

SHORT COMMUNICATION

Documentation of folk knowledge on underutilized wild edible plants of Southern Rajasthan

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Received 23 July 2014; Revised 27 April 2016

An ethnobotanical study was conducted during 2010-12 in Southern Rajasthan with local indigenous communities. Structured interviews, field observations and group discussions with the informants were used to gather the data. A total of 46 plant species belonging to 27 families were reported from the study area. Poaceae was the dominant family with 7 species. Herbs were used primarily as leafy vegetable and grains of several grasses were used during famine. About 81 % of the recorded underutilized wild edible plant species are rarely used, while the 19 % are commonly used. The study showed that the majority (72 %) of the species are edible and eaten after cooking while 28 % were eaten raw. Wild edible plant species of *Ceropegia* have become endangered due to excessive harvesting. Unless efforts are made to make the younger generations aware about the importance of these plants, the related traditional knowledge may be lost. The study suggests that these underutilized plants may play an important role in national food security policy and health care.

Keywords: Ethnobotany, Traditional knowledge, Indigenous communities, Southern Rajasthan, Underutilized wild edible plants.

IPC code; Int. cl. (2015.01)– A23L 1/100, A61K 36/100

Introduction

From the inception of human civilization men used to live in sylvan jungles and the degree of his association with forest determines his status as 'Tribal' in rural urban continuum. Tribals' pockets are found in various parts of India, including Rajasthan, which is endowed with unique flora, fauna and ecosystem with rich natural genetic resources. Ethnobotanical studies on underutilized wild edible plants as food are of immense importance in a state like Rajasthan where famines due to drought occurs rather frequently. During

famine, people resort to eating fruits, nuts, berries, bulbs of certain underutilized wild edible plants and grains of certain wild grasses. The poor people cannot afford to buy the costly cereals during such famine and depend partially or fully upon natural vegetation available in their immediate vicinity and supplement their diet with a variety of wild edible plants. This leads to change in their diet with a variety of underutilized wild edible plants and consumption habit.

Although, some work has been carried out in Rajasthan on underutilized wild edible plants used by tribal communities¹⁻⁵, but there is paucity of knowledge on underutilized wild edible plants of Southern Rajasthan. Therefore, The aim of this paper is to study the nature of traditional knowledge pertaining to the use and management of underutilized wild edible plant^{6,7} resources of the indigenous communities of Southern Rajasthan.

Materials and Methods

Study area

Rajasthan is the largest state of India, located in its northwestern part. Geographically, it lies between 23° 30' to 30° 12' longitude and 69° 30' and 78° 17' latitude. The most striking geological feature of Rajasthan is the Aravalli mountain range (Southern Rajasthan). The variability in climate, physiography, edaphic and topographic conditions explains the diversity of vegetation (including wild food plants) in the Aravalli ranges. This hill range hosts several indigenous communities. The main tribes of the study area are *Bhil*, *Meena*, *Damor*, *Garasia* and *Kathodi*, which constitute the 13.5 % of the total population of the state.

The Aravalli system of mountains dominates the study area. Most of the area is hilly, with long continuous ridges, shallow valleys with an immense network of *Nalas* (drains) and fairly deep gorges. The climate is cool and humid in Southern Rajasthan in comparison to other parts of the state. The vegetation of the study area is mainly constituted by tropical dry deciduous forests with patches of sub-tropical evergreen forests around Mount Abu. The major portion of the forests is dominated by *Anogeissus pendula* Edgew. trees. Other trees that are dominant

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Table 1—Underutilized wild edible plants of Southern Rajasthan and their local uses.

S. No.	Botanical name, [Voucher number]	Family	Local name	Parts used	Preparation (Mode of administration)	Frequency of citation (%)	Relative frequency of citation (%)
1.	<i>Alloteropsis cimicina</i> (L.) Stapf [HEA-9]	Poaceae	<i>Basnti ghass</i>	Grains	Grains are used as famine food.	7	0.3
2.	<i>Amaranthus spinosus</i> L. [HEA-13]	Amaranthaceae	<i>Kantili – cholai</i>	Tender leaves	Leaves are cooked as vegetables.	66	2.6
3.	<i>Amaranthus viridis</i> L. [HEA-14]	Amaranthaceae	<i>Jungli – cholai</i>	Tender leaves and shoots	Leaves and shoots are cooked as vegetables.	69	2.8
4.	<i>Amorphophallus bulbifer</i> (Roxb.) Blume [HEA-15]	Araceae	<i>Jungali suran</i>	Tubers	Tubers are cooked as vegetables.	44	1.8
5.	<i>Ampelocissus latifolia</i> (Roxb.) Planch. [HEA-16]	Vitaceae	<i>Dhamado, Tita</i>	Ripe fruits and sap	Ripe fruits are eaten. The sap is drunk to satiate the thirst.	32	1.3
6.	<i>Anogeissus latifolia</i> (Roxb. ex DC.) Wall. ex Guillem. & Perr. [HEA-20]	Combretaceae	<i>Dhawda</i>	Gum	The gum is fried and consumed in local food preparations during winter season.	91	3.6
7.	<i>Arisaema tortuosum</i> (Wall.) Schott [HEA-25]	Araceae	<i>Suran, Halida</i>	Tubers	Tubers are cooked as vegetables.	51	2.0
8.	<i>Bridelia retusa</i> (L.) A. Juss. [HEA-36]	Phyllanthaceae	<i>Aggniya</i>	Ripe fruit, Tender leaves and inflorescence	Ripe fruits are eaten. Tender leaves and inflorescences are cooked as vegetables.	19	0.8
9.	<i>Buchanania cochinchinensis</i> (Lour.) M. R. Almeida [HEA-37]	Anacardiaceae	<i>Char</i>	Ripe fruits and seed kernels	Ripe fruits are eaten. Seed kernels are used in sweet dishes.	36	1.4
10.	<i>Celosia argentea</i> L. [HEA-47]	Amaranthaceae	<i>Garkha</i>	Leaves and tender shoots	Leaves and tender shoots are cooked as vegetables.	22	0.9
11.	<i>Ceropegia bulbosa</i> Roxb. [HEA-53]	Apocynaceae	<i>Khadula</i>	Leaves and tubers	Leaves are cooked as vegetables. Tubers are eaten either in raw form or cooked.	26	1.0
12.	<i>Cissus repanda</i> (Wight & Arn.) Vahl [HEA-55]	Vitaceae	<i>Pani vela</i>	Shoot and sap	Shoots are cooked as vegetables. The sap is drunk to satiate the thirst.	25	1.0

(contd.)

Table 1—Underutilized wild edible plants of Southern Rajasthan and their local uses (*contd.*).

S. No.	Botanical name, [Voucher number]	Family	Local name	Parts used	Preparation (Mode of administration)	Frequency of citation (%)	Relative frequency of citation (%)
13.	<i>Clerodendrum indicum</i> (L.) Kuntze [HEA-65]	Lamiaceae	<i>Anni</i>	Leaves	Leaves are cooked as vegetables.	14	0.6
14.	<i>Coccinia grandis</i> (L.) Voigt [HEA-66]	Cucurbitaceae	<i>Tindori</i>	Unripe fruits	Unripe fruits are cooked as vegetables.	66	2.6
15.	<i>Cocculus hirsutus</i> (L.) W. Theob. [HEA-67]	Menispermaceae	<i>Van veela, Baar</i>	Leaves	Leaves are cooked as vegetables.	29	1.2
16.	<i>Coix lacrym-jobi</i> L. [HEA-70]	Poaceae	<i>Garelo, Jorgadi</i>	Seeds	Seeds are eaten after boiling and also used for making porridge along with corn.	10	0.4
17.	<i>Commelina benghalensis</i> L. [HEA-71]	Commelinaceae	<i>Kalni, Mokka</i>	Leaves and tender shoots	Leaves and tender shoots are cooked as vegetables and also used in preparing <i>Pakoris</i> (Local snack)	17	0.7
18.	<i>Corchorus trilocularis</i> L. [HEA-74]	Malvaceae	<i>Kagli tambakhu, Karak</i>	Leaves	Leaves are cooked as vegetables.	25	1.0
19.	<i>Cyperus rotundus</i> L. [HEA-93]	Cyperaceae	<i>Moth, Kadel</i>	Bulbs, Seeds	Bulbs and seeds are eaten in raw form.	27	1.1
20.	<i>Dactyloctenium aegyptium</i> (L.) Willd. [HEA-94]	Poaceae	<i>Malicha, Mansi</i>	Grains	Grains are used for making bread, <i>Kheer</i> (local sweet) and porridge.	13	0.5
21.	<i>Dentella repens</i> (L.) J. R. Forst. & G. Forst. [HEA-96]	Rubiaceae	-	Leaves	Leaves are cooked as vegetables.	10	0.4
22.	<i>Digera muricata</i> (L.) Mart. [HEA-97]	Amaranthaceae	<i>Lehsua</i>	Whole plant	Whole plant is cooked as vegetable.	17	0.7
23.	<i>Digitaria longiflora</i> (Retz.) Pers. [HEA-98]	Poaceae	<i>Kaua</i>	Grains	Flour of grains is used in making bread.	10	0.4
24.	<i>Ehretia laevis</i> Roxb. [HEA-112]	Boraginaceae	<i>Tamboli</i>	Ripe fruits, Bark	Ripe fruits are eaten. Stem bark is eaten as famine food.	20	0.8
25.	<i>Euryale ferox</i> Salisb. [HEA-124]	Nymphaeaceae	<i>Tal makhana</i>	Ripe fruits	Fruits are eaten.	10	0.4

(contd.)

Table 1—Underutilized wild edible plants of Southern Rajasthan and their local uses (*contd.*).

S. No.	Botanical name, [Voucher number]	Family	Local name	Parts used	Preparation (Mode of administration)	Frequency of citation (%)	Relative frequency of citation (%)
26.	<i>Flacourtia indica</i> (Burm. f.) Merr. [HEA-135]	Salicaceae	<i>Kankair</i>	Ripe fruits	Fruits are eaten.	27	1.1
27.	<i>Hackelochloa granularis</i> (L.) Kuntze [HEA-150]	Poaceae	<i>Majri hankli</i>	Grains	Grains are used in famine conditions.	8	0.3
28.	<i>Iphigenia indica</i> (L.) A. Gray ex Kunth [HEA-158]	Colchicaceae	<i>Dholi musli</i>	Underground corms	Corms are eaten in raw form.	10	0.4
29.	<i>Leea macrophylla</i> Roxb. ex Hornem. [HEA-170]	Vitaceae	<i>Lal Patti, Hasti kand</i>	Leaves and flowers	Leaves and flowers are cooked as vegetables.	17	0.7
30.	<i>Lepidium didymum</i> L. [HEA-81]	Brassicaceae	<i>Panacholi</i>	Young shoots	Young shoots are cooked as vegetables.	14	0.6
31.	<i>Leptadenia reticulata</i> (Retz.) Wight & Arn. [HEA-171]	Apocynaceae	<i>Jumka</i>	Unripe fruits	Unripe fruits are eaten in raw form with salt.	13	0.5
32.	<i>Leucas cephalotes</i> (Roth) Spreng. [HEA-172]	Lamiaceae	<i>Kubhi</i>	Leaves	Leaves are cooked as vegetables.	17	0.7
33.	<i>Momordica dioica</i> Roxb. ex Willd. [HEA-183]	Cucurbitaceae	<i>Kinkoda</i>	Unripe fruits	Unripe fruits are cooked as vegetables.	88	3.5
34.	<i>Ocimum gratissimum</i> L. [HEA-190]	Lamiaceae	<i>Bapchi, Jungli tulsi</i>	Seeds	Seeds are soaked in water at night and next morning, mixed with curd and then consumed.	22	0.9
35.	<i>Oroxylum indicum</i> (L.) Kurz [HEA-193]	Bignoniaceae	<i>Shivnath</i>	Ripe fruits, flowers	Ripe fruits are eaten. Flowers are cooked as vegetables.	17	0.7
36.	<i>Paspalum scrobiculatum</i> L. [EA-201]	Poaceae	<i>Kodra</i>	Grains	Bread is made from the flour of grains.	58	2.3
37.	<i>Pentanema indicum</i> (L.) Ling [HEA-203]	Compositae	<i>Ram til</i>	Seeds	Seed oil is edible.	17	0.7

(contd.)

Table 1—Underutilized wild edible plants of Southern Rajasthan and their local uses (*contd.*).

S. No.	Botanical name, [Voucher number]	Family	Local name	Parts used	Preparation (Mode of administration)	Frequency of citation (%)	Relative frequency of citation (%)
38.	<i>Pergularia daemia</i> (Forssk.) Chiov. [HEA-204]	Apocynaceae	<i>Gadaria kibel</i>	Inflorescence and flowers	Inflorescence and flowers are cooked as vegetables.	17	0.7
39.	<i>Phoenix sylvestris</i> (L.) Roxb. [HEA-205]	Arecaceae	<i>Khajoor</i>	Ripe fruits, tender shoots, sap and farinaceous deposit	Ripe Fruits are eaten fresh or dried. Young tender shoots are cooked as vegetables. Sap is used as drink and also for making jaggery. Farinaceous deposit called <i>Bari</i> is eaten in raw form.	72	2.8
40.	<i>Pithecellobium dulce</i> (Roxb.) Benth. [HEA-209]	Leguminosae	<i>Jungle jalebi, Kikar</i>	Ripe fruits	Ripe fruits are eaten.	73	2.9
41.	<i>Portulaca oleracea</i> L. [HEA-216]	Portulacaceae	<i>Kulfa, Kungan</i>	Whole plant	Used as vegetable due to its refreshing properties.	25	1.0
42.	<i>Remusatia vivipara</i> (Roxb.) Schott [HEA-225]	Araceae	-	Tuber, leaves	Tubers are eaten raw. Leaves are used as vegetables.	16	0.6
43.	<i>Rhus mysurensis</i> B. Heyne ex Wight & Arn. [HEA-226]	Anacardiaceae	<i>Dansaria</i>	Ripe fruits	Ripe fruits are either eaten fresh or dried.	85	3.4
44.	<i>Salvadora oleoides</i> Decne. [HEA-232]	Salvadoraceae	<i>Pilu</i>	Ripe fruits	Ripe fruits are eaten fresh or dried.	58	2.3
45.	<i>Typhonium trilobatum</i> (L.) Schott [HEA-280]	Araceae	<i>Jungli jamikand</i>	Tubers	Tubers are sliced and steeped in stream overnight and cooked the next day as vegetables.	20	0.8
46.	<i>Urochloa panicoides</i> P. Beauv. [HEA-282]	Poaceae	<i>Sanwal, Kuri</i>	Grains	Grains are used as famine food.	8	0.3

in some areas are *Acacia catechu* (L.f.) Willd., *Boswellia serrata* Roxb. ex Colebr., *Butea monosperma* (Lam.) Taub., *Dendrocalamus strictus* (Roxb.) Nees, *Tectona grandis* L.f., etc.

Data collection

The ethnobotanical surveys in Southern Rajasthan were conducted over a series of prolonged field trips

from 2010 to 2012 using semi-structured interviews. Semi-structured interviews were carried out with groups of people sometimes at different sites. Informants were also taken in the forests and asked to comment on the utility of species as food, especially when species were mentioned by a group.

Sixty-eight informants of different age groups (24, 12, 9 and 23 informants of the *Bhil*, *Garasia*, *Damors*

and *Kathodis* tribe, respectively) were interviewed. The most accurate information regarding old traditions was obtained from informants above the age of 60–65 years. Participation in local banquets, festivals, fairs and in other social events of the informants was helpful in collecting information on plants and observing their current uses.

Identification of plants

The plant samples were identified using the floristic works of Bhandari⁸, Bor⁹, Cooke¹⁰, Duthie¹¹ and Shetty and Singh¹². Herbarium specimens of the collected plant species have been deposited in the Laboratory of Ethnobotany and Agrostology, Department of Botany, University College of Science, Mohanlal Sukhadia University, Udaipur, Rajasthan.

Statistical analysis

Data was analyzed using MS-Excel. To identify the most commonly used wild edible plants, frequency of citation and relative frequency of citation for each species were determined using the following formula¹³:

$$\text{Frequency of citation (\%)} = \frac{\text{Number of informants who cited the species}}{\text{Total number of informants interviewed}} \times 100$$

$$\text{Relative frequency of citation (\%)} = \frac{\text{Frequency of citation}}{\% \text{ Frequency of citation of all species}} \times 100$$

Results

The present study showed that the flora of the study area is rich and provides diverse useful species. A total of 46 plant species belongs to 27 families were recorded (Table 1). Poaceae was the dominant family with a total of 7 species followed by Amaranthaceae and Araceae with 4 species each. The remaining 24 families were represented by one to three species.

The inhabitants of the study area are mostly dependent on the forest for food. Based on the usage mode, informants categorized the plants into two categories, namely vegetables and raw food. The vegetable category (72 %) is consumed after cooking whereas the raw food category (28 %) is directly eaten after washing. Out of these 46 species, 19 % is commonly used while 81 % is lesser used. Nine commonly used species were cited 60 % or more. *Anogeissus latifolia* (Roxb. ex DC.) Wall. ex Guillem. & Perr. was most frequently cited (91 %), followed by *Momordica dioica* Roxb. ex Willd. (88 %) and *Rhus mysurensis* B. Heyne ex Wight & Arn. (85 %). Plant species having citation frequency of 10 % or less are seldom used in the study area. *Coix lacryma-jobi* L., *Dentella repens* (L.) J.R.Forst. & G.Forst., *Digitaria*

longiflora (Retz.) Pers., *Euryale ferox* Salisb. and *Iphigenia indica* (L.) A. Gray ex Kunth have a 10 % of citation frequency each.

Discussion

Despite modernization, the tribal communities still live in primitive conditions and retain the uses of wild food plants as documented in this study. The present study showed that 10 important plant species, namely *Arisaema tortuosum* (Wall) Schott, *Cissus repanda* (Wight & Arn.) Vahl, *Corchorus trilocularis* L., *Dactyloctenium aegyptium* (L.) Willd., *Euryale ferox* Salisb., *Leea macrophylla* Roxb. ex Hornem., *Leucas cephalotes* (Roth) Spreng., *Ocimum gratissimum* L., *Paspalum scrobiculatum* L. and *Typhonium trilobatum* (L.) Schott have not been reported as edible before. It was observed that 11 selected underutilized species {*Amaranthus spinosus* L., *Amaranthus viridis* L., *Anogeissus latifolia* (Roxb. ex DC.) Wall. ex Guillem. & Perr., *Buchanania cochinchinensis* (Lour.) M. R. Almeida, *Coccinia grandis* (L.) Voigt, *Momordica dioica* Roxb. ex Willd., *Phoenix sylvestris* (L.) Roxb., *Pithecellobium dulce* (Roxb.) Benth., *Portulaca oleracea* L., *Rhus mysurensis* B. Heyne ex Wight & Arn. and *Salvadora oleoides* Decne.} belonging to different families were sold in local markets. *Phoenix sylvestris* (L.) Roxb. is good source of vitamins and Minerals¹⁴. These plant species are cheap, easily accessible and may have good or even superior nutritional qualities than conventionally eaten crops¹⁵. Some of these plants are even taken and traded in other districts of Rajasthan thus helping in uplifting the socio-economic condition of the people of the study area. These plants need to be conserved in their natural habitats and proper harvesting and management. Better communication with local communities can raise and improve the awareness, the importance and preservation of the diversity of these underutilized species and build capacity among stakeholders.

Most of plants recorded in this study are edible both in normal times and during the famine. The time and frequency of consumption vary from species to species depending upon the availability of the plant or its parts. For example, *Coccinia grandis* (L.) Voigt. and *Momordica dioica* Roxb. ex Willd. produce edible parts between July and September and are harvested for consumption during these months. On the other hand, some weedy vegetables such as *Bridelia retusa* (L.) A. Juss., *Cocculus hirsutus* (L.) W. Theob., *Commelina benghalensis* L., etc. are available only during the rainy season.

The result revealed that many wild underutilized species such as *Arisaema tortuosum* (Wall.) Schott, *Ceropegia bulbosa* Roxb., *Iphigenia indica* (L.) A. Gray ex Kunth, *Leptadenia reticulata* (Retz.) Wight & Arn., *Oroxylum indicum* (L.) Kurz, *Remusatia vivipara* (Roxb.) Schott are threatened¹⁶ because of over use.

Literature survey revealed that list of neglected and underutilized wild species in Rajasthan has not been documented. Based on the information gathered from the informants, 46 species were listed as neglected and underutilized in the study area.

It was observed that the traditional methods of collecting food plants are in sharp decline as there is lack of interest among younger generations to learn these skills for they prefer food found in the local market rather than collecting it. This may be one of the main reasons for the decline in traditional knowledge on the collection and utilization of wild plants in the state.

Conclusion

The study showed that consumption of wild edible plants is still alive, but declining in Southern Rajasthan. It was observed that underutilized wild edible plants still play a significant role in the diet of indigenous communities but the transmission of knowledge down the younger generations is reducing. The fact that 60 % of the informants were above 60-65 years indicate the risk of losing this knowledge and suggests an urgency in documenting and conserving these plant. Thus, public awareness, community based management, biodiversity conservation and cultivation should be fostered at all levels and germplasm should be collected. The results suggest that it would be important to cultivate the most widely used food plants and also to carry out further investigations about the nutritional profiles and processing methods of all these species reported for exploring alternative sources of nutrition.

Acknowledgement

The authors are thankful to UGC, New Delhi for providing financial assistance (Letter No. F. 14 – 2 (SC) / 2010 (SA-III), Dated, 9.01.2011).

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