



# A Study of Ethnobotany with Reference to Traditional Knowledge of India

AMITA SHARMA

Department of Botany, R.G. PG College, Meerut, India

**ABSTRACT:** The reviewed paper deals with the knowledge and treasure of tribal healers on the use of important trees and plants. This reviewed paper through light on medicinal plants and other economical important plants. This reviewed paper focus the study on traditional healers and local community people who had wide knowledge of local diseases. Common diseases found in tribal areas were stomach-ache, diarrhoea, chest problem and typhoid. The reviewed paper studied about 45 plants eg. *Abrus precatorius*, *Hippophae rhamnoides*, *Jasmanicum*, *Kalanchoe*, *Syzium*, *Zea mays* etc in traditional knowledge of medicinal plants. Traditional knowledge of few plants only could be substantiated after wide study of traditional medicine plants eg. *Abru sp.*, *Bauhinia purpurea*, *Calycopteris floribunda*, *Cocculus hirsutus*, *Cyclea peltata*, *Eucalyptus globulus*, *Hyptis suaveolens*, *Jasminum multiflorum*, *Kalanchoe pinnata*, *Maesa indica*, *Ocimum tenuiflorum*, *Syzgium cuminii*, *Terminalia chebula*. Reviewed study showed that frequently used parts of medicinal plants were young leaves (Maximal use), fruits, young twigs, roots, and tubers (minimal use). The maximal use was found to be for leafy vegetables, then comes raw fruits, herbal teas, salads and least used was found of alcoholic drink and snacks. The reviewed study suggests that ethno-botanical knowledge could potentially guide the search for developing new nutraceutical products in future. The purpose of this paper is to spread awareness of use of medicinal plants used by tribal healers among people and to protect the natural medicinal plant depository from over extraction.

**KEYWORDS:** Tribal healers, ethno-botany, diseases, Knowledge, medicinal plants

## I. INTRODUCTION

Ethno biology is the scientific study of the plants and animals as treated or used by different traditional communities. Early man looked for the best nutritious food to have a healthy and disease free long life with cloth and shelter from the surrounding environment. This effort has resulted in selecting a large number of food items by human communities who lived in different parts of the world. The early humans perhaps combined instinct with indulgence to select his food items. Countless members from various human communities who spread to the different parts of the world, continued to expand the food basket. Since the early 1970s, different groups in various Universities and Research Institutions have been working on ethnobotany and traditional knowledge system of the region and published several reports. Most of the publications were concerned with ethnobotany or agricultural operations including shifting cultivation and festivals of the region. Ethnobotanical reports were mainly on ethnomedicinal plants with a few publications on shelter, timber, oil, fuel, fibre, manure, religious beliefs, food and beverages.

The tribal healer's preparations are either based on single plant part or combination of several plant species parts. The mode of ethnomedicine usage for different diseases is in various forms, such as aqueous extract, paste and oil. In

addition milk, ginger, pepper, oil, turmeric and jiggery etc. are used as ingredients in the administration of ethnomedicine. On the other hand, traditional healers who are the main repository of ethno medicinal knowledge claim extreme secrecy over their ethnomedicinal knowledge. The traditional healers have strong believe that if they disclose the secrecy about the medicinal properties of particular plant all the medicinal potentialities of the plant will be lost and the remedy will not work properly. The study concluded that the local and tribal people have very good knowledge on the use of medicinal plants. But such knowledge of medicinal plants is restricted to a few persons in rural area. Therefore it is necessary that suitability requirements are needed in order to protect the traditional knowledge in a particular area with reference to medicinal plant utilization and it was found that traditional ethno medicine still persists among the tribal. [1,2]

The reviewed paper is based on the study of ethno-botanical herbal medicinal plants used by tribal people. The folk uses as food, fodder, ethno-medicinal, fire and fuel, manure, religious etc. of some few important plants by local



healers or community are listed below: .

1. *Abrus precatorius* L.; Fabaceae; The roots are used in superstitious belief. They are used to wind off evil spirits by hanging in front of house. The leaves of the plant were eaten 3–4 times against cough. They were also eaten against bad taste in the mouth due to fever. Glycyrrhizin, present in the leaves is well known for its expectorant properties. It is also active against certain viruses and possesses weak antibacterial activity. Abrusosides A, B, C, and D were isolated from the leaves and it has been shown that they are several times sweeter than sucrose. The presence of both glycyrrhizin and the abrusosides may verify the traditional use of the plant. Different alkaloids and flavone glycosides have also been found in the plant.
2. *Albizia chinensis*(Osbec.) Merr.; Mimosaceae; The wood is used as fuel.[21]
3. *Ageratum conyzoides*L.; Asteraceae; The juice from the leaves were squeezed onto bleeding wounds and cuts. It has been shown that essential oils from the plant have antibacterial activity (Sharma et al., 1979). Wound healing and antibacterial activities were observed with the petroleum-ether chloroform extract of the leaves Caffeic acid, kaempferol and quercetin present in the leaves also possess antibacterial activity. These compounds may explain the traditional use of the plant as infections often follow cuts. Various other studies on the components of this plant relates basically to essential oils and aerial parts. Some sterols have been found No studies exist on compounds directly influencing the wound healing processes.
4. *Anogeissus latifolia* (DC) Wall. ex. Bedd; Combretaceae; Dried fruits were made into a powder and given against stomachaches. This treatment was continued until the patient felt better. It was claimed that the patient made several visits to the toilet and whatever was eaten did not stay in the stomach. Scientific investigations should be conducted with the fruits of the plant.
5. *Aspidopteris cordata* A. Juss.; Malphiaceae; A twig was rubbed on a stone with some water and tied to a cloth. The juice was then used as eye drops against red, itchy and watery eyes. Scientific investigations should be conducted with the plant.
6. *Bauhinia faveolata*Dalz; Caesalpinaceae; and *Macaranga peltata* (Roxb.) Muell.-Arg. *M. Roxburghii* Wight.: Euphorbiaceae. Bark from both the plants were bundled in a cloth and boiled in water. The bundle was then used to foment the stomach of a woman who had difficulty in conceiving. It was claimed that a tumour near the uterus was responsible for the above condition. The treatment was recommended twice a day for 8 days. Bark from either of the plants could be used but best results were achieved by using *Bauhinia faveolata*. [3,4]
7. *Bauhinia purpurea* L.; Caesalpinaceae; The ethno botanical use of wood is fuel provider. The leaves were used against swollen throat. The leaves were rolled in the form of a cigarette. The cigarette was claimed to be filled with the leaves of dried ‘lajri’, a herb (*Biophytum sensitivum* ) and hairs of ‘makka’ (Zea mays), and smoked twice. The flavonoids ,rutin and quercetin, isolated from the leaves have been shown to possess antibacterial and antiviral activities). These properties may help against a swollen throat as microbial infection may be the cause, there by explaining the traditional use.
8. *Blumea lacera* ; Asteraceae; The juice from the leaves was squeezed on cuts and on bleeding wounds. Two of the compounds isolated from the essential oil of the leaves were citral and cineole They have been used as antiseptics This may substantiate the traditional use as infection very often follows cuts and bleeding wounds. No studies related directly to wound healing were found in the literature. Some flavonoids and glycosides have been found.
9. *Breynia retusa* Alst.; Euphorbiaceae; The leaves were made into a paste with water and drunk three times a day for two days when affected by chicken pox. The paste was also applied on the body. This treatment was given to both children and adults. Chemical and biological tests should be undertaken for this plant.
10. *Caesulia axillaris* Roxb.; Asteraceae; The inflorescence head was used against blackheads. It was made into a paste with water and applied on the affected area. Some of the components isolated from the essential oil of the leaves and the whole plant were cineole terpeneole and eugenol The above compounds have been shown to possess antiseptic [5,6] and antibacterial activities. It was observed that the essential oil isolated from the whole plant also possessed anti-bacterial activity against several bacteria. The above description may explain the traditional use of the plant as secondary infections may follow the appearance of blackheads.
11. *Calycopteris floribunda* Lamk.; Combretaceae; The juice from the leaves wastaken internally by both children and adults against stomach aches due to dysentery. It was claimed that dysentery was caused by the consumption of contaminated water or spoiled food. From the leaves,quercetin and other compounds were isolated. The properties of quercetin may help against dysentery and stomach ache as microbial infections may be the cause. Thus, the traditional use could be justified, but further studies should also be performed.
12. *Casearia graveolens* Dalz.; Samydaceae; The twigs were used as a first-aid treatment against the bites of poisonous snakes. It was claimed that a twig was tucked into the hair bun of women touching the scalp as soon as she was bitten by a snake, she then sought help. In the case of male the twig was tucked in the waist touching the body before further help was sought. The effect of the twig was claimed to last for 3–4 h. The compounds isolated so far for the plant do not explain the traditional use.
13. *Cissampelos pareira* L.; Menispermaceae; The juice from the leaves was rubbed into the head of baby girls



- below one year of age, against green motions. The slim stem was also tied around the wrist of the child for the same purpose. Several alkaloids have been isolated from the aerial parts and the whole plant
14. *Cissus woodrowi* Sant.; Vitaceae; The roots were made into a powder and applied to cut wounds where puss had formed. Chemical and biological analyses should be conducted with the roots of the plant. [7,8]
  15. *Clematis triloba*; Ranunculaceae; Leaf juice is used in combination with *Holarrhena antidysenterica* is used to treat as eye drops. Plant is also used as purgative.[22]
  16. *Cocculus hirtulus* (Linn.) Diels. ; Menispermaceae; Root decoction and leaves extract are used in anorexia, UTI, sun stroke, fever skin disorders and in the treatment of skin problems.
  17. *Cyclea peltata* Hook. Fil & Thoms; Menispermaceae; Plant is used as wound healer, an antidote to poison, skin and digestive problems.
  18. *Cynodon dactylon* pers.; Poaceae . This weed grass is used religiously and medicinally both. It is used as fodder as well. Tradional healers use it as first aid in minor injury. They used it to cure brain related problems, toothache etc. [23]
  19. *Dalbergia volubilis* (Roxb.); Fabaceae; Traditionally leaves, roots and traditional parts are used Used in soar thorat as gargle. Roots are used to treat gonorrhoea. Aerial parts are diuretic.
  20. *Derris scandens* Roxb.; Fabaceae; herb is traditionally used in gastrointestinal problems. Stems and roots are used as insecticide.
  21. *Eclipta prostrata* (L) L.; Asteraceae; The leaves are crushed and boiled with coconut oil and applied in white hairs. Its hair oil is also very beneficial.[21]
  22. *Eucalyptus globules* Labill; Myrtaceae; Eucalyptus oil or Nilgiri oil is extracted from leaves and is used to treat respiratory problems. It relieves pain and used to strengthen the immune system.
  23. *Ficus racemosa* Linn.; Moraceae; Used in diabetes, liver disorder, diarrhea, respiratory band urinary problems.
  25. *Haldina cordifolia* (Roxb.) Ridsdale; Rubiaceae; It is a useful timber plant. It is a multipurpose tree. Traditionally sed by local healers in malaria and stomach pain. [27]
  26. *Melia dubia*; Meliaceae; It is timber tree used in furniture making.
  27. *Hyptis suaveolens* (L.) Poit.; Lamiaceae; Commonly known as vilayti tulsi. Leaves are used as vegetables. It is used in the treatment of liver and skin problems.
  28. *Jasminum multiflorum* (Burm.f.) Andrews; Oleaceae; Fresh leaf juice is given to treat patients of epilepsy and fever. White fragrant flowers are used in marriage rituals.
  29. *Kalanchoe pinnata*; Crassulaceae; It is used ethnomedicinally in the treatment of stone formation in body, liver problem.
  30. *Macaranga peltata*(Roxb.) Muell.-Arg. *M. Roxburghii* Wight; Euphorbiaceae; Compounds isolated from the bark of the plant were lupeol, betulin, ellagic acid and luteolin .The first three compounds have been shown to possess anti-tumour activity and the two latter anti inflammatory activity. Although these compounds may help against any tumours of the uterus that hinders conception, their effect is doubtful as the traditional treatment only involves fomentation. Further tests are necessary.
  31. *Maesa indica* (Roxb.) A. DC. Primulaceae; Fruit is a berry. Berry is of very nutritional value. Berry is rich in polyphenols.[30]
  32. *Melia azedarach* L.;Meliaceae; The ethno-botanical use of plant is in house construction, making cot, doors and windows . Leaves are used as manure.[21]
  33. *Melia dubia*; Meliaceae; Wood is used as timber.
  34. *Ocimum tenuiflorum* (L.) ; Lamiaceae; Tulsi or Holy Basil is used religiously time immemorial. It is an aromatic plant with numerous medicinal values. Besides medicinal uses it is used as insect repellent also.
  35. *Plecranthus ambonicus* (Lour) Spreng.; Lamiaceae; The leaf juice is boiled with coconut oil. It is applied on head. It gives relief from headache and cold.[21]
  36. *Pimpinella heyneana* DC. Benth, & Hook.f.; Apiaceae; Aerial parts and roots are used as traditional medicine in UTI, bladder and kidney stone , edema etc. It is also used nin respiratory problems.
  37. *Radermachera xylocarpa* (Roxb.)K. Schum; Bignoniaceae; Resin is used for skin treatment. It is an antiseptic plant. Economically wood is used as poles, cart, cabinets and shaft.
  38. *Ricinus communis* L.; Euphorbiaceae; The big palmate leaves are used as plates in rituals for offering. Oil is used with coconut oil for hair growth.[21]
  39. *Solena hetrophylla* Lour.; Cucurbitaceae; Plant is traditionally used in respiratory and Gastro problems.
  40. *Syzigium cuminii*; Myrtaceae. It is used in diabetes, digestion problems etc. It is also having anti-inflammatory properties. It is a blood purifier.
  41. *Tamarandis indica* L. ; Fabaceae; It is threatened species by IUCN[2013]. Pods are used in cooking for acidic or sour flavor. Leaves are also eaten raw or cooked. It is used in various problems like liver etc.
  42. *Tectona grandis* L.f. ; Lamiaceae; It is a large Wood timber tree. Wood tar is used as vermifuge. It is used in headaches and tooth aches.[28]
  43. *Terminalia chrbula*; Comretaceae; It is used in acid reflux, asthma, abdominal pain commonly known as Harad. It is used in obesity.



44. *Toddalia asiatica* (L.) Lam.; Rutaceae; The leaves are crushed and applied on the body to protect against snake. [21]
45. *Zea mays* L.; Poaceae; Commonly called as corn silk or makka is used to cure cough, kidney stones, UTI, inflammatory problem and urinary ailments.

## II. DISCUSSION AND COCLUSION

Study on 45 plants showed that frequently used parts of medicinal plants were young leaves (Maximal use), fruits, young twigs, roots, and tubers (minimal use). The maximal use was found to be for leafy vegetables, then comes raw fruits, herbal teas, salads and least used was found of alcoholic drink and snacks. Traditional knowledge of few plants only could be substantiated after wide study of traditional medicine plants eg. *Aburu sp.*, *Bauhinia purpurea*, *Calycopteris floribunda*, *Cocculus hirsutus*, *Cyclea peltata*, *Eucalyptus globulus*, *Hyptis suaveolens*, *Jasminum multiflorum*, *Kalanchoe pinnata*, *Maesa indica*, *Ocimum tenuiflorum*, *Syzigium cumini*, *Terminalia chebula*. For the plants *Ageratum conyzoides*, *Blumealacera*, *Caesulia axillaris* and *Terminalia crenulata* traditional knowledge has been partially substantiated and for the remaining plants the traditional use was not verified. They were the following: *Anogeissus latifolia*, *Aspidopteris cordata*, *Bauhinia faveolata*, *Macaranga peltata*, *Breynia retusa*, *Casearia graveolens*, *Cissampelos pareira*, *Cissus woodrowi*, *Clematis triloba*, *Cynodon dactylon*, *Dalbergia volubilis*, *Derris scandens*, *Euphorbia hirta*, *Ficus exasperata*, *Ficus racemosa*, *Haldina cordifolia*, *Melia dubia*, *Pimpinella heyneana*, *Radermachera xylocarpa*, *Schleicheraoleosa*, *Solena heterophylla*, *Tamarindus indicus*, and *Tectona grandis*. The plant *Bauhinia purpurea* was used against coughs along with the hairs of *Zea mays*. The traditional use has been substantiated for *Bauhinia purpurea*. No study to justify the use of the hairs of *Z. mays* was found either. The reason for the use of these plant parts together against coughs is not clear. A synergic effect may be the reason. Tests should be conducted in this direction. The local traditional knowledge of women in rural areas is fast disappearing along with the resources and traditional practices. Because of the rapid changes due to modernization, it is difficult for these women to find apprentices, i.e., people from the younger generation to learn and continue these practices. It is therefore crucial to record the knowledge. Thorough studies, both chemical and biological, should be performed for most of the plants in order to clarify the most important biological compounds. These could lead to the discovery of important lead compounds for new medicines. [9,10]

In India use of ethno medicinal plants show a long history of human dependence on environment. Herbs were used for medicinal purposes is known from ancient writings. Perhaps the earliest use was documented in the Vedas in about 4500 to 600 BC. This shows the ancient repository of information of medicinal plants. It comprises 66 plant species. Ayurveda is the practice of traditional medicine system. Local people participation for sustainable resource management have to be developed. There should be community-based research and development programs in agriculture forestry, watersheds and resource management. These relations in society may be social, ecological, economic, symbolic, religious, commercial or artistic. Ethnobotany is derived from both the social and biological sciences and is based on a multidisciplinary approach combining a diversity of knowledge bases and methods. Ethnobotany as an interdisciplinary science is therefore in a position to preserve the wealth of traditional knowledge that local people possess concerning their natural systems and environment in which medicinal plants are included. This includes their knowledge on the utilization and maintenance of different types of plant resources on a long-term basis without damaging or destroying their habitats. Hence, maximum efforts should be made to document and integrate indigenous skill on land-use, vegetation and forest management, non-timber forest products, medicinal plants, agro-forestry, home-garden and biodiversity. Meanwhile, the planning for natural resources development should continue by establishing close dialogue and communication with indigenous peoples using ethno botanical approaches. This will also ensure local peoples participation in future management and will help in sustainable development of forests and environment with the help of local people [10,11].

There is severe need for the protection of traditional knowledge. India is a vast pool of traditional knowledge which is passed from one generation to another in form of songs, stories, folklores, beliefs, proverbs, tribal and local peoples rule and agriculture practices. We have to work on ancient literature and VEDAS present in Sanskrit language. Greek and Latin work is not too old. Due to our negligence our old Ayurvedic and Unani formulations of Neem and Turmeric were stolen by foreign companies and got patent of novelty. NEEM, turmeric and basmati rice are the famous case of IPR and patent. In case of Neem US company was granted patent. They showed azadirachtin a bioactive component is responsible for pesticidal activities which not a novelty but already mentioned in our ancient text. In case of turmeric due to alertness of our scientists and some NGOs, Indian Government paid huge Fees and filed application to re-examine and to get back the patent to the native country. They showed classic arguments, extracts from Compendium of Indian Medicinal Plants of Indian and texts in August 1997 defeated US patent and proved their work as lack of novelty. It was a great victory for Indians. In case of Basmati rice an American company Rice Tee was granted patent by USPTO. This created lot of havoc.

A 'Task Force on Conservation and Sustainable Use of Medicinal Plants was formed in June 1999 by the Planning



Commission. Its main aim was to save and protect the Patent Rights and IPR of Medicinal Plants. The task force created a digital library of traditional medicinal plant knowledge with India as prior art. Thus patent applications for our property i.e. preserved in form of **Traditional Knowledge Digital Library (TKDL)** will not fulfil the norms of novelty.

TKDL is a database of more than 25,000 formulations used in Ayurveda, Unani and Yoga ; the traditional medicine system of India. Thus TKDL helps to protect the ethno medicinal knowledge of ancient herbal treatment.

There is a need of keen study to prove our traditional skill of medicinal plants. Historical documents from ancient books and oral literature speaks the importance of medicinal plants. To protect and give proper recognition to the work of our traditional knowledge given by our Holy Sages, it is the duty of each and every Indian citizen, botanists, ayurvedic doctors and scientists to raise the voice globally with full pride through vigorous and extensive high level research work on ancient herbal literature. Now it's time for protection of our traditional knowledge.[ 14,15,16,17,18 ]

## REFERENCES

1. Alagesaboopathi, C., Dearakan, P., Balu, S., 1999. Plants used as medicine by tribals of Shevaroy hills, Tamil Nadu. *Journal of Economic and Taxonomic Botany* 23, 391–393.
2. Aminuddin, Girach, R.D., 1991. Ethnobotanical studies on Bondo tribe of district Koraput (Orissa). *Ethnobotany* 3, 15–19.
3. Azaizeh, H., Fulder, S., Khalil, K., Said, O., 2003. Ethnomedicinal knowledge of local Arab practitioners in the Middle East Region. *Fitoterapia* 74, 98–108.
4. Bakshi, D.N.G., Sensarma, P., Pal, D.C., 1999. *A Lexicon of Medicinal Plants in India*. NayoProkash, 206 Bidhan Sarani, Calcutta, India.
5. Balick, M.J., 1996. *Annals of the Missouri Botanical Garden* 4, 57–65.
6. Bonet, M.A., Parada, M., Selga, A., Valles, J., 1999. Studies on pharmaceutical ethnobotany in the regions of L'AltEmporda and Les Guilleries (Catalonia, Iberian Peninsula). *Journal of Ethnopharmacology* 68, 145–168.
7. Borthakur, S.K., 1993. Native phytotherapy for child and woman diseases from Assam in North Eastern India. *Ethnobotany* 5, 87–91.
8. Chatterjee, A., Pakrashi, S.C., 1997. *The Treatise on Indian Medicinal Plants*, vol. I–V. National Institute of Science Communication (CSIR), New Delhi, India.
9. Gamble, J.S., 1935. *The Flora of the Presidency of Madras*. Adlard & Son, Ltd., London.
10. Ghosh, A., 2003. Herbal folk remedies of Bankura and Medinipur districts, West Bengal (India). *Indian Journal of Traditional Knowledge* 2, 393–396.
11. Grierson, D.S., Afolayan, A.J., 1999. An ethnobotanical study of plants used for the treatment of wounds in the Eastern Cape, South Africa. *Journal of Ethnopharmacology* 67, 327–332.
12. Guarrera, P.M., 1999. Traditional antihelmintic, antiparasitic and repellent uses of plants in Central Italy. *Journal of Ethnopharmacology* 68, 183–192.
13. Handa, S.S., 1998. Indian efforts on standardization and quality control of medicinal plants using scientific parameters. *Amruth (The Traditional Healthcare Magazine)* 2, 10.
14. Ignacimuthu, S., SankaraSivaraman, K., Kesavan, L., 1998. Medicoethnobotanical survey among Kanikartribals of Mundanthurai Sanctuary. *Fitoterapia* 69, 409–414.
15. Jain, S.P., 2004. Ethno-medico-botanical survey of Dhar district, Madhya Pradesh, India. *Journal of Non-Timber Forest Products* 11, 152–157.
16. Jamir, N.S., 1997. Ethnobiology of Naga tribe in Nagaland: I. Medicinal herbs (India). *Ethnobotany* 9, 101–104.
17. Jovel, E.M., Cabanillas, J., Towers, G.H.N., 1996. An ethnomedicinal study of the traditional medicine of the Mestizo people of Suni Mirano, Loreto, Peru. *Journal of Ethnopharmacology* 53, 149–156.
18. Karthikeyani, T.P., 2003. Studies on ethnogynaecological plants used by the Irulars of Siruvani hills, Western Ghats, India. *Plant Archives* 3 (2), 159–166.
19. Katewa, S.S., Arora, A., 1997. Some plant of Folk medicine of Udaipur district of Rajasthan, India. *Ethnobotany* 9, 48–51.
20. Lambert, J., Srivastava, J., Vietmeyer, N., 1997. *Medicinal Plants. Rescuing a Global Heritage*. The World Bank, Washington, DC, p. 61.
21. Manickam, V.S., Jothi, G.J., Murugan, C. and Sundaresan, V., 2003. Check-list of the Flora of Tirunelveli hills, Southern Western Ghats, India, Centre for Biodiversity and Biotechnology, St. Xavier's College, Palayamkottai, India, pp. i–ii.
22. Mohan, V. R. et.al., 2018. *Ethnomedicinal Plants A Biodiversity Treasure*. Daya Publishing House, New Delhi.
23. <https://www.wisdomlib.org/hinduism/book/indian-medicinal-plants/d/doc213929.html>
24. <https://hort.purdue.edu/newcrop/CropFactSheets/doob.html>
25. <http://inforesights.com/phytopharmacology/files/pp4v2i8.pdf>



25. <https://tropical.theferns.info/viewtropical.php?id=Derris+scandens>
26. <https://www.tandfonline.com/doi/pdf/10.3109/13880200903241861>
27. <http://tropical.theferns.info/viewtropical.php?id=Haldina+cordifolia>
28. <https://tropical.theferns.info/viewtropical.php?id=Tectona+grandis>
29. <http://tropical.theferns.info/viewtropical.php?id=Zea+mays>
30. <https://europepmc.org/article/PMC/5052164>