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Wild edible plants with its socio-economic importance used by tribes of Gaya District, Bihar

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Abstract

A total of 48 wild edible plants belonging to 30 families traditionally used by the tribes in Gaya district of Bihar, India, were recorded. From the present study area, out of 48 wild edible plants 13 plant species identified for the socio-economic augmentation of the country as a whole and tribal in particular. The highest number of edible species documented belong to Leguminosae (6), followed by Amaranthaceae (5) while the Apocyanaceae and Anacardiaceae contributed three species each. The maximum utilization of edible parts was of leaves/leafy shoots (19 spp.) followed by fruits (17 spp.), flowers (5 spp.), seeds (3 spp.) etc. It was observed that the tribes of Gaya district were using in their diet 37% leaves and 33% fruits from the forest ecosystem. These wild edible plants are highly nutritious than several known common cultivated ones and also provide rural households with supplemental income opportunities through collection and sale in local markets. Domestication and value addition of such less known edible plant resources was suggested.

Keywords: Wild edibles; Gaya; Leafy vegetables

Introduction

The traditional knowledge is useful to expand new food sources. Documentation of traditional knowledge of wild edible plants along with their ethnomedicinal uses is essential for formulating conservation strategies. Wild edible plants play a significant role in meeting requirement of local people in remote part of country (Sundriyal & Sundriyal, 2001). There are several wild edible plants that are consumed by local people in several forms such as roots, tubers, leaves, flowers, fruits, seeds, etc. Wild edible plants are nutritionally rich than many of the cultivated species (Burlingame, 2002). Reliance on wild edible plants is

found more favorable among the poor and marginalized rural families and farming communities. These plants also provide rural households with supplemental income opportunities through collection and sale in local markets (Moreno-Black & Price, 1993). It was a known fact that many plants used and cultivated today by civilized societies were originally identified and developed through indigenous knowledge. Unfortunately, utilization of indigenous food plants in rural areas also found losing familiarity due to arrival of modernized and processed food items and thereby knowledge on the wild edible plants was declining in alarming speed warranting detail research work on their nutrient value.

Gaya district was established in October 1865. The district has a common boundary with the state of Jharkhand to the south. Gaya city is both the district headquarters and the second-largest city in Bihar. The district occupies an area of 4976 km² and has a population of 43, 91,418 (as of 2011 census). The district has a literacy rate of 66.35%. In 1976 Gaya district became home to the Gautam Buddha Wildlife Sanctuary, which has an area of 260 km². Agriculture is the leading economic activity of the district. The main crops grown are rice, wheat, potatoes, and lentils. The available literature on ethnobotany of Bihar indicates that sufficient work has not been done in the state in context of ethnobotany. Considering the forest cover and tribal population of the Gaya district, many of the earlier studies (Kumar and Yadav, 2004, 2007; Pratap *et al.*, 2007, 2009; Aditya *et al.*, 2009; Keshri, 2010 and Kumar and Singh, 2016) recorded the medico-religious and traditional medicinal uses of plants in and around Gautam Buddha Wildlife Sanctuary.

In this study, authors documented wild edible plants utilized by tribes of Gaya district of Bihar with an expectation that this data will provide baseline information for policy makers.

Materials and Methods

Old and experienced men, women and medicine men were interviewed for the first hand information on uses of the plants from villages and forest areas from Gaya district (Barachatti range, Sankhwara, Karmoni Bazar, Dhobi, Shobha Bazar, Barkichafi, Sankhua, Khaira forest areas, Matgadha, Baijnathpur, Fansunia forest areas, Gurpa range, Birhor tola (Gurpa range), Alagdiha (South), Bakwara, Rangaini (Gurpa range), Dundu, Dumarichatti, Bardah, Paharpur Dumaria

(Emamganj range), Khardag, Chatarpur, Emamganj, Biraj, Salaiya Manpur, Gehlor, Tikari, Belaganj, Konch, Gurua forest) during 2019-2020. During the survey interaction was done with several tribal groups as Kharwar, Oraon, Chero, Birhor and other non-tribal people of the areas. Repeated and cross queries were done for confirmation and verification of the information. The *Prior Informed Consent* (PIC) was obtained from the ethnic groups concerned. The informers were taken to forest for collection of voucher specimens. The voucher specimens were kept between the blotting papers for drying and the blotting papers were bundled in plant press. After drying these specimens were poisoned, mounted, stitched and labeled on herbarium sheet. A total of 140 field numbers have been collected from the district of which 48 are reported here. These plant specimens were identified with the help of keys and botanical description, described regional Floras by Haines (1921-25), Mooney (1941, 1950) and Singh *et al.* (2001). After matching and verification with the authentic specimens kept in Central National Herbarium, voucher specimens have been deposited in Ethno-botanical Herbarium of Central Botanical Laboratory (CBL), Howrah. Further, these uses were compared and cross checked with well-known standard Indian ethnomedicinal (Jain, 1991) and medicinal literatures (Kirtikar and Basu, 1935; Chopra *et al.*, 1956; Anonymous, 1948-76) and found that most of the uses have not been reported earlier, some are less known and some are well known. In the enumeration, the plant species have been arranged alphabetically with their family, local name(s), habit and uses in detail (Table 1). The names of authors were checked from Brummitt & Powell (1992) and widely accepted website International Plant Names Index and Plants of the World Online.



Plate 1.a. *Capparis zeylanica* fruits - edible; b. *Celosia argentea* leaves - edible; c. *Hygrophila auriculata* leaves - edible; d. *Madhuca longifolia* var. *latifolia* flowers and fruits- edible; e. *Marsilea aegyptica* leaves - edible; f. *Medicago polymorpha* leaves – edible; g. *Pergularia deamia* flowers – edible; h. *Woodfordia fruticosa* flowers and nectaries – edible.

Table 1. List wild edible plants growing in Gaya District, Bihar

Sr. No.	Scientific name with field no.	Local name	Habit	Family	Use/s
1.	<i>Aegle marmelos</i> (L.) Correa (CBL 42210)	Bel	Tree	Rutaceae	Fruits are edible. Used to prepare sharbat and jam. Fruit is sold in market/local hat for Rs.10/- per pc.
2.	<i>Aerva lanata</i> (L.) Juss. (CBL 42206)	Khali	Herb	Amaranthaceae	Leaves are eaten during famine.
3.	<i>Alternanthera sessilis</i> (L.) R.Br. ex DC. (CBL 42290)	Gadapahad	Herb	Amaranthaceae	Leaves are eaten as vegetable.
4.	<i>Amaranthus viridis</i> L. (CBL 42300)	Ganari	Herb	Amaranthaceae	Leaves are edible. One bunch is sold for Rs. 5/-.
5.	<i>Azadirachta indica</i> A.Juss. (CBL 42264)	Neem	Tree	Meliaceae	Young leaf made in to curry with bringel and eaten. Two bunch is sold market/local hat for Rs. 5/-
6.	<i>Bauhinia vahlii</i> Wight & Arn. (CBL 42350)	Bhorla	Liana	Leguminosae	Seeds are fried with rectified butter and eaten.
7.	<i>Borassus flabellifer</i> L. (CBL 42278)	Tad	Tree	Arecaceae	Endosperm is eaten. Young seedling (Param) is edible. Param is sold in market for 1/- per piece.
8.	<i>Buchanania cochinchinensis</i> (Lour.) M.R.Almeida (CBL 42237)	Pyar	Tree	Anacardiaceae	Seeds are edible. Seeds are collected by the tribal people and sold in the market for 400/- kg.
9.	<i>Butea monosperma</i> (Lam.) Taub. (CBL 42212)	Palash	Tree	Leguminosae	Flowers decoction is taken as sharbat for cooling purpose.
10.	<i>Capparis zeylanica</i> L. (CBL 42315)	Bhagi	Climber	Capparaceae	Fruits are made in to vegetable and eaten as sabji. Fruits are collected sold in the market for 40/- kg.
11.	<i>Carissa spinarum</i> L. (CBL 42245)	Kanoda	Shrub	Apocynaceae	Fruits are eaten raw. Pickle is prepared from fruits. Fruits are collected sold in the market for Rs.40 to Rs.50/- kg.

12.	<i>Celosia argentea</i> L. (CBL 42205)	Murg	Herb	Amaranthaceae	Leaves are edible.
13.	<i>Cheilocostus speciosus</i> (J.Koenig) C.D.Specht (CBL 42345)	Kewa	Herb	Costaceae	Rhizome is washed in the running water and cooked with rice and eaten.
14.	<i>Chenopodium album</i> L. (CBL 42299)	Bathua	Herb	Amaranthaceae	Leaves are edible.
15.	<i>Coccinia grandis</i> (L.) Voigt (CBL 42351)	Kundri	Climber	Cucurbitaceae	Fruits are edible.
16.	<i>Cocculus hirsutus</i> (L.) W.Theob. (CBL 42281)	Barki Jadi	Climber	Menispermaceae	Leaves are edible.
17.	<i>Cryptolepis dubia</i> (Burm.f.) M.R.Almeida (CBL 42228)	Dudhlar, Dudhi	Climber	Apocynaceae	Flowers and fruits are edible.
18.	<i>Dendrocalamus strictus</i> (Roxb.) Nees (CBL 42252)	Jangi Bans	Shrub	Poaceae	Bamboo shoots (Karel) are edible. Used for preparation of pickle, paratha and curry etc. Karel is sold in market for Rs.20/- per bunch.
19.	<i>Diospyros melanoxylon</i> Roxb. (CBL 42236)	Kendu patta	Tree	Ebenaceae	Fruits are edible. Fruits are sold in market for 1/- per piece.
20.	<i>Ficus religiosa</i> L. (CBL 42319)	Pipal	Tree	Moraceae	Fruits are edible.
21.	<i>Flacourtia indica</i> (Burm.f.) Merr. (CBL 42295)	Behcha	Shrub	Salicaceae	Fruits are edible
22.	<i>Hibiscus cannabinus</i> L. (CBL 42307)	Kudrum	Shrub	Malvaceae	Leaves are edible.
23.	<i>Holoptelea integrifolia</i> Planch. (CBL 42242)	Chilbil	Tree	Ulmaceae	Seed are edible.
24.	<i>Hygrophila auriculata</i> (Schumach.) Heine (CBL 42273)	Gokshur	Herb	Acanthaceae	Leaves are edible.
25.	<i>Grewia asiatica</i> L. (CBL 42261)	Gadkhuli	Shrub	Malvaceae	Fruits are edible
26.	<i>Gymnosporia emarginata</i> (Willd.) Thwaites (CBL 42262)	Behach	Shrub	Celastraceae	Leaves are edible.
27.	<i>Lannea coromandelica</i> (Houtt.) Merr. (CBL 42333)	Gejan	Tree	Anacardiaceae	Gum is edible. Gum is collected and sold in market for Rs.
28.	<i>Lantana camara</i> L. (CBL 42282)	Putus	Shrub	Verbenaceae	Flower nectar is edible.
29.	<i>Madhuca longifolia</i> var. <i>latifolia</i> (Roxb.) A.Chev. (CBL 42235)	Mahu	Tree	Sapotaceae	Flowers and fruits are edible. Fruit oil is used for cooking purpose. Flowers are

30.	<i>Marsilea aegyptica</i> Willd. (CBL 42297)	Berami	Herb	Marsiliaceae	Leaves are edible.
31.	<i>Marsilea minuta</i> L. (CBL 42339)	Dhuna	Herb	Marsiliaceae	Leaves are edible. Sold in market for Rs. 10/- per bunch.
32.	<i>Medicago polymorpha</i> L. (CBL 42301)	Ban Buti	Herb	Leguminosae	Leaves are edible.
33.	<i>Mucuna pruriens</i> (L.) DC. (CBL 42296)	Kurkutia, Kurkut	Climber	Leguminosae	Seed are edible.
34.	<i>Opuntia elatior</i> Mill. (CBL 42320)	Chupchupa	Shrub	Cactaceae	Fruits are eaten
35.	<i>Oxalis corniculata</i> L. (CBL 42341)	Teen patia	Herb	Oxalidaceae	Leaves are edible.
36.	<i>Pergularia daemia</i> (Forssk.) Chiov. (CBL 42288)	Latpatia	Climber	Apocynaceae	Flowers are edible.
37.	<i>Phoenix sylvestris</i> (L.) Roxb. (CBL 42216)	Khejur	Tree	Arecaceae	Fruits are edible.
38.	<i>Physalis angulata</i> L. (CBL 42347)	Puchka	Herb	Solanaceae	Fruits are edible.
39.	<i>Semecarpus anacardium</i> L.f. (CBL 42293)	Bhelwa	Tree	Anacardiaceae	Fruits are edible. Sold in local hat for Rs. 5/- for 10 pieces.
40.	<i>Senna uniflora</i> (Mill.) H.S.Irwin & Barneby (CBL 42322)	Chakuda	Herb	Leguminosae	Leaves are edible.
41.	<i>Solanum americanum</i> Mill. (CBL 42298)	Ban Futka	Herb	Solanaceae	Children are eating fruits after ripening.
42.	<i>Sonchus oleraceus</i> (L.) L. (CBL 42338)	Jhara	Herb	Compositae	Leaves are eaten during famine.
43.	<i>Syzygium cumini</i> (L.) Skeels (CBL 42214)	Jamun	Tree	Myrtaceae	Fruits are edible.
44.	<i>Tamarindus indica</i> L. (CBL 42346)	Tetul	Tree	Leguminosae	Leaves made in to chutney and eaten.
45.	<i>Tinospora sinensis</i> (Lour.) Merr. (CBL 42344)	Giloy bel	Climber	Menispermaceae	Leaves are edible.
46.	<i>Vitex negundo</i> L. (CBL 42207)	Sinduar	Shrub	Lamiaceae	Leaves are edible.
47.	<i>Woodfordia fruticosa</i> (L.) Kurz (CBL 42215)	Ful Dhaw	Shrub	Lythraceae	Flowers and nectaries are edible.
48.	<i>Ziziphus oenopolia</i> (L.) Mill. (CBL 42248)	Dithore	Shrub	Rhamnaceae	Fruits are edible.

Discussion

During this investigation, a total of 48 plant species belonging to 30 families were collected. The highest number of edible species documented belong to Leguminosae (6), followed by Amaranthaceae (5) while the Apocyanaceae and Anacardiaceae contributed three species each. The maximum utilization of edible parts was of leaves/leafy shoots (19 spp.) followed by fruits (17 spp.), flowers (5 spp.), seeds (3 spp.) etc. It was observed that the tribes of Gaya district were using in their diet 37% leaves and 33% fruits from the forest the ecosystem. Leafy vegetables are collected, cooked and eaten with their staple food by a majority of ethnic people. Some of these species are also used for making curry and chutney. These were either collected from forest areas or found as weeds in moist areas of cultivated and open fields. Fruits are eaten as raw as well as in ripen forms. After comparison and cross checking of collected uses with relevant literatures, it is revealed that *Marsilea aegyptica* have been reported as edible for the first time. From the present study area 13 plant species identified for the establishment of herbal cottage industries in the tribal areas for the socio-economic augmentation of the country as a whole and tribal in particular.

Conclusion

It is necessary to collect and document such precious knowledge from the tribal and remote areas before their complete depletion due to lack of interest of young generation towards traditional knowledge, rapid socio-economic, environmental changes, urbanization and unscientific exploitation of natural forests, and also increase awareness among the tribal communities for sustainable use of plant wealth and their conservation. There is further need to explore wild edibles that can be harvested without much pressure on a particular species with the principles of sustainable utilization of genetic resources. Steps are also needed to undertake extensive education about the importance of wild natural edibles as a nutritionally balanced food, and as a direct and indirect source of income particularly for the poor families.

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