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Investigation on Indigenous and Exotic Fruits of Nilgiris

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ABSTRACT

The present study was initiated with an aim to highlight and document the indigenous and exotic fruits of the Nilgiri hills and their morphological features and the medicinal uses. During the study the Shola forests of Nilgiris were visited frequently and information was collected through semi directive, open ended interview among the people inhabiting in the study area. The details on common name, botanical name, family, habit, fruit type, indigenous/exotic and medicinal properties were tabulated. 125 edible fruit species belonging to 41 families have been reported. Among 125 fruits species reported, 42 species were exotic and 83 species were indigenous. Totally 73 tree species, 35 shrubs, 10 herbs and 7 climbers were observed among these. The reported wild edible fruits could be conserved and further validation need for better utilization and provisions of the documented knowledge.

Key words: Indigenous fruits, Exotic fruits, Fruit types, Medicinal uses

The fruits are a huge boon to mankind and chief source of vitamins, minerals and proteins. These constituents are essential for normal physiological wellbeing and also help to develop resistant against pathogen to maintain a healthy state [1]. Fruits supply dietary fiber and intake of these fiber are linked to lower incidence of cardiovascular disease and obesity. Phytochemicals found in fruits act as antioxidants, phytoestrogens, and anti-inflammatory agents and other protective mechanisms [2]. Fruits have a great part in human diet commercially and nutritionally, they are considered an indispensable food source [3]. These commodities are kept in human diet to meet certain nutritional requirements and to provide variety, taste, interest, aesthetic appeal. Botanically, a fruit is defined as a part of a plant consisting of one or more ripened ovaries with or without seeds and sometimes with accessory structures derived from other parts of the flower [4]. Many wild fruits are playing an important role in providing nutrients and economical security to the people in rural areas but the commercial importance and market value of many wild fruits are unknown to them. Hence, exploration and collection, in *in-situ* or *ex-situ* conservation, studying nutritional and anti-nutritional properties, product development and marketing need much emphasis [5]. The world produces around 2446 million tons of fruits totally. Crops belonging to 180 families and thousands of genera are grown all over the world including temperate, tropical and subtropical species [6].

It is now possible to grow a wide range of tropical, subtropical, temperate and arid zone fruit crops in India due to the varied agro-climatic conditions and diversified soil types [7]. There is a very long tradition relationship between the ethnic population of Nilgiris and the wild plants. India is the second largest country in fruit cultivation in the world; many varieties of fruits are grown in different geographical zones in India. Fruit cultivation plays an important role in the prosperity of a nation and contributes to the health, happiness and prosperity of the people. The wild fruits form an additional food source for the people of Nilgiri. The Nilgiri is home not only to the native fruits like *Elaeocarpus*, hill jamun fruit, jack fruit, hill banana, tree tomato, native passion fruit, orange, custard apple, pomegranate and host of other wild fruits, but also the home to exotic fruit varieties such as peach, pears, plum, rambutan, 3 mangosteen, carambola longsat, durian, orange, custard apple and avocado. Since the agro-climatic conditions are very conducive for the growth of these fruits, so many native and exotic fruits grow well in Nilgiris. Despite the considerable amount of fruit cultivation in world agricultural output, many species of fruit plants still remain unnoticed. The indigenous communities inhabited in wild all over the planet mainly depending on forest and forest product for livelihood hold enormous knowledge on these plants. Therefore, ethno botanical and exotic fruit investigations and further analytical studies regarding these underutilized fruits deserve utmost importance.

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MATERIALS AND METHODS

Study area

Nilgiri is one of the smallest of the Thirty-Eight districts in Tamil Nadu. These mountain ranges are situated mainly in the northwestern corner of Tamil Nadu. The state Karnataka

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bound the north and the west and southwest are bounded by Kerala and lie between 11° 12' - 11° 43' N and 76° 14' - 77° 1' E. They are meeting ground of three mountain systems such as Western Ghats, Southern Ghats and Eastern Ghats of peninsular India. The Nilgiri is a region of mountains, forests and tea plantations located in Tamil Nadu of southern India.

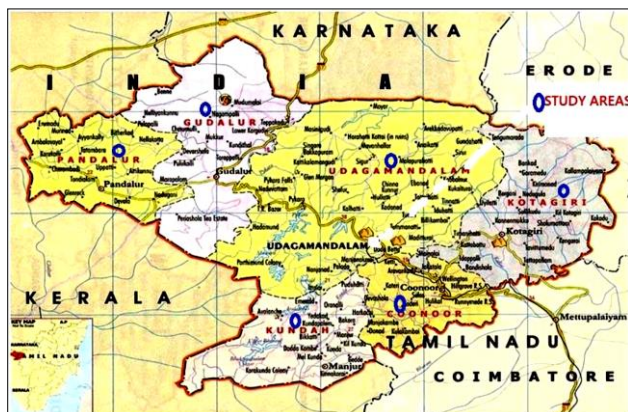


Fig 1 The Nilgiris map showing the study areas

Soil

The soil is ferruginous clay which is derived from charnokite rocks. Clay, clay-loam and loam are the commonly found soil types. They are highly acidic with pH ranging from 4.5 to 6. The soil moisture and temperature of the sholas are maximum as compared to all other vegetative covers. Shola soil comprises of coarse sand (12%), fine sand (10.8%), silt (10.9%), clay (65.7%) and organic carbon (4.5%) up to a depth of 15 to 30 cms.

Climate

This region enjoys a subtropical to temperate and

equable climate by verdure of its altitude though it is situated in the tropical zone. The region experiences an average of 18.4 maximum and 10.1 minimum temperatures. Frosty nights are common during January and February. The Thunder storms throughout April and May and the monsoon blows giving heavy rainfall. The maximum wind velocity of this region is 4.23 and minimum 0.41. The minimum humidity in this region is 53% in the month of February and maximum 92.9% in August.

Rainfall

During the both southwest monsoon and northeast monsoon, the district usually receives rain. During the southwest monsoon the entire Gudalur, Pandalur, Kundah and some portion of Udhagamandalam taluk receive rain and some portion of Udhagamandalam taluk and entire Coonoor and Kotagiri taluks receive rain from the northeast monsoon. The average annual rainfall measures 1,920.80 mm in this district. It is clear from the perusal of the rainfall records; there is significant decrease in the number of rainy days. There is almost no rainfall in the first three months of the year. The month February is found to be the driest month since there is no rainfall recorded in this region. Highest amount of rainfall was recorded during September.

Sample collection

Intensive field trips were undertaken during the study period 2018-2019 in different seasons. The wild edible fruits were collected during the flowering and fruiting season from different Taluks of Nilgiris such as Udhagamandalam, Kotagiri, Coonoor, Kundha, Gudalur, Pandalur. (Fig 1) represents the locations of the study areas. The taxonomical characteristics of indigenous fruits were identified in the Department of Botany, Government Arts College, and Udhagamandalam. The medicinal properties of the wild edible fruits were known from the people living in the area.

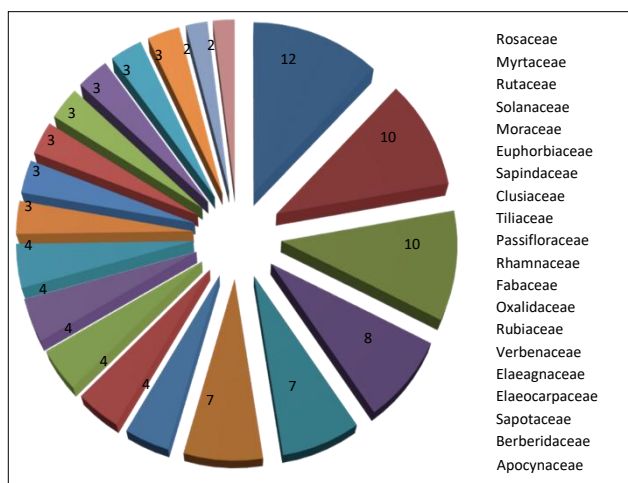


Fig 2 Distribution of indigenous and exotic fruits

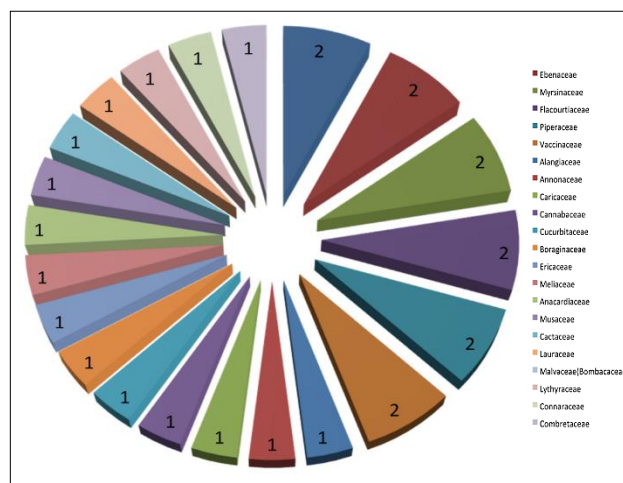


Fig 3 Distribution of indigenous and exotic fruits

RESULTS AND DISCUSSION

The present study was carried out to survey the indigenous and exotic edible fruits of the Nilgiris. In this investigation about 125 edible fruit plant species belonging to 41 families were reported (Table 1). Of these 73 tree species, 35 shrubs, 10 herbs and 7 climbers were observed. (Table 1) shows the Common name, Botanical name, Local name, Family, Habit, Fruit type and their nativity of the collected indigenous and exotic fruit species. Among these the number of plant species observed were Rosaceae (12), Myrtaceae (10), Rutaceae (10), Solanaceae (8), Moraceae (7), Euphorbiaceae

(7), Sapindaceae (4), Clusiaceae (4), Tiliaceae (4), Passifloraceae (4), Rhamnaceae (4), Fabaceae (3), Oxalidaceae (3), Rubiaceae (3), Verbenaceae (3), Elaeagnaceae (3), Elaeocarpaceae (3), Sapotaceae (3), Berberidaceae (2), Apocynaceae (2), Ebenaceae (2), Myrsinaceae (2), Flacourtiaceae (2), Piperaceae (2), Vaccinaceae (2), Alangiaceae (1), Annonaceae (1), Caricaceae (1), Cannabaceae (1), Cucurbitaceae (1), Boraginaceae (1), Ericaceae (1), Meliaceae (1), Anacardiaceae (1), Musaceae (1), Cactaceae (1), Lauraceae (1), Malvaceae (Bombacaceae) (1), Lythraceae (1), Connaraceae (1), Combretaceae (1) (Figure 2) The different types of fruits recorded were 56 Berry, 41 Drupe, 7 Capsule, 5

Achene, 4 Sorosis, 4 Pome, 3 Pods, 3 Hesperidium, 1 Pepo and 1 Hip (Fig 3).

India is having a wide variety of plants and rich in ethnic diversity. The climatic and ecological diversity create a foundation for very rich plant diversity and India is considered as one of the mega diversity centers in the world. Studies on wild edible plants have been carried out by various workers in India [8]. Fruits are commercially important and nutritionally indispensable food commodity and important part of human diet [9].

Fruit is an edible product of perennial higher plants with high water content, a soft texture, a sweet, sour and semi-astringent taste. Due to their exotic flavor and taste, they are quite popular in various parts of the world. The present study was undertaken to investigate the Indigenous and exotic fruits of the Nilgiri hills. The Nilgiri District is divided into six taluks for the administrative purpose. They are Udhagamandalam, Coonoor, Kotagiri Kundah, Gudalur and Pandalur.

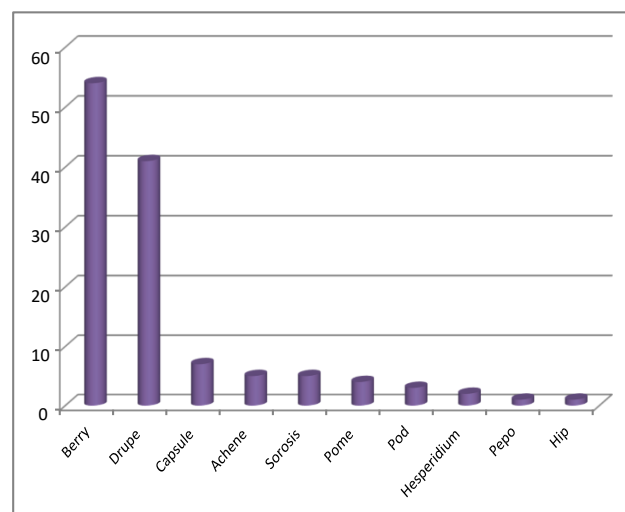


Fig 4 Types of indigenous and exotic fruits

Table 1 Check list of the indigenous / exotic fruits of the Nilgiris

S. No.	Common name	Botanical name	Family	Habit	Fruit type	Indigenous / Exotic	Medicinal properties
1	Australian blackwood	<i>Acacia melanoxylon</i> R.Br.	Fabaceae	Tree	Pods	Exotic	Edible fruits
2	Bael, Bengalquine, golden apple.	<i>Aegle marmelos</i> (L.) Correa	Rutaceae	Tree	Berry	Indigenous	The fruit is a good remedy for diarrhea, dysentery, intestinal parasites, dryness of the eyes, and common cold used in ayurvedic [10].
3	Sage-leaved alangium	<i>Alangium salvifolium</i> Wang.	Alangiaceae	Shrub	Berry	Indigenous	The fruit is used as purgative, expectorant, carminative and antidote poisoning. The fruit juice issued to cure eye diseases [11].
4	Indian allophyllus.	<i>Allophylus serratus</i> (Roxb) Kurz	Sapindaceae	Shrub.	Drupe	Indigenous	The flesh of this fruit is eaten raw to expel tapeworm [12-13]
5	Custard apple.	<i>Annona reticulata</i> Linn	Annonaceae	Tree	Berry	Exotic	The ripe fruits are alleviating biliousness, thirst and stop vomiting. The raw fruit peel possesses antioxidant and antimicrobial properties [14]
6	Lindley's Aporosa.	<i>Aporosa lindleyana</i> (Wight) Baill.	Euphorbiaceae	Tree	capsule	Indigenous	Edible fruits
7	Wild jackfruit	<i>Artocarpus hirsutus</i> Lam.	Moraceae	Tree	Sorosis	Indigenous	The aqueous extract of these fruits were evaluated for diuretic activity using modified Lipchitz method [15]
8	Jackfruit	<i>Artocarpus heterophyllus</i> Lam.	Moraceae	Tree	Sorosis	Indigenous	These fruits showed antibacterial activity [16]
9	Bread fruit	<i>Artocarpus altissimus</i> (Parkinson) Fosberg	Moraceae	Tree	Sorosis	Exotic	This fruit has antioxidant and antimicrobial activities [17].
10	Bilimbi	<i>Averrhoa bilimbi</i> L.	Oxalidaceae	Tree	Berry	Exotic	Fruit juice is used to treat scurvy, biliousness, whooping cough, hypertension, obesity and diabetes [18]
11	Carambola, Starfruit.	<i>Averrhoa carambola</i> L.	Oxalidaceae	Tree	Berry	Exotic	The fruit is used to treat cough, food poisoning, sore throat and malarial splenomegaly [19]
12	Nilgiri barberry.	<i>Berberis tinctoria</i> (Lesch.)	Berberidaceae	Shrub	Berry	Indigenous	Barberry has been used to treat diarrhea, reduce fever, improve appetite and relieve upset stomach [20]
13	Spinous kin tree	<i>Bridelia retusa</i> (L.) A. Juss	Euphorbiaceae (or) phyllanthaceae	Tree	Drupe	Indigenous	Antimicrobial activity [21]
14	Ceylon boxwood	<i>Canthium dicoccum</i> (Gaertn.) Merr.	Rubiaceae	Tree	Drupe	Indigenous	These fruits showed anticancer activity [22]
15	Carragee chedde	<i>Canthium parviflorum</i> Lam.	Rubiaceae	Tree	Drupe	Indigenous	Fruit pulp acts as astringent, cholagogue, strengthening and an expellant of phlegm and bil [23]
16	Cayenne pepper, Tabasco pepper	<i>Capsicum frutescens</i> L.	Solanaceae	Herb	Berry	Exotic	The dried fruit is a powerful local stimulant with no narcotic effect; it is most useful in atony of the intestines and stomach [24]. The fruit also act as a santhi haemorrhoidal, antirheumatic, antiseptic, carminative, diaphoretic, digestive, sialagogue and stomachic agent [25]
17	Papaya	<i>Carica papaya</i> L.	Caricaceae	Tree	Berry	Exotic	The fruit is a good remedy for indigestion, constipation, flatulence and improves appetite [26]
18	Bengal currant, Karanda	<i>Carissacandans</i> Linn	Apocynaceae	Shrub	Berry	Indigenous	The fruit showed anticancer activity [27]
19	Conkerberry or bush plum	<i>Carissa spinarum</i> L (S. of) <i>Carissagangetica</i> Stapf	Apocynaceae	Shrub	Berry	Indigenous	The ripe fruit is taken as an antiscorbutic and remedy for biliousness [28]
20	White sapote, Mexican-apple	<i>Casimiroa edulis</i> La Llave.	Rutaceae	Tree	Drupe	Exotic	Edible fruits
21	Mountain pomegranate	<i>Catunaregam spinosa</i> (Thunb) Tirveng. (S. of) <i>(xeromphisspinosa)</i>	Rubiaceae	Shrub	Drupe	Indigenous	The fruit showed antimicrobial activity [29]
22	Stinkwood	<i>Celtis timorensis</i> Span. (S. of) <i>C. cinnamomea</i> Lindl. ex. planch.	Cannabaceae	Tree	Drupe	Indigenous	Edible fruits

23	Starapple.	<i>Chrysophyllum roxburghii</i> G. Don	Sapotaceae	Tree	Berry	Indigenous	Edible fruits
24	Lemon	<i>Citrus limon</i> (L.) Burmf.	Rutaceae	Tree	Hesperidium (berry)	Indigenous	The fruit is used as blood purifier, blood sugar balance, osteoporosis, insomnia, brain and nerve food, asthma, nausea, vomiting and travel sickness, Rheumatism, Arthritis and treat throat infections [30]
25	Pomelo	<i>Citrus maxima</i> (Burm.) Merr.	Rutaceae	Tree	Hesperidium (berry)	Indigenous	The fruit acts as antiemetic, aphrodisiac, astringent, laxative agent [31]
26	Mandarin orange	<i>Citrus reticulata</i> Blanco.	Rutaceae	Tree	Hesperidium (berry)	Indigenous	The fruits are used to cure asthma, cough, mental aberration [32]
27	Horsewood	<i>Clausenadenata</i> (Willd.) Roemer.	Rutaceae	Tree	Berry	Indigenous	Edible fruits
28	Ivy gourd, scarlet gourd.	<i>Coccinia grandis</i> (L.) Voigt	Cucurbitaceae	Climber	Berry	Indigenous	Young fruit are eaten as a raw for mouth diseases [33]
29	Indian cherry	<i>Cordia dichotoma</i> G. Forst	Boraginaceae	Tree	Drupe	Indigenous	Fruit mucilage was given orally to treat cough [34]
30	Tamarillo	<i>Cyphomandra betacea</i> (Cav) Sendtn	Solanaceae	Tree	Drupe	Indigenous	The fruits possess antioxidant phytonutrients and anti-cholinesterase properties [35]
31	Longan, Dragons eyes.	<i>Dimocarpus longan</i> Lour	Sapindaceae	Tree	Drupe	Indigenous	The fruit has been used as a traditional herbal medicine for relieving insomnia, soothing nerves and promoting blood metabolism [36]
32	Velvet apple, velvet persimmon.	<i>Diospyros blancoi</i> A. Dc. (S. of) D. discolor (Willd)	Ebenaceae	Tree	Berry	Exotic	The fruit is used for wounds and to gargle in cases of aphthous stomatitis [37]
33	Persimmon	<i>Diospyros kaki</i> L. f.	Ebenaceae	Tree	Berry	Exotic	The fruit has shown antioxidant activity [38-39]
34	Golden dewberry, pigeonberry	<i>Duranta erecta</i> L. (Old name)	Verbenaceae	Shrub	Drupe	Exotic	Fruit induces mental derangement in man and fruit juice is used for skin diseases (CRC World dictionary of medicinal and poisonous plants)
35	Durian	<i>Duranto plumieri</i> Jacq. <i>Duriozibethinus</i> L	Malvaceae (Bombacaceae)	Tree	Capsule	Exotic	Fruit possesses antioxidant properties [40]
36	Wild olive, Snake fruit.	<i>Elaeagnus conferta</i> Roxb.	Elaeagnaceae	Shrub	Drupe	Indigenous	Fruits are used as Astringent [41]
37		<i>Elaeagnus indica</i> Serv.	Elaeagnaceae	Shrub	Drupe	Indigenous	The fruit extract revealed antimicrobial, anticancer and larvicidal activity [42]
38	Bastard oleaster	<i>Elaeagnus kolonga</i> Schltd. (S. of) <i>elaegnus latifolia</i> L.	Elaeagnaceae	Shrub	Drupe	Indigenous	The fruit has antioxidant properties [43]
39	Bikki	<i>Elaeocarpus tectorius</i> (Lour) Poir.	Elaeocarpaceae	Tree	Drupe	Indigenous	The fruits are used to treat the treatment of leprosy, pneumonia, rheumatism, ulcers, and piles [44-45]
40	Warty marble tree	<i>Elaeocarpus tuberculatus</i> Roxb	Elaeocarpaceae	Tree	Drupe	Indigenous	The fruit exhibited antimicrobial activity [46]
41	Ceylon olive.	<i>Elaeocarpus serratus</i> L	Elaeocarpaceae	Tree	Drupe	Indigenous	The astringent fruits are used in the treatment of dysentery and diarrhea [47]
42	False black pepper	<i>Embeliaribes</i> Burm. F.	Myrsinaceae	Shrub	Berry	Indigenous	The fruits act as an anthelmintic, diuretic, carminative, contraceptive, anti-bacterial, anti-inflammatory astringent, antioxidant, anticancer agents [48]
43	Loquat fruit	<i>Eriobotrya japonica</i> (Thunb) Lindl.	Rosaceae	Tree	Pome	Exotic	The fruit has been reported to show anti-inflammatory activity [49]
44	Brazilian cherry	<i>Eugenia uniflora</i> L.	Myrtaceae	Shrub	Berry	Exotic	Fruits were recorded to exhibit antioxidant activity [50]
45	Asthma plant	<i>Euphorbia hirta</i> L.	Euphorbiaceae	Herb	Capsule	Indigenous	The fruit showed anti-inflammatory activity [51]
46	Fig	<i>Ficus carica</i> L	Moraceae	Tree	Achene	Exotic	The fruit has antioxidant property [52]. Fruit paste is applied on swellings, tumors and inflammation for relieving pain [53]
47	Hairy fig	<i>Ficus hispida</i> L	Moraceae	Tree	Achene	Indigenous	The fruit juice is used for liver problems [54]
48	Cluster fig	<i>Ficus racemosa</i> Linn (S. of) <i>Ficus glomerata</i> roxb.	Moraceae	Tree	Achene	Indigenous	Fruits play as astringents to bowels, styptic, tonic and useful in the treatment of leucorrhoea, blood disorders, burning sensation, fatigue, urinary discharges, leprosy, menorrhagia, epistaxis and intestinal worms [55].
49	Governor's plum	<i>Flacourtia indica</i> (Burm. f.) Merr. (S. of) <i>Flacourtia ramontchi</i>	Flacourtiaceae	Tree	Pome	Indigenous	This fruit juice is useful in treating fever [56]
50	Mountain sweetthorn	<i>Flacourtia montana</i> J. Graham.	Flacourtiaceae	Tree	Berry	Indigenous	Edible fruits
51	Bush weed, Indian snowberry	<i>Flueggea leucopyrus</i> Willd.	Euphorbiaceae	Shrub	Berry.	Indigenous	The fruits revealed antifungal activity [57]
52	Indian strawberry	<i>Fragaria indica</i> Andr. (ndreus) (S. of) <i>Potentilla indica</i> (Andrews Th. wolf).	Rosaceae	Herb	Achene	Indigenous	The crushed fruit is applied to treat boils and abscesses, swellings, ring worm, snake and insect bites
53	Wild strawberry.	<i>Fragaria nilgerrensis</i> Schlecht. ex J. Ga	Rosaceae	Herb	Achene	Indigenous	Edible fruits
54	Brindle berry, Camboge.	<i>Garcinia gummi-gutta</i> (L) Roxb. (or) <i>Garcinia cambogia</i>	Clusiaceae	Tree	Berry	Indigenous	The fruit is used in a lotion with vinegar to rub over the abdomen of women after confinement [58]
55	Kokum Goabutter	<i>Garcinia indica</i> Choisy	Clusiaceae	Tree	Berry	Indigenous	The fruit has been reported to possess antioxidant, chelating, anti-cancer, anti-fungal, anti-inflammatory, anti-bacterial, cardio protective and anti-ulcer properties [59]
56	Mangosteen	<i>Garcinia mangostana</i> (Linn)	Clusiaceae	Tree	Berry	Exotic	The pericarp of these fruits have been used as a medicinal agent by Southeast Asians in the treatment of skin infections and wounds [60], amoebic dysentery [61]

57	Sourmangosteen	<i>Garcinia xanthochymus</i> Hook.f.ex.T.Anders	Clusiaceae	Tree	Berry	Indigenous	The fruits are used in the treatment of various ailments like fever, stomach problems, skin diseases and sexual disorders [62]
58	Fragrantwintergreen	<i>Gaultheria fragrantissima</i> Wall.	Ericaceae	Shrub	Capsule	Indigenous	The fruit has strong antioxidant property [63]. The unripe fruits are remedies for stomach troubles [64]
59	Orangeberry	<i>Glycosmismauritiana</i> (Lam)Tanaka.	Rutaceae	Tree	Berry	Indigenous	Edible fruits
60	Ginberry	<i>Glycosmis pentaphylla</i> (Retz).	Rutaceae	Shrub	Berry	Indigenous	Fruit is useful to cure fever [65]
61	Kukurbicha	<i>Grewia hirsuta</i> Vahl	Tiliaceae	Shrub	Drupe	Indigenous	Fruits are used to cure diarrhea and dysentery [66]
62	Accu	<i>Grewia obtusa</i> Wall.	Tiliaceae	Shrub	Drupe	Indigenous	Edible fruits
63	Dhaman	<i>Grewia tilifolia</i> Vahl.	Tiliaceae	Tree	Drupe	Indigenous	Edible fruits
64	Hairy-leafcrossberry	<i>Grewia villosa</i> Willd.	Tiliaceae	Shrub	Drupe.	Indigenous	Edible fruits
65	Langsatfruit	<i>Lansium parasiticum</i> (Osbeck) Sahni & Bennet	Meliaceae	Tree	Berry	Exotic	The fruits skin is used to treat diarrhea and, in the Philippines, the dried skin is burned as a mosquito repellent [67]
66	Tick berry	<i>Lantana camara</i> L var.aculeate.	Verbenaceae	Shrub	Drupe	Indigenous	Edible fruits
67	Indianlantana	<i>Lantana indica</i> . Roxb	Verbenaceae	Shrub	Drupe	Indigenous	Edible fruits
68	Lychee	<i>Litchi chinensis</i> Sonn.	Sapindaceae	Tree	Drupe	Exotic	The fruit peel is used to treat diarrhea [68]
69	Wildberry	<i>Maesa indica</i> (Roxb)Dc	Myrsinaceae	Shrub	Berry	Indigenous	The extract of the fruit contains antioxidant, anti-diabetic properties [69]
70	Mullumanjanathi	<i>Mahonia leschenaultia</i> (Wall.ex Wight & Arn.)Takeda	Berberidaceae	Shrub	Berry	Indigenous	These fruits are considered as a diuretic, demulcentin dysentery [70]
71	Apple	<i>Malus pumila</i> Mill.or <i>Malus domestica</i>	Rosaceae	Tree	Pome	Exotic	Phenolic compounds present in the fruits have known to treat diseases like cancer and coronary heart diseases [71]
72	Mango	<i>Mangifera indica</i> L	Anacardiaceae	Tree	Drupe	Indigenous	The fruit is known to show antioxidant, anti-lipid peroxidation, immunomodulation, cardiotoxic, hypotensive, wound healing antidegenerative and antidiabetic activities [72]
73	Sapodilla	<i>Manilkara zapota</i> (L) P.Royen	Sapotaceae	Tree	Berry	Exotic	Fruits have shown anticancer activity [73]
74	Whitemulberry	<i>Morus alba</i> L	Moraceae	Tree	Sorosis	Exotic	It is considered as a laxative and oral juice administration is a good drink during convalescence after a febrile illness [74-75]
75	Curry leaf	<i>Murraya koenigii</i> (L) Spreng	Rutaceae	Tree	Berry	Indigenous	This fruit juice is used to treat insect bites and stings along with lime juice [76]
76	Banana	<i>Musa paradisiaca</i> L. (Linnaeus)	Musaceae	Tree	Berry	Indigenous	The fruit is believed to reduce the worm [77]
77	Rambutan	<i>Nephelium lappaceum</i> L	Sapindaceae	Tree	Drupe	Exotic	The fruit is known to treats to machi, astringent, anthelmintic and believed to be a good remedy for the treatment of diarrhea and dysentery [78]
78	Yellowsorrel	<i>Oxalis corniculata</i> L.	Oxalidaceae	Herb	Capsule	Exotic	Edible fruits
79	Pricklypear	<i>Opuntia dillenii</i> (Ker-Gawl)Haw	Cactaceae	Shrub	Berry	Exotic	The fruit is considered a refrigerant, and is said to be used for gonorrhoea and to control spasmodic cough and expectoration [79]
80	Passionfruit	<i>Passiflora edulis</i> (Sims)	Passifloraceae	Shrub	Pepo	Exotic	Passion fruit juice is known as a good source of antioxidant [80]
81	Bush passion fruit (or) stinking passion flower	<i>Passiflora foetida</i> Linn	Passifloraceae	Climber	Berry	Exotic	Fruits decoction helps to treat asthma and biliousness [81]
82	PassionFruit	<i>Passiflora leschenaultia</i> Dc	Passifloraceae	Climber	Berry	Indigenous	Edible fruits
83	Banana passionfruit	<i>Passiflora mollissima</i> .(Kunth)L.H.Bailey	Passifloraceae	Climber	Berry	Exotic	Edible fruits
84	Avocado	<i>Persea americana</i> Mill	Lauraceae	Tree	Drupe	Exotic	The fruit pulp is emollient, carminative and helps to lower blood cholesterol levels [82]. The unripe fruit is used to induce abortion [83]
85	Stargooseberry	<i>Phyllanthus acidus</i> (L)Skeels	Euphorbiaceae	Tree	Drupe	Indigenous	The fruit is a liver tonic and blood purifier and used in several vitiated conditions of jaundice, bronchitis, constipation, vomiting, biliousness, urinary concretions and piles in Ayurvedic system of medicine [84].
86	Indiangooseberry	<i>Phyllanthus emblica</i> L(Linn)	Euphorbiaceae	Tree	Berry	Indigenous	Fruit can be carminative and stomachic. Dried fruit is sour and astringent [85]
87	Niruri	<i>Phyllanthus niruri</i> L	Euphorbiaceae	Herb	Capsule	Indigenous	The fruit can be used externally for tubercular ulcers, scabies and ring worm [86]
88	SunberryWild capegooseberry	<i>Physalis minima</i> Linn	Solanaceae	Herb	Berry	Exotic	Fruits are used to cure stomach pain and constipation [87]. Ripe fruits are used in gastric trouble [88]
89	Capegooseberry, Goldenberry	<i>Physalis peruviana</i> L	Solanaceae	Herb	Berry	Exotic	The raw fruits are used to cure vomiting and poor digestion [89]
90	Long pepper	<i>Piper longum</i> L	Piperaceae	Climber	Drupe	Indigenous	Fruits are used to treat vata and kapha, asthma, bronchitis, abdominal complaints, fevers, leukoderma, urinary discharges, tumours, piles, diseases of the spleen, pains, inflammation, leprosy, insomnia, jaundice, hiccoughs, tubercular glands and reduces biliousness [90]
91	Blackpepper	<i>Piper nigrum</i> . Linn.	Piperaceae	Climber	Drupe	Indigenous	The fruit is used to treat piles, hypolipidemic and cancer. It is considered as anti-cough, antibacterial, antioxidant and anti-inflammatory agent [91]
92	Manila tamarind,	<i>Pithecellobium dulce</i>	Fabaceae	Tree	Pod	Exotic	The fruit was evidenced in treating gastrointestinal

Monkeypod	(Roxb) Benth.					disorders like peptic ulcer [92]. The fruit peel has antioxidant, antibacterial and wound healing potential [93]
93 Eggfruit	<i>Pouteriacampechiana</i> (Kunth) Baehni	Sapotaceae	Tree	Berry	Exotic	The fruit pulp and peel showed antioxidant activity [94]
94 Pear	<i>Pyruscommunis</i> L	Rosaceae	Tree	Pome	Exotic	The fruit maintains blood glucose levels in diabetics, hypoglycaemic, hypolipidemic [95]. It also contains anti-cancer property [96]
95 Plums	<i>Prunusdomestica</i> L	Rosaceae	Tree	Drupe	Exotic	The fruits exhibited antioxidant activity [97]
96 Peach	<i>Prunuspersica</i> L	Rosaceae	Tree	Drupe	Exotic	The fruits revealed antioxidant activity [98]
97 Strawberry guava	<i>Psidiumcattleianum</i> Afzelexsabine.	Myrtaceae	Tree	Berry	Exotic	Fruits are rich in antioxidant properties [99]
98 Guava	<i>Psidiumguajava</i> L	Myrtaceae	Tree	Berry	Exotic	The fruit has been used as a tonic and laxative and to treat bleeding gums [100]
99 Pomegranate	<i>Punica granatum</i> L	Lythraceae	Tree	Berry	Exotic	In Asian nation fine immature fruit is consumed orally for peptic ulcer [101]
100 Downy rosemyrtle	<i>Rodomyrtustomentosa</i> (Aiton) Hassk	Myrtaceae	Shrub	Berry	Indigenous	The fruits are used to treat diarrhea and dysentery [102]
101 Rose	<i>Rosaindica</i> Linn	Rosaceae	Shrub	Hip	Indigenous	The fruit of roses reduces menstrual pains and also cures kidney stones [103]
102 Roureaminor	<i>Rourea minor</i> (Gaertn) Alston.	Connaraceae	Shrub.	Capsule	Indigenous	Edible fruits
103 Yellow Himalayan raspberry	<i>Rubusellipticus</i> Smith	Rosaceae	Shrub	Drupe	Indigenous	Fruits revealed antioxidant activity [104]
104 Ceylonblackberry	<i>Rubusmoluccanus</i> Linn	Rosaceae	Shrub	Drupe	Indigenous	The fruit is considered to be useful remedy for the nocturnal micturition of children [105]
105 Black raspberry	<i>Rubusracemosus</i> Roxb	Rosaceae	Shrub	Drupe	Indigenous	Edible fruits
106 Keriberry	<i>Rubusrugosus</i> Var. Thwaitisii	Rosaceae	Shrub	Drupe	Indigenous	Edible fruits
107 Cat –thorn	<i>Scuttia myrtina</i> (Burn)F.Kurz.	Rhamnaceae	Tree	Drupe.	Indigenous	Edible fruits
108 Blacknightshade	<i>Solanum nigrum</i> L (S.of) <i>Solanum papiyam</i> L	Solanaceae	Herb	Berry	Exotic	The berry juice is used to treat diarrheal, ophthalmopathy and hydrophobia. It is also used to cure heart disease. They are also useful in the treatment of inflammations and skin diseases [106]
109 Stickynightshade	<i>Solanumsisymbriifolium</i> Lam	Solanaceae	Shrub	Berry	Exotic	An alkaloids olasodine isolated from fruits has been reported for its anticonvulsant activity in rodents [107]
110 Yellow berried night shade	<i>Solanumsurattense</i> Burm.F	Solanaceae	Herb	Berry	Indigenous	The fruit is a very good remedy for diabetes, fever, diarrhea, eye diseases and rabies. Paste from unripe fruit is used to treat headache and ring worm [108]
111 Turkey berry	<i>Solanum torvum</i> SW	Solanaceae	Shrub	Berry	Exotic	Fruit has anti-oxidant properties [109] (SivapriyaandSrinivas,2007). It is intensively used as poison anti-dote and for the treatment of fever, wounds, tooth decay, reproductive problems and arterial hypertension [110]
112 Naval	<i>Syzygium densiflorum</i> Wall.ex Wt. & Arn.	Myrtaceae	Tree	Berry	Indigenous	Edible fruits
113 Pretty- leaved plum	<i>Syzygium arnottianum</i> Walp	Myrtaceae	Tree	Berry	Indigenous	Fruits showed antioxidant and Anti-bacterial activity [111]
114 Javaplum	<i>Syzygium calophyllifolium</i> Walp	Myrtaceae	Tree	Berry	Indigenous	Dried fruits are used for stomach ulcers and reduce acidity and showed antidiabetic activity [112]
115 Rose apple, Malabarplum	<i>Syzygiumjambos</i> L	Myrtaceae	Tree	Berry	Indigenous	Fruit is good for brain and liver and the fruit in fusion has diuretic properties [113]
116 Malayapple	<i>Syzygiummalaccense</i> (L) Merr. & L.M. Perry	Myrtaceae	Tree	Berry	Exotic	Fruit displayed antioxidant activity [114-115]
117 Waxapple	<i>Syzygiumsamarangense</i> (Blume) Merr. & L.M.Perry	Myrtaceae	Tree	Berry	Indigenous	The fruit extract has proven to show antioxidant and antimicrobial activity [116]
118 Tamarind	<i>Tamarindus indica</i> Linn	Fabaceae	Tree	Pods	Indigenous	The fruit displayed anti-diarrheal and anti-dysentery activity [117]
119 Baheda	<i>Terminaliabellerica</i> (Gaertn) Roxb.	Combretaceae	Tree	Drupe	Indigenous	The fruit cures eye related problems and infection, reduces the high blood pressure and leveling the cholesterol, chewing the fruit cures cough, cold, asthma and hoarse voice [118]
120 Orangeclimber	<i>Todaliaasiatica</i> Lam	Rutaceae	Climber	Berry	Indigenous	The fruit is traditionally used to treat malaria and coughs [119]
121 Indian cranberry	<i>Vaccinium leschenaultia</i> Wight (Wt)	Vaccinaceae	Tree	Berry	Indigenous	Fruit has shown antioxidant, anti-inflammatory, antiulcer activity [120]
122 Blue berry	<i>Vacciniumneilgherrense</i> Wt.	Vaccinaceae	Tree	Berry	Indigenous	Edible fruits
123 Jujube, reddate	<i>Zizyphus jujuba</i> (S.of) <i>Zizyphus mauritiana</i> Lam.	Rhamnaceae	Tree	Drupe	Indigenous	Jujube fruits are used to treat anaemia, hypertonia, nephritis and nerve diseases [121]
124 Jackal jujube	<i>Zizyphusoenoplia</i> (L) Mill	Rhamnaceae	Shrub	Drupe	Indigenous	The fruit extract contains wound healing property [122]
125 Zunnaberry	<i>Zizyphusrugosa</i> Lam	Rhamnaceae	Shrub	Drupe	Indigenous	Fruit is used in the treatment of rheumatism [123]

About 125 edible fruit plant species belonging to 41 families were reported from the different taluks of Nilgiris. Of these 73 tree species, 35 shrubs, 10 herbs and 7 climbers. The previous investigation made by Cyril *et al.* [124] (1993) showed

the 27 edible fruits species belonging to 22 families. Sathyavathi and Janardhanan [125] (2014) enlisted 30 wild edible fruits in the Nilgiri district. Regular consumption of fruits reduces the risks of cancer, cardiovascular diseases (especially

coronary heart disease), stroke, Alzheimer disease, cataracts and some of the functional diseases associated with aging [126] (Liu, 2003). Deshmukh and Waghmode [127] (2011) reported the nutritional and medicinal value of 11 fruit species Western Ghats region of Maharashtra.

CONCLUSION

The medicinal properties of the indigenous and exotic fruits of the Nilgiri hills have been studied by many researchers. Among 125 species observed in the present investigation, 25 plants having antioxidant property, 7 plant showed anti-cancer activity, 6 plant showed anti-inflammatory activity, 6 plant

showed anti-microbial activity, 6 plant showed anti-bacterial activity, 6 plant showed diuretic activity, 4 plant showed anti-diarrhoeic activity, 3 plant showed anti-ulcer activity, 2 plant showed anti-dysenteric activity, 2 plant showed anti-fungal activity, 2 plant showed anti-diabetic activity, 2 plant showed anti-dote activity, 2 plant showed wound healing activity. 1 plant showed anti-haemorrhoidal activity, 1 plant showed anti-rheumatic activity, 1 plant showed anti-septic activity, 1 plant showed anti-scorbutic activity, 1 plant showed anti-emetic activity, 1 plant showed anti-cholinesterase activity, 1 plant showed anti-lipid peroxidation activity, 1 plant showed anti-degenerative activity, 1 plant showed anti-cough activity, 1 plant showed anticonvulsant activity.

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