



## A REVIEW OF THE IMPORTATION OF MEDICINAL PLANTS AND CLINICAL INDICATION, IN ASIA

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### ABSTRACT

Medicinal plants are the most important source of life saving drugs for the majority of the world's population. Most of the compounds used for human medication are derived from plants which plays a significant role in development of new pharma products. Secondary metabolites derived from the plants are economically important drugs, fragrance, pigments, food additives and pesticides. These include saponin, L. Dopa, quercetin, hentriacontane, niacin, cyanidin, serotonin, alanine, alpha amyryn, arabinose, beta-amyryn, campesterol, daucosterol, thymine, riboflavin, calcium oxalate flavonoids. Quite a lot of promising new agents are in clinical development based on selective activity against clinical-related molecular targets, including flavopiridols and combretastatin a4 phosphate, and some agents which failed in earlier clinical studies are stimulating renewed interest. Also there are some of the semi synthetic plant derivatives which are clinically used as potential anti clinical agents. These traditional and preliminary scientific work on these plant products are giving promising result, further research in the same is to be continued to derive potent anti clinical agents from medicinal plant.

**KEY WORDS:** Immunomodulator, Herbal remedy, Anti-microbial, Anti-cancer, Globally important medicinal plants and uses.



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## INTRODUCTION

Nature has been a source of medicinal agents for thousands of years and impressive number of modern drugs has been isolated from natural sources. The medicinal plants are rich in secondary metabolites (which are potential sources of drugs) and essential oils of therapeutic importance.<sup>[1]</sup> Scientific research supports the biological activity of many of the photochemicals more in their native forms. They were copiously used in ayurveda and other traditional medicine.<sup>[2]</sup> The important advantages claimed for therapeutic uses of medicinal plants in various ailments are their safety besides being economical, effective and their easy availability. According to a survey (1993) of World Health Organization (WHO), the practitioners of traditional system of medicine treat about 80% of patients in India, 85% in Burma and 90% in Bangladesh.<sup>[3, 4]</sup> Higher plants, as sources of medicinal compounds, have continued to play a dominant role in the maintenance of the human health since ancient times.<sup>[5]</sup> Over 50 of all modern clinical drugs are of natural product origin <sup>[6]</sup> and natural product play an important role in drug development programs in the pharmaceutical industry.<sup>[7]</sup> Plants with possible antimicrobial activity should be tested against an appropriate microbial model to confirm the activity and to ascertain the parameters with it. The effect of plant extracts on bacteria has been studied by a very large number of researchers in different parts of the world.<sup>[8]</sup> The present article incorporates the names of tropical and subtropical regions of the world, some important plants therapeutic uses and pharmacological actions. Given below are some of such plants which are yielding successful results in the drug development.

### LIST OF FEW IDENTIFIED PLANTS

*Sapindus emarginatus*, *Mucuna pruriens*, *Hibiscus rosa-sinensis*, *Casalpinia bonduc*, *Piper betle*, *Nadostachys jatamansi*, *Rheo discolor* Hance, *Azadirachta indica*, *Mirabilis jalapa*, *Nyctanthes arbortristis*, *Acorus calmus*, *Aerva lanata*, *Pistia stratiotes*, *Psoralea corylifolia*, *Phyllanthus niruri*, *Vitex*

*negundo* L. var. *purpurascens* Sivar. and Mold.

#### ***Sapindus emarginatus***

*Sapindus emarginatus* Vahl. belongs to the family Sapindaceae. This tree is 8 to 10 m high and has many branches with leaves and leaflets. Its flowers are white, and its fruits are round. It contains saponin and, glucose.<sup>[9]</sup> The seed contains oil. Traditionally, it is used as anti-inflammatory and antipruritic. It is used to purify the blood. The seed is intoxicant and the fruit rind has oxytropic action. Its powder is used as nasal insufflations.<sup>[10, 11, 12, 13]</sup>

#### ***Mucuna pruriens***

*Mucuna pruriens* var. *utilis* belongs to the family Fabaceae, common name, Velvet bean, Cowitch, Itch bean, Poonai kali vidhai. Parts used seeds.<sup>[14]</sup> It is well known for its activity on Parkinson's (Nadaku Vatham) and seminal weakness (Dhathu Nashtam), *Mucuna pruriens* have rich source of natural amino acid (L - Dopa - C9 H11 NO4), an important brain chemical involved in mood. It helps in reactivating anti-oxidant defense system in infertile men. It improves the general health and vitality and nourishes the nerves. It also helps to reduce problems. Recent study proved to improve sperm count and motility. Indications - Erectile dysfunction, impotence nocturnal emissions and parkinson's disease.<sup>[10, 15, 16, 17]</sup>

#### ***Hibiscus rosa-sinensis***

*Hibiscus rosa-sinensis* L. belongs to the family Malvaceae. The roots are cylindrical, 5 to 15 cm in length and 2 cm in diameter, off white and with light brown transverse lenticles. The roots taste sweet and are mucilaginous. The leaves are simple ovate or ovatae lancolate, and are entire at the base and coarsely toothed at the apex. The flowers are pedicillate, act inomorphic, pentamerous and complete. The corolla consists of 5 petals, red and about 8 cm in diameter. Traditionally, this plant is used for the control of dysfunctional uterine bleeding and as an oral contraceptive. Some of the chemical constituents isolated from this plant are

cyanidin, quercetin, hentriacontane, calcium oxalate, thiamine, riboflavin, niacin, ascorbic acid and flavonoids.<sup>[11]</sup>

### ***Caesalpinia bonduc***

*Caesalpinia bonduc* (L.) Roxb. belongs to the family Caesalpiniaceae, common name yellow 2nicker, nicker seed, bonduc nut. The leaves are large, double compound, 7 pairs of pinne, and each with 3 to 8 pairs of leaflets. Flower are yellow, in dense, long-stalked racemes at the top, fruits are inflated pods, covered with wiry prickles, seeds are 1 to 2 pods, hard, grey, smooth, shiny surface. *Caesalpinia bonduc* is the drug indicated in all Siddha texts for the treatment of inflammation and infection of the testicle. It is a well documented drug for Orchitis of different etiology. Recent studies on *Caesalpinia bonduc* shows its adaptogenic, anti inflammatory, antimicrobial, antiviral activities. Fruits used as tonic and known to have antipyretic activity. Seeds yield a fatty oil used as cosmetic and for discharges from the ear.<sup>[10]</sup>

### ***Piper betle***

*Piper betle* L. belongs to the family Piperaceae. Plant distribution is throughout India and cultivated in southern parts, a perennial root climber with semi woody stems, leaves, simple, alternate ovate, cordate, acuminate sapindu and acute entire and bright green, useful parts are leaf, stem, roots.<sup>[10]</sup> *Piper betel* acts as a double edged sword showing both anti-allergic and antimicrobial activities. It fights with pathogens causing tonsillitis and reduce pain, swelling and fever. Medicinal properties of *Piper betle* is action against tonsillitis, upper respiratory infection, sore throat, asthma and cough, flatulence colic, Pneumonia.<sup>[18]</sup>

### ***Nardostachys jatamansi***

*Nardostachys jatamansi* DC. belongs to the family Valerian. Common names are aralia racemosa, spignet. *Nardostachy jatamansi* to used to traditionally enhance sound sleep. The possible mechanism could be the levels of serotonin, which boost a sound sleep and gives calmness to the mind. It will act as exhibit immunomodulator and adaptogenic

activities, Indications Insomnia sleep disturbance.<sup>[18]</sup>

### ***Rhoeo discolor* Hance**

*Rhoeo discolor* (L.Her.) Hance belongs to the family Commelinaceae. It is commonly grown in gardens, and is usually known as Tradescantia. The leaves are large, imbricated, green above and purple beneath.<sup>[11]</sup> The important therapeutic uses of *Rhoeo discolor* Hance is to treat liver cancer treatment.<sup>[19]</sup> Aqueous crude extract of *Rhoeo discolor* is known to decrease the formation of liver preneoplastic foci in rats.<sup>[20]</sup>

### ***Azadirachta indica***

*Azadirachta indica* A. Juss belong to the family Meliaceae. Common name Neem.<sup>[11]</sup> *Azadirachta indica* leaves are given periodically for deworming and also to maintain the normal functioning of the gastro intestinal tract. Neem shows powerful parasite tropic properties, Neem leaves also produces a hypoglycemic effect, if it is taken regularly it will purifies blood and keep healthy.<sup>[18]</sup> Azadirachtin content in neem cake protects against parasites, rematodles and enriches the soil.<sup>[39]</sup> Recently studies indicate its use against buccal carcinogenesis, skin carcinogenesis, prostate cancer, gastric carcinogenesis, mammary carcinogenesis.<sup>[21]</sup>

### ***Mirabilis jalapa***

*Mirabilis jalapa* Linn. belongs to the family Nyctaginaceae. It is a large, herbaceous plant grown in gardens throughout India. This plant is 50 to 100 cm high. It has antifungal, antiviral, antispasmodic, antibacterial, diuretic, carminative, cathartic, hydragogues, purgative, stomachic, tonic and vermifuge properties.<sup>[22]</sup> This plant contains alanine, alphaamyrins, arabinos, beta-amyrins, campesterol, daucosterol and dopamine, and is used to treat conjunctivitis, edema, fungal infections and inflammations, swelling and pain.<sup>[23]</sup>

### ***Nyctanthes arbortristis***

*Nyctanthes arbortristis* Linn. belongs to the family Oleaceae. The tree measures up to 3 to 10 m in height. The leaves face forwards and are 10 to 12.5 cm long. The leaf juice is used to treat loss of appetite, piles, liver

disorders, biliary disorders, intestinal worms, chronic fever, obstinate sciatica, rheumatism and fever with rigors. The seeds are used as anthelmintics and in alopecia. It is antibilious and an expectorant, and is also useful in bilious fevers.<sup>[11]</sup>

### ***Acorus calamus***

*Acorus calamus* L. belongs to the family Acoraceae, In the genus *Acorus*, commonly known as sweet flag or calamus, It is tall perennial wetland monocot with scented leaves and more strongly scented rhizomes.<sup>[24]</sup> *Acorus calamus* is a purported psychotropic drug, it helps to increase the secretion of salivary gland and gastric juices that helps to counter acidity and ease heartburn and dyspepsia, it relaxes the bowel and helps to expel - flatus. The compound (Beta-asarone) present in the plant aid distended and uncomfortable stomach and relieves headache due to weak or poor digestion. It cures peptic ulcer prevents vomiting and promote digestion.<sup>[18]</sup>

### ***Aerva lanata***

*Aerva lanata* (L.) A. L. Juss. ex Schultes. is a woody prostrate or succulent in the Amaranthaceae family of the genus *Aerva*, is a common weed which grows wild everywhere in the plains of India. The roots are camphor like aroma.<sup>[25]</sup> *Aerva lanata* is herbal diuretic and used for centuries in Siddha to treat renal stones show alkalizing diuretic and lithontriptic actions. Its alkalizing effects prevents microbial growth and treats the urinary tract effect, if it is taken regularly it will purifies blood infection.<sup>[11, 26, 27]</sup>

### ***Pistia stratiotes***

*Pistia* is a genus of aquatic plant in the family Araceae. *Pistia stratiotes* L. often called water cabbage or Nile cabbage. Herbs *Pistia stratiotes* compound such as potassium salts which ensures urinary excretion of waste products and relieves burning sensation.<sup>[28]</sup> It increases the urinary flow, reduces pitha which in turn refrigeable the entire body, It is known to treat urinary tract infection, burning micturition and kidney stones and in the enlargement of prostate.<sup>[11]</sup>

### ***Psoralea corylifolia***

*Psoralea corylifolia* L. belongs to the family name Fabaceae, common name *Psoralea* seed. *Psoralea corylifolia* shows antibacterial and antifungal activity against pathogen causing infection, it reduces inflammation and itching.<sup>[29]</sup> These seeds having compounds (alkaloids) to purify the blood. It has shown effective activity against Psoriasis, eczema, allergic dermatitis, fungal infection of skins boils, itches, rashes due to sun exposure, cracks in palm and foot and for a healthy skin.<sup>[30, 31, 32]</sup>

### ***Phyllanthus niruri***

Hepatoprotective and anti-oxidant potential of *Phyllanthus niruri* L. helps in inhibiting liver pathology. It belong to the family Phyllanthaceae. It grows 50 to 70 cm tall and bears ascending herbaceous branches.<sup>[33]</sup> *P. niruri* it will inhibit membrane lipid peroxidation and reduce oxidative stress to protect liver, and also lowers cholesterol, triglycerides and LDL at the same time increasing HDL. Main medicinal purpose is used against Liver dysfunction, Liver cirrhosis, alcoholic hepatitis, Jaundice, Fatty liver and drug toxicity.<sup>[11, 33, 34]</sup>



### ***Vitex negundo* L. var. *purpurascens* Sivar. and Mold.**

*Vitex negundo* L. var. *purpurascens* Sivar. and Mold. belongs to the family of Verbenaceae. This variety differs from the typical form of the species in having its branches, under surface of the leaflet-blades, panicles, calyxes, and corollas densely purple-pubescent (slightly fading in age), the corollas deep-purple throughout, their throat with the gray and purple hairs mixed, the stamen filaments purplish and with purple hairs at the base, and the style purple.<sup>[35, 36]</sup> The leaves of the plant exhibited significant activity against most of the human pathogens studied which includes both Bacteria and Fungi. This property is due to the presence of phytochemical constituents like alkaloids, carbohydrates, cardiac glycoside, flavonoids, glycoside, phenols, protein, saponin, terpenoid and tannin in the plant<sup>[36]</sup>. Details of few globally important medicinal plants and their uses were been tabled (Table 1).

**Table 1**  
**Global important medicinal plants and their uses**

Plant	Common name / Maturity period	Botanical Name or Family	Parts Used	Medicinal Use
	Amla ( T ) After 4th year	<i>Emblica officinalis</i> Fam - Euphorbiaceae	Fruit	Vitamin – C, Cough, Diabetes, cold, Laxative, hyper acidity.
	Ashok ( T ) 10 years onward	<i>Saraca asoca</i> Fam : Caesalpinioideae	Bark Flower	Menstrual Pain, uterine, disorder, Diabetes.
	Aswagandha ( H ), One year	<i>Withania somnifera</i> Fam: Solanaceae	Root, Leafs	Restorative Tonic, stress, nerves disorder, aphrodisiac.
	Bael / Bilva (T)After 4-5 year	<i>Aegle marmelos</i> Fam: Rutaceae	Fruit, Bark	Diarrhea, Constipation. Dysentery,
	Bhumi Amla (H), with in one year	<i>Phyllanthus amarus</i> Fam : Euphorbiaceae	Whole Plant	Anemic, jaundice, ophthalmopathy, Dropsy.
	Brahmi ( H ) one year	<i>Bacopa monnieri</i> Fam: Plantaginaceae	Whole plant	Nervous, Memory enhancer, mental disorder.
	Chiraita (high altitude) with in one year ( H )	<i>Swertia chirata</i> Fam : Gentianaceae	Whole Plant	Skin Disease, Burning sensation, fever.
	Gurmar / madhunasini, after Four year ( C )	<i>Gymnema sylvestre</i> Fam: Asclepiadaceae	Leaves	Diabetes, hydrocele, Asthma.
	Guggul (T) after 8 years	<i>Commiphora wightii</i> Fam: Burseraceae	Gum resin	Arthritis, paralysis, laxative.
	Guduchi / Giloe ( C ) With in one year	<i>Tinospora cordifolia</i> Fam : Menispermaceae	Stem	Gout, Pile, general debility, fever, Jaundice.
	Calihari / panchangulia Glori Lily Five years	<i>Gloriosa superba</i> Fam: Colchicaceae	Seed, tuber	Skin Disease, Labour pain, Abortion, General debility.

	Kalmegh / Bhui neem ( H ) with in one year	<i>Andrographis paniculata</i> Fam : Acanthaceae	Whole Plant	Fever, weakness, Release of gas.
	Long peeper / Pippali ( C ) two to three years	<i>Piper longum</i> Fam : Piperaceae	Fruit, Root	Appetizer, enlarged spleen, Bronchitis, Cold, antidote.
	Makoi ( H ) Kakamachi / With in one year	<i>Solanum nigrum</i> Fam: Solanaceae	Fruit / whole plant	Dropsy, General debility, Diuretic, anti dysentery.
	Pashan Bheda / Pathar Chur ( H ) One year	<i>Coleus barbatus</i> Fam : Lamiaceae	Root	Kidney stone, Calculus.
	Sandal Wood ( T ) Thirty years onward	<i>Santalum album</i> Fam: Santalaceae	Heart wood, oil	Skin disorder, Burning, sensation, Jaundice, Cough.
	Sarpagandha ( H ) After 2 years	<i>Rauvolfia serpentina</i> Fam: Apocynaceae	Root	Hyper tension, insomnia.
	Satavari ( C ) After 2-3 years	<i>Asparagus racemosus</i> Family: Asparagaceae	Tuber, root	Enhance lactation, general weakness, fatigue, cough.
	Senna ( S ) With in 1 year	<i>Cassia angustifolia</i> Fam: Fabaceae	Dry Tubers	Rheumatism, general debility tonic, aphrodisiac.
	Tulsi (perennial) 3 months	<i>Ocimum sanctum</i> Fam: Lamiaceae	Leaves / Seed	Cough, Cold, bronchitis, expectorant.
	Vai Vidanka ( C ), 2 year onward	<i>Embelia ribes</i> Fam: Myrsinaceae	Root, Fruit, Leaves	Skin disease, Snake Bite, Helminthiasis.
	Pippermint ( H ) Perennial	<i>Mentha piperita</i> Fam : Lamiaceae	Leaves, Flower, Oil	Digestive, Pain killer.
	Henna/ Hina ( S ) 1/25 years	<i>Lawsonia inermis</i> Fam: Lythraceae	Leaf, Flower, Seed	Burning, Steam, Anti Inflammatory.
	Burn Aloe, First Aid Plant ( H ) 2-5 yr	<i>Aloe vera</i> Fam: Xanthorrhoeaceae	Leaves	Laxative, Wound healing, Skin burns, Ulcer.

	Sada Bahar ( H ) Periwinkle / Nyantara	<i>Vinca rosea</i> / <i>Catharanthus roseus</i> Fam : Apocynaceae	Whole Plant	Leukemia, Antispasmodic , Antidote.	Hypotensive,
	Vringraj ( H )	<i>Eclipta alba</i> Fam: Asteraceae	Seed/whole	Anti-inflammatory, hair tonic.	Digestive,
	Ceylon Leadwort Perennial ( H )	<i>Plumbago zeylanica</i> Fam: Plumbaginaceae	Root, Rootbar	Appetizer, Anticancer.	Antibacterial,
	Rakta Chitrak ( H )	<i>Plumbago indica</i> Fam : Plumbaginaceae	Root, Root bar	Dyspepsia, colic, inflammation, cough.	
	Kochila ( T ) 15 yrs	<i>Strychnos nuxvomica</i> Fam: Loganiaceae	Seed	Nervous, Paralysis, healing wound.	
	Kadukkai ( T )	<i>Terminalia chebula</i> Fam: Combretaceae	Seed	Wound ulcer, leprosy, inflammation, Cough.	
	Bahera ( T )	<i>Terminalia bellerica</i> Fam: Combretaceae	Seed, Bark	Cough, Vomiting, Ulcer.	Insomnia, Dropsy,
	Bai ji li, puncturevine ( H ) 1 yr	<i>Tribulus terrestris</i> Fam: Zygophyllaceae	Whole Plant	Sweet cooling, appetizer, Digestive, Urinary.	Aphrodisiac,
	Neem ( T )	<i>Azadirachta indica</i> Fam : Meliaceae	Rhizome	Sedative, analgesic, hypertensive.	epilepsy,
	Anantamool / sariva ( S ) ) Indian Sarap sarilla	<i>Hemibismus indicus</i> Fam: Asclepiadaceae	Root/ Leaf	Appetizer, aphrodisiac, Astrigent.	Carminative,
	Bach ( H ) Sweet Flag / 1 yr	<i>Acorus calamus</i> Fam : Acoraceae	Rhizome	Sedative, analgesic, hypertensive.	epilepsy,
	Vasa ( S )	<i>Adhatoda vasica</i> Fam : Acanthaceae	Whole Plant	Antispasmodic, Stimulant.	respiratory,



Nageswar,  
Sirunagappoo ( T ) Nag  
Champa

*Mesua Ferrea*  
Fam : Calophyllaceae

Bark, Leaf,  
Flower

Asthma, Skin, Burning,  
Vomiting, Dysentery, Piles.



Vetiver, *khus* ( S )

*Chrysopogon  
zizanioides*  
Fam : Poaceae

Root

Hyperdipsia, Burning, ulcer,  
Skin, Vomiting.



Centella, *brahmi booti*,  
Indian pennywort ( H )

*Centella asiatica*  
Fam : Mackinlayaceae

Whole plant

- Anti-inflammatory, Jaundice,  
Diuretic, Diarrhea.



*Poonaiikkaali* / Creeper  
Baidanka

*Mucuna pruriens*  
Fam : Fabaceae

Root, Hair,  
Seed, Leaf

- Nervous, Disorder,  
Constipation, Nephropathy,  
Strangury, Dropsy.



Dalchini  
Perennial Shrub

*Cinnamomum  
zeylanicum*  
Fam : Lauraceae

Bark, Oil

- Bronchitis, Asthma, Cardiac,  
Disorder, Fever.



Kurai ( S )

*Holorheena  
antidysentrica*  
Fam: Apocynaceae

Bark, Seed

- Scabies, Antipyretic, Amoebic  
dysentery.



Kantakari / Akranti  
Perennial ( H )

*Solanum  
xanthocarpum*  
Fam : Solanaceae

Whole Plant,  
Fruit, Seed

- Diuretic, Anti-inflammatory,  
Appetizer, Stomachic.

Fam - Family, T – Tree, H – Herb, C – Climber, S- shrub)

## CONCLUSION

Considerable work has been done on the medicinal plants to treat many kind of diseases, and many plant products are identified and are even marketed as drugs.

These plants may promote host resistance against infection by re-stabilizing body equilibrium and conditioning the tissues<sup>[37]</sup>. The various combinations of active



components of these plants after isolation and identification can be further assessed for their synergistic effects. Preparation of standardized dose and dosage regimen may play a critical role in the remedy of infections. Therefore, the scientific investigations may be utilized to develop drugs for these diseases. Further research is deserved to isolate the

compounds responsible for the observed biological activity.

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## REFERENCES

1. Prakash P, Neelu Gupta, Therapeutic uses of *Ocimum sanctum* linn with a note on eugenol and pharmacological actions Indian J Physiol Pharmacol, 49 (2) : 125–131, (2005).
2. Moon K, Khadabadi SS, Deokate UA and Deore SL, *Caesalpinia bonducella* F- An overview. Report Opin., 2 (33) 83-90, (2010).
3. Siddiqui HH, Safety of herbal drugs-an overview. Drugs News & Views, 1 (2): 7–10, (1993).
4. WHO survey, In medicinal plants (Eds. Haq. I.) Hamdard Foundation Press, Karachi, 13, (1993).
5. Ates DA, Erdo Ürul OT, Antimicrobial activities of various medicinal and commercial plant extracts. Turk J Biol, 27: 157-162, (2003).
6. Stuffness M, Douros J, Current status of the NCI plant and animal product program. J Nat Prod, 45: 1-14, (1982).
7. Baker JT, Borris RP, Carte B, Natural product drug discovery and development: New perspective on international collaboration. J Nat Prod, 58: 1325-1357, (1995).
8. Erdo Ürul OT, Antibacterial activities of some plant extracts used in folk medicine. Pharmaceutical Biology, 40: 269-273, (2002).
9. Venkatesh V, Sharma JD and Raka Kamal, A Comparative study of alcoholic extract of *Sapindus emarginatus*, *Terminalia bellerica*, *Cuminum cyminum* and *Allium cepa* on reproductive organs of Male albino rats. Asian J. Exp. Sci, 16: 510 (2002).
10. Farombi EO, African indigenous plants with chemotherapeutic potentials and biotechnological approach to the production of bioactive prophylactic agents. African J Biotech, 2: 662-671, (2003).
11. Nair R, Kalariya T, Sumitra chanda, Antibacterial activity of some selected Indian medicinal flora, Turk J Boil, 29 : 41- 47, (2005).
12. The Wealth of India, A dictionary of Indian raw materials and industrial products. Raw Materials, vol. IX, CSIR, p 227 (1972).
13. Wilawan Mahabusarakam, Towers GHN, Pittaya Tuntiwachwuttikul and Pichaet Wiryachitra, Pesticidal triterpenoid saponins of the pericarps of *Sapindus emarginatus*., J.Sci.Soc. Thailand., 16 :187, (1990).
14. Yamini B. Tripathi and Anil K. Upadhyay, Effect of Alcohol Extract of the Seeds of *Mucuna pruriens* on Free Radicals and Oxidative Stress in Albino Rats. Phytother Res., 16 : 534-538, (2002).
15. Hussain G, Manyam BV, *Mucuna pruriens* proves more effective than L-DOPA in Parkinson's disease animal model. Phytother Res., 11: 419-423, (1997).
16. Manyam BV, Dhanasekaran M, Hare T, Neuroprotective effects of antiparkins on drug *Mucuna pruriens*. Phytother Res., 18: 706-712, (2004).
17. Pant MC, Joshi LD, Identification of pharmacologically active substance in the seeds of *Mucuna pruriens* DC. Indian J pharmacol., 2 :24-29, (1970).
18. Kathirkaman R, Selvaraj B, Annai Aravindh Herbals Health care. Vol.2 :65-85, (2009).

19. Ratnakaram Satya Teja, Bibhukalyam, Prasad Nayak, Anticancer of plant products 2(1) :111 -113, (2011).
20. Rosales-Reyes T, de la Garza M, Arias-Castro C, Rodríguez-Mendiola M, Fattel-Fazenda S, Arce-Popoca E, Hernández-García S, Villa-Treviño S, Aqueous crude extract of *Rhoeo discolor*, a Mexican medicinal plant, decreases the formation of liver preneoplastic foci in rats. J Ethnopharmacol.;115(3):381-6, (2008).
21. Barel.R, Chatopadhyay, Neem (*Azadirachta indica*) leaf mediated immune activation causes prophylactic growth inhibition of murine Ehrlich carcinoma and B16 melanoma, International Immunopharmacol 4 (3) : 355 – 56.
22. Dimayuga RE (1998). Antimicrobial activity of medicinal plants from Baja California Sur/Mexico. Pharmaceutical Biol, 36: 33-43, (2004).
23. Yang SW, Three new phenolic compounds from a manipulated plant cell culture, *Mirabilis jalapa*. J. Nat Prod, 64: 313-17, (2001).
24. Asha DS, Deepak G (2009).Antimicrobial activity of *Acorus calamus* (L.) rhizome and leaf extract. Acta Biol. Szegediensis, 53(1): 45-49.
25. Afaq S H, Tajuddin S and Afrdi R, Bisheri Booti, *Aerva lanata* some lesser known uses and pharmacognosy, Ethnobotany, 5 : 37, (1991).
26. Chandra S and Sastry M S, Chemical constituents of *Aerva lanata*, Fitoterapia ,61 :188, (1990)
27. Zapesochnaya G, Kurkin V and Hiroshnikov A, Canthin-6-one and beta-carboline alkaloids from *Aerva lanata*. Planta Med, 37 : 192, (1992).
28. Chidumayo Emmanuel N, Aquatic Weeds in Zambia, One, Lusaka, Biological Control of Weeds: Southeast Asian Prospects, (p.196207), (1998).
29. The Ayurvedic pharmacopoeia of India, Government of India, Department of Ayush, Part.1, Vol.1:31-32.
30. Lai PK, Roy J, "Antimicrobial and chemopreventive properties of herbs and spices". Curr. Med. Chem., 11 (11): 1451–60, (2004).
31. Mukherjee PK, Quality Control of Herbal Drugs-An Approach to evaluation of Botanicals. Business Horizons Pharmaceutical Publishers, (2002).
32. Rangari VD, Agrawal SR, Chemistry and Pharmacology of *Psoralea corylifolia* Indian Drugs., 29: 662, (1992).
33. Rajesh B and Parames C S, Protein isolate from the herb, *Phyllanthus niruri* L. (Euphorbiaceae), plays hepatoprotective role against carbon tetrachloride induced liver damage via its antioxidant properties. Food Chem Toxicol, 45: 817–826, (2007).
34. Kongstan N, Effect of *Phyllanthus amarus* on hepatotoxicity induced by galactosamine in rats. Master's Thesis, ; Department of Toxicology, Faculty of Science, Mahidol University, (2000).
35. Sivarajan, VV, Moldenke, Harold Norman, *Vitex negundo* Linn. Var. *purpurascens* Sivarajan & Moldenke, Phytologia, 28 : 404, (1974).
36. Krishnavignesh Lakshmanan, Mahalakshmi priya Arumugam and Ramesh Mani, Phytochemical Screening and In Vitro Antimicrobial activity of *Vitex negundo* L. var. *purpurascens* Sivar. and Mold. against pathogenic microorganisms, Drug Invention Today, 4(12) : 667-670, (2012).
37. Ratnakaram Satya Teja and Bibhukalyan Prasad Nayak (2011). Anticancer Property of Plant Products. IJRAP, 2(1): 11-113.
38. Kirtikar KR and Basu BD: Indian Medicinal Plants. Periodical Experts, Vol. II: 1052-53, (1975)
39. List of important medicinal plants and their uses, Odisha Forest Development Corporation ([http://www.odishafdc.com/products\\_medical\\_plants.php](http://www.odishafdc.com/products_medical_plants.php)).
40. Mohan K and Padmanaban AM, Biototoxicity Assay Of Neem (*Azadirachta Indica*) Products And Distillery Effluent On The Third Instar Larvae Of Coconut Rhinoceros Beetle, *Oryctes rhinoceros*, Int J Pharm Bio Sci 4(4): 102 – 110, (2013).