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Ethnobotanic Informations on Uncommon Anti-Diabetic Medicinal Plants from Alagarkoil Forest Reserve: Evidence Based Strategic Rationale in Management of Diabetics

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ABSTRACT

Natural products based treatment options for several diseases and human-health disorders such as diabetes mellitus have gained considerable research interest. WHO depicts that over 80% of the world's population depends on natural resources and traditional system of medicine for healthcare needs. In India, traditional, indigenous medical practices are more empirical; however, an estimate suggests that over 200 million people with limited access to primary health-care needs depend on plant-based traditional medicine. Additionally, local communities with a splendid diversity of indigenous tradition remain unnoticed or underestimated. Their knowledge base and practices have been marginalized due to political, social and economic reasons. Valaiyans of Alagarkoil are known to use more than 100s of plants as a source to treat diabetics. Since, in-depth study on the usage of medicinal plants by Valaiyans of Alagarkoil Hills is lacking, an attempt has been made to gather information and authenticate it with bibliographic databases including PubMed, Scopus, Elsevier, Springer, Bentham Science, and other scientific databases. Anti-diabetic medicinal plants diversity informatics at present is not at instant access, data on antidiabetic medicinal plants diversity is either scanty in the existing databases or other media and are not amenable to interactive search. Moreover, majority of the literature does not contain botanical, phytochemical, ethnobotanical, pharmacological information with their local names under one roof.

INTRODUCTION

Diabetes mellitus, collective metabolic disorders associated with complications such as neuropathy, retinopathy, nephropathy, ischemic heart disease, stroke, and micro-angiopathy (1). According to IDF, approximately 463 million adults (20-79 years) survive with diabetes; by 2045 this is expected to rise to 700 million. The proportion of people with type 2 diabetes is increasing in most of the countries; furthermore, 374 million people are at increased risk of developing type II diabetes (2). Diabetes management without side effects is still a major challenge to the healthcare service providers. Herbal medicines are widely prescribed because of their efficacy, fewer side effects, and relatively low cost. Several plant extracts have proven anti-diabetic activity. The bioactive constituents of the plants include glycosides, alkaloids, polysaccharides, galactomannan gum, steroids, guanidine, carbohydrates, terpenoids, peptidoglycan, hypoglycin, glycopeptides, amino-acids, and inorganic ions. These affect various metabolic cascades that directly or indirectly affect glucose metabolism in the human body (3).

Ethnic groups across the world are known for their indigenous cultures, customs, religious rituals, myths, medicine, food, and other folklore practices. Tribal people dwelling in the forests are repository of accumulated experience and knowledge of indigenous vegetation. Documentation of traditional knowledge and indigenous practices that have evolved over some time has gained due prominence in the recent past as it is considered as a latent aspect of "bioprospecting".

In recent times, mounting body of research is hoisting the credibility of underexplored traditional knowledge base in meeting the challenges of primary health-care services. AYUSH and other Traditional Folklore System of Medicine (TFSM) in India use Plants Based Natural Products (PBNPs) to treat diabetics. Surprisingly, many of such ailments are commonly used by the tribal and local communes in rural area. They exploit the therapeutic potential of common plants that have not received much attention or their therapeutic potential is less known or have not been scientifically explored yet (4-8). India is one of the twelve mega biodiversity hot spots of the world and has 17,000 flowering plants. Among 25 hotspots in the world, Eastern Himalayas (9) and Western Ghats are two hotspots of India (10-12).

Three major tribal groups of Tamil Nadu are the Valaya or Valaiyans, who live in the hill tracks of Madurai, Dindigul and Tanjore districts, and the Paliyan and the Pulayan, dwelling in the Western Ghats. A considerable number of studies have been published on the Ethnobotany and ethnomedicine of tribal groups in different regions of India (9). Valaiyans of Alagarkoil are known to use more than 100s of plants treat diabetics. Since, an in-depth study on the usage of medicinal plants by Valaiyans of Alagarkoil Hills is lacking, an attempt has been made to gather information and validate it.

Ethnomedicinal uses of plant species used by Valaiyans inhabiting the foothills of Alagarkoil reserve forest, Madurai district, Tamil Nadu, India. They use the plants for treatment of diabetes and various other diseases, like skin diseases, colds, and coughs, ulcers, stomach related problems, fevers, piles, jaundice.

MATERIALS AND METHODS

Study area

Dry deciduous forests of Alagarkoil hills, South India are subjected to high degree of anthropogenic disturbances. The hill top is relatively relieved from such disturbances (13). Further, habitat destruction, overexploitation, environmental pollution, and anthropogenic pressure are the major cause of disturbance to the forest ecosystem. Dry tropical forests account for 38.2 % of total forest cover in India, however, is largely disturbed by anthropogenic interventions (14).

Ethnomedicinal information was gathered by contacting local healer, headman and persons with a thorough knowledge about the local plants. The information gathered was confirmed by different groups of people dwelling in and around the area of study. Methodology reported previously was adopted (8). Data were meticulously entered in the field note; voucher specimens were collected, identified with the help of standard flora (15-17), authenticated and deposited in the Herbarium at Department of Botany, Government Arts College, Melur, Madurai.

Invariably, plants were used in different forms such as juice, extracts, decoctions, pastes, infusions, etc. Juice extract - prepared by grinding whole plant or plant parts with water and filtered. Decoction - obtained by boiling whole plant or plant parts in water, filtered. Paste - made by crushing plant parts with little water, the preparation is made into a soft mass.

Infusion - prepared by soaking clean plant material or plant parts in water for few hours or days; filtered and used. A list of medicinal plants with their binomial, family, vernacular name, useful parts, and medicinal uses is provided below.

RESULTS

A total of 173 plants were documented from the study area during the period from Jan 2015 to Dec 2017. Of the list, 152 plants belong to the dicotyledons group and the remaining 21 were shortlisted as monocotyledons. List of plants with family, vernacular name, habit is given in Table 1. Habit wise distribution analysis depicts that there were several Herbs (62, 36%) followed by Trees (57, 33%) > Shrubs (31, 18%)> Climbers (23, 13%) in the decreasing order (Figure. 1). Relative abundance of antidiabetic plants assorted to their respective families were in the decreasing order of representation was maximum in Fabaceae (23, 13.22) followed by Lamiaceae (12, 6.90) > Cucurbitaceae (9, 5.17) > Apocynaceae (8, 4.60) > Solanaceae (8, 4.60) > Asteraceae (6, 3.45) > Poaceae (6, 3.45) > Euphorbiaceae (5, 2.87) > Malvaceae (5, 2.87) (Figure. 2).

All the 173 plants were invariably used to treat diabetes; also, the plants were used to cure other ailments. Of the total number, about 25 species were used for treating Skin Infectious Diseases (SID), 18 species were used for treating Gastro-Intestinal Ailments (GIA), 16 species for Respiratory Track Diseases (RTD), 17 species for Genito-Urinary Ailments (GUA), 12 species for Fever/ Headache (FH), 6 species for Skeleto-Muscular Disorders (SMD), 19 species were used for the management of Cardiovascular Diseases (CVD), 05 for Dental/ Oral Care (DOC), 24 were for General Health Management (GHM), 20 species were used for Poisonous/ Insect Bites (PIB), 05 species were used for Ear, Nose, Throat problems (ENT), 24 species were used for Endocrinal Disorders (ECD), 07 species were used for Hair Growth/ Care (HGC), and nearly 04 species were used for Liver/ Hepatic Problems (LHP) and 87 plant species were used for management of disease in animals as ethnoveterinary medicine (EVM) and other economic importance of the plant species is given in Table 2.

DISCUSSION

The role of ethnobotany and its role in drug development has been highlighted (18). Tribal and rural people rely on medicinal plants to meet their healthcare needs. This has attracted botanists and scientists for vigorous research on medicinal plants. The studies on ethnomedicinal lore of the Seithur hills (18) revealed the use of 36 plant species belonging to

33 genera distributed over 24 families of flowering plants by the Valaya tribals of Virudhunagar. Out of these, 7 species were used for scabies and other skin diseases, 2 species for jaundice, 4 species for headache, 3 species for fever and one species for diabetes. Ganesan *et al*., (19) conducted an ethnomedicinal survey of Alagarkoil hills and documented 111 medicinal plant species belonging to 100 genera distributed over 48 families. Out of these, 20 species were employed in skin diseases, 2 species in cases of jaundice, 3 species in cases of headache, 5 species in fevers, 3 species in cases of diabetes. Nearly 19 plants recorded in the present study were also employed by Valaiya of Seithur hills (20).

Ganesan *et al*. (21) conducted an ethnobotanical survey of the Lower Palani hills of Tamil Nadu. They enumerated 45 species of plants distributed over 42 genera and belonging to 26 families as of ethnomedicinal value among the Paliyans and Pulayans for the treatment of various ailments. The plants were distributed over the Acanthaceae (4 species), Liliaceae, Cucurbitaceae, Solanaceae (3 species each), Sapindaceae, Amaryllidaceae, and Euphorbiaceae (2 species each). The Pteridophytes were represented by one species (*Nephrolepis auriculata*) and the remaining 16 families also contained one species each. Valaiyans utilize a large number of plants for medicinal and other purposes. A fair number of these species, listed for medicinal purposes by Valaiyans, were found to be common and already reported from other places (22-26). The uses of certain species have gained importance due to their manifold properties. For example, *Abutilon indicum* is used for piles and leg pain, *Acalypha indica* for eczema and chest pain, *Mollugo nudicaulis* for cold, *Notonia grandis* for earache and eczema besides diabetes, amongst plants such as *Syzygium cumini* exclusively endowed with bioactive compounds (27) for the treatment of diabetes.

Information on common hand remedies popular among tribals/ ethnic communities through experiences overages passed on from generation to generation without any written record is on the verge of extinction. As the tribal population is adopting the modern way of life, their heritage, traditional knowledge of plants will soon be lost forever. For ethnobotanist, it's perhaps the last call to record the original relics of knowledge about time tested usage of plants before they disappear. Alarmingly, incredible tropical biodiversity is under serious threat due to habitat destruction, overexploitation, shifting cultivation, industrial development, and several other anthropogenic interventions like a road for transportation besides unavoidable natural pressures such as climate change. Further research on the

documented medicinal plant species may lead to the discovery of novel bioactive molecules for the treatment of diabetics in the days to come.

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Table No. 1: List of plants recorded during the study with family, local name, habit, and part used

BOTANICAL NAME	FAMILY	TAMIL	HABIT	PART USED
Abelmoschus moschatus Medik.	Malvaceae	Kasturi-vendaik-kay	Herb	Leaf/ WP
Abrus precatorius L.	Fabaceae	Gundumani	Climber	Leaf/ WP
Abutilon indicum (L.) Sweet	Malvaceae	Thuthi	Shrub	Leaf/ Root
Acacia catechu (L. f.) Brandis	Fabaceae	Cenkarungali	Tree	Fruit/ Seeds
Acalypha indica L.	Euphorbiaceae	Kuppaimeni	Herb	Leaf/ WP
Achyranthes aspera L.	Amaranthaceae	Nayuruvi	Herb	Leaf/ WP
Adhatoda zeylanica Medik.	Acanthaceae	Adathodai	Shrub	Leaf
Aegle marmelos (L.) Corrêa	Rutaceae	Vilvam	Tree	Leaf/ Fruit
Aerva lanata (L.) Juss. ex Schult.	Amaranthaceae	Poolai	Herb	APP/ Leaf/ Flower
Ailanthus excelsa Roxb.	Simaroubaceae	Perumaram	Tree	Bark
Alangium salviifolium (L. f.) Wangerin	Cornaceae	Alanji	Tree	Leaf/ Fruit
Albizia amara (Roxb.) Boivin	Fabaceae	Usilai	Tree	Stem Bark
Albizia lebbeck (L.) Benth.	Fabaceae	Vagai	Tree	Bark
Allium cepa L.	Amaryllidaceae	Vengayam	Herb	Bulb/ Leaf/ WP
Allium sativum L.	Amaryllidaceae	Poondu	Herb	Bulb/ Leaf/ WP
Aloe barbadensis Mill.	Asphodelaceae	Kathalai	Herb	Leaf
Aloe vera (L.) Burm. f.	Asphodelaceae	Kathalai	Herb	Leaf
Alpinia galanga (L.) Willd.	Zingiberaceae	Aruttai; Perarattai	Herb	Leaf/ Rhizome
Anacardium occidentale L.	Anacardiaceae	Mundiri	Tree	Bark
Andrographis paniculata (Burm. f.) Wall.	Acanthaceae	Nilavembu	Herb	Leaf/ WP
Anisomeles malabarica (L.) R. Br. ex Sims	Lamiaceae	Aruvaachadachi	Shrub	Rhizome
Annona squamosa L.	Annonaceae	Sitapalam	Tree	Leaf/ Fruit/ WP
Areca catechu L.	Arecaceae	Pukam	Tree	Leaf/ Fruit/ Seeds
Artemisia dracunculus Hook. f.	Asteraceae	Macipattiri	Herb	Leaf
Asparagus racemosus Willd.	Asparagaceae	Thaneervitaanki zhangu	Climber	Root
Azadirachta indica A. Juss.	Meliaceae	Vaembu	Tree	Leaf/ Fruit/ Seed/ Fl
Bauhinia racemosa Lam.	Fabaceae	Atti	Tree	Leaf/ Fruit/ Seed/ WP
Benincasa hispida (Thunb.) Cogn.	Cucurbitaceae	Neer Poosanikai	Climber	APP/ Leaf
Berberis aristata DC.	Berberidaceae	Mullukala	Tree	Root/ Stem/ Leaf/ WP
Beta vulgaris L.	Chenopodiaceae	Beet root	Herb	WP/ Tuber
Boerhaavia diffusa var. hirsuta Kun	Nyctaginaceae	Punarnava	Herb	Leaf/ WP

tze				
Borassus flabellifer L.	Arecaceae	Panamaram	Tree	Fruit/ Toddy
Brassica nigra (L.) W.D.J. Koch	Brassicaceae	Kadugu	Herb	Seeds
Brassica oleracea L.	Brassicaceae	Nolcol	Herb	Seeds
Butea monosperma (Lam.)Taub.	Fabaceae	Purasu	Tree	Leaf/ WP
Caesalpinia bonduc (L.) Roxb.	Fabaceae	Kazharchikkaai	Climber	Seeds
Caesalpinia sappan L.	Fabaceae	Sappannam	Tree	Leaf/ WP
Cajanus cajan (L.) Huth	Fabaceae	Thuvaranparuppu	Shrub	Root
Calotropis gigantea (L.) W. T. Aiton	Apocynaceae	Vella-erikku	Shrub	Seeds/ WP
Capparis spinosa L.	Capparaceae	Tharaipadarmulli	Shrub	Leaf
Capsicum annuum L.	Solanaceae	Mulaga	Shrub	Leaf/ Fruit/ WP
Cardiospermum halicacabum L.	Sapindaceae	Mudakattan	Climber	Leaf/ WP
Carica papaya L.	Caricaceae	Pappali	Tree	Leaf/ Fruit/ Seeds
Carissa carandas L.	Apocynaceae	Kilaakkaai	Shrub	Seeds
Cassia fistula L.	Fabaceae	Konrai	Tree	Bark/ Flower/ Leaf
Ceiba pentandra (L.) Gaertn.	Malvaceae	Ulagamaram	Tree	Bark/ fruit/ Seed
Centella asiatica (L.) Urb.	Apiaceae	Vallarai	Herb	Leaf
Cichorium intybus L.	Asteraceae	Chikkar	Herb	Seeds
Cissus quadrangularis L.	Vitaceae	Pirandai	Climber	APP/ Leaf
Citrus medica L.	Rutaceae	Komattimadali	Tree	Fruit
Cleome aspera Koenig ex. DC.	Cleomaceae	Naivelai	Herb	Leaf
Cleome viscosa L.	Cleomaceae	Naikkaduku	Herb	Leaf
Clitoria ternatea L.	Fabaceae	Sankupushpam	Climber	Leaf
Coccinia grandis (L.) Voigt	Cucurbitaceae	Kovai	Climber	Leaf/ Fruit
Cocos nucifera L.	Arecaceae	Thnnai	Tree	Flower bud/ Nut/ Stem
Colocasia esculenta (L.) Schott	Araceae	Shamakkilangu,	Herb	Leaf/ WP
Coriandrum sativum L.	Apiaceae	Kothumalli	Herb	Leaf
Cucumis maderaspatana L	Cucurbitaceae	Muchumuchukkai	Climber	Leaf
Cucurbita maxima Duchesne	Cucurbitaceae	Pusani	Climber	Seeds
Cucurbita muschata Duchesne	Cucurbitaceae	Pusani	Climber	Bark
Cuminum cyminum L.	Apiaceae	Seeragam	Herb	Leaf
Curcuma domestica Valeton	Zingiberaceae	Veeralimanjal	Herb	Rhizome
Curcuma longa L.	Zingiberaceae	Manjal	Herb	Rhizome
Cuscuta chinensis Lam.	Convolvulaceae	Mudithali	Climber	Leaf
Cyanotis arachnoidea C.B. Clarke	Commelinaceae	Nirupalli	Herb	Leaf/ WP
Cynodon dactylon (L.) Pers.	Poaceae	Arugampul	Herb	Leaf/ WP
Datura metel C.H. Wright	Solanaceae	Oomathai	Herb	Leaf/ Fruit/ Seeds
Decalepis hamiltonii Wight & Arn.	Apocynaceae	Mahaali Kizhanku	Climber	Leaf
Diospyros malabarica (Desr.) Kostel.	Ebenaceae	Tumbika	Tree	Fruit
Diospyros peregrina (Gaertn.) Gürke	Ebenaceae	Karimaathi	Tree	Fruit
Dodonaea viscosa (L.) Jacq.	Sapindaceae	Viraali	Shrub	Leaf
Dolichandrone falcata (Wall. ex	Bignoniaceae	Kaliyacha	Tree	Leaf

DC.) Seem.				
Eclipta prostrata (L.) L.	Asteraceae	Karisakkankanni	Herb	Leaf
Eleusine coracana (L.) Gaertn.	Poaceae	Kaelvaragu	Herb	Seeds
Eleusine indica (L.) Gaertn.	Poaceae	Kattuthinai	Herb	Seeds
Erythrina abyssinica DC	Fabaceae	Kalyana murungai	Tree	APP/ Leaf
Eucalyptus globulus Labill.	Myrtaceae	Karpuramaram	Tree	Leaf
Euphorbia hirta L.	Euphorbiaceae	Amman pacharisi	Herb	Leaf/ WP
Ficus benghalensis L.	Moraceae	Alamaram	Tree	Bark
Ficus racemosa L.	Moraceae	Atthi	Tree	Leaf
Ficus religiosa L.	Moraceae	Arasamaram	Tree	Leaf
Foeniculum vulgare Mill.	Apiaceae	Sompu	Herb	Fruit
Glycyrrhiza glabra L.	Fabaceae	Ati-maduram	Herb	Leaf/ Root
Gmelina arborea Roxb.	Lamiaceae	Kumalaamaram	Tree	Leaf/ WP
Gymnema sylvestre (Retz.) R. Br.	Apocynaceae	Sirukurinjan	Climber	Leaf/ WP
Gynostemma pentaphyllum (Thunb.) Makino	Cucurbitaceae	Peiarlanthei	Climber	Leaf/ WP
Hemidesmus indicus (L.) R. Br. ex Schult.	Apocynaceae	Nannari	Climber	Leaf/ WP
Holoptelea integrifolia Planch.	Ulmaceae	Ayil maram	Tree	Leaf
Hybanthus enneaspermus (L.) F. Muell.	Violaceae	Orilaithamarai	Shrub	Leaf/ WP
Hygrophila auriculata (Schumach.) Heine	Acanthaceae	Nirmulli	Herb	Leaf
Hyoscyamus niger L.	Solanaceae	Koracaniomam	Herb	Seeds
Indigofera tinctoria Blanco	Fabaceae	Avaarikodi	Shrub	Leaf
Inula racemosa Hook. f.	Asteraceae	Pushkarmulam	Herb	Fruit
Ipomoea batatas (L.) Lam.	Convolvulaceae	Sarkaraivallikizangu	Climber	Leaf/ Seeds
Jatropha curcas L.	Euphorbiaceae	Kattukkotai	Shrub	Seeds
Justicia adhatoda L.	Acanthaceae	Adathodai	Shrub	Leaf
Lablab purpureus (L.) Sweet	Fabaceae	Motchai	Twiners	Seeds
Lawsonia inermis L.	Lythraceae	Maruthani	Shrub	Leaf
Leucas aspera (Willd.) Link	Lamiaceae	Thumbai	Herb	Leaf/ WP
Litchi chinensis Sonn.	Sapindaceae	Lychee	Tree	Fruit
Lupinus albus L.	Fabaceae	Lupin	Herb	Seeds
Madhuca longifolia (J. Koenig ex L.) J.F. Macbr.	Sapotaceae	Iluppai	Tree	Bark
Mangifera indica L.	Anacardiaceae	Maamaram	Tree	Leaf/ Fruit
Manihot esculenta Crantz	Euphorbiaceae	Maravalli kilazhangu	Shrub	Leaf
Medicago sativa L.	Fabaceae	kutirai macal	Herb	Leaf/ WP
Melia azedarach L.	Meliaceae	Malai vembu	Tree	Leaf
Mentha piperita L.	Lamiaceae	Pudina	Herb	Leaf/ WP
Mollugo nudicaulis Lam.	Molluginaceae	Parpatakam	Herb	APP/ Leaf
Momordica charantia L.	Cucurbitaceae	Pakarkai	Climber	Leaf/ Fl/ Fr/ Seed
Moringa oleifera Lam.	Moringaceae	Murungai	Tree	Leaf/ Fruit/ Seed
Musa paradisiaca L.	Musaceae	Valazhi	Herb	Flower/ Stem
Myristica fragrans Houtt.	Myristicaceae	Jathikkaai	Tree	Leaf

Nelumbo nucifera Gaertn.	Nelumbonaceae	Thamarai	Herb	Rhizome
Nerium oleander L.	Apocynaceae	Arali	Shrub	Leaf
Nymphaea alba L.	Nymphaeaceae	Neytarkilanku	Herb	Tuber/ Flower/ Leaf/
Ocimum basilicum L.	Lamiaceae	Kuruthulasi	Herb	Leaf
Ocimum tenuiflorum L.	Lamiaceae	Thulasi	Shrub	Leaf
Oldenlandia uniflora L.	Rubiaceae	Kattucayaver	Herb	Leaf
Opuntia ficus-indica (L.) Mill.	Cactaceae	Chappathikkalli	Shrub	Leaf/ WP
Oryza sativa L.	Poaceae	Nel	Herb	Fruit
Passiflora edulis Sims	Passifloraceae	Thatpoot	Climber	Leaf
Pavetta indica L.	Rubiaceae	Pavettai	Tree	Leaf
Pedalium murex L.	Pedaliaceae	Aananjerinjil	Herb	Leaf
Phoenix dactylifera L.	Arecaceae	Perichaimaram	Tree	Fruit
Phyllanthus amarus Schumach. & Thonn.	Phyllanthaceae	Kizhaanelli	Herb	Leaf/ WP
Phyllanthus emblica L.	Phyllanthaceae	Nelli	Tree	Fruit
Plectranthus amboinicus (Lour.) Spreng	Lamiaceae	Karpuravalli	Herb	Leaf
Plumbago zeylanica L.	Plumbaginaceae	Koduveli	Shrub	Leaf
Pongamia pinnata (L.) Pierre	Fabaceae	Pungamaram	Tree	Leaf
Premna serratifolia L.	Lamiaceae	Munnaimaram	Tree	Leaf/ Root
Psidium guajava L.	Myrtaceae	Koyya	Tree	Leaf/ Fruit/ Seeds
Pterocarpus marsupium Roxb.	Fabaceae	Vengai	Tree	Bark/ Leaf/ Fruit/ Seed
Punica granatum L.	Lythraceae	Madhulai	Shrub	Leaf/ Fruit/ Seeds
Raphanus sativus L.	Brassicaceae	Catakketanam	Herb	Leaf
Rauvolfia serpentina (L.) Benth. ex Kurz	Apocynaceae	Chevanamalpodi	Shrub	Leaf
Rosmarinus officinalis L.	Lamiaceae	Rosemary	Shrub	Leaf
Rubia cordifolia L.	Rubiaceae	Savulikkodi	Climber	Leaf/ Fruit/ Seed
Saccharum officinarum L.	Poaceae	Karumbu	Herb	Stump
Salvia officinalis L.	Lamiaceae	Seemaikarpuralai	Undershrub	Leaf
Sansevieria trifasciata Prain	Asparagaceae	Pichu kilanzhu	Herb	Leaf
Scoparia dulcis L.	Plantaginaceae	Sarakkotthini	Herb	Leaf/ WP
Semecarpus anacardium L. f.	Anacardiaceae	Saaraya pattai maram	Tree	Leaf
Senna auriculata (L.) Roxb.	Fabaceae	Avaarai	Shrub	Leaf/ Flower
Sesbania grandiflora (L.) Pers.	Fabaceae	Aghathi	Tree	Leaf
Shorea robusta Gaertn.	Dipterocarpaceae	Venkungiliyam	Tree	Leaf
Solanum melongena L.	Solanaceae	Kathri	Herb	Leaf
Solanum nigrum L.	Solanaceae	Manathallaki	Herb	APP/ Leaf/ Fruit
Solanum torvum Sw.	Solanaceae	Sundaikkai	Undershrub	Leaf
Solanum trilobatum L.	Solanaceae	Thoothuvalai	Undershrub	Leaf
Spondias pinnata (L. f.) Kurz	Anacardiaceae	Pulima	Tree	Leaf
Stevia rebaudiana (Bertoni) Bertoni	Asteraceae	Cheeni-tulsi	Shrub	Fruit/ Leaf
Strychnos nuxvomica L.	Loganiaceae	Yettimaram	Tree	Bark/ Seeds/ WP

Syzygium cumini (L.) Skeels	Myrtaceae	Naval maram	Tree	Leaf/ Fruit/ Seeds/
Tamarindus indica L.	Fabaceae	Puli	Tree	Seeds
Tephrosia purpurea (L.) Pers.	Fabaceae	Kattukozhinji	Shrub	Leaf
Terminalia arjuna (Roxb. ex DC.) Wight & Arn.	Combretaceae	Maruthamaram	Tree	Bark/ Leaf/ Fruit
Terminalia bellirica (Gaertn.) Roxb.	Combretaceae	Thaanimaram	Tree	Leaf/ Bark
Terminalia chebula (Gaertn.) Retz.	Combretaceae	Kadukkai	Tree	Fruit
Theobroma cacao L.	Malvaceae	Kakkavo	Small tree	Bark
Thespesia populnea (L.) Sol. ex Corrêa.	Malvaceae	Puvarasu	Tree	Leaf
Tinospora cordifolia (Willd.) Miers ex Hook. f. & Thomson	Menispermaceae	Amirtavalli	Climber	Root/ Stem/ Leaf/ WP
Tragia involucrata L.	Euphorbiaceae	Chenthatti	Climber	Leaf
Tribulus terrestris L.	Zygophyllaceae	Nerinji	Herb	Seeds
Trichosanthes cucumerina L.	Cucurbitaceae	Kattupodalai	Climber	Leaf
Trichosanthes dioica Roxb.	Cucurbitaceae	Kombu-pudalai	Climber	Leaf
Tridax procumbens L.	Asteraceae	Thathapoondu	Herb	Leaf/ WP
Vitex negundo L.	Lamiaceae	Nocchi	Small Tree	Leaf
Vitex trifolia L.	Lamiaceae	Vellanochi	Shrub	Leaf
Withania somnifera (L.) Dunal	Solanaceae	Amukkira	Shrub	Root/ Leaf
Wrightia tinctoria R.Br.	Apocynaceae	Veppalai, Palamaram	Tree	Leaf
Zaleya decandra (L.) Burm. f.	Aizoaceae	Charanai	Herb	Root
Zea mays L.	Poaceae	Sozhaum	Herb	Seed
Zingiber officinale Roscoe	Zingiberaceae	Inji	Herb	Rhizome

Table No. 2: Economic importance of plant species in the study area

Class of Plants based on use	No. of Plant Species	Percentage (%)
Edible	32	9
Fodder	10	3
Medicinal	173	49
Medicinal, Edible	32	9
Medicinal, Ornamental	21	5
Medicinal, Timber	10	3
Ornamental	59	16
Others	20	5

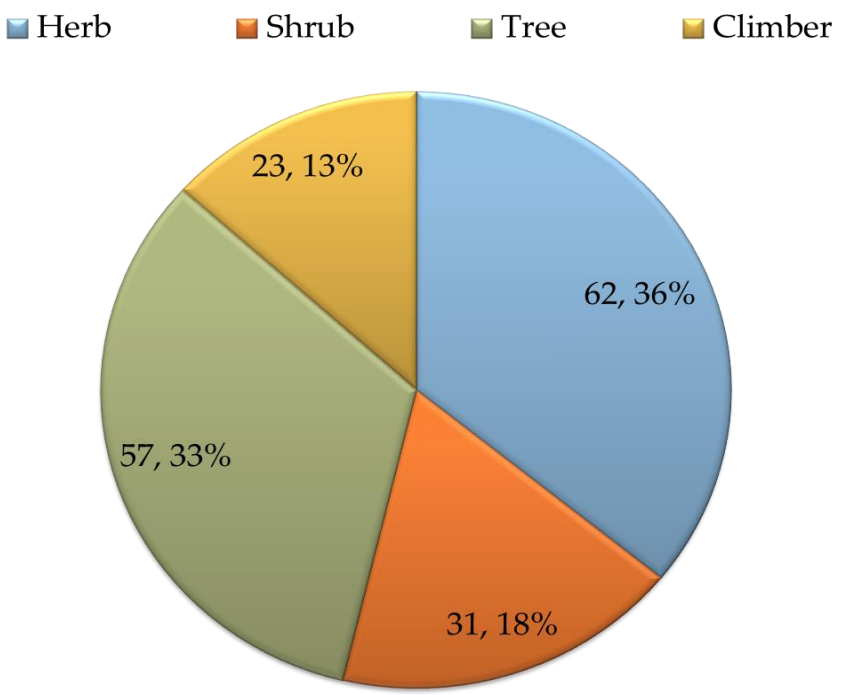

Figure No. 1: Habit wise distribution of plant species in AFR

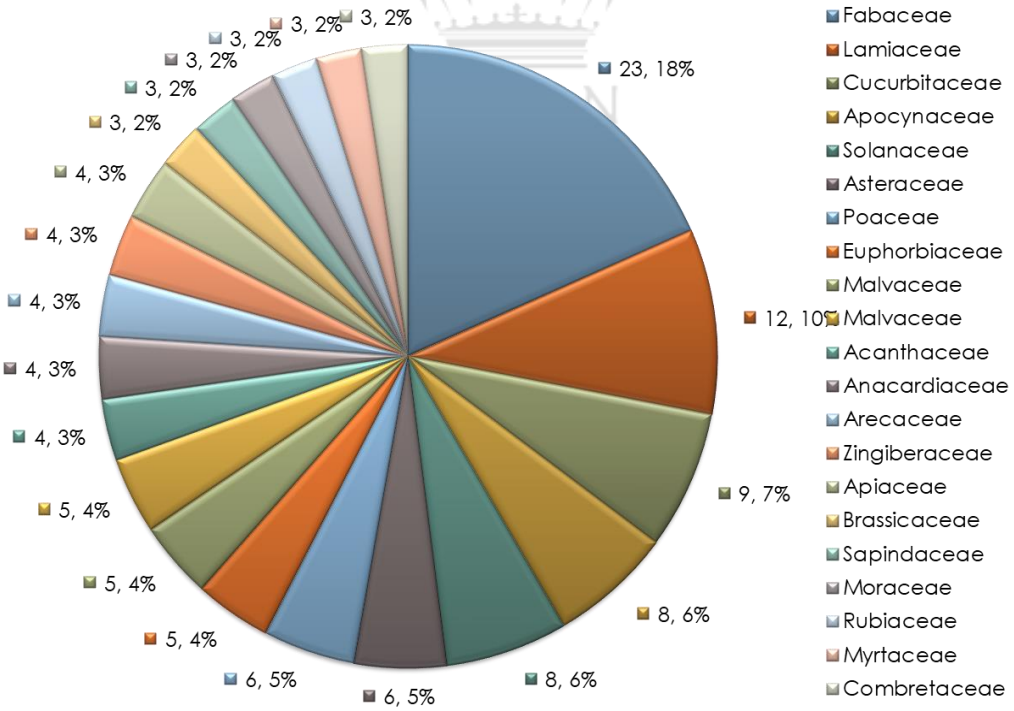

Figure No. 2: Family wise distribution of dominant plant species