

**TRADITIONAL UNDERUTILIZED GREEN LEAFY VEGETABLES AND ITS CURATIVE PROPERTIES**

Sudha K and S.K. Mathanghi*

College of Food and Dairy Technology, Tanuvas, Koduvalli, Alamathi (Po), Chennai-52

***Corresponding author e-mail:** mathanghisoma@gmail.com**ABSTRACT**

Any discussion on health and wellness is not complete without a discussion on the uses of greens food in our daily diet plan. Studies have shown that a fiber rich diet ensures our overall health. Nutritional value of greens (Keerai) is twenty times more than in other vegetables. Dark green leafy vegetables are calorie for calorie, probably the most concentrated source of nutrition of any food. They are a rich source of minerals (including iron, calcium, potassium, and magnesium) and vitamins, including K, C, E, and many of the B complex vitamins. They also provide a variety of phytonutrients including beta-carotene, lutein, and zeaxanthin, which protect our cells from damage also helps in alleviating the age-related problems. The range of health benefits of the greens is so vast that it is not easy to consolidate them in a single article like the present one. However, we can cite here a few varieties of greens and their respective health benefits.

Key words: Greens, phytochemicals, curative properties, traditional varieties.**INTRODUCTION**

As per the World Health Organization (WHO) report, 80% of the world population, presently use herbal medicine for some aspect of primary health care ^[1]. Medicinal plants are part and parcel of human society to combat diseases from the dawn of civilization ^[2]. There is a widespread belief that the green medicines are healthier and safer than synthetic ones ^[3]. The consumption of synthetic drugs leads to hyperuricemia, diarrhoea, nausea, myositis, gastric irritation, flushing, dry skin and abnormal liver function ^[4]. Since the last decade, the rise in the failure of chemotherapeutics and antibiotic resistance exhibited by pathogenic microbial infectious agents has led to the screening of several medicinal plants for their potential antimicrobial activity ^[5,6].

Plants used in traditional medicines contain a wide range of ingredients that can be used to treat chronic as well as infectious diseases. The bioactive compounds like alkaloids, flavonoids, tannins and phenolic compounds are the reason for the medicinal

value of plants that produce a definite physiological action on the body ^[7]. The present attempt is to review and compile updated information on various aspects of greens and its curative properties.

***Bauhinia tomentosa* (Iruvachi)**

Bauhinia tomentosa commonly known as Yellow bell orchid tree belongs to Fabaceae family is one of the best, versatile and most commonly used household remedy for many manifestations ^[8]. Phytochemical screening of the acetone, ethanol and aqueous extracts of the leaves of *Bauhinia tomentosa* showed the presence of steroids, alkaloids, terpenoids, flavonoids, saponins, phenolic compounds, tannins, lignin, fat and oil, inulin, cardiac glycosides, proteins, carbohydrates, aminoacids, reducing sugars and absence of phlobatannins. Acetone extracts showed the presence of steroids, flavonoids and carbohydrates ^[9]. The plant possesses activities like Antibacterial ^[10], Antifungal ^[10], Antioxidant ^[11-13], Anti hyperglycaemic and anti-lipidemic. ^[13-18]

A decoction of the root bark is prescribed for liver troubles and as a vermifuge. Infusion of the stem bark is useful as an astringent gargle. The leaves constitute an ingredient of a plaster applied to abscesses. They are used as a yellow dye along with turmeric. The dried leaves, buds and flowers are used in dysentery. The fruit is diuretic. The seeds are used as tonic and yield a fatty oil called ebony oil^[19]. Seeds are eaten for their aphrodisiac action and made into a paste with vinegar as an efficacious application to wounds inflicted by poisonous animals, snakes and scorpions. Bruised bark ground with rice-water into a paste is externally applied to tumours and wounds such as scrofulous^[20].

Chutney (*thuvayal*) is prepared from the leaves together with pepper, tamarind and salt. It is then fried and taken with tiffin or with cooked rice. It helps to cure indigestion and diarrhoea. If this chutney is given to children regularly it promotes their appetite and improves the 'taste testing' quality of the tongue.

***Sesbania Grandiflora* (Agathi)**

Sesbania grandiflora belongs to Fabaceae family which is a folk remedy for bruises, catarrh, dysentery, eyes, fevers, headaches, small pox, sores, sore throat and stomatitis^[21]. The astringent bark was used in treating small pox and other eruptive fevers. The juice from the flowers is used to treat headache, head congestion of stuffy nose. Rheumatic swellings are poulticed or rubbed with aqueous decoctions of the powdered roots of the red flowered variant. Indians apply the roots in rheumatism, the juice of the leaves and flowers for headache and nasal catarrh^[22]. The powdered bark is also recommended for ulcers of the mouth and alimentary canal. In java, the bark is used for thrush and infantile disorders of the stomach. Leaves are chewed to disinfect the mouth and throat^[23].

Agathi keerai is very good when mixed with milk and boiled and then made into curd and that made into buttermilk if taken twice a day all vaginal related problems can be solved (White discharge, vaginal discharge with odour). Crushed leaves are applied to sprains and bruises of all kinds. A tea made from the leaves is believed to have antibiotic, anthelmintic, antitumour and contraceptive properties. This is not advised during medication, since it will reduce the power of medicine.

The tender leaves, green fruit, and flowers are eaten alone as a vegetable or mixed into curries or salads. Flowers may be dipped in batter and fried in butter. Tender portions serve as cattle fodder. This agathi

leaves is very good for health and this saaru especially, will cure mouth and tongue ulcers and good for your stomach. Coconut milk and jeera adds more goodness. Agathi keerai is also cooked with drumstick leaves as poriyal. Sometimes cooked alone as poriyal.

***Celosia argentea* (Pannai Keerai)**

Celosia argentea belongs to Amaranthaceae family. It grows as a weed during rainy season throughout India and other tropical regions of the world such as Sri Lanka, South Asia, Africa and America. The leaves are used for the treatment of inflammations, fever and itching. The seeds are bitter, useful in blood diseases, mouth sores^[24]. They are efficacious remedy in diarrhoea^[25]. Based on ethno botanical practice the plant was investigated for anti-inflammatory^[26], anti-pyretic^[27], anti-diabetic^[28], anti-bacterial^[29], antioxidant^[30] and diuretic properties^[31]. Hepato protective effect of *celosia* was investigated by using liver injury models^[32]. The anti-diarrhoeal effect of ethanolic leaf extract of *celosia argentea* is due to the presence of tannins and flavanoids in the extract^[33].

Leaves are eaten as a vegetable. Poultice of leaves smeared with honey, are being used as cooling agent that can be applied to inflamed areas and painful affections such as buboes and abscesses. Pannai keerai is cooked as *masiyal* (a culinary preparation from south of India) or cooked with other greens as *kalavai keerai masiyal* (mixed greens preparation).

***Delonix elata* (Vadanarayanan)**

Delonix elata commonly known as Perungondrai tree (in Tamil) belongs to Fabaceae family most commonly used household remedy for many manifestations. *Delonix elata* is known to be used for joint pains and in flatulence. The medical usefulness of the tree is acknowledged by people living in the villages who take a decoction of the leaves to get relief from rheumatic problems like pain and stiffness of the joints, especially the knees^[34]. It has been used in the treatment of bronchitis, stomach disorders^[34] and pneumonia in infants^[35]. Leaf extracts of *D. elata* are reported for strong anti-inflammatory activity^[36]. Studies shows on phytochemicals reported the antibacterial activity of terpenoids, saponins, tannin, alkaloids and flavonoids isolated from leaves *D.elata*. The leaves of *Delonix elata* is a potential source for arresting the growth and metabolic activities of various general bacteria and fungi^[37].

The leaves possess heat nature and have a bitter taste. They are used in the preparation of spicy kuzhambu and thuvayal. Regular intake of these preparations helps to control joint pain, arthritis, and other nervous and bone related complaints associated with swellings. The leaves can be included in food preparations and consumed once a week to support general immunity. Vadanarayanan keerai is always cooked with drumstick leaves as pooriyal in villages of Tamil Nadu.

***Achyranthes aspera* (Naayuruvi)**

Achyranthes aspera is an important medicinal herb belongs to Amaranthaceae family found as a weed throughout India. Though almost all of its parts are used in traditional systems of medicines, seeds, roots and shoots are the most important parts which are used medicinally. Crushed plant is boiled in water and is used in pneumonia. Infusion of the root is a mild astringent in bowel complaints. The flowering spikes or seeds, ground and made into a paste with water, are used as external application for bites of poisonous snakes and reptiles, used in night blindness and skin diseases^[38]. For snake bites the ground root is given with water until the patient vomits and regains consciousness. Inhaling the fume of *Achyranthes aspera* mixed with *Smilax ovalifolia* roots is suggested to improve appetite and to cure various types of gastric disorders^[39].

It is useful in haemorrhoids, leaves and seeds are emetic, hydrophobia, carminative, resolve swelling, digestive and expel phlegm. Ash of the plant is applied externally for ulcers and warts. The crushed leaves rubbed on aching back to cure strained back^[40]. A fresh piece of root is used as tooth brush. Paste of the roots in water is used in ophthalmia and opacities of the cornea. Paste of fresh leaves is used for allaying pain from bite of wasps^[41]. The plant is useful in liver complaints, rheumatism, scabies and other skin diseases. It also possesses tranquillizing properties^[42, 43].

The plant which possesses activities like cardio protective^[44], spermicidal^[45], antiparasitic^[46], Hypoglycaemic^[47], cancer Chemo preventive^[48], hepatoprotective^[49], analgesic and antipyretic^[50,51], anti-inflammatory and anti-arthritic^[51], antimicrobial^[52, 53] anti-oxidant^[54,55], nephroprotective^[56], wound healing^[57], immunomodulatory^[58], and hypolipidemic^[59].

Naayuruvi fresh leaves together with other spinach greens are cooked and consumed to help strengthen the body. The seeds are sometimes cooked and

eaten to also strengthen the body, but suppress hunger.

***Murraya koenigii* (karuveppilei)**

Murraya koenigii belongs to Rutaceae family. The leaves, bark and the root are used intensively in indigenous medicine from ancient time, as a tonic for stomachache, stimulant and carminative^[60]. The *M. koenigii* leaves are used in traditional medicine for the treatment of piles, headache, stomach ache, influenza, rheumatism, traumatic injury, insect, snake bites, anti-vomiting, curing dysentery and diarrhoea^{[61],[62]}. The leaf extract significantly decreased the level of blood glucose in experimental diabetic rats^[63]. A 10% curry leaf diet has shown reduction of total serum cholesterol content^[64]. It has been reported that carbazole alkaloids present in the plant possess various biological activities such as anti-tumor, anti-oxidative, anti-mutagenic, and anti-inflammatory activities^[65-67].

Extract showed the presence of tannins, phenolic compounds and alkaloids. Carbazole alkaloids present in *M. koenigii* are reported for its cytotoxic, antimicrobial and antibacterial activity^[68-70] which indicate the probable role of these alkaloids for stimulant activity on macrophages.

The leaves are an important flavouring in South Indian cooking. Leaves have slight pungent taste and heat quality. Regular intake of the leaves helps to increase appetite, strengthen the body and eliminate gastric trouble. The required quantity of dried leaves are fried in ghee and prepared to a fine powder. A spoon of the powder is mixed with cooked rice, a pinch of salt and ghee. When consumed it helps assist with vision improvement. The leaves are also prepared as *thuvayal* or chutney and eaten as side dish.

***Clorodendum Phlomidis* (Tazhuthaazhai)**

Clorodendum Phlomidis belongs to Verbenaceae family. Due to its bitter and pungent nature *C. phlomidis* is considered to normalize the vitiated Kapha and Vata dosa^[71]. It is constituted as a number of Ayurvedic formulations indicated for digestive disorders, acidity, gas, diarrhoea, laxative, liver tonic and general health tonic^[72].

C. phlomidis finds a lot of applications in Indian traditional veterinary practices^[73]. The tribals

Santals feed *C. phlomidis* to their cattle for diarrhea and worms or when the stomach swells^[74-76]. Extracts of leaves are applied on body of domestic animals to kill lice. Leaves are good fodders especially for goats^[77]. Leaf paste is applied to infested hooves to give a relief for the animals and reportedly cures foot and mouth diseases and secondary infections^[78]. Fresh leaf extracts are pasted on animals with skin problems^[79] and used for hypothermia or shivering in cattle^[80]. Leaves are given orally twice daily to cure convulsive seizures and trypanosomiasis infection until cured^[81].

This plant also possesses activities like analgesic^[82], anti-amnesic^[83], anti-asthmatic^[84], antidiarrhoeal^[85], anti-inflammatory^[86], antimicrobial^[87], antiviral^[88], hypoglycemic^[89], nematocidal^[90], and psychopharmacological^[90].

When consumed excess phlegm is removed from the body. It is one of the important medicinal herbs detailed by Sage Ramalinga Vallalar. Three handfuls of leaves are mixed with ¼ kg of rice and prepared as dosa flour. When consumed it helps to cure colds and coughs. It is also effective for reducing fevers and fevers associated with colds and loss of taste. Eating of tender, fresh leaves helps to promote digestion and improves appetite.

***Portulaca oleracea* (paruppu keerai)**

Portulaca oleracea belongs to Portulacaceae family. It is eaten as a salad and vegetable all around the world and used medicinally for a variety of conditions that include headache, stomach ache, painful urination, enteritis, mastitis, lack of milk flow in nursing mothers and in postpartum bleeding. Externally it is used to treat burns, earache, insect stings, inflammations, skin sores, ulcers, pruritis (itching skin), eczema and abscesses. These conditions are usually treated with the fresh herb used as a poultice or the expressed juice is used^[91].

It acts as a refrigerant and alterative in scurvy and liver diseases^[92]. The fresh leaves bruised are applied to the temples to allay excessive heat and pain; and are also used as a cooling external application in erysipelas and an infusion of them is given as a diuretic. Sour leaves are used as a vegetable^[93]. Herb is chiefly valued as a refrigerant and alterative pot herb, particularly useful as an article of diet in scurvy and liver diseases^[93]. Young stems and leaves are cooked like spinach, with salt and chillies, and are also used in curries^[93]. Juice of the stems may be beneficial in cases of prickly heat and also soothing to hands and feet whenever a burning sensation is felt.

Plant and seeds are used in diseases of the kidney and bladder, as strangury, dysuria, haematuria, gonorrhoea etc., and also for diseases of the lungs. They are beneficial to the intestinal mucous membrane and therefore relieve tormina, tenesmus and other distressing symptoms in dysentery and mucous diarrhoea, particularly when combined with other drugs of similar nature^[93].

Other effects include: antibacterial and antifungal; wound healing; anti-inflammatory; uterine stimulant and diuretic in rabbits. Although norepinephrine may account for some pharmacologic activities, the active principle for most of the biological activities and medicinal properties of purslane are still unidentified^[91].

It has been used in salads and as a medicinal plant (for people) for hundreds of years Purslane is a good edible and is eaten throughout much of Europe and Asia. It can be eaten fresh or cooked and has no bitter taste at all. Since it has a mucilaginous quality it is great for soups and stews.

***Mukia maderaspatana* (Tamil: Musumusukkai)**

Mukia maderaspatana belongs to Cucurbitaceae family. It is a good diuretic, stomachic, antipyretic, and antifatulent^[94], antiasthmatic and antibronchitis besides its use in vertigo and biliousness^[95]. It is used in Ayurveda for various therapeutic purposes such as relief of toothache or flatulence, and as an expectorant and a sudorific. Certain traditional medical practitioners also use the leaf-tea of this plant for alleviation of jaundice^[96, 97]. Decoctions of leaves of this plant have been used^[98] by Siddha practitioners in Tamil Nadu for the treatment of hypertension. This plant leaf extract has also been shown to have hepatoprotective^[99,100] and immunomodulatory effects^[101-103] and antiarthritic activity properties^[104]. Furthermore, studies showed that consumption of *M. maderaspatana* leaf-tea significantly attenuated blood pressure, strengthened blood antioxidant potential, and lowered glycoprotein components in patients with hypertension^[105].

M. maderaspatana leaf-tea consumption brings blood pressure to near normalcy, strengthens blood lipid profile, and showed beneficial effects on fibrinogen and bilirubin levels in patients with hypertension, which provide a pharmacologic basis for the traditional use of this plant^[106].

***Eclipta Prostrata* (Karisalankanni)**

Eclipta Prostrata belongs to Asteraceae family. The plant is used as the following diseases; acidity, alopecia, asthma, body pain, bronchitis, pneumonia, burns, constipation, diarrhoea, dysentery, fever, general weakness, gingivitis, haemorrhoids, hair fall, high blood pressure, jaundice, liver enlargement, oedema, palpitation of heart, paronychia or whitlo, pimples, premature graying of hair, skin diseases, spleen enlargement, urinary tract infections, weakness of vision wounds, wrinkles^[107-111] and antibacterial activity^[112].

Eclipta prostrata roots possess purgative, haemostatic and anti-inflammatory properties^[113, 114]. Therefore, administration of root extract may ease the passage of stool and reduce blood flow and inflammation. Similarly, myocardial depressant and hypotensive activity of alcoholic extract of *Eclipta prostrata* leaves explain its application in treatment of high blood pressure and palpitation of heart^[113, 114].

The leaves are fried in ghee and consumed. Regular intake of this spinach helps to improve vision, strengthen the body and also strengthens the liver. Our ancestral people believed that this plant prevented aging. Sage Ramalinga Vallalar describes this is one of the important plants used in rejuvenation therapy. Eating of 5 fresh leaves in the morning cures constipation. Gargling using the juice of the leaves strengthens teeth and gums and clears coating of the tongue. It is also good for throat and lung infection. Karisalankanni is cooked as kottu.

CONCLUSION

Thus the green leaves possess many Nutraceutical effects and phytochemical effects which will be very useful in treating and preventing the many diseases. Especially the bioactive compounds like alkaloids, flavonoids, tannins and phenolic compounds are the reason for the medicinal value of plants that produce a definite physiological action on the body. It would be beneficial for the humans to explore the traditional green varieties to include into their daily diet menu and can able lead a healthy life in a natural way.

REFERENCES

1. Sujatha S. Journal of Cancer pain and Symptom Palliation 2005; 1:25-9.
2. Bandyopadhyay U, Biswas K, Chattopadhyay I, Banerjee RK. Curr Sci 2002; 82(11):1336-45.
3. Parvath S, Brindha R. Ancient Sci Life 2003; 22:14. 3. Goyal BR, Goyal RK, Mehta AA. Pharmacog Rev 2008; 1:1.
4. Speight TM. In: Avery's Drug treatment Principles and Practice of clinical pharmacology and therapeutics. 1987, 3rd Edition, ADIS press Ltd, pp.599.
5. Colombo ML, Bosisio E. Pharmacol Res 1996; 33: pp.127-34.
6. Iwu MM, Duncan AR, Okunji CO. New Antimicrobials of Plant Origin. In: Janick J, editor Perspectives on new crops and new uses. Alexandria: Ashs Press; 1999; pp. 457-62.
7. Hemashenpagam N. Lali Growther, Sankar, Selvaraj, T. and Panneerselvam, A. *Biomedicine*, 29 (4): 353-356.
8. http://www.staurtxchange.org/bauhinia_tomentosa.html.
9. Rhama S, Madhavan S. Journal of Drug Delivery & Therapeutics; 2012; 2(2): 76.
10. Gopalakrishnan S, Vadivel E. Int. J Pharm 2011; 2(3):103S-9S.
11. Bandyopadhyay U, Das D, Banerjee RK. Curr Sci 1999; 77:658-65.
12. Dhuley JN. Indian J Exp Biol 1999; 37:238-42.
13. Mannangatti V, Ayyasamy B, Rangasamy M, Emin B, Natesan SK. JGPT 2010; 2(3):71-6.
14. Mazunder UK, Gupta M, Rajeshwar Y. Eur Bull Drug Res 2005; 13(1):15-23.
15. Chatterjee MN, Shinde R. Text Book of Medical Biochemistry. 5th ed. New Delhi Jaypee brothers Medical publishers Ltd; 2002; p p. 317.
16. Goodman MW, Michels LD, Keane WF. Proc Soc Exp Biol Me 1982; 170:286-90.
17. Golay A, Chen YD, Reaven GM. J Clin Endocrinol Metab 1986; 62:1081-88.
18. Glasgow AM, August GP, Hung W. Relationship between control and serum lipids in juvenile-onset diabetes. Diabetes Care 1981; 4:76-80.
19. Anonymous, The wealth of India. CSIR, New Delhi, 1976; 2: 55.
20. Nadkarni AK, Indian Materia Medica. Popular Prakashan Pvt Ltd., Tardeo, Mumbai 400 034, 1976; 1:183-184.

21. Saravanakumar A, Venkateshwaran K, Vanitha J, Saravanan VS, Ganesh M, Sivakumar T. J. Pharma. Tech. 2008; 1:67-68.
22. Singh R, Sidhu PS, Vadhera S, Sital JS, Bhatia S. *Plantarum*. 1980; 48: 504-508.
23. Kirtikar KR, Basu BD. *Indian Medicinal Plants*. Lalit Mohan Basu, 4, Leaders Road Allahabad 1975; pp.1061-1065.
24. Kirtikar K, Basu L *Indian Medicinal Plants*, Vol. III 2nd ed., Allahabad. 1935; pp. 2053-2054.
25. Kulasekaran S Priya, Arumugam Ganamani, rathinam Bhuvanewari. *Wound repair regeneration*. 12(6):618–27.
26. Patil K, Bhujbal S, Chaturvedi S. *Ind.J.Pharm. Sci*. 2003; 645- 647.
27. Bhujbal S, Patil K, Patil M. *Planta Indica*. 2006; 2: 19-20.
28. Thangarasu V, Manuiappan J, Bangaru A. *Biol. Pharm. Bull*. 2002;25:526-528 .
29. Wiart C, Mogana S, Khalifah S. *Fitoterapia Antimicrobial screening of plants used for traditional medicine in the state of perak*. Vol. 75. *Peninsular Malaysia*: pp. 68–73.
30. Olowoyo OG, Adesina OA, Adigun AO, Aziike CK, *J. of med. Food*. 8:539–44.
31. Patel K, Shah M. *Int. J. Pharmacogn* 1993; 31(3):223-234.
32. Hase K, Kadota S, Basnet P, Takahashi T, Namba T. *Pharma bull*. 19(4):567–72.
33. Praveen Sharma, Gali Vidyasagar, Sunder Singh, Santosh Ghule, and Bimlesh Kumar. *Adv Pharm Technol Res*. 2010 Jan-Mar; 1(1): 41–48.
34. Thirugnanam S. *Mooligai Maruthuvam*. (Tamil) Trichy: Selvi Publishers; 2003; pp. 33, 117, 131,139,147
35. *Compendium of Medicinal Plants*. Delhi: National Institute of Industrial Research (NIIR) publication; 2005; pp. 91.
36. Sethuraman MG, Sulochana N.. *Curr Sci* 1986; 55:343.
37. Sivanarayan V, Suriyavathana M. *International Journal of Current Research* September, 2010; Vol. 8, pp.066-069.
38. Nadkarni KM. *Indian Materia Medica*. Bombay Popular Prakashan, 2009; Vol.I, 21.
39. Bhattaraj NK. *Fitoterapia* 1992; 63(6): 497-506
40. Singh VK, Ali ZA, Zaidi STH. *Fitoterapia* 1996; 67(2): 129-139.
41. Gupta RK. *Medicinal & Aromatic Plants*. CBS publishers & distributors, 2010; pp.190.
42. Khare CP. *Indian medicinal plants*. Springer, 2007; pp.11-13.
43. Anonymous. *The Wealth of India - Raw Materials*, Council of Scientific & Industrial Research (CSIR), New Delhi, 2007; pp. 17-18.
44. Neogi NC, Garg RD, Rathor RS. *Indian Journal of Pharmacy*, 1970; 32(2): 43-46.
45. Shibeshi W, Makonnen E, Zerihun L, Debella A. *African Health Science*, 2006; 6(2): 108-112.
46. Zahir AA, Rahuman AA, Kamaraj C, Bagavan A, Elango G, Sangaran A, Kumar BS. *Parasitology Research*, 2009; 105(2): 453-461.
47. Akhtar MS, Iqbal J. *Journal of Ethnopharmacology*, 1991; 31(1): 49-57.
48. Chakraborty A, Brantner A, Mukainaka T, .Nobukuni Y, Kuchide M, Konoshima T, Tokuda H, Nishino H. *Cancer letter*, 2002; 177(1): 1-5.
49. Bafna AR, Mishra SH. *Ars Pharmaceutica*, 2004; 45(4): 343-351.
50. Sutar NG, Sutar UN, Sharma YP, Shaikh IK, Kshirsagar SS. *Biosciences Biotechnology Research Asia*, 2008; 5(2): 841-844.
51. Mehta FA, Patel BG, Pandya SS, Ahir KB, Patel SB. *Pharmacologyonline*, 2009; 3:978-985.
52. Saravanan P, Ramasamy V, Shivakumar T. *Asian Journal of Chemistry*, 2008; 20(1): 823- 825.
53. Manjula M, Indira V, Dhasarathan P. *Asian Journal of Microbiology, Biotechnology & Environmental Sciences*, 2009; 11(2): 365-368.
54. Tahiliani P, Kar A. *Journal of Ethnopharmacology*, 2000; 71(3): 527-532.
55. Gayathri DS, Archanah A, Abiramasundari P, Priya V, Uma K, Abirami T. *Indian Journal of Nutrition and Dietetics*, 2009; 46(12): 485-490.
56. Jayakumar T, Sridhar MP, Bharathprasad TR, Ilayaraja M, Govindasamy S, Balasubramanian MP. *Journal of Health Science*, 2009; 55(5): 701-708.
57. Edwin S, Jarald E, Edwin DL, Jain A, Kinger H, Dutt KR, Raj AA. *Pharmaceutical Biology*, 2008; 46(12): 824-828.
58. Chakrabarti R, Vasudeva RY. *International Immunopharmacology*, 2006; 6(5): 782-790.
59. Khanna AK, Chander R, Singh C, Srivastava AK, Kapoor NK. *Indian Journal of Experimental Biology*, 1992; 30(2): 128-130.
60. Pruthi JS, *Spices and condiments*. 5th ed. National Book Trust, India, 1998; pp.38.

61. Chakraborty DP, Barma BK & Bose PK. *Tetrahedron*, 1965; 21: 681.
62. Kong YC, Ng KH, But PP, Yu Q Li SX, Zhang HT, Cheng KF, Soejarto DD, Kan WS, Waterman PG. *J Ethnopharmacol*, 1986;15: 195.
63. Arulselvan P, Senthilkumar GP, Sathishkumar D, Subramanian S. *Pharmazie*, 2006; 61: 874.
64. Khan BA, Abraham A, Leelamma S. *Plant Foods Hum Nutr*, 1996; 49: 295.
65. Tachibana Y, Kikuzaki H, Lajis NH, Nakatani N. *J Agric Food Chem*, 2001; 49: 5589.
66. Ramsewak RS, Nair MG, Strasburg GM, DeWitt DL, Nitiss JL. *J Agric Food Chem*, 1999; 47: 444.
67. Nakahara K, Trakoontivakorn G, Alzoreky NS, Ono H, Onishi-Kameyama M, Yoshida M. *J Agric Food Chem*, 2002;50: 4796.
68. Nutan MTH, Hasnat A, Rashid MA. *Fitoterapia*, 1998; 69: 173.
69. Ramsewak RS, Nair MG, Strasburg GM, De Witt DL, Nitiss JL. *J Agric Food Chem*, 1999; 47: 444.
70. Khan BA, Abraham A, Leelamma S. *Invest New Drugs*, 1996;14: 365.
71. Chaturvedi GN, Subramaniyam PR, Tiwari SK, Singh KP. *J. Ancient Sci Life*, 1983; 3(4) : 216-224.
72. Tyagi DK. *Pharma forestry: field guide to medicinal plants* M. New Delhi: Atlantic Publishers and Distributors, 2005; 61: pp.65-157.
73. Srivastava GN, Hasan SA, Bagchi GD, Kumar S. *Indian traditional veterinary medicinal plants* M. Lucknow: Central Institute of Medicinal and Aromatic Plants, 2000; 45: 581.
74. Kirtikar KR, Basu BD, An ICS. *Indian medicinal plants*. Vol 3. M. Dehradun: Bishen Singh Mahendra Pal Singh, 1975; pp.1947-1948.
75. Watt G. *A dictionary of the economic products of India*. Vol. 2, M. Calcutta: The Superintendent of Government Printing, 1889; 374.
76. Anjaria J, Parabia M, Bhatt G, Khamar R. *Nature heals: a glossary of selected indigenous medicinal plants of India*. Ahmedabad: SRITI Innovations, 2002: 21
77. Pawar S, Patil DA. *Ethnobotany of Jalagon District Maharashtra* M. New Delhi: Daya Publishing House, 2008: 279-280.
78. Bhagore M. *Foot and mouth disease* J. *Honey Bee*, 1991; 2(1): 20.
79. Keshabhai JR. *J. Honey Bee*, 1992; 3(2): 21.
80. Vaidyar MS. *Hypothermia or shivering in cattle* J. *Honey Bee*, 1997; 8(4) : 9.
81. Sanyasi Rao ML, Varma YNR. *India J. Ethnobotanical Leaflets*, 2008; 12: 217-226.
82. Srinivasa U, Rao JV, Krupanidhi AM, Babu PRS. *J. J Res Edu Indian Med*, 2007; 13: 23-25.
83. Joshi H, Megeri K. *J. Brazilian J Pharm Sci*, 2008; 44(4) : 717-125. Gokani RH, Lahiri SK, Santani DD, Shah MB. *J. Int J Pharm*, 2007; 3(4) : 352-356.
84. Vadnere GP, Somani RS, Singhai AK. *J. Pharmacolgyonline*, 2007; 1: 487-494.
85. Rani S, Ahamed N, Rajaram S, Saluja R, Thenmozhi S, Murugesan T. *J. J Ethnopharmacol*, 1999; 68(1-3) : 315-319.
86. Krishnamurthy KH, Masilamoney P, Govindraj N. *J Res Indian Med*, 1972; 7(1): 27-36.
87. Vaghasiya Y, Chanda SV.. *Turkish J Biol*, 2007; 31: 243-248.
88. Khan MMAA, Jain DC, Bhakuni RS, Zaim M, Thakur RS. *Plant Sci*, 1991; 75(2) : 161-165
89. Sharma N, Trivedi PC. *Asian J Exp Sci*, 2002; 16(1-2) : 21-28.
90. Murugesan T, Saravanan KS, Lakshmi S, Ramya G, Thenmozhi K. *Phytomedicine*, 2001; 8(6) : 472-476.
91. Leung, AY, Foster, Steven. *Encyclopedia of Common Natural Ingredients used in food, drugs and cosmetics*. 2nd. edition. John Wiley 1996, ISBN No. 0-471-50826-8.
92. Drury, Colonel Heber. *The useful plants of India; with notices of their chief medicinal value in commerce, medicine and the arts*. Higginbotham and Co. Madras. 1873. ISBN No. not available.
93. Nadkarni KM, Nadkarni AK. *Indian Materia Medica - with Ayurvedic, Unani-Tibbi, Siddha, Allopathic, Homeopathic, Naturopathic and Home remedies*. Vol.1. 1999, Popular Prakashan Private Ltd., Bombay, India. ISBN No. 81-7154-142-9.
94. *Publication and Information Directorate. The Wealth of India*. New Delhi: C.S.I.R., 1962:336.
95. Kirtikar KR, Basu BD. *Indian Medicinal Plants*, 2nd ed., vol. III. New Delhi, India: International Book Distributors, 1975:1161.
96. Attygalle J. *Sinhalese Materia Medica*, 2nd ed. Colombo, Sri Lanka: M.D. Gunasena & Co. Ltd., 1952:91.
97. Jayaweera DMA. *Medicinal Plants Used in Ceylon*, Vols 1-5. Colombo, Sri Lanka: National Science Council, 1982:47, 153.
98. Marundugalin UK. *Treatment for High Blood Pressure: Tamil Nadu, India*: SKM Udal Matrum Mana Nala Arakkattalai, 173.

99. Jayatilaka KAPW, Thabrew MI, Perera DJB. J Ethno Pharm 1990; 30:97–105.
100. Jayatilaka KAPW, Thabrew MI, Pathirana C, et al.. Plan Med 1989; 55:137–139.
101. Thabrew MI, de Silva KTD, Labadie RP. J Ethno Pharm 1991; 33:63–66.
102. Thabrew MI, Jayatilaka KAPW, Perera DJB. J Ethno Pharm 1988; 23:305–312.
103. Thabrew MI, Gove CD, Robin D. Phyto Res 1995; 9:513–517.
104. Ramakrishnamacharya CH, Krishnaswamy MR, Rao RB. Clin Rheumatol 1996; 15:214–215.
105. Raja B, Kaviarasan K, Arjunan MM. J Altern Complement Ther 2005; 11: 264–268.
106. Boobalan Raja, Kuppusamy Kaviarasan, Mangalam Muthu Arjunan, Kodukkur viswanathan pugalendi. The journal of alternative and complementary medicine. Volume 13, Number 3, 2007; pp. 349–354
107. Dixit RS & Pandey HC. Int. J Crude Drug Res, 22 (1984) 47.
108. Jain SK, Dictionary of Indian Folk Medicine and Ethnobotany, (Deep Publications, New Delhi), 1991.
109. Khanna KK & Mudgal V, Ethnobotany of Uttar Pradesh Plains, 4th Int Cong Ethnobiol, NBRI Lucknow, 1994, 340.
110. Ali MS & Azhar I, *Hamdard Medicus*, 2006; 3: 72.
111. Sharma SK, Ali M, Ansari SH, Gupta J. Hamdard Medicus, 2000; 63(2): 39.
112. Abdul Viqar Khan, Athar Ali Khan. Indian Journal of Traditional Knowledge. Vol. 7(2), April 2008: 316-320.
113. Asolkar LV, Kakkar KK, Chakra OJ, Second Supplement to Glossary of Indian Medicinal Plants with Active Principles, Part I (A-K), (Publications and Information Directorate, CSIR, New Delhi), 1992: 414.
114. Chopra RN, Chopra LC & Varma BS, Supplement to Glossary of Indian Medicinal Plants, (Publications and Information Directorate, CSIR, New Delhi), 1980:104.