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Research Article

ETHNO BOTANICAL SURVEY OF COMMERCIAL WILD EDIBLE PLANTS OF BIDAR DISTRICT, KARNATAKA, INDIA

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ABSTRACT
The present study involves the identification, enumeration and utilization of wild edible plants (WEPs) available in local markets, villages and cities in Bidar district. It gives the traditional knowledge of ethnic people, most of the tribal people as per season were fetch the wild edible plants from the forest then sold in the villages and cities for their income. Field trips were undertaken during the period from December 2014 to December 2015 (13 months) by the help of questionnaires to the tribal people vendors, vegetable dealers, fruit dealers and various village headmen. During the survey, 24 wild edible plants species from 20 genera and 16 families were recorded from vegetable and fruit markets of towns, cities and in villages by dealers and sellers. Among the 24 species, 6 plant species were used as leafy vegetables, 4 as fruit vegetables, 12 as fruit edibles and 2 species used as fruit and seed edibles (*Anacardium occidentale* and *Diospyrous montana*) and only 1 species *Colocasia esculenta* used as tuber as well as leafy vegetable. It reveals the knowledge about use of wild edible plants among the tribal communities and serves the commence cultivation as new crops for their economical and socio-cultural purpose in livelihood of human beings.

Keywords: *Ethno-Botany, Wild Edible Plants, Wild Edibles, Wild Vegetables, Commercial Wild Plants, Bidar*

INTRODUCTION
Market places were always considered on the demand of interaction between the people of sellers and customers. The people belongs to different socio-economic groups and they depend on the sources of a locally available sold food, food habits, and wild and cultivated food plant species (Alexiades and Sheldon, 1996; Angami *et al.,* 2006).
Wild food plants play a very essential role as a source of energy in the form of micro and macronutrients under the dietary supplements in many developing countries viz., India, Iran, Nepal and Ethiopia (Aberoumand, 2000; Afolayan and Jimoh, 2009; Caluwe, 2010; Promod *et al.,* 2014; Tilahun *et al.,* 2010; Yadav *et al.,* 2012). WEPs have a very high economic value and available in the naturally growing areas like forest, road sides and wastelands and also in agricultural fields (Rajeswar *et al.,* 2013). Since, time immemorial traditional knowledge of wild food plants passed on from parents to their children through orally by which most of them have been dependent on forest for their livelihood (Kar *et al.,* 2013; Rajeswar *et al.,* 2013).
Majority of tribal population lives in villages of Karnataka, by them people purchases the wild edible plants those are living in to cities (Nandini and Siddamallayya, 2014; Rajasab and Mahamad, 2004). Bidar district has ethnic groups like Halakki, Kadukuruba, Lambani, etc inhabitate in both village and forest areas (Prashanthkumar and Vidyasagar, 2006). However, the present paper includes the ethno botanical survey of commercially used wild edible plants by tribal's and rural people of the different socioeconomic communities.

MATERIALS AND METHODS
Study Area
The district is situated in the North eastern part of Karnataka state covering an area of 5448 sq. km., within 17° 35′ and 18° 25′ N latitude and 76° 42′ and 77° 39′E longitude and has elevation 673-570

meters above the sea level (figure 1). District is covered with 8.5% of forest in its total geographical area. This district comprises five taluka such as Aurad, Bidar, Bhalki, Basavakalyan and Humnabad. Agriculture is the main occupation in rural parts of the district.

Here, WEPs have extensively available in forest area, open places, waste lands and agricultural fields of the district and many of them were sold for economical purpose.

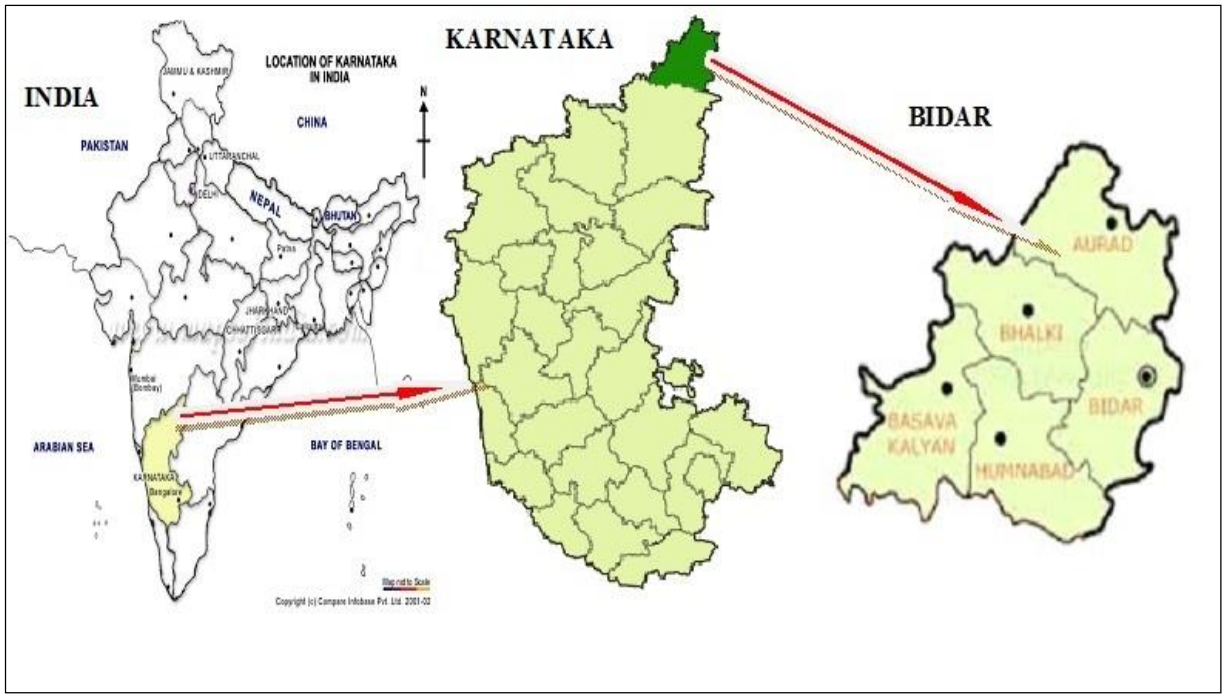


Figure 1: Location Map of the Study Area

Methodology

During the period from December 2014 to December 2015 (13 months) field trips were undertaken in vegetable and fruit markets of towns, cities and in villages.

To record the availability and marketing of WEPs in Bidar district interview were under taken by the help of questioners to tribal people vendors, vegetable dealers, fruit dealers and various village headmen. Local people were bringing the wild edible plants from the forest, sold in the cities and villages. Majority of the sellers are tribal women (age: 40-50 years), Children (age: 12-15 years) and few men (figure 2). During the survey, plants were collected made into herbarium by standard techniques (Jain and Rao, 1977) and then plant species were identified and cross checked with the help of Gamble and Fisher (1957), Seetharam *et al.*, (2000) and available references.

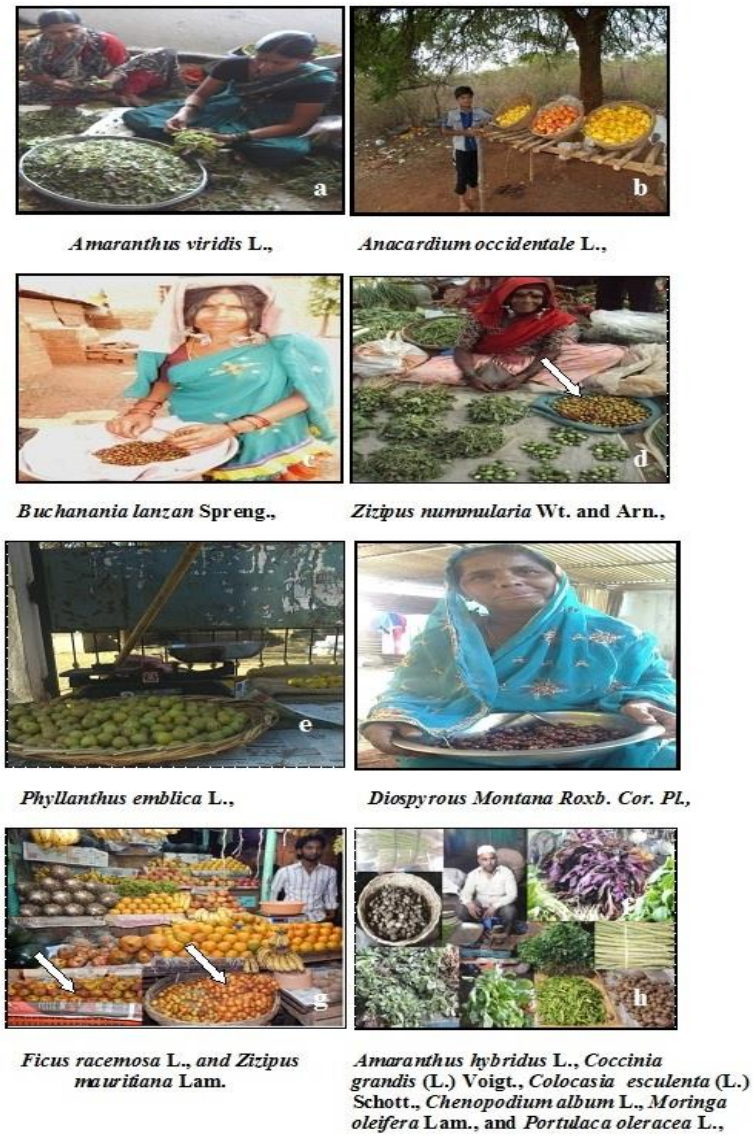
The herbarium sheets were deposited in herbarium centre of Botany department Gulbarga University, Kalaburagi, Karnataka.

RESULTS AND DISCUSSION

During the survey, 24 wild edible plants species from 20 genera and 16 families were recorded from vegetable and fruit markets of towns, cities and in villages by dealers and sellers.

Among the 24 species, 6 plant species were used as leafy vegetables, 4 as fruit vegetables, 12 as fruit edibles and 2 species used as fruit and seed edibles (*Anacardium occidentale* and *Diospyrous montana*). *Colocasia esculenta* used as tuber as well as leafy vegetable (Figure 3).

Wild edible plants sold in the market areas are arranged in alphabetical order along with botanical name, family, local name, part used, mode of usage, habitat, available season in market, part sold, market price, market locality, regions of import and marketing status (Table 1).



Amaranthus viridis L., *Anacardium occidentale* L., *Buchanania lanzan* Spreng., *Zizipus nummularia* Wt. and Arn., *Phyllanthus emblica* L., *Diospyrous Montana Roxb. Cor. Pl.*, *Ficus racemosa* L., *and Zizipus mauritiana* Lam., *Amaranthus hybridus* L., *Coccinia grandis* (L.) Voigt., *Colocasia esculenta* (L.) Schott., *Chenopodium album* L., *Moringa oleifera* Lam., and *Portulaca oleracea* L.,

Figure 2 (a-h): Documentation of Wild Edible Plants from Markets and Seller in Villages and Cities

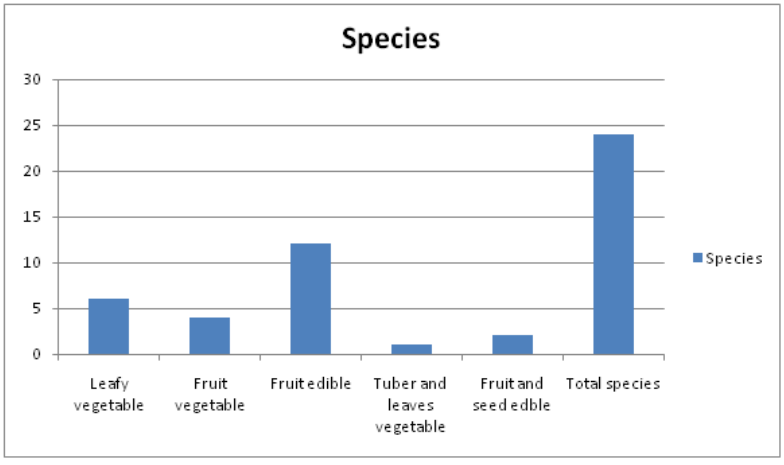


Figure 3: Life Forms Mode of Available of Wild Edible Plants in the Markets

Table 1: Description of Wild Edible Plants and their Market Value

Sl. No.	Botanical Names [Family]	Local Name	Part used/ Mode of Usage	Habitat and Available Season	Part Sold and Market Price in Rupees	Market Locality	Regions of Import	Marketing Status
1.	*Amaranthus hybridus* L. [Amaranthaceae]	Rajgiri palya	Leaves/ leaves used as vegetable	Cultivated in fields and found in open fields. Summer	Leaves:10-15 rupees per Kg	Vegetable markets in the district of Bidar, Bhalki, Humnabad.	Bidar	Common
2.	*Amaranthus viridis* L. [Amaranthaceae]	Kantha bhaji	Leaves/ leaves used as vegetable	Invasive weed, common in open areas, fields and gardens. Rainy	Leaves:10-15 rupees per Kg	Vegetable markets in the district of Bidar, Bhalki, Humnabad.	Bidar	Common
3.	*Anacardium occidentale* L. [Anacardiaceae]	Kaaju, Cashew apple	Fruit and seeds/ ripe fruits and seeds are eaten raw	Cultivated fields. Summer	Fruit (Cashew apple): 80-90 rupees per Kg Seeds: 400-450 rupees per Kg	Seller sell on road side and in villages and more frequently sell in markets.	Bidar, Aurad, Basavakalyan	Seasonable
4.	*Annona squamosa* L. [Annonaceae]	Sithaphala	Fruits/ ripe fruits eaten raw	Cultivated and found on road side, open field. Rainy	Fruits: 60-80 rupees one bosket.	All fruit markets and seller sell in the villages and cities	From local places Bidar, Bhalki, Aurad	Common
5.	*Artocarpus hirsuta* Lam. [Moraceae]	Halasu/ Jack fruits	Fruit pulp/ jackfruit pulp is eaten raw and used in	Found in cultivated lands, forest	Fruits: 250-300 rupees per Kg	Few in fruit markets	Hyderabad	Seasonable

			fruit salads	region. Winter				
6.	*Buchanania lanzan* Spreng. [Anacardiaceae]	Malle kai	Fruits and seeds / ripe fruits and seeds eaten raw	Forest region. Summer	Fruits: 8-10 rupees one bowl	Seller sell in the villages and cities	Forest region of the district	Seasonable
7.	*Canthium parviflorum* Lam. [Rubiaceae]	Khare hannu	Fruits/ ripe fruits and seeds eaten raw	Forest region. Winter	Fruits: 10 rupees one bowl	Seller sell in the villages and cities	Forest region of the district	Seasonable
8.	*Chenopodium album* L. [Chenopodiaceae]	Hunachikki palya,	Leaves/ leaves used as vegetable	Found in cultivated fields. Rainy	Leaves: 50-60 rupees per Kg	All vegetable markets in the district	Bidar, Aurad, Basavakalyan	Common
9.	*Citrus medica* L., var. *limetta*, [Rutaceae]	Gajnimbe	Fruits/ fruits used as pickles and chutney	Found in the gardens and often cultivated fields. Rainy	Fruits: 10-15 rupees per one fruit	Few vegetable markets	Bidar, Aurad, Basavakalyan	Seasonable
10.	*Coccinia grandis* (L.) Voigt. [Cucurbitaceae]	Tonde kai	Fruits/ green fruits used as vegetable	Common found on hedges and bushes in cultivated lands. Winter	Fruits: 20-24 rupees per Kg	All vegetable markets in the district	Bijapur, Gulbarga	Common
11.	*Colocasia esculenta* (L.) Schott. [Araceae]	Shavi gaddi	Tuber and Leaves/ leaves, petiole and corm cooked as vegetable also used in the	Locally abundant in marshy places. Rainy	Tuber: 80-100 rupees per Kg Leaves: 10-15rupees per Kg	All vegetable markets in the district	Bidar	Common

			preparation of snacks (bhajj's)					
12.	*Diospyrous montana* Roxb.[Ebenaceae]	Kendu, Enchil hannu	Fruits and Seeds/ Ripe fruits and seeds are eaten raw. Seeds are taste like Areca nut and can store many years.	Found in dry deciduous forests. Summer	Fruits: 10-15 rupees one bowl.	Seller sell in the villages and cities	Forest region of the district	Seasonable
13.	*Ficus racemosa* L. [Moraceae]	Atti kai	Fruits/ ripe fruits (Figs) are eaten raw	Found in dry forests, in city area and cultivated lands. Winter	Fruits: 60-80 rupees per Kg	All fruit markets	Hyderabad	Common
14.	*Moringa oleifera* Lam. [Moringaceae]	Nugge kai	Fruits/ young leaves and fruits used as vegetable and mixed in curry called saambar	Forest edges and open areas and cultivated fields. Summer	Fruits: 80-100 rupees per Kg	All vegetable markets in the district	Ananthpur, Solapur	Common
15.	*Murraya koenigii* (L.) Spreng. [Rutaceae]	Kari bevu	Leaves/ leaves are chopped and fried in oil and they are also often used to garnish many curry dishes	Road side, waste and cultivated lands. Winter	Leaves: 40-60 rupees per Kg	All vegetable markets in the district	Local places of the district	Common

16.	*Phyllanthus acidus* (L.) Skeeles [Euphorbiaceae]	Keeri nelli	Fruits/ fruits used to prepare pickles and eaten raw with small amount of salt for taste.	Found in the gardens, forest regions and cultivated fields. Summer	Fruits: 10-15 rupees per 50 gram and 5-10 rupees one bowl	Few fruit markets	Local parts of district	Seasonable
17.	*Phyllanthus emblica* L. [Ephorbiaceae]	Bettad nelli	Fruits/ fruits eaten raw when ripe and used to prepare jelly, pickles and sauce	Found in cultivated fields, gardens and dry forests. Summer	Fruits: 200-250 rupees per Kg	Few fruit markets	Bhalki, Bidar, Gulbarga	Seasonable
18.	*Portulaca oleracea* L. [Portulacaceae]	Dodda ghooli palya	Leaves/ leaves cooked as vegetable and mixed in curries	Along the edges of open field, cultivated fields and plains. Rainy	Leaves: 14-16 rupees per Kg	All vegetable markets in the district	Hyderabad, Belagao, Solapur	Common
19.	*Portulaca quadrifida* L. [Portulacaceae]	Sanna ghooli palya	Leaves/ cooked as vegetable and mixed in curries	Along the edges of open field, cultivated fields and plains. Rainy	Leaves: 14-16 rupees per Kg	All vegetable markets in the district	Hyderabad, Belagao, Solapur,	Common
20.	*Semecarpus anacardium* L. [Anacardeaceae]	Kyare kai	Fruits/ receptacle or fruit edible at maturity	Open land, road side and forest lands. Winter	Fruits: 100-150 rupees per Kg and 15-20 rupees per 50 gram	Few fruit markets and seller sell in the villages and cities	Local people brought from forest regions and Zaheerabad	Seasonable

21.	*Syzigium cumini* (L.) Skeels. [Myrtaceae]	Nerale kai	Fruits/ ripe fruit eaten raw and taste this fruit with little amount of salt	Found in moist habitats, gardens, and cultivated fields. Winter	Fruits: 50-60 rupees per Kg	Few fruit markets	Local places of the district and Jaheerabaad, Nanded	Seasonable
22.	*Tamarindus indica* L. [Caesalpinaceae]	Hunasin kai	Fruits/ young leaves cooked as vegetable, unripe fruits making as pickles and ripe fruits used in curries	Cultivated places near villages. Winter	Unripe fruits: 16-20 rupees per Kg Ripe fruits: 20-40 rupees per Kg.	All vegetable markets in the district	Local parts of district.	Common
23.	*Zizipus mauritiana* Lam. [Rhamnaceae]	Baare kai	Fruits/ ripe fruits eaten raw	Found mostly along the forest edges and often cultivated fields. Winter	Fruits: 10-15 rupees per Kg	Fruit markets	Local parts of district.	Seasonable
24.	*Zizipus nummularia* Wight. and Arn. [Rhamnaceae]	Kaad bare kai	Fruits/ ripe fruits eaten raw	Commonly found in grassland, semi arid and scrub forests. Winter	Fruits: 5-10 rupees one bowl.	Fruit markets and seller sell in the villages and cities	Local parts of district and Nanded	Seasonable

It has been observed that wild edible plant species like *Amaranthus hybridus, Amaranthus viridis, Chenopodium album, Coccinia grandis, Colocasia esculenta, Ficus racemosa, Moringa oleifera, Murraya koenigii, Portulaca oleracea, Portulaca quadrifida, Tamarindus indica* and *Zizipus mauritiana* have much market demand and available commonly in all markets where as species like *Artocarpus heterophyllus, Citrus medica* L. var. *limetta, Phyllanthus emblica, Phyllanthus acidus* and *Syzigium cumini* have been seen in few markets in particular season.

In other words species like *Anacardium occidentale*, *Annona squamosa*, *Semecarpus anacardium* and *Zizipus nummularia* are sold in markets as well as in villages and cities by sellers as per seasonable and the others species like *Buchanania lanzan, Canthium parviflorum* and *Diospyrous montana* are sell in villages and cities by sellers only.

These wild edible plant species obtained from the forest in available season and marketed in villages and cities for good market value.

The other plant species import from the district of Ananthpur, Hyderabad, Zaheerabaad (Andhra Pradesh state), Solapur, Nanded, (Maharastra state), Belgao, Bijapur, Gulbarga and Bidar district (Karnataka state).

During the ethno botanical survey of available literature in various countries viz., Argentina, South Ethiopia, Bulgarian-Turkish border and Nepal, wild edible plants were used as wild vegetables, wild edibles and wild medicinal plants and sold in local bazaars for their high market value as source of income (Diego *et al.,* 2006; Balmie and Kebebew, 2006; Shrestha and Dhillion, 2006; Yunus and Anely, 2015).

In India, diversity of WEPs is rich in all communities, covering a variety of areas especially in medicine and in many ingredients for food supplements (Hazarika *et al.,* 2006). In North East India wild edible plants consumed by Assam's peoples as wild edible vegetable either raw or cooked in daily diet (Kar and Borthakur, 2007; Moitreyee, 2015).

In Orissa most of tribal population depends on forest ecosystem and has its own socio-cultural pattern, tradition and typical food preparations (Rekha and Valeria, 2005). In Western Ghats region of Maharashtra and districts of Chandrapur, Nagpur and Thane, ethno botanical studies of wild edible plants used by the tribal women, rajgond tribe and local people for their food resources (Desmukh and Ahilya, 2011; Mallesh, 2012; Suwarna *et al.,* 2015; Gayatri *et al.,* 2015). In north Karnataka wild edible plant of *Launea procumbens* have documented as leafy vegetable in markets (Rajasab and Rajshekhar, 2012). However, in Bidar district there is no such detailed study on documentation of commercial wild edible plants so far the present paper is communicated.

Conclusion

The study reveals the current position on the local markets located in the towns and in rural areas and this also gives the knowledge about tribal vendors marketed in villages and cities. It proved that participants of selling wild edible plants were more by women and children when compare to men. It serves the knowledge of proper utilization and to conserve the wild edible plants into production of agricultural crops to get appropriate price, generate income in throughout the year.

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