

Role of edible Plants to balance dietary requirements in human diet

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Abstract

The present study on edible plants, which are distributed in Ramanattukara, Kozhikode District of Kerala highlights, there are about 50 species of plants belonging to 38 genera and 25 families of edible potential plants in the study area. The present analyses also revealed their distribution pattern, medico-potentiality and nativity.

1. Introduction

Most of the people commonly use some wild plants in their regular dish. They consume these plants or plant parts after boiling, frying, or preparing curry or chutneys or as raw. The various anti-nutritional elements which are present in the edible plant parts were removed during cooking process (Bandyopathy & Mukherjee, 2009). More over the edibles which are eaten as raw are comparatively negligible percentage of anti-nutritional elements. Tribal communities are widely used wild edibles for balancing dietary equilibrium. Now a days they also cultivate some wild edibles in their habitats or near by their houses (Nath, 2015). The tribal as well as other common people of various parts of the country are commonly used some wild plants in their regular dish. They consume their plants or plant parts after boiling or frying or preparing curry or chutney or as raw (Jose & Sasidharan, 2016). The consumption of these edibles varies with respect to the species or parts of the plant as well as it according to the tribe and communities who use these items. The wild edible plant parts like leaves, fruits, tubers, rhizomes etc., may provides an adequate amount of

vitamins and minerals for humans. They are rich source of carotenes, ascorbic acid, riboflavin. folic acid and minerals like calcium, iron, phosphorous etc., (Sheela *et al.*, 2004).

The tribal people fully depended on both wild and cultivated plants for their food, medicine, shelter and other uses. They usually used variety of leaves, fruits, tubers, rhizomes, flowers etc., for their dietary purposes. However these tribal families also depends minor forest products for their daily needs (Sanjasi Rao *et al.*, 2014). More over many ethno-botanical studies conducted by various authors in the countries also documented variety of wild edibles which are utilized by tribal and local inhabitants. Their food habit also linked with their culture (Chen & Qui, 2012). The earth is filled with overwhelming plant diversity. The efforts of the man is to categorize them based on their structural and functional features. Among the functional features, the health benefits of edible plant parts and its bioactive compounds and their incorporation in food has simulated wider interest and demand across the world (Nemli & Tanyolac, 2015). The trial and error practices of both tribal and local

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inhabitants by various edible plant species from their surroundings, thereby they understanding the useful edible plant parts and other useful plants from their local vegetation. When man began settled life, the demand in food plants increased day by day to fulfill their needs (Bhatt *et al.*, 2016). The present study mainly aims to document edible plants which are distributed in the study area

2. Materials and Methods

2.1. Study Area

2.1.1. Kozhikode District

Kozhikode also known as *Calicut*, is a city in the state of Kerala in Southern India on the Malabar coast and is formed on 1 January 1957. Kozhikode is the largest urban area in the state and 195TH largest urban area in the world. The city of Kozhikode is 410 kilometres north of the state capital [Thiruvananthapuram](#). It is located at approximately 11.25°N 75.77°E. It has an elevation of 1 metre along the coast with the city's eastern edges rising to at least 15 metres. The rainy season is during the South West [Monsoon](#), which sets in the first week of June and extends up to September. The North East Monsoon extends from the second half of October through November. The average annual rainfall is 3266 mm and the best weather is found in towards the end of the year, in December and January (Chaithra & Binu Thomas, 2017).

2.1.2. Ramanattukara Municipality

Ramanattukara is a Municipality situated at 16 Km south of [Kozhikode city](#) of [Kerala](#). This area was formerly called Kadungan Chira village. Its location on the intersection of [National Highway 17](#) and [National Highway 213](#). The border villages are Olavanna and Vazhayoor at North; Feroke, Nallalam, and Cheruvannur at West; Cherukavu at East; and Chelembra at South (Plate-1). Ramanattukara panchayath was formed in 1962. Former it was called as Velipram which include both Ramanattukara

panchayath and Azhinjilam. Later these two were separated and Ramanattukara raised to a rank of Panchayath. On 2015, it was raised to a rank of Municipality. This panchayath is nourished by Chaliyar River at North - West region and also with various hilly as well as rocky regions. Various religious celebrations conducted in sacred groves and temples of this are add more to its cultural beauty (Chaithra M. & Binu Thomas, 2017).

2.2. Documentation

The present study was based on an extensive survey and field observations during the year December 2016- February 2017. In this study an attempts were made to to document edible plants from Ramanattukara. The documentation was mainly based on the field observation, discussions with local peoples as well as scrutinizing the literature review. During the field visits, the plant specimens were collected at different reproductive stages to prepare herbarium specimens. The collected specimens were identified taxonomically with the help of available floras and literature (Hooker, 1984; Gamble and Fischer, 1915 - 1936; Manilal & Sivarajan, 1982; Sasidharan, 2004). The nomenclature of each species has been brought up to data as per the rules given in the International Code of Nomenclature (ICN). The specimens were processed for the preparation of Herbarium by standard methods (Santapau & Hentry, 1973). The voucher specimens were deposited in the Herbaria of PG & Research Department of Botany, St. Joseph's College, Calicut (DEV) for future reference.

Plate -1



A) Map of India Showing Kerala State



B) Map of Kozhikode district

3. Results and Discussion

3.1. Edible plants and their Edible potentiality

The present study on edible plants of which are distributed in Ramanattukara, Kozhikode district was reveals that, there are about 50 species of plants belonging to 38 genera and 25 families. The present documentation is mainly based on filed observation, discussion with local inhabitants as well as scrutinizing literature. The various plant parts and their mode of consumption is also discussed (**Table-1**). When any plant or their parts are edible

means, those plants are having more percentage of nutrional elements when compared to anti-nutrional elements. Similarly when any plants are said to be non edible or poisonous, means those plants are having more percentage of anti-nutrional elements when compared to nutrional elements.

Table-1: List edible plants and their edible potentiality

Sl. No.	Botanical Name	Family	Edible potentiality
1.	<i>Ammona muricata</i> L. (Pl.2A)	Annonaceae	Ripe fruits are eaten
2.	<i>Ammona reticulata</i> L.	Annonaceae	Ripe fruits are eaten
3.	<i>Ammona squamosa</i> L. (Pl.2B)	Annonaceae	Ripe fruits are eaten
4.	<i>Garcinia gummi-gutta</i> (L.) Robs.	Clusiaceae	Young fruits are used to prepare pickles, dried fruits used for flavoring for curries
5.	<i>Abelmoschus esculentus</i> (L.) Moench.	Malvaceae	Young fruits are used as vegetables
6.	<i>Averrhoa bilimbi</i> L.	Oxalidaceae	Fruits used for making pickles
7.	<i>Averrhoa carambola</i> L. (Pl.2C)	Oxalidaceae	Ripe fruits are eaten as raw
8.	<i>Citrus limon</i> (L.) Burm. f.	Rutaceae	Fruits are used to prepare pickle; Fruit juice is rejuvenating
9.	<i>Citrus maxima</i> (Burm.f.) Merr. (Pl.2D)	Rutaceae	Ripe fruits are eaten as raw
10.	<i>Nephelium lappaceum</i> L. (Pl.2E)	Sapindaceae	Ripe fruits eaten as raw
11.	<i>Mangifera indica</i> L.	Anacardiaceae	Young fruits used to prepare pickles also for the preparation of various dishes. Ripe fruits eaten as raw
12.	<i>Spondias pinnata</i> (L. f.) Kurz. (Pl.2F)	Anacardiaceae	Young fruits used to prepare pickles
13.	<i>Moringa pterygosperma</i> Gaertn.	Moringaceae	Leaves and fruits used as vegetable
14.	<i>Phaseolus vulgaris</i> L.	Fabaceae	Pods and young leaves used as vegetables
15.	<i>Senna tora</i> (L.) Roxb.	Caesalpiniaceae	Young leaves used as vegetables
16.	<i>Tamarindus indica</i> L.	Mimosaceae	Ripe fruits eaten as raw, also for the preparation of various dishes
17.	<i>Terminalia catappa</i> L.	Combretaceae	Seeds eaten as raw
18.	<i>Psidium guajava</i> L.	Myrtaceae	Ripe fruits eaten as raw
19.	<i>Syzygium aqueum</i> (Burm.f.) Alston (Pl.3A)	Myrtaceae	Ripe fruits eaten as raw
20.	<i>Syzygium cumini</i> (L.) Skeels (Pl.3B)	Myrtaceae	Ripe fruits eaten as raw
21.	<i>Passiflora edulis</i> Sims (Pl.3C)	Passifloraceae	Ripe fruits eaten as raw
22.	<i>Passiflora foetida</i> L. (Pl.3D)	Passifloraceae	Ripe fruits eaten as raw
23.	<i>Carica papaya</i> L.	Caricaceae	Young fruits used as vegetables; ripened fruits also eaten as raw

24.	<i>Citrullus lanatus</i> (Thunb.) Mats.	Cucurbitaceae	Fruit juice is rejuvenating
25.	<i>Coccinia grandis</i> (L.) Voight (Pl.3E)	Cucurbitaceae	Young leaves and fruits used as vegetable
26.	<i>Cucumis sativus</i> L.	Cucurbitaceae	Fruits used as vegetable also eaten in raw form
27.	<i>Cucurbita maxima</i> Duch.	Cucurbitaceae	Fruits used as vegetable
28.	<i>Momordica charantia</i> L.	Cucurbitaceae	Fruits used as vegetable
29.	<i>Trichosanthes anguina</i> L.	Cucurbitaceae	Leaves and fruits used as vegetable
30.	<i>Centella asiatica</i> (L.) Urban (Pl.3F)	Apiaceae	Leaves used as vegetable
31.	<i>Manilkara zapota</i> (L.) P.Royen	Sapotaceae	Ripe fruits eaten as raw
32.	<i>Capsicum annuum</i> L.	Solanaceae	Fruits used for the preparation of various dishes
33.	<i>Capsicum frutescens</i> L.	Solanaceae	Fruits used for the preparation of various dishes
34.	<i>Lycopersicon esculentum</i> Mill.	Solanaceae	Fruits used as vegetable
35.	<i>Physalis angulata</i> L.	Solanaceae	Fruits eaten as raw
36.	<i>Solanum melongena</i> L.	Solanaceae	Fruits used as vegetable
37.	<i>Solanum torvum</i> Sw.	Solanaceae	Fruits used as vegetable
38.	<i>Boerhavia diffusa</i> L. (Pl.4A)	Nyctaginaceae	Young leafy twigs used as vegetable
39.	<i>Amaranthus hybridus</i> L.	Amaranthaceae	Leaves used as vegetables
40.	<i>Amaranthus tricolor</i> L. (Pl.4B)	Amaranthaceae	Leaves used as vegetables
41.	<i>Amaranthus viridis</i> L.	Amaranthaceae	Leaves used as vegetables
42.	<i>Phyllanthus emblica</i> L.	Euphobiaceae	Fruits used to prepare pickles. Fruit juice is also used to control diabetes.
43.	<i>Sauropus androgynus</i> (L.) Merr. (Pl.4C)	Euphobiaceae	Young leaves used as vegetables
44.	<i>Artocarpus heterophyllus</i> Lam.	Moraceae	Young fruits and seeds are cooked before eating. While ripe fruits are eaten as raw.
45.	<i>Artocarpus hirsutus</i> Lam.	Moraceae	Ripe fruits are eaten as raw
46.	<i>Artocarpus incisus</i> (Thunb.) L.f. (Pl.4D)	Moraceae	fruits are used as vegetable
47.	<i>Morus alba</i> L. (Pl.4E)	Moraceae	Young fruits used to prepare pickles. Ripe

			fruits also eaten as raw
48.	<i>Dioscorea alata</i> L. (Pl.4F)	Dioscoreaceae	Tubers cooked before eating
49.	<i>Colocasia esculenta</i> (L.) Schott.	Araceae	Rhizome cooked before eating
50.	<i>Amorphophallus paeoniifolius</i> (Dennst.) Nicolson	Araceae	Corn is cooked before eating

3.2. Analysis of dominant families and genera of edible plants

The present documentation reveals that, 50 species of edible plants which are distributed in the 25 families. Out of these

25 families, Cucurbitaceae and Solanaceae are the first dominant families with 6 species each, followed by Moraceae with 4 species, Amaranthaceae, Annonaceae and Myrtaceae with 3 species each and other families are represented 2 and single species respectively (**Fig.1**).

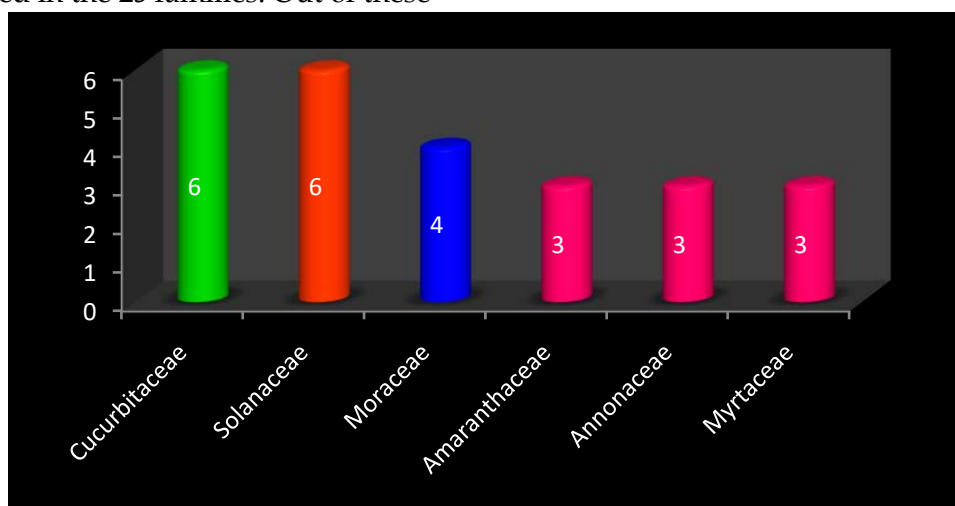


Fig.1 Analysis of dominant families of edible plants

Similarly the analysis of dominant genera among the total of 38 genera represented shows that genera like *Annona*, *Amaranthus* and *Artocarpus* are the dominant ones with 3 species each followed by *Averrhoa*, *Citrus*, *Syzygium*, *Passiflora*, *Capsicum* and *Solanum* with 2 species each and all other families are represented with single species

respectively.

3.3. Analysis of life forms/growth forms of edible plants

Analysis of various life/growth forms of edible plants in study area consists of Trees are dominant (23 Nos.) followed by Herbs (15 Nos.), Climbers (10 Nos.) and Shrubs (2 Nos.) (**Fig. 2**).

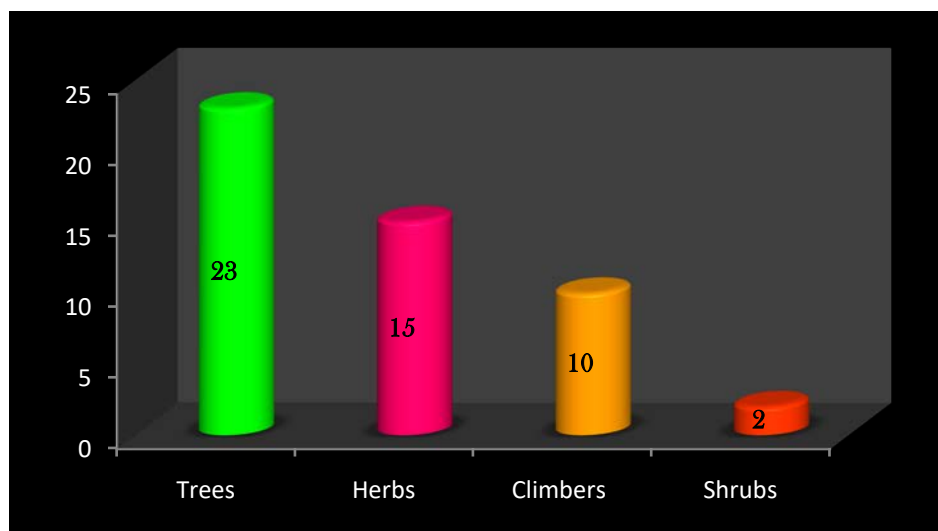


Fig.2 Life form/growth form analysis of edible plants

3.4. Analysis of edible plant parts

The present study on edible plants reveals that, there are diverse kinds of plant parts are used for edible purposes. Some edible plant parts are eaten as raw while some are cooked before eating. During cooking process, some amount of antinutritional elements in the particular

edible part of a plant becomes eliminated. Similarly the juice prepared from some fruits also rejuvenating. The different parts/products like Fruits (37 Nos.), Leaves (9 Nos.), Seed (1 No.), Tuber (1), Rhizome/Corm (2 Nos.), etc. are used for edible purposes (Fig.3)

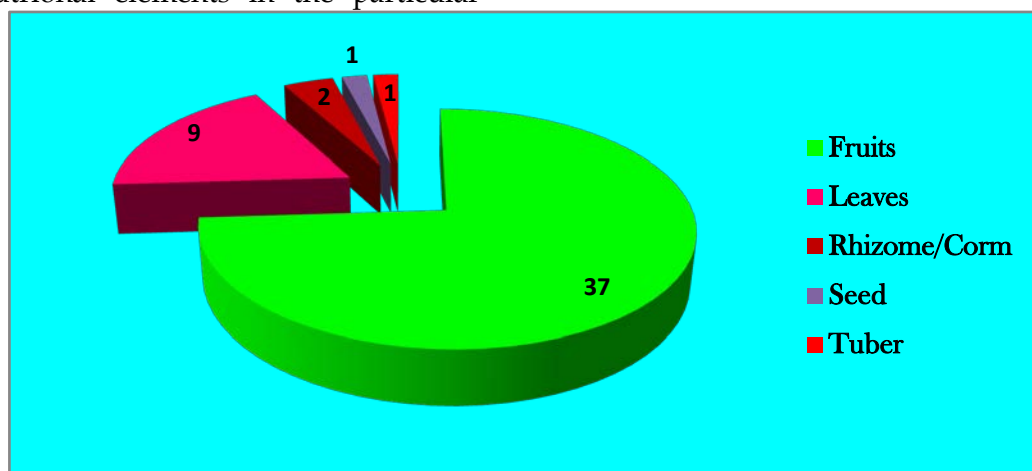


Fig.3 Analysis of plant parts/products for edible purposes

3.5. Plant species which are showing medico-potentialities

The present documentation also highlighted medicinal importance of some edible plants. The present results reveals that, there are about 14 species of edible plants which are belonging to 11 families are also possessing potential medicinal properties to cure various ailments like hypertension, diabetes, cholesterol,

enhance memory power, immunity power etc., The various plant parts like Fruits (8 No.s), Leaves (3 No.s), Whole plant (1 No.), Bark (1 No.) and Seed (1 No.) respectively. The extract/juice prepared from these plant parts are either directly taken or sometimes it may applied externally to cure/control different diseases (Table-2 & Fig.4).

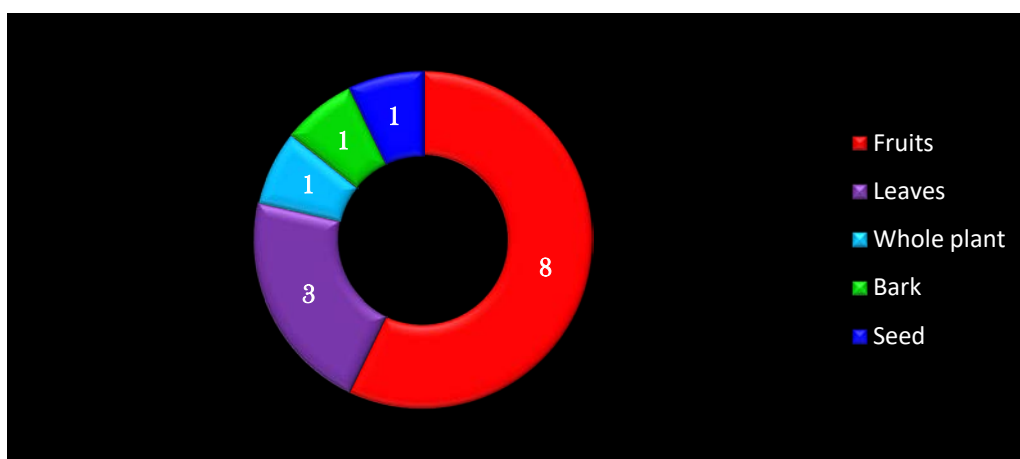


Fig.4 Analysis of plant parts for medicinal purposes

Table-2: List of plant species which are showing medico-potentialities

Sl. No.	Botanical Name	Family	Edible potentiality
1.	<i>Abelmoschus esculentus</i> (L.) Moench.	Malvaceae	Fruits are cut in to small pieces and it is kept in the water for overnight. The consumption of such water after removing fruits from it in the next day morning is used to control diabetes
2.	<i>Annona muricata</i> L.	Annonaceae	The fruits and seeds are reported that, high anti-oxidant potential, more over they are also having anti-cancerous properties.
3.	<i>Averrhoa bilimbi</i> L.	Oxalidaceae	Fruit juice is reported to reduce hypertension
4.	<i>Averrhoa carambola</i> L.	Oxalidaceae	Fruit juice is reported to reduce cholesterol
5.	<i>Capsicum frutescens</i> L.	Solanaceae	Fruits are also used to control cholesterol as well as hypertension
6.	<i>Carica papaya</i> L.	Caricaceae	Leaf juice is used to improve immunity power
7.	<i>Centella asiatica</i> (L.) Urban	Apiaceae	Whole plant juice also enhance the memory power
8.	<i>Coccinia grandis</i> (L.) Voight	Cucurbitaceae	Eating raw fruits also reduce diabetes
9.	<i>Momordica charantia</i> L.	Cucurbitaceae	Juice from leaves and 1fruits also used to control diabetes
10.	<i>Garcinia gummi-gutta</i> (L.) Robs.	Clusiaceae	Fruit juice is also reported to reduce cholesterol
11.	<i>Psidium guajava</i> L.	Myrtaceae	Young leaves and fruits are reported to control diabetes
12.	<i>Syzygium cumini</i> (L.) Skeels	Myrtaceae	Tea spoon full of dried seed powder is mixed in the glass of water and taken it

			in empty stomach to control diabetes
13.	<i>Phyllanthus emblica</i> L.	Euphobiaceae	Fruit juice is also used to control diabetes
14.	<i>Moringa pterygosperma</i> Gaertn.	Moringaceae	Crushed bark is pasted in the cotton cloth and tied around the fractured bone, for immediate cure

3.6. Nativity of some introduced edible plants

Out of 50 edible plant species documented, there are about 22 plants are introduced to here from different countries like Central America, Malaysia, Indonesia, South America, Tropical Africa, Tropical America, South America, Pacific Islands, Afghanistan etc., These introduced plants are now naturalized

and well grown in our habitats. In spite of these, some species of introduced plants, which are sometimes threat to our native flora and fauna; they are called as invasive or exotic weeds. While the present documentation highlights edible or economic potentiality of some introduced plants, which are become major constituents in our daily diet (Table-3).

Table-3 List of plant species which are introduced from other countries

Sl No.	Botanical Name	Family	Nativity
1.	<i>Annona muricata</i> L.	Annonaceae	Central America
2.	<i>Annona reticulata</i> L.	Annonaceae	Central America
3.	<i>Annona squamosa</i> L.	Annonaceae	Central America
4.	<i>Averrhoa bilimbi</i> L.	Oxalidaceae	Malaysia
5.	<i>Averrhoa carambola</i> L.	Oxalidaceae	Indonesia
6.	<i>Nephelium lappaceum</i> L.	Sapindaceae	Malaysia
7.	<i>Phaseolus vulgaris</i> L.	Fabaceae	Central America
8.	<i>Senna tora</i> (L.) Roxb.	Caesalpinaceae	South America
9.	<i>Tamarindus indica</i> L.	Mimosaceae	Tropical Africa
10.	<i>Terminalia catappa</i> L.	Combretaceae	Malaysia
11.	<i>Psidium guajava</i> L.	Myrtaceae	Tropical America
12.	<i>Syzygium aqueum</i> (Burm.f.) Alston	Myrtaceae	Malaysia
13.	<i>Passiflora edulis</i> Sims	Passifloraceae	America
14.	<i>Passiflora foetida</i> L.	Passifloraceae	America
15.	<i>Carica papaya</i> L.	Caricaceae	Tropical America
16.	<i>Citrullus lanatus</i> (Thunb.) Mat.	Cucurbitaceae	Africa
17.	<i>Manilkara zapota</i> (L.) P.Royen	Sapotaceae	South America
18.	<i>Capsicum annuum</i> L.	Solanaceae	West Indies
19.	<i>Capsicum frutescens</i> L.	Solanaceae	Tropical America
20.	<i>Lycopersicon esculentum</i> Mill.	Solanaceae	South America
21.	<i>Artocarpus incisus</i> Thunb.	Moraceae	Pacific Islands
22.	<i>Morus alba</i> L.	Moraceae	Afghanistan

3.7. Distribution analysis of edible plants

The study documents about 50 species of edible plants from the study area. These

plants were distributed variously in the study area. Based on their distribution pattern and occurrence in the study area, they are categorized as Common (32

Nos.), Uncommon (9 Nos.), and Rare (9 Nos.) (Fig. 5).

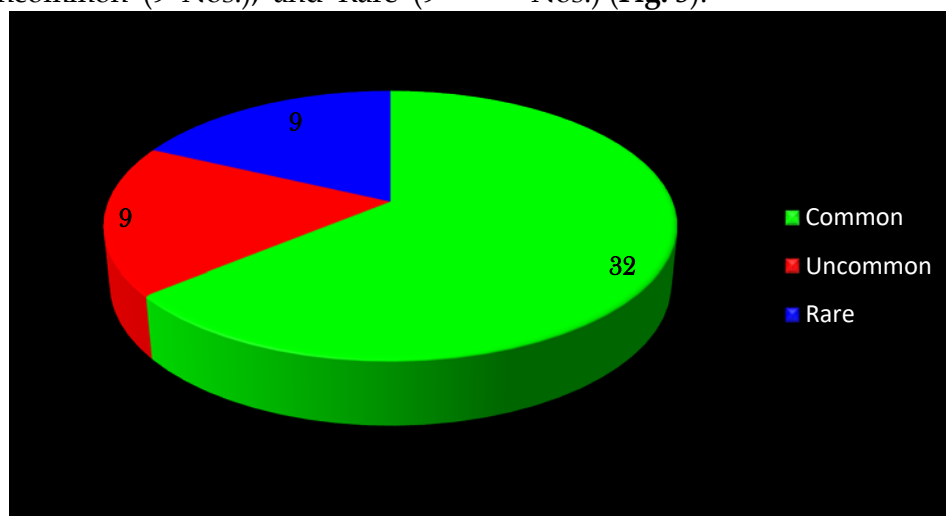


Fig.5. Analysis of distribution pattern of edible plants in the study area

Plate-2



A). *Annona muricata* L.



B). *Annona squamosa* L.



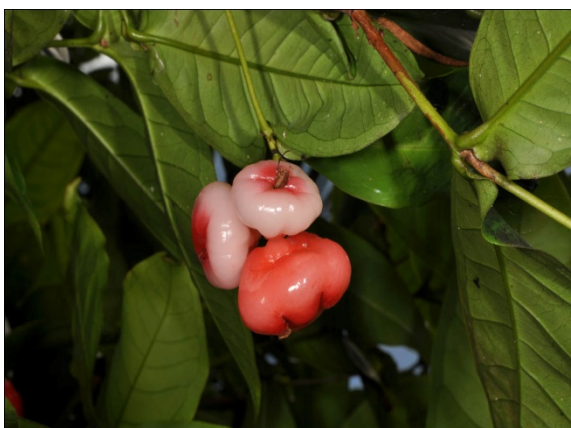
C). *Averrhoa carambola* L.



D). *Citrus maxima* (Burm.f.) Merr.



E). *Nephelium lappaceum* L.



F). *Spondias pinnata* (L. f.) Kurz



Plate-3

A). *Syzygium aqueum* (Burm.f.) Alston

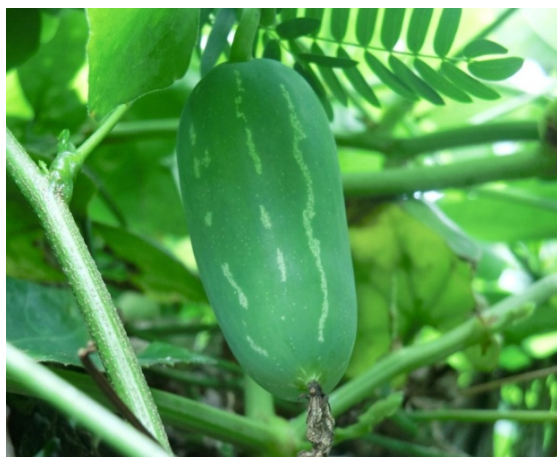


B). *Syzygium cumini* (L.) Skeels



C). *Passiflora edulis* Sims

D). *Passiflora foetida* L.



E). *Coccinia grandis* (L.) Voight



F). *Centella asiatica* (L.) Urban

Plate-4



A). *Boerhavia diffusa* L.



B). *Amaranthus tricolor* L.



C). *Sauropus androgynus* (L.) Merr.



D). *Artocarpus incisus* (Thunb.) L.f.



E). *Morus alba* L.

F). *Dioscorea alata* L.

4. Conclusion

The present study on edible plants, which are distributed in Ramanattukara, Kozhikode district reveals that, there are about 50 species of plants belonging to 38 genera and 25 families. These plants were distributed variously in the study area. Based on their distribution pattern and occurrence in the study area, they are categorized as Common (32 Nos.), Uncommon (9 Nos.), and Rare (9 Nos.). Out of these 25 families, Cucurbitaceae and Solanaceae are the first dominant families with 6 species each, followed by Moraceae with 4 species, Amaranthaceae, Annonaceae and Myrtaceae with 3 species each and other families are represented 2 and single species respectively. The different plant parts/products like Fruits (37 Nos.), Leaves (9 Nos.), Seed (1 No.), Tuber (1), Rhizome/Corm (2 Nos.), etc. are used for edible purposes. The present documentation also highlighted medicinal importance of some edible plants. It consists of 14 species of edible plants which are belonging to 11 families are possessing potential medicinal properties to cure various ailments. Moreover out of 50 edible plant species documented, there are about 22 plants are introduced to here from different countries like Central

America, Malaysia, Indonesia, South America, Tropical Africa, Tropical America, South America, Pacific Islands, Afghanistan etc., The present study is a preliminary approach in this field. More and detailed study on this aspect is required to disclose edible potentiality of many less known plant species in forest as well as other unexplored areas of the country. Tribal people of the state are more conscious about edible plant wealth of their surroundings. While native inhabitants are not that much conscious about it. In this context the present study also suggest to conducting some more explorative approach to various uncultivated areas to reveal edible/economic potential of our prospective plants, each individual has an equal responsibility to conserve these valuable plants through sustainable utilization.

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