

Review Article

## Review of *Alternanthera Sessilis* with Reference to Traditional Siddha Medicine

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### ABSTRACT

'Food as Medicine' is one of the basic concepts of Traditional Siddha Indian Medicine. The household recipes containing greens are part of Tamil culture. Even today one can find preparations containing greens (Keerai in Tamil) in the regular diet of south Indians. This tradition is passed through generations because of the immense medicinal properties which the greens possess. Among the frequently consumed greens Ponnankanni (Sessile joyweed - *Alternanthera sessilis*) finds an important place in Traditional Siddha Medical literatures. The specialty begins with its Tamil name which indicates 'Ponnankanni - Pon aagum kaan nee' (Literally meaning - Your body will get golden luster). According to Traditional Siddha literatures, this herb contains gold and thereby comes under Kaya Kalpa (Panacea) category also. Besides it is also rich in anti-oxidants, Sterol compounds, gives cooling effect to eyes & body, relieves neuritis, treats 96 types of eye diseases and aids disease free healthier life. This review paper gives an overview of all aspects of *Alternanthera sessilis* including botanical, phyto-chemical, Pharmacognosy and medicinal uses with reference to Siddha Indian Medicine.

**Keywords:** Siddha Medicine, *Alternanthera sessilis*, Kaya Kalpa herb, Phyto-sterols.

### INTRODUCTION

Everyone is gaining awareness about the Traditional Indian Medicine and its holistic approach towards leading a Healthier life. In that way, the Siddha system of medicine is also one among the precious Medical systems, native to Tamilnadu. Siddha Treatment aims in providing ultimate cure to both mind and body systems. Diet and lifestyle play a major role not only in maintaining health but also in curing diseases. The authors of the paper decided to explore one among the many greens (Keerai) documented in Traditional Siddha literatures, 'Ponnankanni' (*Alternanthera sessilis*, Amaranthaceae Family). 'Food as Medicine' is one of the basic concepts of Traditional Siddha Indian Medicine. Siddhars with their ancient medical knowledge, found out the medicinal actions of each herb, documented them and encouraged those things as food material like Myrobalan, Sesban etc. Here the Focused herb, *Alternanthera sessilis* is being widely used for cooking by people of Tamilnadu and other Southern states of India. It contains many of the Phytochemical compounds especially stigmaterol, campesterol,  $\beta$ -sitosterol,  $\beta$ -spinasterol, palmitates of sterol, etc.

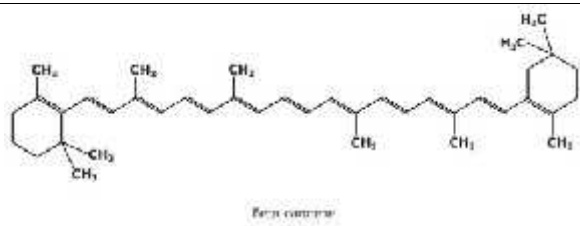
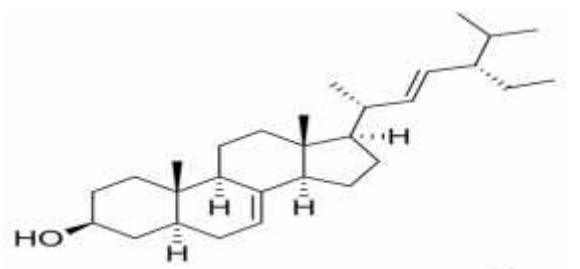
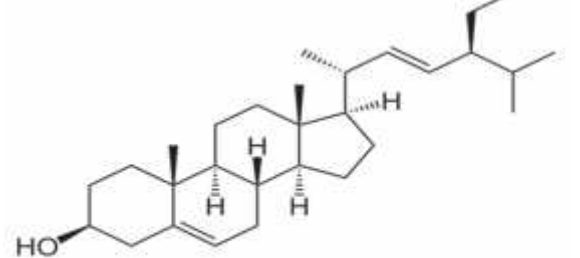
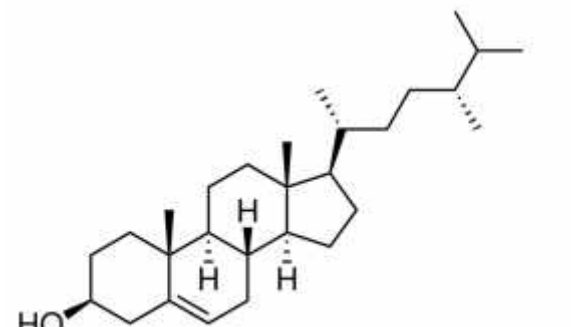
Taxonomic Hierarchy<sup>1,2,7</sup>:

Kingdom	:	Plantae
Subkingdom	:	Tracheobionta
Super division	:	Spermatophyta
Division	:	Magnoliophyta
Class	:	Magnoliopsida
Sub Class	:	Caryophyllidae
Order	:	Caryophyllales
Family	:	Amaranthaceae

Genus	:	<i>Alternanthera</i>
Species	:	<i>Alternanthera sessilis</i> (L.) R. Br.
Synonym/s <sup>2,4,7</sup>	:	<i>Alternanthera denticulata</i> R. Brown <i>Alternanthera nodiflora</i> R. Brown <i>Gomphrena sessilis</i> L. <i>Alternanthera glabra</i> Moq.
Vernacular Names <sup>7</sup> :		
Tamil	:	Ponnankanni, Citai, Koduppai
Malayalam	:	Meenamgani, Ponnankannikkira
Sanskrit	:	Matsyaki, Ionica
Hindi	:	Gudrisag, Garundi
Kannada	:	Honagone soppu
Telugu	:	Ponnagantikura
Bengali	:	Chanchi, Haicha, Sachishak
Marathi	:	Kanchari
Manipuri	:	Phakchet
Other Geographical names:		
French	:	Brede Chevette, Magloire.
Portuguese	:	Bredo-D, Periquito-Sessil, Perpétua.
Indonesian	:	Daun Tolod
Malaysia	:	Keremak.
Sinhalese	:	Mukunu-Wenna
Chinese	:	Lian Zi Cao, Bai Hua Zi

Geographical distribution: This is a pioneer species, typically growing on disturbed parts of a variety of wetland habitats, often in species-rich associations with a range of other aquatic and wetland plants<sup>2</sup>. It grows in the draw-

Table 1. Phyto-chemical constituents of *Alternanthera sessilis*.

Chemical name	Structure	Reference
$\beta$ - carotene		[5] [6] [11] [12]
- Spinasterol		[5] [6] [14]
Stigmasterol		[5] [9]
Campesterol		[5] [9]

down zones of water bodies or in water up to 1 m deep, where it may be part floating and part emergent or even grow in mats of floating vegetation. It is a typical plant of the flood plain wetlands, margins of rivers<sup>23</sup>, streams, canals, ponds, reservoirs, tanks in India; About 16 species, throughout hotter regions of India and Ceylon in damp places, ascending the Himalayas to 4000 ft, and in all warm countries<sup>9</sup>.

Biology and ecology: *Alternanthera sessilis* prefers places with constant or periodically high humidity, but may however tolerate extremely dry conditions<sup>9</sup>. It often grows in mixed association with several other aquatic species. The propagation of the plant is spreads by seeds, which are wind- and water-dispersed, and by rooting at stem nodes. On basis of Siddha, It grows in Marutham thina<sup>15,23</sup>.

Botanical description:

a) Macroscopic

Root - Cylindrical, 0.1 to 0.6 cm. diameter, cream to grey, numerous roots arising from the main tap root as lateral rootlets; fracture short; no characteristic odour and taste.

Stem - Herbaceous, weak, cylindrical, with spreading branches from the base; yellowish-brown to light-brown; nodes and internodes distinct.<sup>10</sup>.

Leaf - sessile, linear-oblong, or elliptic, obtuse or sub acute; no characteristic odour and taste.

Flower - Flower in small axillary sessile heads, white often tinged with pink, bracteoles about 1 cm long, ovate, scarious; perianth long, sepals ovate, acute, thin, ovary obcordate, compressed, style very short, capitellate; no characteristic odour and taste.

Fruit - Utricle 1.5 mm. long, orbicular, compressed with thickened margins; no characteristic odour and taste<sup>5</sup>.

b) Microscopic<sup>23</sup>

Root - Shows circular outline consisting of 5 to 7 layered, thin-walled tangentially elongated and squarish, radially arranged cork cells; secondary cortex narrow, consisting of thin walled, round or oval, parenchymatous cells, vascular bundles radially arranged, numerous, consisting of thin-walled cells; xylem tissues lignified; conjunctive tissue between bundles consisting of oval, thin-walled,

parenchymatous cells, pith consisting of thin-walled, round to oval, isodiametric, parenchymatous cells.

**Stem** - Shows single layered epidermis consisting of round or oval, thin-walled cells, vascular bundles arranged in a ring, bicollateral, open and endarch; phloem narrow consisting of thin-walled cells traversed by phloem rays; xylem consisting of usual elements traversed by xylem rays; pith distinct, a few parenchymatous cells contain rosette crystals of calcium oxalate.

**Leaf** - Shows single layered epidermis on both surface, covered with striated cuticle; collenchymatous cells, parenchymatous cells, thin-walled round or oval, isodiametric cells, a few of them containing rosette crystals of calcium oxalate; vascular bundles three, each consisting of xylem and phloem, present in the centre.

**Lamina** - Dorsiventral; shows single layered epidermis; stomata diacytic more on ventral side; upper epidermal cells with slightly wavy walls, lower with sinuous walls; palisade ratio 3 to 5; vein - islet number 6 to 12 and veinlet termination number 8 to 10 per square mm.

**Chemical Constituents:** Herb contains 2, 4-methylenecycloartanol and cycloeucaleanol, choline, oleanolic acid. Saponins have been isolated from the leaves. Roots contain lupeol<sup>17</sup>. Young shoots contain protein and iron (Ghani, 2003). It also contains 5- $\alpha$ -stigmasta-7-enol (Asolkar et al., 1992; Rastogi & Mehrotra, 1993). The  $\beta$ -sitosterol possess potent anti-inflammatory by reducing the secretion of pro inflammatory cytokines and TNF.

**Actions:** Galactagogue, Cholagogue, Abortifacient, Febrifuge

**Traditional uses:** The precious method in the Siddha Medicine is 'Food as medicine'. In that way, eating of sessile leaves is fried with ghee, which gives cooling effect to eyes, disease free life. It acts as a good anti-oxidant. Relieves floating abdomen, liver diseases, vatha diseases<sup>3</sup>. The leaves are very effective in treating in cuts & wounds<sup>18</sup>, antidote for snake bite & scorpion sting and skin diseases<sup>20</sup>.

It calcifies copper into red powder (chind), which is very useful in gastric & duodenal ulcers, tamarind should be avoided<sup>21</sup>.

Medicated oil prepared out of the juice of sessile plant as chief ingredient, used as bathing oil, gives cooling effect to eyes & body, neuritis, treating 96 types of eye, piles, Halitosis. Dried whole plant is used as blood purifier and cures Skin diseases<sup>22</sup>.

**Experimental Studies:** This experimental study gives a scientific ground to the traditional uses of the plant *Alternanthera sessilis*. The following invitro & invivo study materials are explained below.

**Anti-microbial activity:** Johnson et al has reported that, antibacterial potential of ethanolic extracted leaves, internodal segments, leaves and inter-nodal segments derived calli of *Alternanthera sessilis* by disc diffusion method. The antibacterial effect of *A. sessilis* was evaluated against *Proteus vulgaris*, *Streptococcus pyogenes*, *Bacillus subtilis* and *Salmonella typhi*. The antibacterial activity was shown better zone of growth inhibition with respect to

standard antibiotic gentamycin and ampicilin as the positive antibacterial controls<sup>24</sup>.

**Wound healing activities:** Sunil et al concluded the screening of wound healing activity of chloroform extract leaf of *Alternanthera sessilis* Linn<sup>26</sup>. The chloroform extract of leaves of *Alternanthera sessilis* at a dose of 200  $\mu\text{g/mL}$  (orally) ingested in all models initially. The contraction of wound area ( $P < 0.005$ ) at 16th day, time for complete epithelization in 16 days ( $P < 0.0001$ ), and scar area after complete epithelization was found to be  $33.2 \pm 0.0730$  ( $P < 0.0008$ ) in excision wound model, wound breaking strength is also good in incision wound model. The results were significant and presence of phytoconstituents Sterols, which may responsible for wound healing activity<sup>27</sup>.

**Anti-oxidant activities:** Yadav et al, was aimed to evaluate the antioxidant activity<sup>19</sup> of *A. sessilis* plant extracts in different solvents by phosphomolybdate method and DPPH method. The highest radical scavenging activity by DPPH method was found in methanol extracts (IC 50  $587.093 \mu\text{g/ml}$ ). Ferrous chelating activity, superoxide radical scavenging activity, nitric oxide radical scavenging activity was found high in acetone, acetone and methanol extracts respectively. The antioxidant activity increases with increase in the concentration. This study indicates that *A. sessilis* is a potential source of natural antioxidant<sup>28</sup>.

**Antipyretic activity:** Praveen Singh Nayak et al, reported the antipyretic activity of the ethanol extract of the aerial parts of *Alternanthera sessilis*. (Amaranthaceae) was investigated and claimed the ethno temperature regulatory action in yeast-induced pyrexia in albino rats<sup>29</sup>. The ASE at doses of 200, and 400 mg/kgBW p.o., showed significant reduction in normal body temperature and yeast-provoked elevated temperature in a dose-dependent manner when comparable to a standard anti-pyretic agent. The significant reduction of yeast provoked elevated temperature of the tested animals by the extract appears to be due to the action of  $\beta$ -sitosterol, lupeol.

**Nootropic activity:** Rajiv Gupta et al reported the nootropic potential (memory enhancing effects) of the leaves of *Alternanthera sessilis* (Amaranthaceae) on mice<sup>32</sup>. Methanolic extracts of leaves *Alternanthera sessilis* dosed at 100 mg/kg each administered to adult Swiss albino Wistar mice and the effect on acquisition, retention and retrieval of spatial recognition memory was determined. The higher doses elicited greater responses mice models studied and were comparable to that achieved with the standard drug.

**Hepatoprotective Activity:** Song-Chow Lin et al reported the hepatoprotective effects of the Taiwanese herb 'Horngtyan-wu' (*Alternanthera sessilis* (L.) DC.) were investigated in three kinds of experimental animal model by various chemicals such as carbon tetrachloride<sup>33</sup>, a reduction in elevation of serum glutamate oxaloacetic transaminase (SGOT) and glutamate pyruvic transaminase (SGPT) levels could be observed at 24 h after administration of hepatotoxins. These serological observations were also confirmed by histopathological examinations and shows Hepatoprotective activity.

Table 2. The List of the drugs, in which *A. sessilis* is a main ingredient:

Name of the Medicine	Main ingredients	Uses	References
Puliyarai nei	Oxalis corniculata Prosopis spicigera Glycyrrhiza glabra	Cooling effect to body, syncope, venereal diseases	[21]
Neillikai thailam	Phyllanthus emblica Aloe vera	Eye diseases, Venereal diseases	[3]
Ponnankanni thailam	Elettaria cardamomum Eclipta alba Phyllanthus emblica Glycyrrhiza glabra	Peripheral neuritis 96 types of eye diseases, summer diseases	[3]
Ganathailam	Castor oil Aloe vera juice	Primary complex, indigestion, Fever	[30]
Siru santhanathi thailam	Sandal wood Chrysopogon zizanioides Withania somnifera	Tuberculosis, Fever Anaemia, Vatha diseases.	[30]
Pothigai valarai nei	Centella asiatica Citrus lemon Phyla nodiflora	Urticaria, cancer, Leprosy	[31]
Megari thailam	Castor oil Clitoria ternatea Withania somnifera	Vatha diseases, veneria diseases.	[31]

Hematinic activity: Erna CA et al, The hematinic activity of *Alternanthera sessilis* (L.) R. Br. was investigated by monitoring the change in serum ferritin and hemoglobin levels of mice and rats<sup>34</sup>. Test animals were induced of anemia after which different doses of test sample were administered orally for 14 days. The standard drug used was ferrous sulfate, which served as the positive control and H<sub>2</sub>O as the negative control. Results of the study showed a significant increase in serum ferritin and hemoglobin level.

Anti- Ulcer Activity: Roy Amit et al were analyzed the *in vivo* antiulcer activity<sup>32</sup> of the chloroform insoluble ethanolic extract of whole plant of *A. sessilis* using different models of ulceration in rats, viz. pylorus ligation, aspirin induced and cold-restraint stress-induced gastric lesions in rats<sup>29</sup>. Parameters taken to assess antiulcer activity were volume of gastric secretion, pH, free acidity, total acidity, ulcer index and % inhibition of gastric ulcers in pylorus ligation model. While in aspirin and cold resistant stress induced models, ulcer index and % inhibition of gastric ulcers was determined. Famotidine (20mg/kg) was used as a reference drug and exhibited significant results.<sup>28</sup>

Hypoglycemic activity: R Rao et al, has reported the Anti-diabetic activity of the herb *Alternanthera sessilis*<sup>35</sup>, demonstrated that the alcoholic and aqueous extracts showed significant reduction in blood glucose levels of STZ induced diabetic rats and the activity of both the extracts was quite significant and encouraging. The Antidiabetic activity of *A. sessilis* can be attributed to the presence triterpenoids, phytosterols and glycosides. The results also further revealed that the aqueous extract is slightly less effective when compared with alcoholic extract.

Anti-Diarrhoeal Property: Yadav et al, reported the anti diarrhoeal activity of the aqueous extract of dried entire

plant material of *Alternanthera sessilis* Linn (Amaranthaceae)<sup>35</sup>. Diarrhea was induced in mice by the administration of 0.3 ml of castor oil, with the control group receiving water. The aqueous extract of *A. sessilis* showed significant antidiarrhoeal activity ( $P < 0.01$ ) against castor oil induced diarrhoea in mice due to its inhibitory effect both on gastrointestinal propulsion and fluid secretion.

Anti- Inflammatory activity: Rajani et al evaluated the anti-inflammatory activity of ethanolic and aqueous extracts of *Alternanthera sessilis* Linn<sup>16</sup> at doses of 200 and 400mg/kg body weight using carrageenan induced rat paw edema model. It suggested that the mechanism of action of *Alternanthera sessilis* may be related to the prostaglandin synthesis inhibition, as described for the anti inflammatory mechanism of Indomethacin in the inhibition of the inflammatory process induced by carrageenan. This finding showed and considered to be used in therapeutics for treating inflammation<sup>25</sup>.

## CONCLUSION

Our forefathers had a special way of transferring and documenting traditional heritages. one among them is through documenting the traditions through popular sayings for example our focused herb *Alternanthera sessilis* has two such popular sayings, one is About the transformation of body into golden luster and the other one is regarding the clarity of the eyes to visualize the stars even in broad day light when this green is consumed periodically as mentioned in the traditional literatures. These sayings may look like exaggerated once but it has been proved through *in-vitro* and *in-vivo* studies that this Green has proven anti-microbial, wound healing activities, anti-oxidant activities, antipyretic activity, nootropic activity, hepatoprotective activity, hematinic activity, anti-

ulcer activity, hypoglycemic activity, anti-diarrhoeal property, anti- Inflammatory activity.

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