

## Review on Ethnopharmacognosy of *Justicia tranquebariensis* L. – A Traditional Siddha Drug.

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**Abstract:** Medicinal plants are the local heritage with universal importance. World is gifted with a rich wealth of medicinal plants. Herbs have always been the principal source of medicine in India and presently they are becoming popular throughout the world. But the major lacuna is the lack of proper identification and information about the medicinal plants. This is mainly because due to the fact that there exist many single drugs under one name or one drug is used in different names. Many Botanical sources are equated for one single drug and the drug becomes a controversial drug and many such drugs exist in Indian systems of medicine. ‘Sivanarvembu’ is one such drug of doubtful origin in Siddha system of medicine. ‘*Justicia tranquebariensis* L.’ belonging to the family Acanthaceae one of the sources of sivanarvembu is reviewed from ethnopharmacognostic view and presented in this paper. In Tamil it is called as “Tavashoo moorunghie” or “Poonakapoondo”. The present paper deals with the literature available on the ethno botanical, pharmacognostic, phytochemical and pharmacological studies on ‘*Justicia tranquebariensis* L.’.

This present review can help in detecting the selected drug from other sources of ‘Sivanarvembu’ and will also scientifically help in justifying its usage as ‘Sivanarvembu’.

**Keywords:** Sivanarvembu, *Justicia tranquebariensis* L. ethno botanical, pharmacognostic, phytochemical, pharmacological studies.

### Introduction

“SIVANARVEMBU” a Siddha Kalpha drug is one of the controversial drugs in the Siddha system of medicine. Traditionally ‘Sivanarvembu’ is used in the treatment of Leprosy, Cancer, Oedema, abscess, skin disorders <sup>1</sup>. Two botanical sources are existing as ‘Sivanarvembu’ one of the sources is *Indigofera aspalathoides* Vahl. ex DC.<sup>2,3</sup> and other one is *Justicia tranquebariensis* L.<sup>4,5</sup> In the present review ‘*Justicia tranquebariensis* L.’ is reviewed from botanical, chemical and pharmacological point of view.

**Fig. 1: *Justicia tranquebariensis* L.****Taxonomy****Taxonomic Classification<sup>6</sup>**

Kingdom	: Plantae
Division	: Magnoliophyta
Class	: Magnoliopsida
Order	: Scrophulariales
Family	: Acanthaceae
Subfamily	: Acanthoideae
Genus	: <i>Justicia</i>
Species	: <i>tranquebariensis</i>

**Regional Names<sup>7,8</sup>**

<b>Sanskrit</b>	: Pindi
<b>Tamil</b>	: Sivanarvembu, tavashoo moorunghie, punnakupudi, tavacumurunkai, tavicimurunkai, kakanacam, niyakkiyam, niyakkiyamaram, pilavumurunkai, pinnakkuceti, punakappuntu, punnakkuppuntu, putanayaki, putanayakiceti, taciver, tavaci, tavacimurunkaiceti, tavamurunkai, tavattumurunkai, mutaliyar, narimurunkai, narimurunkaiceti, vankanattam, Mozhimurungai
<b>Oriya</b>	: Pindi
<b>Telugu</b>	: Pindikonda, Chikerachettu, Kondapindi, Redamandalam
<b>Kannada</b>	: Shiva naaru balli, Kaddiyarakina, Kaddiyarakina gida

**Geographical Distribution**

Deccan, Mysore, Karnataka, Southwards and also in all districts of Peninsular India and in Srilanka.<sup>7,8</sup>

**Macroscopic Characters**

Stems Whitish grey and branches Stiff. The leaves are obvate, simple, opposite and decussate. Stipules absent.<sup>9</sup>

**Microscopic Characters**

The leaf is dorsiventral, mesomorphic, hypostomatic and glanduliferous. It has projecting prominent midrib and thin lamina. Midrib has thick, conical adaxial hump and wide semicircular abaxial part. It also has

thin epidermal layer of small squarish cells. The adaxial conical part has compact collenchyma cells. The abaxial part has circular, thin walled compact cells. Vasculature is distinct conical and collateral. (Fig. 2 & 3). Glandular trichomes are seen on the epidermis of the lamina. (Fig. 4).

The glands are peltate type. They have a short stalk cell and a circular plate of secretory body. The mesophyll tissue consists of an upper zone of cylindrical palisade cells lower wide zone of spongy parenchyma cells. The lamina has wide adaxial epidermal layer of dilated squarish thin walled cells. Some of these cells are highly dilated into circular cavities possessing Cystoliths. (Fig. 5) The cystoliths are calcium carbonate bodies, the cells possessing the cystoliths are called lithocysts. The petiole is semicircular in outline with flat adaxial side. Xylem elements are angular, thick walled and wide. Phloem occurs in narrow band beneath the xylem. The vascular strand is single, wide and arc shaped. Apart from the main arc of vascular strand, there are two small circular accessing strands, one on either side of the main strand. The accessory strands are also collateral with a circular mass of xylem and a thin lateral collateral phloem. Xylem elements are angular, thick walled and wide. Phloem occurs in narrow band beneath the xylem.<sup>9</sup>

The stem is roughly circular and it has wide epidermal layer of rectangular cells with thick cuticle. The cortex is differentiated into outer collenchymas and inner thin walled circular compact parenchyma cells. Glandular trichomes are long stalked or sessile. Xylem segments at frequent intervals angular, solitary and diffuse. Xylem cylinder also consists of thin zone of fibres. Phloem occurs in thin continuous cylinder of uniform width, Pith is wide, parenchymatous and the cells are large, thin walled, angular and compact.<sup>9</sup> (Fig. 6)

These Microscopic features are useful scientific tools to determine the genuineness of drug samples of plant origin and in detecting adulterants and substitutes.

**Fig. 2 : T.S of the leaf through midrib with lamina**

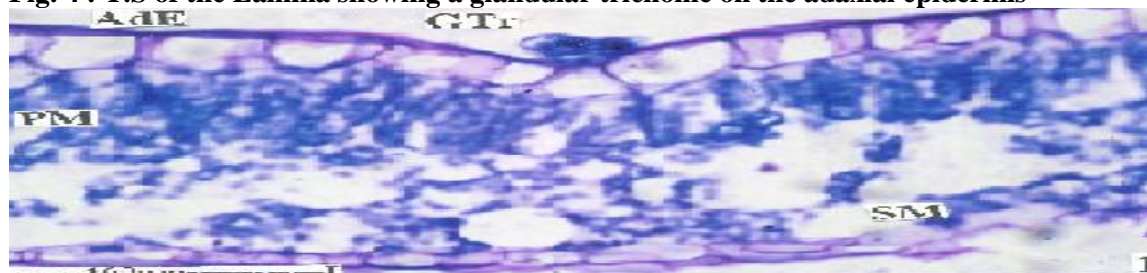


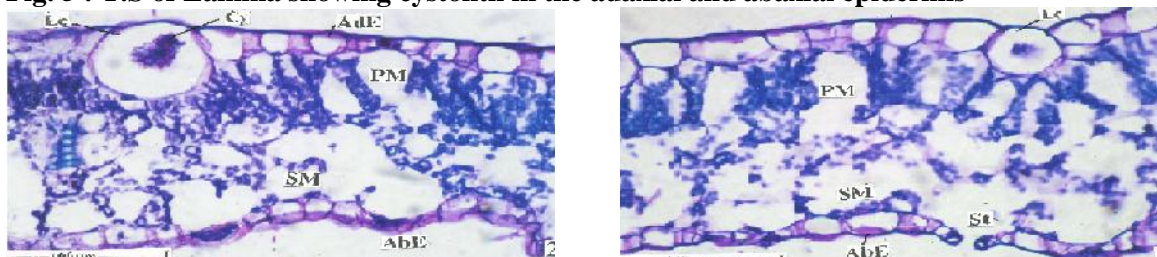
**Fig. 3 : T.S of lamina through lateral vein with leaf margin**



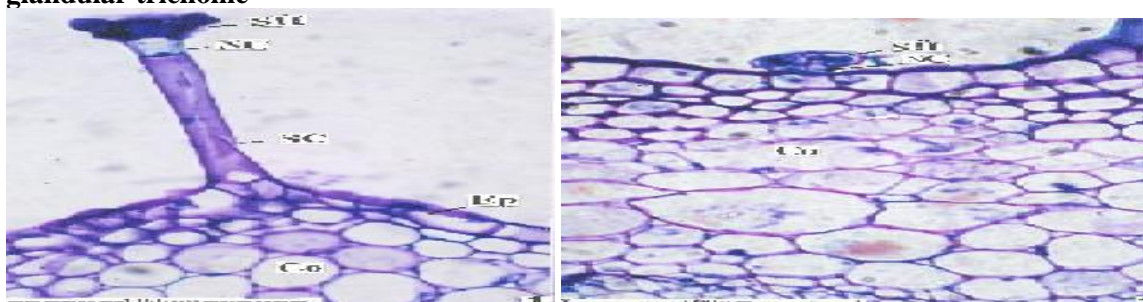
Abs – Abaxial side; AdE – Adaxial epidermis; AdH – Adaxial hump; Ep – Epidermis Lc –Lithocyst; La – Lamina; LM – Leaf margin; Lv – Lateral vein; MR – Midrib; TrP – Transcurrent palisade mesophyll; VB – Vascular bundle; X- Xylem.

**Fig. 4 : T.S of the Lamina showing a glandular trichome on the adaxial epidermis**



**Fig. 5 : T.S of Lamina showing cystolith in the adaxial and abaxial epidermis**

Abs – Abaxial side; AdE – Adaxial epidermis; Cy – Cystolith; GTr – Glandular trichome; Lc – Lithocyst; PM – Palisade mesophyll; SM – Spongy mesophyll; St – Stomata

**Fig.6: T.S of Stem – showing a glandular trichome & cortex with a glandular trichome**

### Powder Microscopy

Maceration of stem tissue when observed after clearing and staining, revealed vessel elements, fibres, trichomes and thin walled parenchyma cells. Stalked and sessile trichomes are very characteristic. Powder microscopy of leaves showed characteristic cystoliths.<sup>9</sup>

### Ethnomedicinal Uses

#### Tribal Claims

Local people use this plant drug for inflammations.<sup>7</sup>

#### Siddha Uses

Leaf is used as expectorant, in Cold, Cough and nasal disorders.<sup>7</sup>

#### Medicinal Uses

Juices of leaves act as a cooling agent and aperients and also given to children in Small pox. Crushed leaves applied to contusions.<sup>10</sup> Paste made of the leaves applied externally on the swelling to reduce the pain. Root paste applied for tooth ache.<sup>11</sup> Leaf juice, about 15-20 ml, is administered orally for every one hour up to half of the day and keeping of leaf paste externally on the sight of snake bite work as an antidote for Cobra bite.<sup>12</sup> Leaf juice is given orally to treat jaundice and leaf paste is applied over affected area to treat skin diseases.<sup>13</sup>

### Phytochemical Constituents

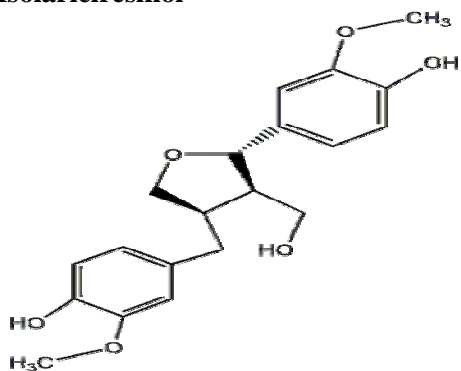
Phytochemical studies of leaf of the plant of *Justicia tranquebariensis* revealed the presence of phytosterols, flavonoids, Glycosides and absence of triterpenoids, alkaloids, saponins and tannins.<sup>14</sup>

From Aerial Parts of *Justicia tranquebariensis* L. Lignans such as aryltetralin were isolated and characterized as (-)-beta-Cubebin, (+) –Lariciresinol, (+) –isolariciresinol, (+) –Lyoniresinol and (+) –Medioresinol<sup>15,16,17</sup>. (Fig. 7)

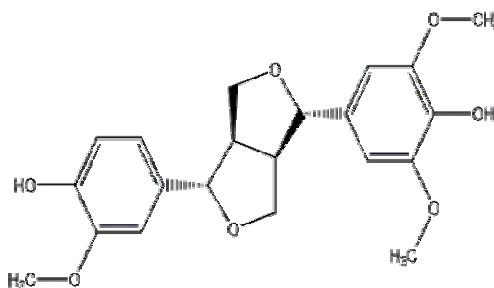
Lariciresinol and Isolariciresinol were proven to be anti inflammatory, antinociceptive, anti – ulcerogenic, antimicrobial , cytotoxic and antioxidant activities<sup>18</sup>. Cubebin possess anti inflammatory activity<sup>19</sup>. Lyoniresinol reveals antioxidative and also antimutagenetic activity<sup>20</sup>.

The alcoholic extract of the aerial part of *justicia tranquebarensis* yielded Phytosterols , brassicasterol, Campesterol, 7, 22 – ergostadienol, stigmasterol, sitosterol, spinasterol, 28-isofucoesterol and betasitosterol-3-O-glucoside.<sup>4</sup>

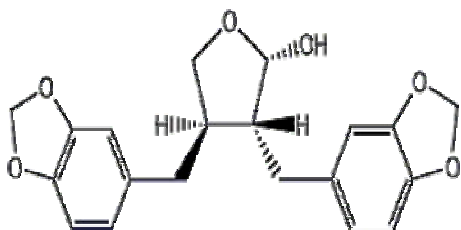
**Fig.7: Structures of (+)-Lariciresinol, (+)-Medioresinol, (-)-beta-Cubebin, (+)-Lyoniresinol & Isolariciresinol**



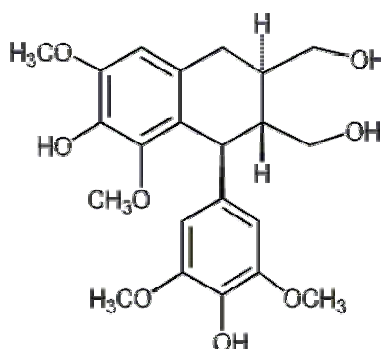
(+)-Lariciresinol



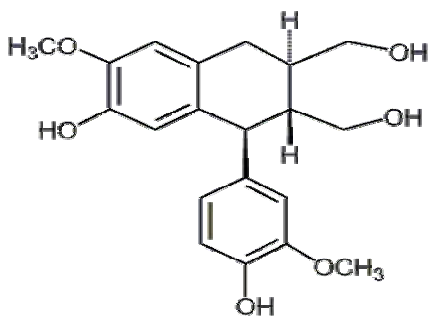
(+)-Medioresinol



(-)-beta-Cubebin



(+)-Lyoniresinol



Isolariciresinol



## Pharmacological Activity

### Anti-inflammatory activity

*Justicia tranquebariensis* L., leaf extract (200mg/kg) was screened for its anti-inflammatory potential in adult albino rats employing carrageen induced paw oedema method. The ethanolic extract showed significant anti-inflammatory activity. The percentage protection of the extract was comparable to diclofenac sodium.<sup>21</sup>

### Hepatoprotective activity

Ethnobotanical research in folk-lore medicine has been carried out in Coimbatore district of Tamilnadu and Palaghat district of Kerala. Of the assembly of the 20 remedies for jaundice, two were found to be new reports and few others showed interesting combinations. The specimens were identified at the Botanical Survey of India, coimbatore, and deposited in the herbarium of the ethnobiology Department of the International Institute of Ayurveda, Coimbatore. Among the two newly reported plants for jaundice, one is *Alysicarpus vaginalis* DC. and the other one is the plant selected for the present study *Justicia tranquebariensis* L.<sup>22</sup>

The protective and curative effect of *Justicia tranquebariensis* leaf extract was evaluated using acetaminophen - induced liver injury in mice. The leaf extract at dosage of 500 and 1000 mg/kg exhibited significant protective effect against acetaminophen induced hepatotoxicity. Level of serum markers such as aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase (ALP), and total bilirubin (TB) were significantly increased in acetaminophen treated mice. Simultaneously, *Justicia tranquebariensis* leaf extract significantly suppressed mainly the increase in plasma activities of AST, ALT, ALP and TB concentration, which are considered as markers of liver functional state. The results of this study confirmed the protective and curative effect of the aqueous leaf extract of *Justicia tranquebariensis*<sup>23</sup>.

### Free Radical Scavenging Activity

The ethanolic extract of the aerial parts of *Justicia tranquebariensis* L. showed the significant free radical scavenging activity using 1, 1 Diphenyl Picryl Hydrazyl radicals.<sup>24</sup>

### Antimicrobial activity

The aerial portions of the plant *Justicia tranquebariensis* Linn. were successively extracted with chloroform and ethanol by soxhlet extraction method. The extracts were vacuum dried and subjected to antibacterial (*Staphylococcus aureus*, *Bacillus subtilis*, *Escherichia coli* and *Klebsiella pneumoniae*) and antifungal (*Aspergillus niger* and *Candida albicans*) screening using agar disc diffusion method. Minimum Inhibitory Concentration required for cessation of microbial growth was evaluated by Agar streak dilution method.<sup>24</sup>

The in vitro antibacterial activity of different extracts obtained from roots and rhizomes of *Justicia tranquebariensis* against different organisms namely *Bacillus subtilis*, *Staphylococcus aureus*, *Escherichia coli* and *Klebsiella pneumoniae* have been carried out. The prepared extracts of petroleum ether and hydro alcohol (50:50) were investigated with different concentrations. Findings showed that both extracts had highest antibacterial activity in gram positive strains than gram negative strains. Increase in concentration of each extract increased the antibacterial activity. Both the extracts showed significant broad spectrum anti-bacterial activity.<sup>25</sup>

The antibacterial activity of leaves of *Justicia tranquebariensis* L. were evaluated against 10 pathogenic bacteria strains. 25mg/ml showed more level of activity than 5mg/ml against all the tested microorganism in a dose dependent manner. Both chloroform as well as ethanol extract were found to possess antibacterial activity. But chloroform extract showed better activity than ethanolic extract against a range of bacteria, as revealed by in vitro Agar well diffusion method. The inhibitory effect of the extract was compared with standard antibiotic amoxicillin.<sup>26</sup>

## Conclusion

From the literature review delineated above on the ethnopharmacognostic and pharmacological values of *Justicia tranquebariensis* L. it is observed that this traditional plant is medicinally important. Besides, various parts of this plant are enriched with bioactive molecules and nutraceutical potentials. Wide spectrum of biological activity such as antioxidant, anti-inflammatory, antimicrobial and hepatoprotective activity are reported from various parts of this taxon. Further in depth studies can contribute in developing a scientifically validated eco-friendly antimicrobial, anti-inflammatory, hepatoprotective and herbal dietary supplement. This

literature review also contributes to distinguish *Justicia tranquebarensis* L. from the other sources of SIVANARVEMBU a drug of doubtful origin and justifies its usage in Siddha system as a febrifuge, anti-inflammatory and anticancer agent as drug molecules possessing these properties are present in this plant drug. Tribal reports supports its use in skin diseases as claimed in Siddha system.

## References

1. Chopra R.N., Nayar S.L., & Chopra IC., Glossary of Indian Medicinal Plants, NISCOM, CSIR, New Delhi, 1999.
2. Anonymous, The Siddha formulary of India, Part I, Ministry of Health and Family Welfare, Government of India, New Delhi, 1992.
3. Ram P., Rastogi & Mehrotra B.N., Compendium of Indian Medicinal Plants, Central Drug Research Institute, Lucknow, 1994, 5, 467.
4. Nadkarni K.M., Indian Materia medica, Ramdas Bhatkal, Popular prakashan, Mumbai, 2007, 2, 715.
5. Khare C.P., Indian Medicinal plants: An illustrated Dictionary, Springer –Verlag, Berlin, 2007, 350.
6. About the plant: *Justicia tranquebariensis*, [Cited 2009 July 4]. Available from : [http://zipcodezoo.com/Plants/J/Justicia\\_tranquebariensis/](http://zipcodezoo.com/Plants/J/Justicia_tranquebariensis/)
7. Yoganarasimhan S.N., Medicinal Plants of India, Regional Research Institute, Bangalore, 2000, 2.
8. Whitelaw Ainslie M.D., M.R.A.S, Materia indica, Longman, Rees, ORMe, Brown & Green, London, 1826, 2, 412.
9. Saritha B., & Brindha P., Microscopic standardization studies on *Justicia tranquebarensis* L, Journal of Pharmacy Research, 2011, 4(9), 2897-2899.
10. Asolkar L.V., Kakkar K.K., & Charke O.J., Second supplement to Glossary of Indian Medicinal Plants with Active principles ( A – K ), Part I, National Institute of Science communication New Delhi, 2000, 382.
11. Sandhya B., Thomas S., Isabel W., & Shenbagarathai R., Ethnomedicinal plants used by the Valaiyan community of Piranmalai hills (reserved forest), Tamilnadu, India. - A Pilot study, Afr. J. Trad. CAM, 2006, 3 (1), 101 – 114.
12. Sekhar J., Penchala pratap G., Sudarsanam G., & Prasad GP., Ethnic information on treatments for snake bites in Kadapa district of Andhra Pradesh, Life Sciences Leaflets, 2011, 12, 368 – 375.
13. Poongodi A., Thilagavathi S., Aravindhan V., & Rajendran A., Observations on some ethnomedicinal plants in Sathyamangalam forests of Erode district, Tamil Nadu, India. Journal of Medicinal Plants Research, 2011, 5(19), 4709-4714.
14. Akilandeswari S., Mainmaran S., Valarmathi R., Karpagam kumara sundari S., & Loganathan V., Phytochemical Observation on Leaf of *JusticiaTranquebariensis*. L.F. Ancient Science of Life, 2001, 20, 1-3.
15. Umezawa T., Phylogenetic distribution of lignan producing plants, Wood Research, 2003, 90, 27-110.
16. Umezawa T, Diversity in lignan biosynthesis, Phytochemistry Reviews, 2003, 2, 371-390.
17. Raju G.V.S., & Pillai K.R., Lignans from *Justicia tranquebariensis* Linn, Indian Journal of Chemistry, 1989, 28, 558–561.
18. Kucukboyaci N., & Bilge Sener., Biological activities of lignans from *Taxus baccata* L. growing in Turkey, Journal of Medicinal Plants Research, 2010, 4(12), 1136-1140.
19. Bastos J.K., Carvalho J. C., De Souza G. H., Pedrazzi A. H., & Sarti S. J., Anti-inflammatory activity of cubebin, a lignan from the leaves of *Zanthoxylum naranjillo* Griseb, Journal of Ethnopharmacology, 2001, 75 ( 2-3), 279-282.
20. Shirasaka norifumi, Nomura tsuyoshi, Murakami tetsuo & Yoshizumi hajime, Antimutagenetic Activaties of Aryltetralin Compound Comprised in Ume Vinegar, Journal of the Japanese Society for Food Science and Technology, 2003, 50(4), 203-206.
21. Akilandeswari S., Kumarasundari S.K., Valarmath R., Manimaran S., & Sivakumar M., Studies on anti-inflammatory activity of leaf extract of *Justicia tranquebariensis* L., Indian Journal of Natural products. 2001,17(1), 14-16.
22. Sankaranaryanan, Folk-Lore Medicines for Jaundice from Coimbatore and Palghat Districts of Tamilnadu and Kerala, India. Ancient Sci of Life, 1988, 7(3 & 4), 175-79.
23. Shabana Begum M., Muhammad Ilyas M.H., & Burkanudeen A., Protective and curative effects of *Justicia tranquebariensis* (Linn) leaves in acetamenophen induced hepatotoxicity, International Journal of pharmaceutical and Biological archieve, 2011, 2(3), 989-995.

24. Balamurugan G., Arunkumar M.P., Muthusamy P., & Anbazhagan S., Preliminary Phytochemical Screening, Free radical Scavenging and Antimicrobial activities of *Justicia tranquebariensis* Linn. Research Journal of Pharmacy and Technology, 2008, 1, 116-118.
25. Arasan Elayaraja, Sheikh Abdul Rahaman, Gananadhamu Samantalu & Devala Rao Garikapati. Antibacterial Activity of Various Crude Extracts of *Justicia tranquebariensis*, Journal of Pure & Applied Microbiology, 2008, 2 (1 ), 231-233.
26. Shabana Begum M., Muhammad Ilyas M.H., & Burkanudeen A., Evaluation of Antibacterial activity of leaves of *Justicia tranquebarensis* L., The Pharmacist, 2008, 3(1), 35-37.

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