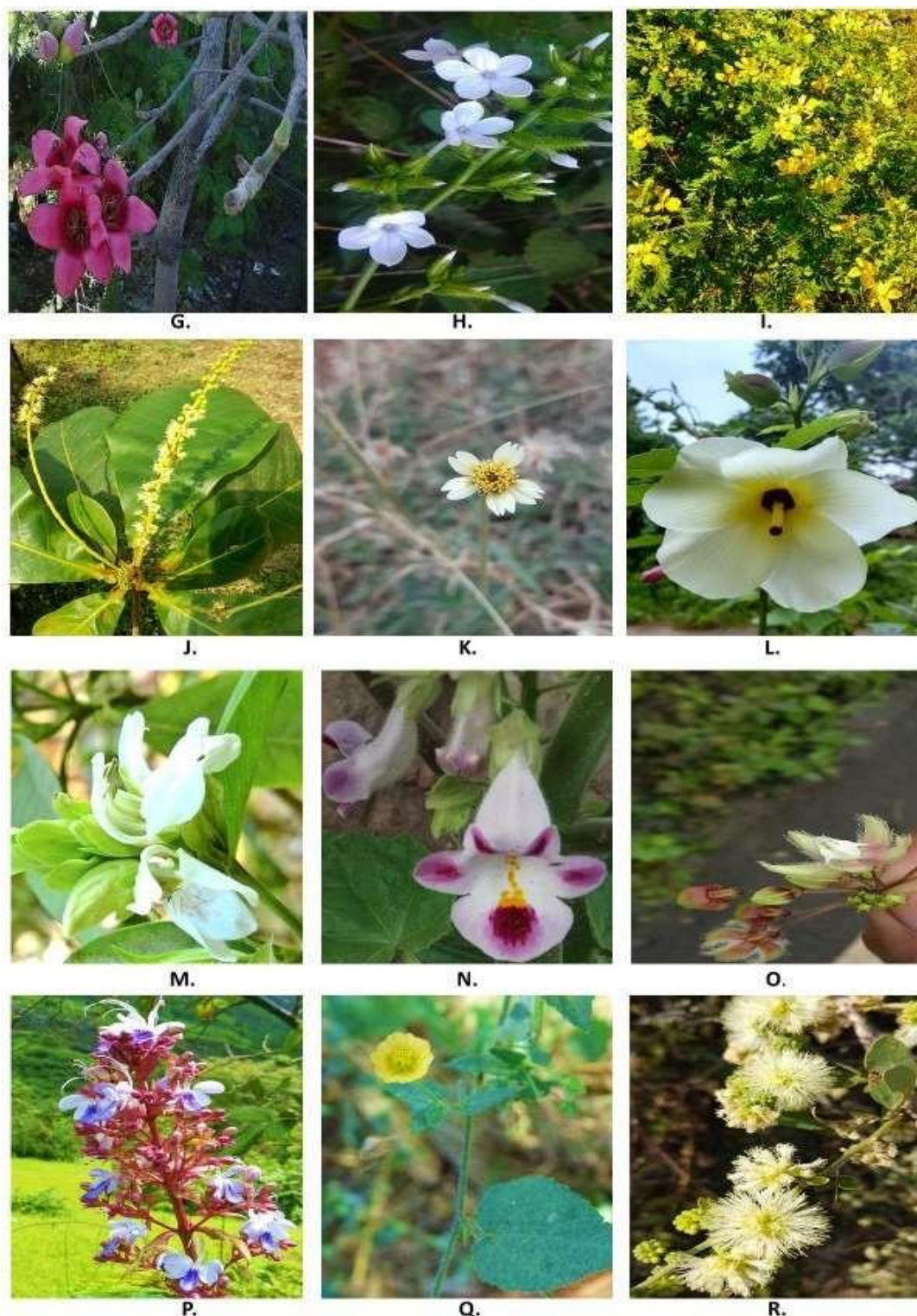


Figure 1: Floristic diversity of some ethnomedicinal plant species

A. *Urena lobata* L. moorthy. **B.** *Celmatis triloba* Heyne ex Roth. **C.** *Mucuna pruriens* L. D.C. **D.** *Echinops echinatus* Roxb. **E.** *Solanum xanthocarpum* Schrad & Wendl. **F.** *Cassia fistula* L. **G.** *Bombax ceiba* L. **H.** *Plumbago zeylanica* L. **I.** *Cassia auriculata*. **J.** *Terminalia catappa* L. **K.** *Tridax procumbens* L. **L.** *Abelmoschus manihot* L. Medik. **M.** *Adhatoda zeylanica* Medik. **N.** *Martynia annua* L. **O.** *Pergularia daemia* (Frossk.) Chiov. **P.** *Rothea serrata* L. Steane & Mabb. **Q.** *Sida cordata* (Burm.f.). **R.** *Pithecellobium dulce* (Roxb.) Benth.

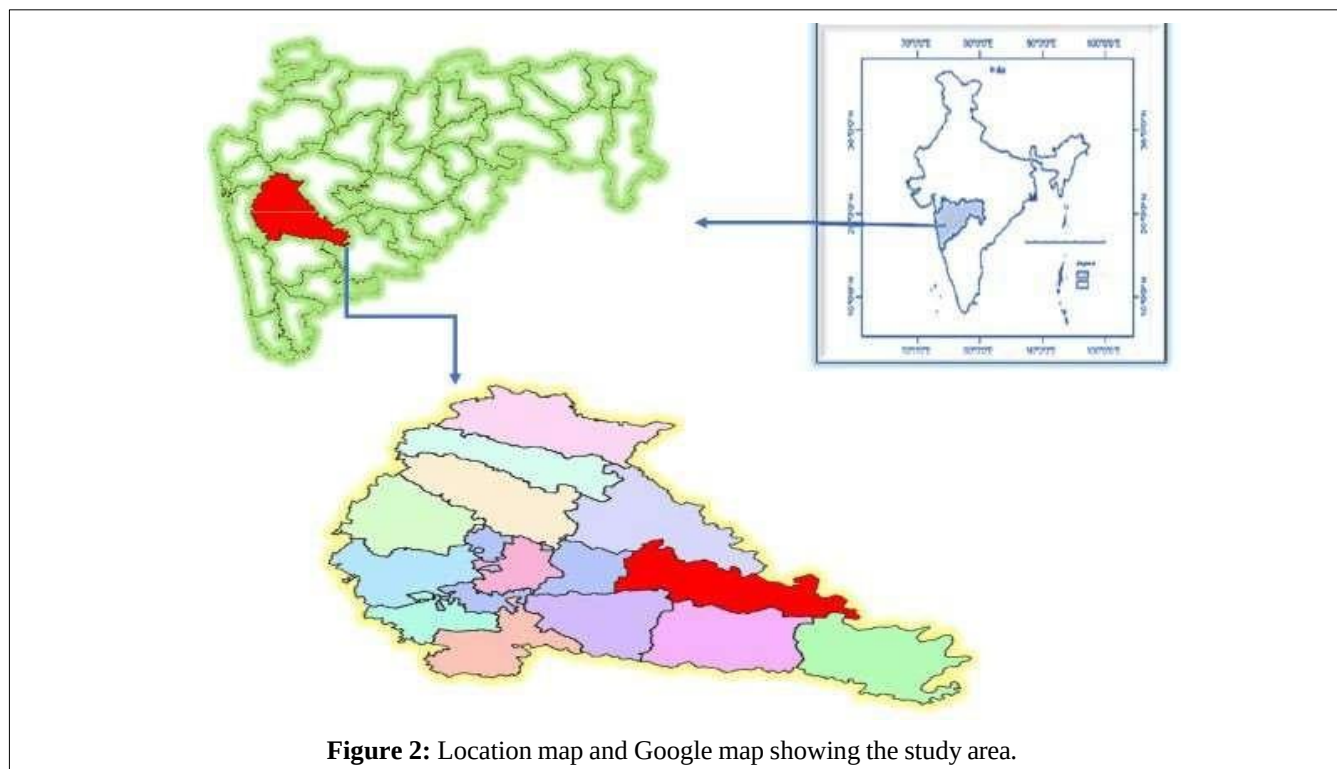


Figure 2: Location map and Google map showing the study area.



Figure 3: Imagery ©2021 Landsat / Copernicus, Data SIO, NOAA, U.S. Navy, NGA, GEBCO, Map data ©2021 10 km.

and Rao, 1976). The herbarium specimens are deposited at Department of Botany, K.G. Kataria College Daund, Pune. The data on ethno-botany has been identified and confirmed with help of regional flora and relevant scientific literature. The information was recorded on questionnaire and in the field note books.

RESULTS AND DISCUSSION

The present study involved the documentation of ethnomedicinal information that is based on actual field visits, discussion with people, questionnaires within the Daund tehsil of Pune district; which revealed total 74 ethnomedicinal plant species belonging to 37 families.

The recorded plant species were found to be used by local traditional healers and practitioners who have been using specific plant parts in specific formulations and doses, to cure various ailments and diseases (Table 1).

Majority of medicinal plants are used as simple drug; i.e. the plant part used are roots leaves and stems or even as a whole plant; while some plant species are used in combination with other plant parts. Out of 37 plant families; maximum number of plants species was belonging to plant families like Fabaceae (16%), Malvaceae (8%) and Asteraceae (7%) with 12, 6 and 5 plant species respectively. Similarly; Plant families like Euphorbiaceae, Lamiaceae, represented by 4 plant species each, Solanaceae and Apocynaceae by 3 plant

species each. Habit wise; the recorded plant species were mostly herbaceous (34%) tree species (26%) as well as few were shrubs (19%), climbers and twiners (16%) (Figure 4-A and Figure 4-B).

It was observed that local people have been consistently utilizing medicinal plant species as recorded during this study; for their therapeutic nutritional as well as ethnoveterinary purposes. The ethnomedicinal plant species like *Dioscorea*

Table 1: Ethno-medicinal observations of Daund tahsil Pune District (M.S.) India.

Sr. No.	Family	Botanical Name	Common Name	Habit	Plant part used	Ethnomedicinal uses	Reference
1	Malvaceae	<i>Abelmoschus manihot</i> L. Medik.	Bhendi	Herb	Roots	Root paste applied over the cuts, injuries for quick healing.	Patil et al. (2010)
2		<i>Bombax ceiba</i> L.	Sawar	Tree	Root	Fruits used in dysentery. Diluted root paste used for the treatment of menorrhagia gum.	Patil et al. (2010), Suneetha et al. (2012).
3		<i>Helicteres isora</i> L.	Muradeseng	Large shrub	Bark, Root	Bark powder boiled along with water, allowed to cool and used against snake bite.	Patil et al. (2010), Kuvar and Shinde (2019)
4		<i>Grewia tiliifolia</i> Vahl.	Dhamani	Tree	Bark, ripe fruits	One to two gm of bark is chewed for the treatment of urinary trouble. ripe fruits eaten raw	Reddy et al. (2006); Koteswara Rao et al. (2014). Lokhnade (2020)
5		<i>Sida cordata</i> (Burm.f.) Borss. Waalk Burm.f	Bhumi petari, Bhoybal	Herb	Leaves	Juice is used as stomachic, in bowel complaints.	Sahu et al. (2013), Salve and Mishra (2019).
6		<i>Urena lobata</i> L. Ssp. <i>lobata</i> moorthy	Caesar gavat	Shrub	Leaves, root	Juice of leaves and roots is used for antioxidant, antimicrobial properties also used in rheumatism.	Rai and Lalramnghinglova (2011), Salave et.al. (2012),
7	Fabaceae	<i>Pithecellobium dulce</i> (Roxb.) Benth.	Chichbilai	Tree	Bark, leaves, seeds, flowers and fruits	Fruits seeds are used to cure diarrhoea, chest congestion, ulcers, indigestion etc.	Kulkarni and Jamkhandi (2018), Kamble et.al. (2010).
8		<i>Abrus precatorius</i> L. Syrt.	Gunj	Climber	Seeds	Seed are boiled in water, the concentrated extract used as blood purifier.	Dhore et al. (2012), Awasarkar et.al. (2014).
9		<i>Butea monosperma</i> (Lamk) Tauub.	Palas	Tree	Bark and Flower	The bark is boiled in water used in stomach pain. Flowers used as vegetable	Awasarkar et.al. (2014), Lokhnade (2020).
10		<i>Cassia auriculata</i> L.	Tarwad	Shrub	Leaves	Decoction used for rheumatism.	Jagtap et.al. (2020)
11		<i>Cassia fistula</i> L.	Bahawa	Tree	Fruit	Fruit pulp mixed with breast milk and given for the treatment of constipation in infants.	Awasarkar et.al. (2014).
12		<i>Erythrina variegata</i> L.	Pangara	Tree	Bark and Leaves	Inner bark, made warm over fire and its repeated application over joints to get relief from joint pain. Bark and leaves are crushed together and extract is used as antidote for snake bite.	Kuvar and Shinde (2019)

13		<i>Glycyrrhiza glabra</i> L. Jeshthamadh	Herb	Root and Stem bark.	The roots are chewed for the relief of cough and bronchitis, ulceration of urinary tract. The stem bark used for external application on cuts and wounds.	Padal et al. (2013).	
14		<i>Macrotyloma uniflora</i> (Lam.) Verdc.	Hulaga	Climber	Seeds	Soup in rejuvenation after prolonged illness. Seeds also taken in asthma and stomachic.	Jagtap et.al (2013), (2020).
15		<i>Mucuna pruriens</i> L. DC.	Khaj-Kuiri	Climber	Leaf and Seeds	The crushed leaves used in boils. The pod hairs are used as to expel acaroid mites. Seeds used as vegetable.	Lokhnade (2020)
16		<i>Pongamia pinnata</i> (L.) Pierre. Papilionaceae	Karanj	Tree	Seeds	Seed paste applied on wounds, carbuncles.	Desale et.al. (2013), Jagtap et.al (2020).
17		<i>Sesbania grandiflora</i> (L) poir.	Shevari or Agasta	Tree	Leaf and Flower.	The leaf juice is used in night blindness for night blindness and dimness of vision. Leaves flowers are used as vegetable.	Misra and Misra (2013), Salve and Mishra (2019).
18		<i>Tephrosia purpurea</i> (L.) Pers.	Unhali	Herb	Whole plant	Whole plant decoction is taken once a day to cure skin diseases.	Desale et.al. (2013), Kuvar and Shinde (2019)
19		<i>Acalypha indica</i> L.	Chuda	Herb	Shoot	Leaf juice on earache and cough.	Jagtap et.al (2013), Awasarkar et.al. (2014).
20		<i>Chrozophora rottleri</i> (Geis.) Juss	Shahdevi	Herb	Leaves	Dried leaf powder applied on wounds of animals and human.	Jagtap et.al (2013).
21	Euphorbiaceae	<i>Euphorbia tiruculli</i> L.	Nangadi sher	Shrub	Cladode	Warm cladode juice is used in earache.	Jagtap et.al. (2013), (2020)
22		<i>Jatropha curcus</i> L.	Mogali errand	Shrub	Stem	Juice on toothache & eye, juice on jaundice, latex seals and heals wounds.	Jagtap et.al. (2013), Ghalme (2020).
23		<i>Achyranthus aspera</i> L.	Aghada	Herb	Root, leaves	Roots crushed in water given in scorpion sting and dog bite, leaves with milk of goat in asthma, genital disorders.	Awasarkar et.al. (2014), Atre and Khedkar (2020).
24	Amaranthaceae	<i>Amaranthus spinosus</i> L.	Katemath	Herb	Stem	Stem is burnt, ash is left behind 1-2 gm of powder with water is taken internally for 1-2 week for the treatment of kidney stone	Awasarkar et.al. (2014).
25		<i>Adhatoda zeylanica</i> Medik.	Adulsa	Shrub	Leaves	The decoction of leaves is given twice a day to children to cure cough till relief from cough.	Padal et.al. (2013).
26	Acanthaceae	<i>Lepidagathis cristata</i> Willd.	Bhui- tervad	Shrub	Shoot	Dried ash applied on skin infections.	Jagtap et.al. (2013), Awasarkar et.al. (2014).

27		<i>Echinops echinatus</i> Roxb.	Bharamdanda Kate chendu	Shrub	Roots	Root decoction used in cough and toothache.	Jagtap et.al. (2013),
28		<i>Eclipta alba</i> L. Hassk.	Maka	Herb	Shoot	Juice is used in cold and cough, and genital problems.	Awaskar et.al. (2014), Atre and Khedkar (2020).
29	Asteraceae	<i>Glossocardia bosvallea</i> (L. f.) DC.	Ran shepu	Herb	Shoots	Bitter shoot in throat infection and hoarseness of throat.	Awaskar et.al. (2014).
30		<i>Tridax procumbens</i> L.	Dagadi pala	Herb	Shoot	Leaf juice on wounds and applied at insect bite.	Awaskar et.al. (2014), Jagtap et.al. (2020).
31		<i>Vernonia anthelmintica</i> (L.) Willd.	Kadu karale	Herb	Seeds	Seeds baked with milk are used in respiratory diseases and asthma.	Jagtap et.al. (2013),
32		<i>Lavandula bipinnata</i> (Roth) Kuntze	Gond	Herb	Stem	Stem powder is used in the treatment of diarrhoea.	Desale et.al. (2013),
33		<i>Ocimum basilicum</i> L.	Sabja	Herb	Seeds	Seeds soaked in water and used in kidney stone.	Salve and Mishra (2019).
34	Lamiaceae	<i>Plectranthus barbatus</i> Andrews	Vanarmaukhi, Maainmul	Herb	Roots	The root paste is applied for the treatment of scabies.	Awaskar et.al. (2014).
35		<i>Rotheca serrata</i> L. Steane & Mabb.	Bharangi	Shrub	Leaves, roots	Roots are useful in tooth problems. Leaves are used in asthma, rheumatism, snake bite, dyspepsia etc.	Awaskar et.al. (2014).
36		<i>Aegle marmelos</i> L. Corr.	Bel	Tree	Leaves, fruit	Chewing of leaves in piles, genital problems. Ripened fruit in anaemic dysentery.	Sahu et al. (2013), Atre and Khedkar (2020).
37	Rutaceae	<i>Feronia elephantum</i> Corr.	Kawath	Tree	Leaves and fruits	Dried powders of leaves consumed with cow milk in the treatment of impotency.	Kambale et.al. (2010).
38	Burseraceae	<i>Commiphora wightii</i> (Arn.) Bhandari	Guggul	Tree	Stem bark, Latex	Gum obtained from the mature stem and is reputed medicine in arthritis. Latex is used in urinary and genital disorders. Gum is also useful in religious ceremonies.	Kshirsagar (2018), Atre and Khedkar (2020).
39		<i>Boswellia serrata</i> Roxb. ex Colebr.	Dhupali, Salai	Tree	Bark gum/ resins	Gum is used for the treatment diseases affecting skin, eye, and gastrointestinal tract and respiratory and genital disorders such as asthma, bronchitis.	Dev (1983), Atre and Khedkar (2020).
40		<i>Datura inoxia</i> Mill.	Pandhara Dhotra	Large herb	Leaves	Warmed leaves applied on joint pains and swellings.	Awaskar et.al. (2014).
41	Solanaceae	<i>Solanum xanthocarpum</i> Schrad. & Wendl.	Bhuiringani	Shrub	Seeds	Seed smoked on toothache.	Desale et.al. (2013),
42		<i>Withania somnifera</i> L. Dunal	Ashwagandha	Shrub	Leaves & root	Leaves used to reduce obesity. Root powder in milk given in seminal debility.	Ramanathan et al. (2014), Jagtap et.al. (2020)

43		<i>Hemidesmus indicus</i> R.Br.	Anantmul	Twiner	Root and stem.	The roots are used on burning sensation, skin disease and diarrhoea. The stem powder is boiled and used on the inflammation uterine disorders, cough and asthma.	Kannan and Kumar (2014); Satyavathi et al. (2014); Kshirsagar (2018).
44	Apocynaceae	<i>Pergularia daemia</i> (Frossk.) Chiov.	Utaran	Shrub	Leaves, root, latex	Leaves and root powder is used in throat infection, fever, urinary problems, bone fracture, swellings, snake bite, scorpion sting etc.	Nagalakshmi (2014); Marathe and Deshmukh (2020).
45		<i>Caralluma adscendens</i> var. <i>fimbriata</i> (Wall.) Grav. & Mayur	Shenguli	Herb	Tender fresh stem	Fresh stem in diabetes to reduce blood sugar.	Misra and Misra (2013); Deepa et al. (2014); Kshirsagar (2018).
46		<i>Lagenaria siceraria</i> (Molina) Standl.	Dudhi- bhopala	Climber	Fruits	Fruit juice is consumed to reduce excess body fats.	Padal et al. (2013).
47	Cucurbitaceae	<i>Citrulus colocynthis</i> L. Schrad.	Kadu Indrayan	Climber	Leaves root	Leaf juice applied on swellings in animals, root with water in jaundice.	Jagtap et.al. (2013),
48		<i>Cocculus villosus</i> DC.	Vasanvel	Climber	Leaves	Leaves are useful in dysentery.	Jagtap et.al. (2013),
49	Menispermaceae	<i>Tinospora cordifolia</i> (Willd.) Miers	Gulwel	Climber	Leaves & roots	Leaf juice used with curd in jaundice and piles, leaf and root juice in cholera.	Kshirsagar (2018), Jagtap et.al. (2020)
50	Simaroubaceae	<i>Ailanthus excelsa</i> Roxb.	Muharuk	Tree	Stem bark.	The stem bark with mango stem bark and jambul stem bark are crushed together and used for multipurpose diseases in animals.	Patil et al. (2010)
51	Aristolochiaceae	<i>Aristolochia bracteolata</i> Lam.	Gandhak	Twiner	Leaves	Fresh juice is employed on wounds in animals to remove wound worms.	Murthy (2012), Jagtap et.al. (2020)
52	Poaceae	<i>Bambusa arundinacea</i> (Retz.) Willd.	Kalak	Bamboo	Leaves	Leaves in animal dysentery, Leaf ash in coconut oil applied on scabies.	Rekha and Kumar (2014)
53	Nyctaginaceae	<i>Boerhavia diffusa</i> L.	Punarnava	Herb	Shoot	Leaf juice is used on jaundice, gas trouble and constipation.	Jagtap et.al. (2020)
54	Capparaceae	<i>Capparis zeylanica</i> L.	Waghati	Shrub	Leaves	Leaf juice mixed with water used in kidney stone.	Awasarkar et.al. (2014). Deepa et al. (2014); Panda et.al. (2014)
55	Sapindaceae	<i>Cardiospermum heliacabum</i> L.	Kapal Phodi	Climber	Leaves	Leaf decoction in rheumatism and piles.	Awasarkar et.al. (2014). Shanmukha Rao et al. (2014)
56	Apiaceae	<i>Centella asiatica</i> L. Veb.	Bramhi	Herb	Whole Plant.	The entire herb is consumed on regular basis as a brain tonic.	Awasarkar et.al. (2014).
57	Vitaceae	<i>Cissus quadrangularis</i> L.	Kandvel Ghanasvel	Climber	Root and Stem.	The stem powder is very specific for bone fractures and used on complaints of the back and spine	Padal et al. (2013)

58	Ranunculaceae	<i>Celmatis triloba</i> Heyne ex Roth	Mogra	Climber	Leaves	Leaf paste is applied on head against headache, leaf juice used in itching due to ringworms.	Natarajan and Paulsen (2000).
59	Zingiberaceae	<i>Curcuma inodora</i> Blatt.	Vedi Halad	Herb	Rhizome	Rhizome paste is applied locally to get relief from muscle pain.	Kshirsagar (2018).
60	Cyperaceae	<i>Cyperus rotundus</i> L.	Nagarmotha or Lohal	Herb	Tubers	The tuber juice is used in nausea, intestinal worms, and diarrhoea, wound and skin diseases.	Awasarkar et.al. (2014).
61	Araceae	<i>Colocasia esculenta</i> L. Schott	Alu	Herb	Corn, petioles, leaves	Leaves are used during parturition to minimize labour pain, fever, constipation, earaches. Also used as vegetable.	Rekka and Senthil Kumar (2014), Pimple et.al (2019).
62	Dioscoreaceae	<i>Dioscorea bulbifera</i> L.	Kadu-karanda	Large climber	Bulbils	Bulbils are used in the treatment of piles, dysentery, syphilis, ulcers, cough, leprosy, diabetes, and asthma.	Awasarkar et.al. (2014), Misra and Misra (2014). Marathe and Deshmukh (2020).
63	Ulmaceae	<i>Holoptelea integrifolia</i> (Roxb) planch.	Papada	Tree	Bark	Bark powder pasted on the wound of animals for healing.	Naidu (2003), Ghalme (2020).
64	Covolvulaceae	<i>Ipomoea pes-tigris</i> L.	Borvel, Borvak	Climber	Stem	Stem powder boiled in water, extract missed with sugar-candy, used in impotency.	Khairnar and Gadekar (2019).
65	Sapotaceae	<i>Madhuca longifolia</i> . (Koen) Macbr.	Mohwa	Tree	Plant latex	Latex applied in animal bites and muscular pain.	Padal et al. (2013) Awasarkar et.al. (2014).
66	Martyniaceae	<i>Martynia annua</i> L.	Waghnakhi	Shrub	Fruits	Ripened fruits oil is applied/rubbed in treatment of skin disorders.	Awasarkar et.al. (2014).
67	Plumbaginaceae	<i>Plumbago zeylanica</i> L.	Chitrak	Shrub	Roots	The smoked root powder is used in piles, used as an antidote for snake bite.	Samyudurai et al. (2012) Kshirsagar (2018), Kuvar and Shinde (2019)
68	Anacardiaceae	<i>Semecarpus anacardium</i> L. f.	Biba	Tree	Seed	Seed oil is applied on knee joints to get relief from rheumatic pain, wounds, skin diseases and sexual disorders.	Atre and Khedkar (2020), Ghalme (2020).
69	Pedaliaceae	<i>Sesamum laciniatum</i> Klein ex Willd.	Rantil	Herb	Shoots	Juice used in animal dysentery.	Jagtap et.al. (2013),
70	Combretaceae	<i>Terminalia catappa</i> L.	Deshi-badam	Tree	Leaves, bark and Seeds	Leaf juice is used to treat scabies, skin diseases and leprosy. Bark in used against mouth and throat problems and stomach up sets, dysentery and fever.	Manikandan and Lakshmanan (2014)
71	Boraginaceae	<i>Trichodesma indicum</i> L. R. Br. ex Lehm.	Phopati	Herb	Leaves	The leaves are used to treat fever, eye, ear disorders and joint problems.	Misra and Misra (2013)

72	Zygophyllaceae	<i>Tribulus terrestris</i> L.	Sarata	Herb	Shoot	Shoots consumed as vegetable and used in waist pains; decoction used in seminal debility. The roots are useful in inflammation dysentery,	Deepa et al. (2014), Atre and Khedkar (2020).
73	Verbenaceae	<i>Vitex negundo</i> L.	Nirgudi	Tree	Root and Flower.	urinary disorders, wounds and skin diseases. The flowers are used in diarrhoea, cholera and fever. Fresh roots with milk given in jaundice and urine and sexual disorders. Fruit syrup is also used in the treatment of stomach ailments.	Lingaiah and Rao (2013); Shanmukha Rao et al. (2014), Patil et al. (2014)
74	Phyllanthaceae	<i>Phyllanthus acidus</i> L. Skeels	Rai-awala	Tree	Roots, leaves Fruits		Atre and Khedkar (2020).

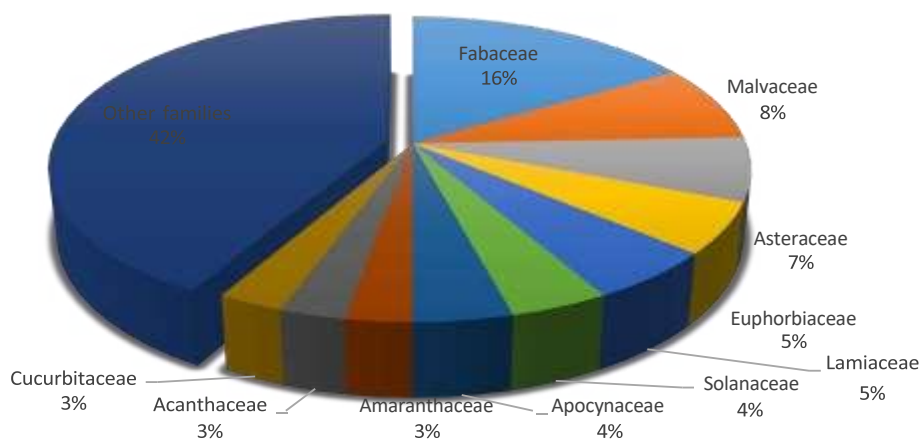


Figure 4A: Family wise distribution of ethnomedicinal plant species.

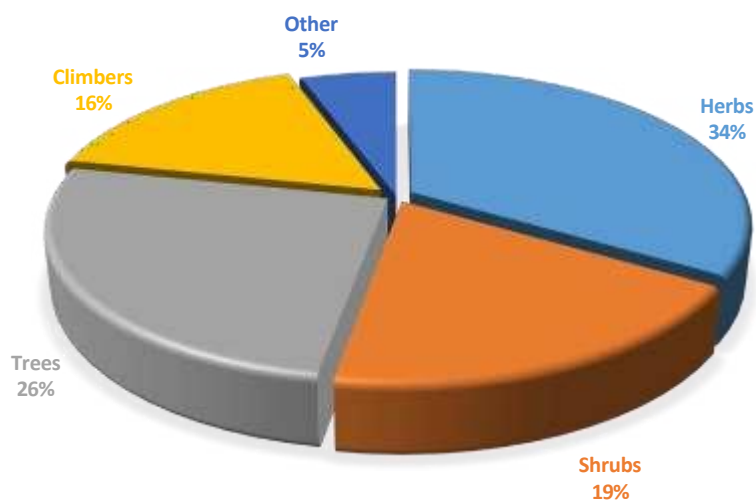


Figure 4B: FHabit wise distribution of ethnomedicinal plant species.

bulbifera, *Caralluma adscendens*, *Lagenaria siceraria* etc. have been found to be effective against the urban lifestyle related serious diseases like diabetes and obesity (Patil et.al. 2010). Similarly; *Withania somnifera*, *Tribulus terrestris* *Ipomoea pes-tigris* *Feronia elephantum* etc. have a potential to be used in the treatments of impotency and seminal debility. (Kambale et.al. 2010; Khairnar and Gadekar, 2019; Jagtap et.al.2020). Also; plant species like *Plumbago zeylanica*, *Helicteres isora*, *Erythrina variegata*, *Pergularia daemia* are found to be useful as antidotes against snake scorpion bites etc. (Kumar and Shinde 2019; Marathe and Deshmukh 2020). Moreover; plant species like *Sesamum laciniatum* *Holoptelea integrifolia*, *Ailanthus excelsa*, *Chrozophora rotterlin* have also been used as ethnoveterinary medicines. (Ghalme 2020). It was observed that the local people depended on their farm produces and some people collected forest products such

as fruit, gum, honey and medicinal plants from the forest area. They have an accurate knowledge of the environment, including plant species and ecological relations that exist among them by their long association with nature.

CONCLUSION

The knowledge regarding use of native plant species have diversified ethno-medicinal significances. Unfortunately, most of the traditional ethno-botanical knowledge in India is eroding at faster rate days after days due to losses of the ancient traditions and culture as they are mostly oral. In order to collect, conserve and maintain it, collective efforts are needed from the NGOs, government authorities, ethno-botanists and the pharmaceutical industries. To achieve the target, documentation and computerization of useful medicinal plants with their traditional uses should be initiated at national as well as international level. Moreover; it may provide lead in the development of new drugs as the endemic medicinal plant wealth of the Daund tehsil which is having enormous potential to establish and run herbal drug industry and cultivation of medicinally significant species through various outreach activities or programmes for the benefit of local inhabitants.

ACKNOWLEDGEMENT

Authors are thankful to the notified and de-notified rural, tribal and non-tribal groups, traditional healers from area under the study for their immense help and co-operation during the field work.

REFERENCES

- Arisdason W and Lakshminarasimhan P(2019). Status of plant diversity in India: An overview. ENVIS Centre, Ministry of Environment & Forest, Govt. of India.
- Atre, Nitin M, Khedkar and Dinesh D(2020). A Review on herbal remedies for sexually transmitted infections (STIs) from Melghat region of Maharashtra state, India. European Journal of Medicinal Plants 31(14):1-17
- Awasthakar, Umesh, Kulkarni, Aboli, Datar Mandar N, Upadhye and Anuradha(2014). Checklist of angiosperms of Bhor Taluka, Pune District, northern Western Ghats of Maharashtra, India, based on herbarium records. Check List 10(4): 835–849.
- Chopra RN and Chopra(1956). Glossary of Indian medicinal plants. C.S.I.R., New Delhi.
- Chopra RN, Nayar SL and Chopra(1958). Glossary of Indian medicinal plants. C.S.I.R. New Delhi.
- Deepa P, Muruges S, Sowndhararajan K and Manikandan(2014). Ethnobotanical Studies on wild edible plants used by Malayali tribals of Melur, Bodha Hills, Southern Eastern Ghats, Namakkal District, Tamil Nadu, India. World J. Pharmaceut. Res. 3(7): 621-633.
- Desale MK, Bhamare PB, Sawant PS, Patil SR and Kamble(2013). Medicinal plants used by the rural people of Taluka Purandhar, district Pune, Maharashtra. Indian Journal of Traditional Knowledge. 12 (2): 334-338.
- Dev S(1983). Chemistry of resins exudates of some Indian trees. Proc. Indian Natn. Sci. Acad. 49A (3):359–365.
- Dhore MM, Lachure PS, Bharsakale DB and Dabhadkar DK(2012). Exploration of some wild edible plants of Digrahs Tahsil, Dist. Yavatmal, Maharashtra, India. International J. Scientific. Res. Publications, 2(5): 1-5.
- Ekka, Neeli Rose, Dixit and Vinod Kumar 2007. Ethno pharmacognostical studies of medicinal plants of Jashpur district (Chhattisgarh). Inter. J of Green Pharmacy.1(1): 2-5.
- Ghalme RL(2020). Ethno-medicinal plants for skin diseases and wounds from Dapoli Tehsil of Ratnagiri district, Maharashtra (India). Flora and Fauna.26 (1):58-64.
- Grivetti LE. and Ogle BM(2000). Value of traditional foods in meeting macro- and micronutrient needs: the wild plant connection. Nutr. Res. Rev. 13:31-46.
- Jagtap DK, Patil HS and Jakhi PS(2013). Ethno-medicinal survey of some plants from villages of Khatav Tahashil (M.S.) India. Int. J. of Life Sciences.1 (4): 264-269.
- Jagtap DK, Jakhi PS and Kashid LM(2020). Ethno-medicinal study of some plants from Baramati and nearby villages of Pune district, Maharashtra state. International Journal of Agriculture Science and Research.10 (1):23-32.
- Jain SK. and Rao RR(1976). A handbook of field and herbarium methods. Today and Tomorrow's Printers and Publishers, New Delhi.
- Jain SK (1994). Medicinal plants. NBT, New Delhi, India.
- Jain SK, Banerjee DK and Paul DC(1973). Medicinal plants among certain Adivasis in India. Bull. Bot. Survey of India. 15: 85-91.
- Kamble SY, Patil SR, Sawant PS. Sawant S, Pawar SG and Singh EA(2010). Studies on plants used in traditional medicine by Bhilla tribe of Maharashtra. Indian Journal of Traditional Knowledge. 9 (3):591-598.
- Kannan P and Kumar PS(2014). Antidotes against snake bite from ethnobotanical practices of primitive tribes of Tamilnadu. J. Sci. Trans. Environ. Technov. 8(1):33-39.
- Khairnar, Shrikant Sanjayrao, Gadekar and Vipul Sanjay(2019). Studies on ethnobotanical plants used by tribal community of Nashik district, Maharashtra, India. Journal of Medicinal Plants Studies, 7(4): 201-204.
- Kholkunte SD(2008). Database on ethnomedicinal plants of Western Ghats. Final report 5-7-2005 to 30-06-2008 ICMR, Delhi.
- Koteswara Rao J, Prasanthi S, Aniel Kumar O and Seetharami Reddi TVV(2014). Ethnomedicine for cuts and wounds by the primitive tribe groups of north coastal Andhra Pradesh. J. Non-Timber For. Prod. 21(4): 237-240.
- Kshirsagar SR(2018). Taxonomy and occurrence of some medicinal plants used in traditional medicines. Archives of Pharmacy & Pharmacology Research.(3):1-8.

- Kulkarni Kaushik V, Jamakhandi Varsha R(2018). Medicinal uses of *Pithecellobium dulce* and its health benefits. *Journal of Pharmacognosy and Phytochemistry*. 7(2): 700-704.
- Kuvar Sachin D and Shinde R.D(2019). Plants used by Kokni tribe as antidote for snake bite and scorpion sting from Nasik and Dhule districts of Maharashtra. *Journal of Global Biosciences*.8(3): 6043-6050.
- Lingaiah M and Rao PN(2013). An ethnobotanical survey of medicinal plants used by traditional healers of Adilabad district, Andhra Pradesh, India. *Biolife* 1:17-23.
- Lokhande Kailash S(2020). Ethnobotanical survey on wild edible plants used by tribals & rural people of Arjuni/Mor taluka, Gondia district, Maharashtra state, India. *Advances in Zoology and Botany* 8(3):209-217.
- Manikandan S and Lakshmanan GMA(2014). Ethnobotanical survey of medicinal plants in Kalrayan hills, Eastern Ghats, Tamil Nadu. *Int. Letters of Natural Sciences*.12:111-121.
- Marathe Vishal R and Deshmukh Muzammil M(2020). Ethno-veterinary medicinal plant species of Hadgaon Taluka, Nanded district, Maharashtra, India. *Int. J. of Life Sciences*.8(2):404-410.
- Misra S and Misra MK(2013). Leafy Vegetable plants of South Odisha, India. *Intern. J. Agric. Food Sci*.3(4):131-137.
- Misra S and Misra MK(2014). Ethno-botanical study of plants with edible underground parts of South Odisha, India. *Intern. J. Agric. Food Sci*. 4(2):51-58.
- Mitra RG and Jain SK(1991). Medicinal plants research in India-A review. *Ethnobotany*.3:65-77.
- Murthy EN(2012). Ethnomedicinal plants used by Gonds of Adilabad district, Andhra Pradesh, India. *Intern. J. Pharm. Life Sci*. 3(10): 2034-2043.
- Nagalakshmi, NVN(2014). Diversity of wild greens knowledge from the rural households of Anantapur district, A.P. *Intern. J. Res. Appl. Nat. Social Sci*.2(5):157-160.
- Naidu BVAR(2003). Ethnomedicine from Srikakulam district, Andhra Pradesh, India. PhD Thesis, Andhra University, Visakhapatnam.
- Nair CKN and Mohanan N(1998). *Medicinal Plants of India*. Nag Publishers, Jawaharnagar, Delhi.
- Natarajan, Bhanumathi, Paulsen and Berit Smestad(2000). An ethnopharmacological study from Thane district, Maharashtra, India: Traditional knowledge compared with modern biological science. *Pharmaceutical Biology*.38(2):139-151.
- Nisha AR(2008). Antibiotic residues a global health hazard, *Vet. World*.1:375-377.
- Padal SB, Devender R, Ramakrishna H and Prabhakar R. (2013). Ethnomedicinal diversity of Ananthagiri mandal of Paderu forest division in Andhra Pradesh. *Ethnobotany*.25:143-147.
- Panda SP, Sahoo HK, Subudhi HN and Sahu AK(2014). Potential medicinal plants of Odisha used in rheumatism and conservation. *Am. J. Ethnomedicine* 1(4):260-265.
- Patil DA, Patil PS, Ahirrrao YA, Aher UP and Dushing YA(2010). Ethnobotany of Budhana district (Maharashtra: India): Plants used in veterinary medicine. *J. Phytol*. 2(12):22-34.
- Patil, P.V., Taware, S. & Kulkarni, D. 2014. Traditional knowledge of broom preparation from Bhor and Mahad region of Western Maharashtra, India. *Bioscience Discovery* 5(2), 218-220.
- Pimple, Bhushan, Kulkarni, Amrita, Bhor, Ruchita, Atkalikar and Shankarrao(2019). Pharmacognostic investigations of *Colocasia esculenta* leaves. *Current Trends in Pharmacy and Pharmaceutical Chemistry* 1(4):10-18.
- Rai, Prabhat Kumar and Lalramnghinglova H(2011). Ethnomedicinal plants of India with special reference to an Indo-Burma hotspot region: An overview. *Ethnobotany Research and Applications*. 9:379-420.
- Ramanathan R, Bhuvaneswari R, Indhu M, Subramanian G and Dhandapani R(2014). Survey of ethnomedicinal observation on wild tuberous medicinal plants of Kolli hills, Namakkal district, Tamilnadu. *J. Medicinal Plants Studies* 2(4):50-58.
- Razi BA(1952). Some aspects of vegetation of Poona and neighbouring districts. *Journal of Poona University (Science & Technology)* 1(2) :1-57.
- Reddy KN, Reddy CS and Trimurthulu G(2006). Ethnobotanical survey on respiratory disorders in Eastern Ghats of Andhra Pradesh, India. *Ethnobotanical Leaflets*.139-148.
- Rekka R and Senthil Kumar S(2014). Indigenous knowledge on some medicinal plants among the Malayali tribals in Yercaud hills, Eastern Ghats, Salem District, Tamilnadu, India. *Intern. J. Pharma Biosci*. 5(4): 371-374.
- Sahu CR, Nayak RK and Dhal NK(2013). Ethnomedicinal plants used against various diseases in Boudh district of Odisha, India. *Ethnobotan*. 25:153-159.
- Salave AP, Sonawane BN and Diwakar Reddy PG(2012). Traditional ethnoveterinary practices in Karanji Ghat areas of Pathardi tahasil in Ahmednagar district (M.S.), India. *Int. J. Plant, Animal Env. Sci*. 2:64-69.
- Salve NR and Mishra DN(2019). Ethnomedicinal list of plants treating fever in Ahmednagar district of Maharashtra, India. *Advances in Zoology and Botany* 7(3):35-46.
- Samyadurai P, Jagatheshkumar S, Aravinthan V and Thangapandian V (2012). Survey of wild aromatic ethnomedicinal plants of Velliangiri hills in the southern Western Ghats of Tamil Nadu India. *Int. J. Med. Arom. Plants*. 2:229-234.
- Santapau H (1951). A contribution to the flora of Simhagad Hill, Poona District. *Poona Agricultural College Magazine* 41(4):270-284.
- Santapau H(1957). *The Flora of Purandar*. Oxford University Press, New Delhi.
- Satyavathi K, Deepika DS and Padal SB(2014). Ethnomedicinal plants used by the Bagata tribes of Paderu forest division, Andhra Pradesh, India. *Int. J. Adv. Res. Sci. Technol*. 3:36-39.
- Shanmukha Rao V, Srinivasa Rao D, Venkaiah VM and Venkateswara Rao Y(2014). Ethnobotanical studies of some selected medicinal plants of Pathapatnam Mandalam, Srikakulam district, Andhra Pradesh, India. *Indian J. Pl. Sci*. 4(3): 22-33.
- Shinde YP, Arangale KB, Bhalariao VU and Jadhav SA (2018). Ecological vegetation of some medicinal plants in Nandur Madhyameshwar, Nashik, India. *International Journal of Botany Studies*. (3)2:158-160.
- Sieber SS, Medeiros PM, Albuquerque UP(2010). Local perception of environmental change in a semi-arid area of northeast Brazil: a new approach for the use of participatory methods at the level of family units". *Journal of Agricultural and Environmental Ethics*. 24(5):511-531.
- Singh P and Dash SS (2014). *Plant Discoveries 2013-New Genera, Species and New Records*. Botanical Survey of India, Kolkata.
- Singh P, Karthigeyan K, Lakshminarasimhan P and Dash SS (2015). *Endemic Vascular Plants of India*. Botanical Survey of India, Kolkata.
- Suneetha J, Prasanthi S and Seetharami Reddi TVV (2012). Plants in ethnoveterinary practices in East Godavari district, Andhra Pradesh. *J. Non-Timber Forest Product*. 19:63-68.

Vartak VD(1953). Contribution to the flora of Torna Hill, Poona District. Journal of Poona University Science and Technology. 1(4) :1-10.

Vartak VD(1960). The study of the flora of the Katraj Ghat. Journal of Poona University (Science & Technology).22 :85-117.

Wagh AN, Sonawane MD and Deore SV(2018). Ecological vegetation of some Rare, Endangered, Threatened and Endemic medicinal

plants of Salher and Mulher Forest, Nashik (Maharashtra). International Journal of Management, Technology & Engineering. 8(11): 2204-2211.

Zingare AK(2012). Ethnomedicinal uses of plants among the Halba tribe of Gondia district of Maharashtra, India. Bionano Frontier. SI:121-125.