ORIGINAL RESEARCH PAPER

Botany

ENTHNOBOTANICAL STUDIES ON CHOLAPURAM IN KUMBAKONAM TALUK, THANJAVUR DISTRICT, TAMILNADU, INDIA

KEY WORDS: Ethnobotanical survey,medicinal plants, Thanjavur District,vernacular name, medicinal uses.

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ABSTRACT

Ethnobotany is the scientific study of relationship that exists between people and plants. It interfaces between indigenous people and their wild exploit of plants around them, which is a significant aspect of biological diversity conservation. Ethnomedicinal plants are utilised for the treatments of diseases and disorders like dysentery, skin diseases, hypertension, headache, boils and blisters, rheumatism ,fever, toothache, diarrhoea, bone fracture, cough, insect and snake bites, worm infection, cuts and wounds, cold and catarrh, bronchitis, asthma, leprosy etc., Aethnobotanical survey was carried out among the various species of medicinal plants in Cholapuram, Kumbakonam Taluk, Thanjavur District,Tamil Nadu.In this survey was identified totally 25 plant species belonging to 22 families. The information detailed about the medicinal plants used by them is arranged alphabetically followed by botanical name, vernacular name, family name and part of medicinal uses.

INTRODUCTION

Ethnobotany may be defined as an anthropocentric approach to botany and is essentially concerned with gathering information on plants and their use[1]. Ethno medicinal survey is one of the reliable sources to natural and synthetic drug discovery[2]. Medicinal plants have been observed to be very effective in the treatment of ailments in both rural and urban areas in developing countries. Despite this, only few people value the plants around them due to inadequate knowledge of their usefulness. The use of plants and its secondary metabolic products as medicines could be traced as far back as the beginning of human civilization.The earliest mention of medicinal use of plants in Hindu culture was found long years ago in "Rig Veda", which was written between 4500 - 1600 B.C. and was supposed to be the oldest repository of human knowledge. It is Ayurveda, the foundation of medicinal science of Hindu culture, in its eight division deals with specific properties of drugs and various aspects of science of life and the art of healing.

Ancient methods of treatment by ethno medicinal value of various types of trees, shrubs, herbs and underground modification such as root, stem, bark, leaves, flowers, fruits and seed.The ethno medicinal value of plants make grounded plant parts, and juices used to cure the various diseases like, cough, cold, asthma, eye disease, ulcer, jaundice, rheumatic arthritis, memory stimulants, wound healing and cardiovascular disease[3].The use of medicinal plants in the treatment and prevention of diseases is attracting the attention of scientists worldwide.The specific part of the plant used for medicinal applications varies from species to species, and from one traditional healer to another.

Ethno botanists gather data mainly from living peoples in hopes of gathering a view of their past existence as well as an understanding of present uses of plants for food, medicine, construction materials, and tools. Ethno botanical research can be a door into cultural realities as well as a way to understand the future of human relationships.

Documentation of the indigenous knowledge through ethno-botanical studies is important for the conservation and utilization of biological resources[4&5]. Therefore, determining the local names and indigenous uses of plants has significant potential societal benefits[6].

Herbal drugs obtained are safer in the treatment of various diseases (Ayyanar and Ignacimuthu, 2005[7], Sathyavathi *et al.*, 2011[8]). The medicinal plants are listed in various indigenous medicinal systems such as Siddha (600 species), Ayurveda (700 species) and Unani (700 species). Major pharmaceutical industries depend on the plant products for the preparation of medicines (Anbarashan, and Padmavthy 2010[9]).

They survive in the area of development because of conservation and ethics traditions. Ethnobotany are nature's laboratories for evolution of wild species and repositories of significant genetic and ecosystem diversity. Their continued survival has effect offered protection to the biological life there in turning into biodiversity reservoirs.

MATERIALS AND METHODS

Study area

In the presents study, the plants were collected from the Cholapuram in Kumbakonam Taluk, Thanjavur District,Tamil Nadu.Tamil Nadu is ethnobotanically very rich, having a wide variety of medicinal plants. With its (Cauvery) diverse topographical condition, the region is well situated for a range of medicinal plant species. Kumbakonam (Aduthurai) is located at 10.97°N 79.42°E. It is situated 273 km (170 mi) south of Chennai, 96 km (60 mi) east of Tiruchirappalli, and about 40 km (25 mi) north-east of Thanjavur. It lies in the region called the "Old delta" which comprises the north-western taluks of Thanjavur district that have been naturally irrigated by the waters of the Cauvery and its tributaries for centuries in contrast to the "New Delta" comprising the southern taluks that were brought under irrigation by the construction of the Grand Anicut canal and the Vadavar canal in 1934. It has an average elevation of 26 meters (85 ft).The town is bounded by two rivers, the Cauvery River on the north and Arasalar River on the south. Although the Cauvery delta is usually hot, the climate of Kumbakonam and other surrounding towns is generally healthy and moderate. Kumbakonam is cooler than Chennai, the capital of Tamil Nadu.The average maximum temperature is 39.4 °C while the average minimum temperature is 32.8 °C.The average annual rainfall is 1,125 mm.

Ethnobotanical data collection

Ethnobotanical survey was conducted between, September-2017 to February- 2018. The regular field visits were made during the period of six month. During this period, most of the plants species are available in the study areas. A totally 25 medicinal plants were collected. Photographs and slides were also taken. The herbarium specimens were identified with the help of floras, The Flora of the Presidency of Madras Gamble J.S and Fischer, C.E.C[10] (1915-1936). The Flora of

British India Hooker J.D.[11] (1872-1897). The Flora of the Tamil Nadu Carnatic[12] (Matthew K.M. 1982), The Flora of Tamil Nadu[13, 14] (Henry A.N. *et al.,* 1987, Nair N.C and Henry A.N, 1983), has been referred for the correct binominal names for the specimens collected. Plants were identified using the standard text, the name of plant families were listed in alphabetical order by scientific name, vernacular name, habit, plants parts used and their medicinal use.

In the present study, the plants were collected from the Cholapuram in Kumbakonam Taluk, Thanjavur District,Tamil Nadu. In this ethnobotanical survey was identified totally 50 plant species belonging to 17 families, such as *Acanthaceae, Amaranthaceae, Anacardiaceae, Asclepdiaceae, Asteraceae, Apocynaceae, Apiaceae, Capparaceae, Caricaceae, Euphorbiaceae, Fabaceae, Lamiaceae, Malvaceae, Mimosaceae, Moringaceae, Nyctaginaceae, Rhamnaceae, Rubiaceae, Rutaceae, Solanaceae, Verbinaceae* and *Vitaceae*. The most encountered medicinal plant families were *Asteraceae, Lamiaceae, Solanaceae, Euphorbiaceae, Fabaceae* and *Malvaceae.*

Our study showed that medicinal plants continue to play an important role in the primary healthcare system for the local population. The medicinal plants used by local people are listed with botanical name, family, local name, habit of the plant, parts used and mode use is given in the list 1.

I. List of Ethnomedicinal Plants and its uses

1. Botanical name: *Abelmoschus esculentus* (L.) moench
Family name: Malvaceae
Vernacular name: Vendaikai
Part used: Seed

Uses: It is used in the treatment of catarrhal infection, ardor urinae, dysuria and gonorrhea. The seeds are antispasmodic, cordial and stimulant.an infusion of the roasted seeds has sudorific properties.

2. Botanical name: *Abutilon indicum* (Link) sweet
Family name: Malvaceae
Vernacular name: thuthi
Part used: Leaves crushed with sugar and tablets of approximately of 1 gm are made and taken 3 tablets once crushed leaves are applied.

Uses: Stomach pain and wounds.

3. Botanical name: *Acalypha indica* L.
Family name: Euphorbiaceae
Vernacular name: Kupaimeni
Part used: Whole plant& Leaf

Uses: It is a very good remedy in the treatment of piles and fistuyla. The pancreas of goat boiled in this juice is given as medicine for night blindness. For scorpion sting, the leaves are crushed with salt and few drops are poured in to the ear in the opposite side, that is sting in the right side of the body pour in the left ear, similarly left side right ear, instant pain relief.

4. Botanical name: *Achyranthes aspera* L.
Family name: Amaranthaceae
Vernacular name: Naaiurvi
Part used: Leaf

Uses: It is bitter, pungent, heating, laxative, stomachic, carminative and useful in treatment of vomiting, bronchitis, heart disease, piles, itching abdominal pains, ascites, dyspepsia, dysentery, blood diseases etc.

5. Botanical name: *Adatoda vasica* L.
Family name: Acanthaceae
Vernacular name: Adathoda
Part used: Aerial part
Uses: Bronchitis, leprosy, heart troubles, asthma, cough sore eyes and gonorrhea.

6. Botanical name: *Alternanthera sessilis* (L.)R.Br ex DC
Family name: Amaranthaceae
Vernacular name: Ponnakanni Keerai
Part used: Leaf

Uses: Eye sight improvement Leaf decoction given 2 times a day for 14-30 days to cure nervous disorders. The leaf Juice is mixed with boiled cowmilk and given in morning on empty stomach to improve the eye sight.

7. Botanical name: *Amaranthus viridis* L.
Family name: Amarathaceae
Vernacular name: Kubbaikkirai
Part used: Leaf

Uses: Leaves and seeds are edible and eaten as vegetable. The tops are rich in calcium.

8. Botanical name: *Andrographis paniculata* (Burm. F.) Wall
Family name: Acanthaceae
Vernacular name: Nilavempu
Part used: Leaf

Uses: Andrographis is used as astringent, bacteria killing agent, painkiller, fever reducer, and treatment for worms.

9. Botanical name: *Arachis hypogaea* L.
Family name: Fabaceae
Vernacular name: Nila kadalai
Part used: Seed

Uses: Jaundice, lacting mothers. Malnutrition, tuberculosis and general weakness. Homorrhoids or pils. Otalgia or pain in the ear.

10. Botanical name: *Boerhavia diffusa* L.
Family name: Nyctaginaceae
Vernacular name: Mukiraatai
Part used: Root

Uses: Dyspepsia jaundice. The tea forms of the root decoction.

11. Botanical name: *Caesalpinia pulcherrima* L.
Family name: Fabaceae
Vernacular name: Mailkondrai (nazhal)
Part used: Roots, bark and leaves

Uses: In folk medicine, various parts of caesalpinia pulcherrima are used medicinally, A Combination of the roots, bark and leaves may be boiled into a medicinal tea, which is given to patients as a treatment for fever, jaundice, kidney disease and gastrointestinal disorders gargling with the tea is also said to treat sores in the in the mouth or throat.

12. Botanical name: *Calotropis gigantea* R. Cr
Family name: Asclepiadaceae
Vernacular name: Erukku
Part used: Roots, leaves and flowers

Uses: Juice from the plant is used to cure piles. Root bark is made into a paste and applied to treat elephantiasis. Flower decoctions are good digestive and also cure stomachache.

13. Botanical name: *Capsicum annuum* L.
Family name: Solanaceae
Vernacular name: Milagai
Part used: Fruit

Uses: Cayenne is stomachic, carminative, stimulant,

antispasmodic, analgesic, alterative, astringent, hemostatics and antiseptic in nature.

14. Botanical name: *Carica papaya* L.
Family name: Caricaceae
Vernacular name: Pappali
Part used: Leaf, fruit

Uses: In some parts of the world, papaya leaves are made into tea as a treatment for malaria, but the mechanism is not understood and no treatment method based on these results has been scientifically proven.

15. Botanical name: *Catharanthus roseus* (L.)
Family name: Apocyanaceae
Vernacular name: Nithyakalyani
Part used: Aerial part

Uses: Leaf and root juices are used daily two times to cure diabetes. Leaves paste helps to relief muscle pain and wasp sting.

16. Botanical name: *Centela asiatica* L.Urban
Family name: Apiaceae
Vernacular name: vallarai
Part used: Aerial part

Uses: Increasing memory power.

17. Botanical name: *Cissus quadrangularis* L.
Family name: Vitaceae
Vernacular name: Pirandai
Part used: Whole plants

Uses: Herbaceous perennial climber; weak stem containing tendrils for support and attachment, quadrangular-sectioned branches with internodes; toothed trilobe leaves appear at the nodes; each has a tendril emerging from the opposite side of the node. Racemes of small white, yellowish, or greenish flowers; globular berries are red when ripe.

18. Botanical name: *Citrus Limon* (L.) osbeck
Family name: Rutaceae
Vernacular name: Elumicchai
Part used: Root, leaf, fruit and bark

Uses: Reduce hyperacidity in the stomach. Lemon juice and peel have an antiseptic effect. Leaves of the tree are used to reduce fever.

19. Botanical name: *Cleom viscosa* L.
Family name: Capparaceae
Vernacular name: Kattu-kaduku
Part used: leaf

Uses: Acrid, thermogenic, antiscorbutic, anthelmintic and sudorific. The roots are stimulant, and vermifuge.

20. Botanical name: *Clitoria ternatea* L.
Family name: Fabaceae
Vernacular name: Sangu poo
Part used: Leaf

Uses: Amemory enhancer, nootropic, antistress, anxiolytic, antidepressant, anticonvulsant, sedative agent, antimicrobial and anti-cancer agents.

21. Botanical name: *Cyamopsis tetragonoliba*
Family name: Fabaceae
Vernacular name: kotthavarai
Part used: Leaves, seed, seedpods

Uses: Leaves are used in asthma and to cure night blindness whereas the pods and seed are used to cure inflammation, sprains, arthritis, as anti-oxidant, antibilious laxatives and in polluting boiling.

22. Botanical name: *Datura metal* L.
Family name: Solanaceae
Vernacular name: Oomathai
Part used: Leaf

Uses: The leaves of datura are used to treat heart problems like palpitation and hypertension. The burning leaf smoke of datura is good to treat asthma and bronchitis.

23. Botanical name: *Eclipta Alba* L.
Family name: Asteraceae
Vernacular name: Manjal karisalaganni
Part used: Leaf

Uses: Rejuvenating, Scorpion stings.

24. Botanical name: *Eclipta prostrata* L.
Family name: Asteraceae
Vernacular name: Karisalaganni
Part used: Leaf

Uses: Stomach cancer, Cold, Coughs.

25. Botanical name: *Gossypium arboreum* L.
Family name: Malvaceae
Vernacular name: paruthi
Part used: Leaves

Uses: The juice of the root is used in the treatment of fevers.

The information detailed about the medicinal plants used by them are arranged alphabetically followed by botanical name, vernacular name, family name, part of medicinal uses (plate1-9). The records were documented from the local people of Cholapuram. The village peoples have used the plants for many aliments. The medicinal plants used by local people are listed with botanical name, family, local name, habit of the plant and parts of used (plate 1, 2).

DISCUSSION

In the present study, it was found that 50 plants species belong to distributed in 22 families. The plants document in this survey belong to the families such as Acanthaceae, Amaranthaceae, Anacardiaceae, Asclepdiaceae, Asteraceae, Apocynaceae, Apiaceae, Capparaceae, Caricaceae, Euphorbiaceae, Fabaceae, Lamiaceae, Malvaceae, Mimosaceae, Moringaceae, Nyctaginaceae, Rhamnaceae, Rubiaceae, Rutaceae, Solanaceae, Verbinaceae, Vitaceae. The most encountered medicinal plant families were Asteraceae, Lamiaceae, Solanaceae, Euphorbiaceae, Fabaceae, Malvaceae.

In the present study the survey of ethno-medicinal plant species collected by the Cholapuram, in Kumbakonam Taluk, Thanjavur district of Tamil Nadu. The information detailed about the medicinal plants used by them are arranged alphabetically followed by botanical name, vernacular name, family name, part of medicinal uses. The records were documented from the local people of Cholapuram. The village peoples have used the plants for many aliments. The medicinal plants used by local people are listed with botanical name, family, local name, habit of the plant and parts of used. The similar documented was made for 50 plants belong to 22 families are identified as traditional folklore medicinally used species[15], gastro intestinal problems like digestive problems, diarrhoea, dysentery, stomach ache and constipation were treated using specific herbal prescriptions by the rural peoples same reported[16].

In the present study the various parts of the medicinal plants such as leaf, whole plant, root, gum, prop roots, fruits, bark and

etc., were used for the ailments such as stomach pain, wounds scabies, itch, ring worm, kidney stone, eye diseases, stomach ulcer, jaundice, joint pain, malaria, antidote against poison, diabetes, foot cracks, wound healing, fever, asthma, and etc. The identified medicinal plants were used for the treatment of various diseases among the village of Cholapuram people. In the present study showed that, the medicinal plants continue to play an important role in the primary healthcare system for the local population. The aim of Ethnobotany is study how and why people use and conceptualize plants in their local environments. The two questions mostly asked are[17] how and in what ways people use nature[18] and how and in what ways people view nature. However the survey of ethno-medicinal plants has been reported from Aduthurai, Thanjavur district[6]. Ethno botanists gather data mainly from living peoples in hopes of gathering a view of their past existence as well as an understanding of present uses of plants for food, medicine, construction materials, and tools. Ethno botanical research can be a door into cultural realities as well as a way to understand the future of human relationships.

Ethnobotanical survey can contribute to preserving knowledge on the use of medicinal plants for diabetes treatment and to explore the phytochemical and pharmacological potential of medicinal plant[20]. The data collected shows that majority of the remedies are taken orally. Herbal medicines prescribed by local people are either preparation based on single plant or a combination of several plant parts. The fresh plant parts are used for the preparation of medicine. When fresh plant parts are unavailable, dried parts are also used. However, leaves were found most frequently used part[21]. Generally, the people of the study area still have a strong belief in the efficacy and success of herbal medicine. The results of the present study provide evidence that medicinal plants continue to play an important role in the healthcare system of this local people[22].

Previous work has shown that the survey of ethno-medicinal plant species used by treated the herbal medicines by the rural peoples in the groves site (Rameshkumar *et al.,* 2013, Jayapal. *et al.,* 2014). Effectiveness of the herbal drug was connected to nature of the disease and dose response. Doses are differing from patient to patient from time based on the cause and effectiveness of the drug general is also documented (Balyogan Sivasankari*, et al.,* 2013).

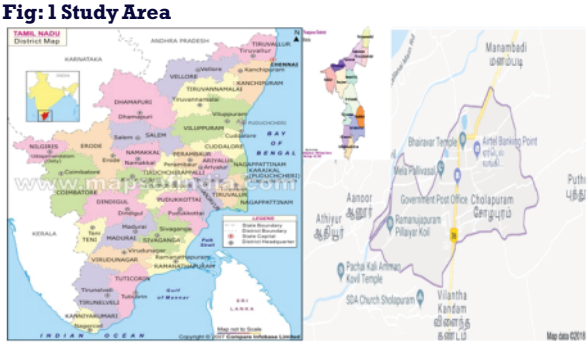
In the present study the ethnobotanical survey can help the scientists to identify for further research those plants whose medicinal properties may be useful in the development of new drugs. Ethnomedicinal plants are less expensive, easily available and reliable sources, they are considered than modern medicines. Moreover, this study could play an important role for the conservation of these plants and represent the preliminary information required for future phytochemical and pharmacological investigation.

6. SUMMARY AND CONCLUSION

The ethnobotanical survey can help the scientists to identify for further research those plants whose medicinal properties may be useful in the development of new drugs. We suggest that these plants can be used as drugs by pharmacologically unexplored areas of India, which may be utilized for the better human health. In such cases laboratory investigations and clinical trials are suggested to validate the therapeutic properties of these herbal preparations for effective and safe use.

Moreover, this study could play an important role for the conservation of these plants and represent the preliminary information required for future phytochemical and pharmacological investigation. Thus, the present study revealed the ethno medicinal plants are less expensive, easily available and reliable sources, they are considered than modern medicines.

Fig: 1 Study Area



COLLECTION OF PLANTS

***Andrographis paniculata*(Burm. F.) Wall**

***Adathoda vasica* L.**

***Amaranthus viridis* L.**

Alternanthera sessil L.

Achyranthes aspera L

Mangifera indica L.

Centela asiatica L. Urban

Nerium aleander L.

Catharanthus roseus(L.)G.Don, 1837

Calotropis giganteaR.Cr

Tridax procumbens L.

Eclipta prostrata **L.**

Eclipta alba L.

Caesalpinia pulcherrima L

Carica papaya L.

Ceom viscose L.

Acalipha indica L.

Ricinus communis L.

PLATE:4

Clitoria ternatea L.

Trigonella foenum graecum L.

Sesbania grandiflora (L.)poiret

Cyamopsis tetragonoloba

Arachis hypogaea L.

PLATE:5

Ocimum tenuiflorum L.

Leucas aspera L.

Vitex nugunda L.

Cissus quadragularis L

Gossypium arboreum L.

Hibiscus rosa-sinensis L.

Abutilon indicum (Link)sweet

Thespesia populnea (L.) sol

PLATE:6

Abelmoschus esculentus (L.)

Moench *Melia dubai*

Moringa oleifera L.

Mimosa pudica L.

Boerhavia diffusa **L.**

Phyllanthus niruri **L.**

PLATE: 7

Ziziphus mauritianaLam.

Ixora coccinea L.

Morinda tinctoriaRoxb.

Murraya koenigii L.

Citrus Limon (L.)osbeck

Solanam lycopercicum L.

PLATE: 8

Citrus Limon (L.)osbeck

Solanam lycopercicum L.

Solanum melongena L

Datura metal L.

Solanum xanthocarpum

Solanum trilobatum L.

REFERENCES

1. Rao.N.R and and Henry.N.A. The ethnobotany of Eastern Ghats in Andhra Pradesh, India. New Zealand of ethnobotany, 1997; 8, 8.
2. Fabricant. D. S. and Farnsworth N. R. The value of plants used in traditional medicine for drug discovery. Environmental Health Perspectives (Supplement), 2001; 109, 69–75.
3. Kaliyamoorthy. J. Ethno Medicinal Value of Plants in Thanjavur District, Tamil Nadu, India. International Letters of Natural Sciences, 2015; Vol. 29, pp 33-42.
4. Muthu, C., Ayyanar, M., Raja, N., Ignacimuthu, S. Medicinal plants used by traditional healers in Kancheepuram district of Tamil Nadu, India. J. Ethnobiol. Ethnomed, 2006; 2: 43-48.
5. Macia, M. J., Garcia, E., and Vidaurre, P. J. An ethnobotanical survey of medicinal plants commercialized in the markets of La Paz and El Alto, Bolivia. J. Ethnopharmacol., 2005; 97: 337-350.
6. Kaliyamoorthy Jayakumar,. Traditional Medicinal Values of Adhatoda vasica International Journal of Traditional and Natural Medicines, 2013b; 3(1): 26-31.
7. Ayyanar. M and Ignacimuthu, S., Medicinal plants used by the tribals of Tirunelveli hills, Tamil Nadu. to treat poisonous bites and skin diseases. I. J. Trad. Knowl. 2005; 4(3), 229-236.
8. Sathyavathi.R and Janardhan. K.J. Folklore medicinal practices of badaga community in Nilgiri biosphere reserve, Tamilnadu, India. International Journal of pharma research and Development, 2011; 3(2) 50-63.
9. Anbarashan M, Padmavthy A., Ethno- Medicinal plants in five sacred groves in Cuddalore district, Tamil Nadu, India. Ethno-botanical leaf lets, 2010; 14: 774-80.
10. Gamble J.S and Fischer, C.E.C. Flora of the Presidency of Madras. Vols.13. Adlard & Sons Ltd., London 1915-1936.
11. Hooker J.D. The Flora of British India. 1872-1897; Vols.1-7. L. Reeve & Co., London.
12. Matthew K.M. Flora of the Tamil Nadu Carnatic. Rapinat Herbarium, Tiruchirapplli, 1982; 1-3.
13. Henry A.N., Kumari G.R and Chithra V. Flora of Tamil Nadu. Series.1. Vol.2. Botanical Survey of India 1987. Coimbatore.
14. Nair N.C and Henry A.N. Flora of Tamil Nadu. Botanical Survey of India, Coimbatore 1983; 1Vol.1101-106.
15. Munisamy Anbarashan, Narayanaswamy Parthasarthy and Anbarashan Padmavathy. Ethno-floristic survey in sacred groves, Pudukottai district, Tamil Nadu- India. Journal of Medicinal Plants Research, 2011; 5(3): 439-443.
16. Sundaresan S and Senthil kumar B. A survey of traditional medicinal plants frome the Vellore District, Tamil Nadu, India. Int. J. of Ayurvedic and Herbal Medicine. 2013; 3(5): 1347-1355.
17. Heywood, V. Use and potential of wild plants in farm households. FAO Farm Management Series No. 15. Food and Agriculture Organization of the United Nations, Rome, Italy. 1999; pp 113.
18. Schippmann, U, Leaman D.J and A.D. Cunningham,. Impact of cultivation and gathering of medicinal plants on Biodiversity: Global trends and issues. In (FAO). 2002>
20. Abderrahmaine Katiri, Mohamed Barkaoui, Fouad Msanda and Hassan Boubaker., Ethnobotanical Survey of Medicinal Plants Used for the Treatment of Diabetes in the Tizi n'Test Region (Taroudant Province, Morocco). Journal of Pharmacognosy & Natural Products. 2017; 3.1.1-10
21. Poorani, N., Kulothungan, S., Panneerselvam, A. and Revathy. M. Survey of medicinal plants of Rajarajan Manimandapam in Thanjavur district of Tamilnadu. International Journal of Information Research and Review, 2016. pp. 2169-2174.
22. Rajasekaran. S., Satheskannan. T.M., Arumugam. R., Jayakumar.K. Silvia Nithya Kumari. J., and Malarvizhi, P. Ethno botanical studies on Cauvery delta region of Kumbakonam, Thanjavur district of Tamil Nadu. International Journal of Current Research and Development. 2016; Vol.4 (2): 17- 22.
23. Rameshkumar S. Yokesh, M. Ramakritinan CM. and Eswaran, R. Ethnomedicinal studies of coastal medicinal plants in around mandapam coastal regions, Gulf of Mannar, Tamil Nadu. Int. J. of Biol. Pharmacy and Allied Scin. 2013; 2(1): 90-101.