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Plants as Food and Medicine: An Ethnobotanical Survey among Kanikaran Community in Southern India

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Author's contribution

This work was carried out in collaboration between both authors. Author MA designed the study, carried out the field work and wrote the first draft of the manuscript. Author SI managed the analyses of the study. Both authors read and approved the final manuscript.

Research Article

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ABSTRACT

The study mainly focused on the plants used as food as well as medicine by Kani tribals in Kalakad Mundanthurai Tiger Reserve in Southern Western Ghats, India. An ethnobotanical survey was carried out among the Kani tribals through questionnaires and consultations with age-old and knowledgeable tribals during June 2007 to September 2009. A total of 59 species of plants were recorded in this study with their vernacular names, parts used as food either raw or cooked and medicinal uses. Among all the edible plants, unripe fruits of *Artocarpus heterophyllus* and tubers of *Manihot esculenta* are favorite edibles and these are the main food for the Kani tribal community. Due to indiscriminate exploitation, destruction of forests and changing scenario of rural life, the oral folklore of plants is on the way of extinction. The present investigation underlines the potential of ethnobotanical research and the need for documentation of traditional knowledge pertaining to the utilization of plants for greater benefit of mankind.

Keywords: Ethnobotany; food plant; medicinal plant; kani tribal; Tamil Nadu.

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1. INTRODUCTION

Since immemorial time, people have enhanced their own health by eating healthful foods including herbals [1]. Throughout the ages, humans have relied on nature for their basic needs for the production of food-stuffs, shelters, clothing, means of transportation, fertilizers, flavours and fragrances, and, not the least, medicines. Between 60-70% of population in developing countries living between agricultural and forest land areas collect various parts of plants and foods from the forest species such as roots, leaves, fruits, and nuts forms [2].

Wild edible plants plays a major role in supplementing staples with micronutrients in many areas and they represent cheap but quality nutrition for large segments of the population in both urban and rural areas [3]. Throughout the world, edible species are nutritionally providing a source of income to subsistence farmers [4]. There are more than 30,000 plant species known to man as food and majority of these are harvested locally and are not widely used at the global level [5]. People living in villages and far-flung areas depend completely on forest resources for maintaining their day-to-day needs like medicine, food, fuel and household articles [6]. Information on cultural significance of plants can be gathered from anthropological, ethnobotanical, geographical, ethnomedicine and linguistic studies and such studies generally focus on particular community or ethnic groups [7].

During the last few decades there has been an increasing interest in the study of medicinal and food plants and their use in different parts of India. There are many reports on the use of plants in traditional healing and also for their livelihood by indigenous communities. Even today, tribals and certain local communities in India practice herbal medicine to cure a variety of diseases and disorders and most of the tribal people only depends on the forest resources for their food and medicine etc.

Until recently, only a few fragmented studies on edible plants have been conducted among the tribal people in India [8-17]. But, no such studies have been carried out among the Kani tribals in southern India except a few studies on ethnomedicinal point of view [18-25]. The present communication enumerates the plants used for food as well as medicinal purposes by the Kani tribals in Kalakad Mundanthurai Tiger Reserve (KMTR), Southern Western Ghats of Tamil Nadu, India.

2. METHODOLOGY

2.1 Study Area

KMTR is established under the auspices of Project Tiger as the 17th Tiger Reserve of the country during 1988 [26] with an area of 895 km^2 in Tirunelveli hills and lies between the longitudes 77º 10' - 77º 35' E and latitudes 8º 25' - 8º 53' N. It is one of the few places in South India where five primate species occur such as lion-tailed macaque, Nilgiri langur, common langur, bonnet macaque and slender loris. This reserve exhibits considerable variation in plant diversity perhaps as a result of small-scale changes in elevation, coupled with the historical differences in land use.

The hills of KMTR are characterized by numerous folds and extension engulfing small, narrow valleys and the elevation varies from 50 to 1869m [27]. The vegetation is floristically rich compared to other regions of Western Ghats and represents several unique habitats. In this region, the pattern of high endemism and diversity is well illustrated by plant taxa and

this region has about 150 localized plant endemics [28]. This area has unique flora of biogeographical interest with high diversity and endemism. The river Tamiraparani (a lifeline of Tirunelveli and Tuticorin districts and a part of Kanyakumari district of Tamil Nadu) originates from the eastern valley of KMTR (Fig. 1). Several tributaries like Kuraiar, Kouthalaiar, Vanar, Kudupalar and Servalar arise from the complex hill system around Mundanthurai pleateu and some other small rivulets arising from this hills are Manimuthar, Kodumudiar, Kadananadi, Pachaiyar and Ramanadi get connected to Tamiraparani river in the foot hills near to Karayar and Papanasam.

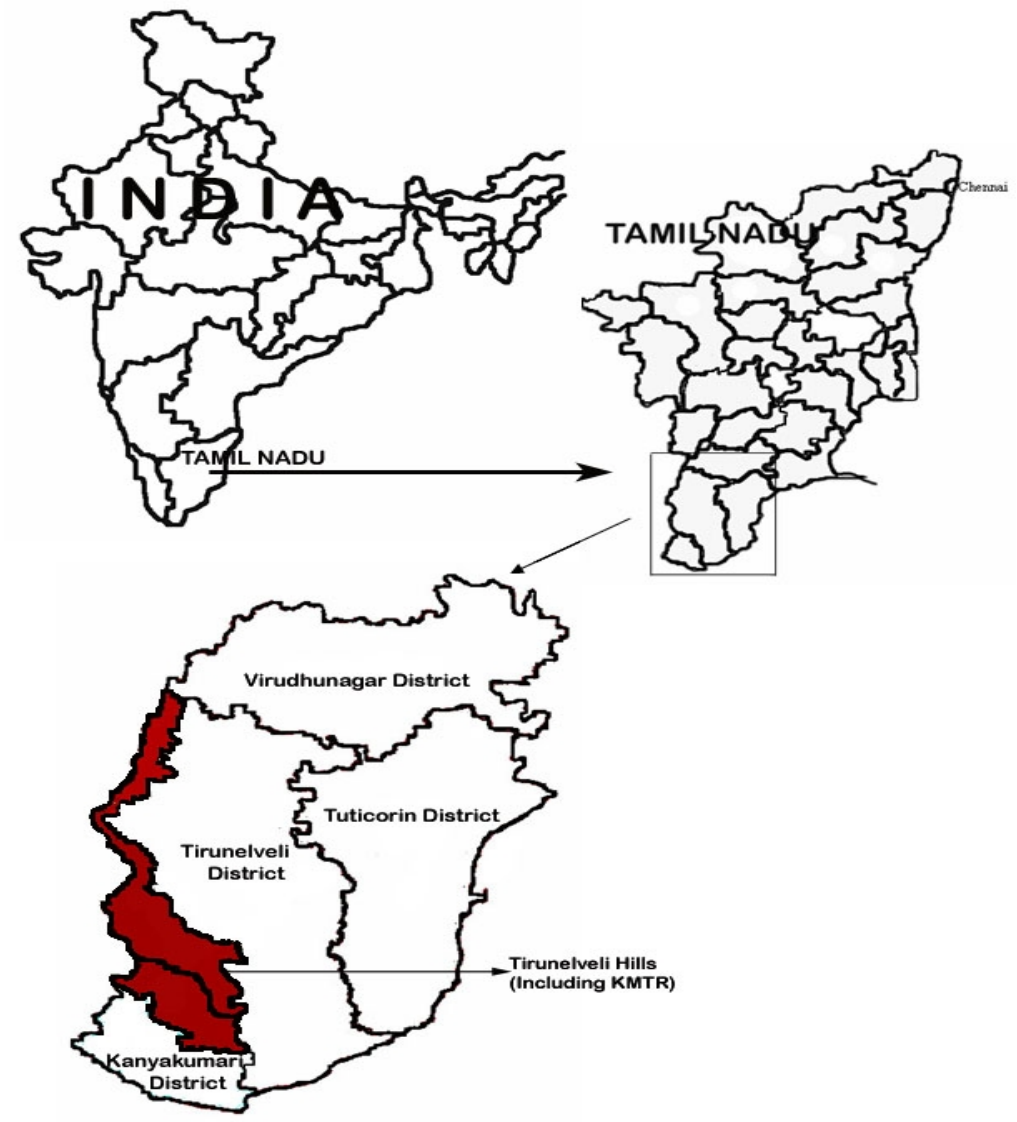

Fig. 1. Location map of Kalakad Mundanthurai Tiger Reserve in Tirunelveli hills of Tamil Nadu, India

2.2 Tribal People Studied

The indigenous people of the study area are Kani or Kanikaran, the oldest group of the branch of the ethnic group in South India. The detailed information about the Kani tribals and their villages are discussed in our previous publications [22-25]. In the prehistoric period they only depended on the rhizome of tapioca and unripe fruits of Jack-fruit for their main food. In some houses they also grew some vegetables, fruits and flowers for their day to day needs. The Kani tribals, who are residing in the deep forest areas, are still dependent on medicinal plants for their primary healthcare. They use mostly herbs to cure different kind of disorders starting from childbirth. Many plant remedies are known by some local people, especially by the elder who is not necessarily a traditional healer.

2.3. Data Collection

Frequent field surveys were carried out in KMTR in different seasons during June 2007 to September 2009. The information regarding the food uses of the plants were gathered among the family members of the Kani people and ethnomedicinal data were collected through general conversations and questionnaires with the traditional practitioners. Informants were asked to provide the following information for each plant viz., local (vernacular) name, parts used as food and medicine and preparation methods. The collected plants were identified by their vernacular names and sample specimens were collected for the preparation of herbarium. The Flora of Presidency of Madras [29] was used to ascertain the nomenclature. Angiosperm Phylogeny Group III [30] was followed to classify the species and binomial was checked with the International Plant Names Index [31]. The voucher specimens were deposited in the herbarium at Entomology Research Institute (ERIH), Loyola College, Chennai (India).

3. RESULTS

Kani tribe's diet comprises variety of unconventional foods such as edible forms of flowers, fruits (ripe and unripe), tubers and rhizomes, leaves, stems, seeds and wild mushrooms. 59 species of plants were identified as edible and medicinal plants in KMTR which are used by the Kani tribals (Table 1). Most of the Kani families cultivate some green vegetables in their small home gardens. The edible plants are consumed in different ways. Some of them need only the washing of the part of the plant to be eaten and some others imply a more or less complex preparation process with sugar, salt and spices. Mostly many plants with edible leaves, fruits and rhizomes are eaten raw and some plants are eaten cooked.

Table 1. List of edible plants used as food and medicine by Kani tribals in KMTR

Botanical Name & Voucher Specimen Number	Family	Local name (Tamil)	Part used as food	Part used as medicine and ailment treated
Allium cepa L. (ERIH - 48)	Alliaceae	Siruvalli	Bulb	Bulb - rheumatism, headache
Allium sativum L. (ERIH - 101)	Alliaceae	Poondu	Bulb	Bulb - Indigestion
Alternanthera sessilis R. Br. (ERIH - 50)	Amaranthaceae	Ponnankanni	Leaf	Leaf - eye diseases
Amaranthus caudatus L. (ERIH - 701)	Amaranthaceae	Keerai	Leaf	Leaf - skin diseases
Amaranthus spinosus L. (ERIH - 698)	Amaranthaceae	Mullu keerai	Leaf	Leaf - wounds
Amorphophallus paeoniifolius (ERIH - 197)	Araceae	Karunai kilangu	Corm	Corm - scabies
Ananus comosus (L.) Merr. (ERIH - 56)	Bromeliaceae	Annacchi	Fruit	Fruit - venereal diseases
Annona squamosa L. (ERIH - 701)	Annonaceae	Seetha pazham	Fruit	Fruit - wounds in tongue
Artocarpus heterophyllus L. (ERIH - 360)	Moraceae	Palaamaram	Fruit	Latex - swellings
Asparagus racemosus Willd. (ERIH - 36)	Asparagaceae	Thannir vittaan kizhangu	Tuber	Leaf, tuber - constipation
Baccaurea courtallensis M. Arg. (ERIH - 389)	Euphorbiaceae	Moottu pazham	Fruit	Fruit - to induce fertility
Basella alba L. (ERIH - 699)	Basellaceae	Pasalai keerai	Leaf, stem	Leaf - to stimulate hunger
Borassus flabellifer L. (ERIH - 681)	Arecaceae	Panai maram	Young stem & fruit	Fruit - stomachache
Brassica juncea (L.) Czern. & Coss. (ERIH - 703)	Brassicaceae	Kadugu	Leaf, seeds	Seed oil - fever, headache
Cajanus cajan Spreng (ERIH - 690)	Fabaceae	Thuvarampayaru	Seeds	Seedlings - body strength
Carica papaya L. (ERIH - 614)	Caricaceae	Pappali	Fruits	Fruit - constipation , toothache
Carissa carandas L. (ERIH - 83)	Apocynaceae	Kalakkai	Fruit	Fruit - stomachache
Carmona retusa (Vahl.) Masam. (ERIH - 135)	Cordiaceae	Kuranguvetthilai	Fruit	Leaf & fruit - toothache
Caryota urens L. (ERIH - 54)	Arecaceae	Koonthal panai	Young stem	Young stem - body strength
Casearia elliptica Willd. (ERIH - 387)	Flacourtiaceae	Vitti, kodi mulli	Fruits	Leaf - skin diseases
Celosia argentea L. (ERIH - 704)	Amaranthaceae	Mayil keerai	Leaf, stem	Leaf - to stimulate hunger
Centella asiatica (L.) Urban. (ERIH - 97)	Apiaceae	Vallarai keerai	Leaf	Leaf - headache
Coccinia grandis (L.) Voigt. (ERIH - 226)	Cucurbitaceae	Kovai pazham	Fruit	Leaf, fruit - to stimulate semen secretion
Cocos nucifera L. (ERIH - 689)	Arecaceae	Thennai maram	Endosperm	Endosperm - wounds
Costus speciosus (J. Koen.) Smith (ERIH - 103)	Costaceae	Kostak-kizhangu	Tuber	Tuber - diabetes; leaf - wounds
Dioscorea oppositifolia L. (ERIH - 705)	Dioscoreaceae	Noorai kilangu	Tuber	Tuber - constipation
Dioscorea pentaphylla L. (ERIH - 227)	Dioscoreaceae	Siruvalli kilangu	Tuber	Tuber - constipation
Eclipta prostrata Roxb. (ERIH - 383)	Asteraceae	Karisalankanni	Leaf	Leaf - hair growth
Ficus bengalensis L. (ERIH - 130)	Moraceae	Aalamaram	Fruit	Leaf - wounds; young stem - toothache

Ficus racemosa L. (ERIH - 407)	Moraceae	Arasamaram	Fruit	Stem bark - wounds; fruit - stomachache
Hemidesmus indicus (L.) R. Br. (ERIH - 237)	Asclepiadaceae	Nannari	Tuber	Root - to increase semen secretion
Indigofera sp. (ERIH - 688)	Fabaceae	Siru chinnichedi	Flowers	Leaf - poison bites
Leucas aspera (Willd.) Link. (ERIH - 66)	Lamiaceae	Thumbai chedi	Flowers	Leaf - fever, headache
Mangifera indica L. (ERIH - 159)	Anacardiaceae	Maa maram	Fruit	Stem bark - body pain
Manihot esculenta Crantz. (ERIH - 421)	Euphorbiaceae	Maravallikilangu	Tuber	Tuber - to increase stamina
Marselia quadrifolia (ERIH - 682)	Marseliaceae	Thannir chedi	Leaf	Leaf - skin diseases
Mirabilis jalapa L. (ERIH - 168)	Nyctaginaceae	Anthimantharam	Leaf, tuber	Flowers, root - stomachache; leaf - fever & headache
Moringa pterygosperma Gaertn. (ERIH - 171)	Moringaceae	Murungai	Leaf	Flower - to increase semen production
Mucuna pruriens (L.) DC. (ERIH - 176)	Fabaceae	Poonaik-kaali	Seeds	Leaf - scabies
Opuntia dillenii Haw. (ERIH - 183)	Cactaceae	Sappathi kalli	Fruit	Stem - wounds
Pandanus odoratissimus L.f. (ERIH - 672)	Pandanaceae	Thaalai chedi	Stem	Young leaves - jaundice
Panicum italicum L. (ERIH - 683)	Poaceae	Thinai payaru	Seeds	Seeds - to increase stamina
Passiflora foetida L. (ERIH - 750)	Passifloraceae	Thoppi pazham	Fruit	Fruit - stomachache
Phaseolus mungo L. (ERIH - 684)	Fabaceae	Pacchai payaru	Pods	Pods - toothache
Phyllanthus emblica L. (ERIH - 184)	Euphorbiaceae	Periya nellikkai	Fruit	Fruit - body strength
Physalis minima L. (ERIH - 13)	Solanaceae	Sodakku thakkali	Fruit	Leaf - venereal diseases
Portulaca quadrifolia L. (ERIH - 687)	Portulacaceae	Paruppu keerai	Leaf	Leaf - stomachache
Psidium guajava L. (ERIH - 686)	Myrtaceae	Koyya maram	Fruit	Stem bark - poison bites
Ricinus communis L. (ERIH - 438)	Euphorbiaceae	Aamanakku	Seeds	Leaf – stomach-ache; seed oil - joint pain
Sesbania grandiflora Pers. (ERIH - 222)	Fabaceae	Agathi	Leaf	Leaf - cold, cough, fever
Solanum melongena L. (ERIH - 706)	Solanaceae	Katthiri	Fruit	Seeds - toothache
Solanum nigrum L. (ERIH - 198)	Solanaceae	Manatthakkali	Leaf, fruit	Leaf - ulcer
Tamarindus indica L. (ERIH - 610)	Caesalpiniaceae	Puliyamaram	Fruit	Leaf - body cooling
Tinospora cordifolia Miers. (ERIH - 376)	Menispermaceae	Seenthil kodi	Stem	Leaf - fever
Trianthema portulacastrum L. (ERIH - 602)	Aizoaceae	Saaranatthi	Leaf, seeds	Leaf, root - disease resistant in children
Trichopus zeylanicus Gaertn. ssp. *travancoricus* (Bedd.) Burk. (ERIH - 81)	Trichopodaceae	Arockia-pacchilai	Fruits	Fruit - body strength; leaf - venereal diseases
Vigna radiata (L.) Wilczek (ERIH - 710)	Fabcaeae	Mochhai payaru	Pods	Pods - body stamina
Zizyphus jujuba (L.) Gaertn. (ERIH - 212)	Rhamnaceae	Elandhai	Fruit	Fruit - wounds in lips and tongue
Ziziphus rugosa Lam. (ERIH - 601)	Rhamnaceae	Kaattu elandhai	Fruit	Fruit - wounds in lips and tongue

The Kanis residing in the deep forests of KMTR mainly depend on tubers of *Manihot esculenta* (Cassava) and unripe fruits of *Artocarpus heterophyllus* (Jackfruit) for their livelihood. These two plants are cultivated in their surroundings.

Cassava is the sixth major staple crop of the world after rice, wheat, maize, potato, and sweet potato with annual production of 185 million tones and third largest source of carbohydrates for meals (FAO). Its starch is an important raw material in food processing, paper, textile and adhesive manufacturing and in oil drilling industry and it is also a raw material for producing many derived sugar products, such as glucose, maltodextrines and mannitol [32]. Rhizome of cassava is a primary food of the Kani tribals. They boil the rhizome with salt and turmeric and eat with or without sugar. The plant is cultivated in several places and the tubers are harvested after maturity for commercial purposes. This tuber is also cut into small pieces and placed for drying to make chips. After that, the dried pieces of Tapioca are taken into market in the foot hills to sell them (Fig. 2).

Fig. 2. (A) Cassava (*Manihot esculenta*) plantation for its edible tuber, (B) Storehouse for tubers of cassava, (C) & (D) Small pieces of Tapioca tubers placed for drying to make chips, (E) Dried pieces of Tapioca being taken to local market (F) *Trichopus zeylanicus* plant, (G) Fruiting twig of *Phyllanthus emblica*, (H) Fruiting twig of *Baccaurea courtallensis*

Kani's another main food plant is *Artocarpus heterophyllus*; they boil the unripe fruits of this plant and eat them along with salt and chilli powder mixture. Flakes of ripe fruits of jackfruit is rich in nutritive value with high amount of carbohydrates, minerals, vitamin A and thiamine and is unsuitably called 'Poor man's food' in eastern and southern parts of India [17]. In addition to these two plants, fruits of *Ananus comosus*, *Carica papaya*, *Annona squamosa* and *Mangifera indica* are also frequently taken by them for their livelihood.

Leaves of various plants are collected in different seasons, cooked and eaten along with boiled rice or eaten freshly. These leaves are collected from deep forests or found as weed in the cultivated lands of nearby houses. For example most of the *Amaranthus* sp., leaves are used as vegetables. Most of the leafy vegetables are cultivated in their home gardens. Like the leaves, there are a large number of edible fruit plants used by the Kanis. Some of the fruits have been eaten as raw either ripe or unripe while some are consumed after cooking as curries. In addition, some of the fruits are pickled and some are made into chutneys and taken with food. Also, seeds of some plants consumed by these tribals have also been identified (details of species are given in Table 1). In most of the cases, the seeds are eaten after roasting or boiling. Besides these some of the plant's flowers, endosperm, tender parts and pods are also used as food among the Kani tribals.

4. DISCUSSION

Food and dishes always reflect the regional identity of ethnic/tribal communities, and the use of wild food plants is an example that exemplifies local knowledge or traditional ecological knowledge [33]. In the folk traditions of Italy, ethnic communities are using 120 species of plants to treat various ailments, of which about 60 % of the plants are plays an important role as food medicine [34]. Similar to Kani tribals, leaves of *Acacia caesia*, *Asystasia gangetica*, *Oxalis corniculata*, rhizomes of *Costus speciosus*, *Dioscorea oppositifolia*, fruits of *Gmelina arborea* and seeds of *Piper nigrum* are used as food by the paliyar tribals in the Madurai district of Tamil Nadu [35], of which most of the plants are used for medicinal purposes.

Different below ground parts such as root, rhizome, tuber, bulb and corn are used by the Kanis as food. They collect tubers in the forest areas and use them as food in raw form or after boiling. Tubers of *Dioscora oppositifolia* and *D. pentaphylla* are taken as food and for the treatment of constipation by the Kani people. In Thailand fifteen species of *Dioscorea* were found in the living areas of the Sakai tribe at Banthad Range, of which eight species are consumed as main food sources by the Sakai people including *D. pentaphylla* [36] and most of these edible *Dioscorea* species are used for the treatment of warts, asthma, fever and etc.

Wild plants are considered either as food or medicinal have an important role in the life of indigenous people around the world. In many Mediterranean regions the traditional knowledge about wild food plants are at risk of disappearing, and hence the urgent need to study such knowledge system and there are several exhaustive global catalogues of edible plants of the world including crops, wild plants and weeds [33]. Documenting and revalorizing indigenous knowledge on wild edible plants is urgently needed to maintain and promote nutritional health at the local level and beyond and to preserve genetic and cultural diversity [3].

5. CONCLUSION

The present study documents the medicinal uses of edible plants among the Kani tribals in the region of KMTR in southern India. During our ethnobotanical research it was found that many food uses are practiced by the Kani tribals and many edible plants has been playing an important role in their daily life. It was also realized that the transmission of folk uses of plants decreased in the present generations and surely the knowledge is very much delimited. This research is important to document this valuable information and to provide the basis for the development of food medicine and to encourage the local people to preserve their ethnobotanical knowledge. The nutritional significance of edible plants used as either vegetables, different therapies or for both continues to be crucial to many tribal and rural populations. Hence, we need to pay greater attention to the multiple functions of edible plants and what they contribute beyond traditional nutrient supply. In general, the publications with the title ethnobotany contain mostly botanical part but lack ethnic/ethnographical contents. When information about the cultural and social nature and food habit of the community is added, it becomes more useful and interesting.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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