WORLD JOURNAL OF PHARMACY AND PHARMACEUTICAL SCIENCES
SJIF Impact Factor 8.025
Volume 14, Issue 10, 128-138 Review Article ISSN 2278 – 4357

AN OVERVIEW OF ALTERNANTHERA SESSILIS LEAVES

Ramesh H. A.[2], Bhavya V. H.[1]*, Ranjitha D. E., Kruthi S., Rohith R.[3]

Shridevi Institute of Pharmaceutical Science, TUMKUR, Tumkur, Karnataka, India.

Article Received on
04 August 2025,

Revised on 24 August 2025,
Accepted on 13 Sept. 2025

https://doi.org/10.5281/zenodo.17214036

***Corresponding Author**
Priyanka Prajapati
Krishna Institute of Pharmacy and Sciences, Amiliha, Tatiyaganj, Kanpur- 209217.

ABSTRACT

It is Commonly known as dwarf copperleaf or sessile joyweed, Alternanthera sessilis is a leafy vegetable that has long been used in Southeast Asia, India, and Sri Lanka. It is prized in traditional medicine for its laxative, cooling, diuretic, and tonic properties. It has long been used to make kajal and medicinal oils, as well as to treat eye conditions, hemorrhoids, and dysuria. Its medicinal potential has been validated by recent research. When rats were exposed to gentamicin, the ethanolic extract of A. sessilis (EEAS) demonstrated nephroprotective effects. With protective effects similar to those of vitamin E, EEAS dramatically reduced blood creatinine, uric acid, and BUN at dosages of 100–200 mg/kg while raising levels of protein, albumin, and globulin. Kidney protection was further validated by histological studies. Additionally, in albino rats, the ethanol extract of aerial portions had antipyretic properties as effective as paracetamol, lowering both normal and yeast-induced fever in a dose-dependent manner (200–400 mg/kg). These findings highlight its nephroprotective and antipyretic properties while validating its traditional uses.

KEYWORDS: Alternanthera sessilis, antipyretic, ethanolic extract.

INTRODUCTION

The perennial plant Alternanthera sessilis, often known as sessile joy weed or nasty weed, is a member of the Amaranthaceae family and has long been prized for its culinary and therapeutic properties. There are between 80 and 200 species in the genus Alternanthera, while the precise number is unknown because of frequent cross-pollination and the wide variation in characteristics including habit, flower colour, and leaf chemistry. Although it may have originated in North or South America, the plant is currently found across tropical and subtropical climates, where it thrives in conditions that are moist or disturbed.[1]

Usually reaching a height of one meter, this plant has diverse foliage, including opposing, simple leaves that can be linear or oblong, as well as bisexual flowers that can be either pink or white. It comes in both annual and perennial varieties, and its use for medicinal and nutritional purposes has increased recently. Cross-pollination promotes genetic variety and adaptation, which might occasionally make genus classification more difficult.

In tropical environments, Alternanthera sessilis is known to be a competitive weed that can outcompete crops and grow throughout both the kharip and rabbi seasons. It may be recognized by its light-sensitive seeds, thick clusters of white flowers, simple opposite leaves, and robust roots. This plant has been used historically to cure pain, inflammation, diarrhoea, bronchitis, malaria, and conditions of the eyes and skin. It has also been used to encourage the healing of wounds. Because of its many therapeutic uses, Alternanthera sessilis is used in many herbal treatments for ailments like hypertension and is becoming more and more significant economically.[1]

TAXONOMICAL CLASSIFICATION

Domain: Eukaryota

Kingdom: Plantae

Phylum: Spermatophyta

Subphylum: Angiospermae

Class: Dicotyledonae

Order: Caryophyllales

Family: Amaranthaceae

Genus: Alternanthera

Species: Alternanthera

Vernacular Names

Tamil: Ponnankanni, Citai, Koduppai

Malayalam: Meenamgani, Ponnankannikkira

Sanskrit: Matsyaki, lonica

Hindi: Gudrisag, Garundi

Kannada: Honagone soppu

Telugu: Ponnagantikura

Bengali: Chanchi, Haicha, Sachishak

Marathi: Kanchari

Manipuri: Phakchet

Other Geographical names

French: Brede Chevrette, Magloire.

Portuguese: Bredo-D, Periquito-Sessil, Perpétua.

Indonesian: Daun Tolod

Malaysia: Keremak.

Sinhalese: Mukunu-Wenna

Chinese: Lian Zi Cao, Bai Hua Z[1]



Fig. 1: Althernanthra sessilis.



Fig. 2: Fresh parts of *Alternanthera sessilis.*

MORPHOLOGICAL DESCRIPTION

In general, A. sessilis is a fast-growing, widely distributed plant with elliptical to oval-shaped leaves. These inflorescences also have an axillary, sessile, and clustered look. When comparing the morphology of the two cultivars, it is clear that ASG differs from ASR. The green cultivar has short, sessile leaves that are greenish in color, with glabrous (fine, thin, articulate hairs) borders and an acute blunt tip. It likewise has white flowers with tiny axillary sessile heads that have a hint of pink, and it has a cylindrical, light brown prostrate stem. The plant has many upright branches and robust taproots, reaching a height of 0.2 to 1 m. This plant produces white flowers that bloom from December to March, which is a specific time of year. The fruit is 2–2.5 mm long, and the seed is enclosed by a tiny, flattened, indehiscent utricle. The disc-shaped, glossy seeds have a diameter of 0.8 to 1 mm and are brownish-black in color. Its root emerges from the node of the stem. The weed's seeds are dispersed by wind or water, depending on whether it is growing on land or in water. ASR, on the other hand, has pink or yellow blooms with reddish purple leaves and branches.[2]

GEOGRAPHICAL SOURCE

Originating in Brazil, Alternanthera sessilis is a well-known plant that has been grown for thousands of years in most tropical and subtropical regions of the world. The terms "alternans" (meaning "alternating") and "anthera" (meaning "anther") from ancient Greek are the source of Alternanthera sessilis' generic name, which refers to the stamen and pseudosaminode alternations.

Even though Alternanthera sessilis thrives in a variety of environmental and climatic situations, hot nations with low humidity, strong light, and suitable temperature are the best places for it to develop. Hydromorphic rice fields in West Africa and Asia, as well as the following cultivated areas, include tobacco, dry land field crops, pastures, and vegetable farms in the Philippines, as well as maize crops in Nigeria, sorghum, millet, maize, cotton, cassava sativa, ground nuts, and cash crops in Zaire. Bangladesh, Bhutan, Brazil, Cameroon, Chad, China, Ecuador, Egypt, Gambia, India, Kenya, Indonesia, Iran, Nepal, Saudi Arabia, New Zealand, Uganda, Sri Lanka, and Zambia are just a few of the nations where this plant may be found.[3]

Alternanthera sessilis is now produced in the following nations, with an estimated 50 to 55 tons generated annually worldwide: Among these countries are India (17 tons annually), Bangladesh (5 tons annually), Brazil (4.5 tons annually), Sri Lanka (4 tons annually), China (3 tons annually), the United States (2 tons annually), Argentina (1.5 tons annually), Nigeria (1.5 tons annually), Zambia (0.5 tons annually), Uganda (0.4 tons annually), Saudi Arabia (0.3 tons annually), and Australia (0.2 tons annually). It is difficult to get figures on the production of dried noxious weeds worldwide. Since it is typically consumed domestically, a significant portion of global output, especially in India and Sri Lanka, is not exported outside. India is a big producer, while the United Kingdom is a major consumer.[4]

BOTANICAL DESCRIPTION

a) Macroscopic

Root: cylindrical, cream to gray, 0.1 to 0.6 cm in diameter, with many lateral rootlets growing from the primary tap root; short fracture; no distinct flavor or smell.

Stem: Herbaceous, weak, cylindrical, with branches that stretch out from the base; light-brown to yellowish-brown; noticeable internodes and nodes.

Sessile, linear-oblong, elliptic, obtuse, or subacute leaves lack a distinctive flavor or smell.

The flower has tiny, axillary, sessile heads that are white and frequently tinted pink. The bracteoles are approximately 1 cm long, elliptical, and scarious; the perianth is long, the sepals are oblong, sharp, thin, the ovary is obcordate, compressed, the style is very short, and the capitellate is present. The flower has no distinct flavor or smell.

Fruit: Utricle, orbicular, compressed, 1.5 mm long, thickened edges; no distinct flavor or smell.

b) Microscopic

The root exhibits a circular shape with five to seven layered, thin-walled, tangentially elongated, squarish, radially arranged cork cells; a narrow secondary cortex with thin-walled, round or oval, parenchymatous cells; vascular bundles that are radially arranged and numerous, with thin-walled cells; lignified xylem tissues; conjunctive tissue between bundles with oval, thin-walled, parenchymatous cells; and pith with thin-walled, round to oval, isodiametric, parenchymatous cells.

The stem exhibits a single-layered epidermis with round or oval, thin-walled cells, vascular bundles arranged in a ring, bicollateral, open, and endarch; narrow phloem with thin-walled cells traversed by phloem rays; xylem with regular elements traversed by xylem rays; pith distinct, with a few parenchymatous cells containing calcium oxalate rosette crystals.

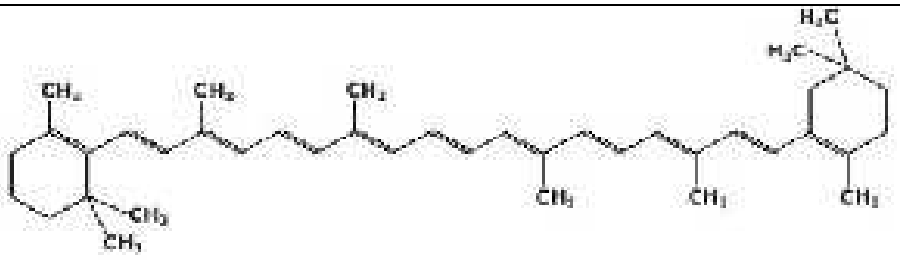
The midrib of the leaf, which has a single layer of epidermis on both surfaces and is covered in striated cuticle, has three vascular bundles in the center, each of which is made up of xylem and phloem; collenchymatous cells; parenchymatous cells; and thin-walled round or oval, isodiametric cells, some of which have rosette crystals of calcium oxalate.[4]

CHEMICAL CONSTITUENTS

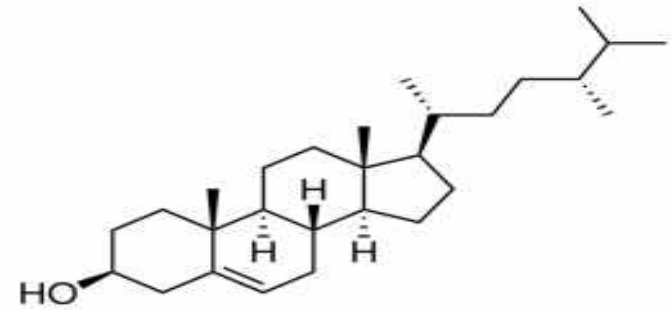
Choline, oleanolic acid, 2, 4-methylenecycloartanol, and cycloeucalenol are all present in the herb. The leaves' saponins have been separated. Lupeol17 is found in roots. Iron and protein are present in young shoots (Ghani, 2003). (5-a-stigmatista-7-enol) is also present (Asolkar et al., 1992; Rastogi & Mehrotra, 1993). By lowering the release of pro-inflammatory cytokines including TNF, β-sitosterol has strong anti-inflammatory properties. Actions 5: Febrifuge, Abortifacient, Cholagogue, and Galactagogue.

Alternanthera sessilis fresh leaves have 80g/100g of water, 251kJ/mol of energy, 4.7g/100g of protein, 0.8g/100g of fat, and 11.8g/100g of carbohydrates. 3.2g of carbohydrate, 0.225 mg of amino acids, 2.76 mg of vitamin B1, 12.6 mg of vitamin B2, 2.1 mg of fiber, 148 mg of calcium, and 45 mg of phosphorus are all present in 100g. Flavonoids, which are known to have antioxidant qualities, are also present. It is used to treat night blindness since its leaves are high in iron and carotene. Methyl propionate, 2,4-dimethyl-3-pentanol, 2-(1-methylpropyl)cyclopentanone, 2,3,4-trimethylpentanoic acid, methyl-2-O-methyl-a-dxylofuranoside, 2,6-dimethyl-7-octen-3-ol, terahydro-2,5-dimethoxy furan, 9-heptadecanone, 1-fluorododecane, 1,1-oxybis heptane, 1-chlorooctadecane, octyl ester 2-propenoic acid, 2,4,4,6,8,8-heptamethyl-1-nonene, (Z)-7-tetra-decene, 2-pentyl-1-heptene, tetracontane-1,40-diol, didodecyl phthalate, and 1-fluorododecane are all present in the essential oil.[5]

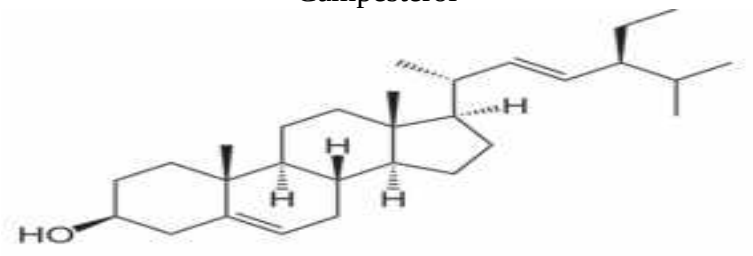
Table 1: Phytochemical structures of A. sessilis leaves.



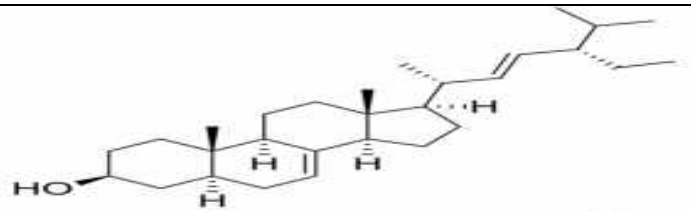
β - carotene



Campesterol



Stigmasterol



α- Spinasterol

USES

In Siddha medicine, *Alternanthera sessilis* is recognized under the principle of "food as medicine." Eating its leaves fried in ghee is believed to cool the eyes, enhance overall health, and provide antioxidant benefits. Traditionally, the plant is used to relieve abdominal bloating, liver ailments, vatha disorders, wounds, skin diseases, and as a remedy for snake and scorpion bites. It is also known to calcify copper into a red powder useful for gastric and duodenal ulcers, though tamarind consumption should be avoided. Oils prepared from its juice are applied to treat neuritis, piles, bad breath, eye disorders, and to impart cooling effects, while the dried plant is valued as a blood purifier. Furthermore, *A. sessilis* is employed in the treatment of hepatitis, bronchitis, asthma, and other lung conditions, supported by its wide range of pharmacological properties, including anti-diabetic, anticancer, anti-ulcer, antioxidant, antimicrobial, anti-inflammatory, antipyretic, wound-healing, hepatoprotective, hypoglycemic, and anthelmintic effects.[6]

PHARMACOLOGICAL ACTIVITIES

Anti-Fungal Potentials

Alternanthera sessilis leaf extract, essential oil, and their constituents were investigated for their antifungal properties using the agar well diffusion technique. The plant pathogen Cyrtomium falcatum was tested against Alternanthera sessilis's ethanol, methanol, and aqueous extract. PDA medium was poured into a sterile petri dish, and the medium was thereafter allowed to solidify there. The test fungal culture was uniformly distributed on the medium using sterile cotton swabs. After creating wells (6 mm) in the medium with a sterile cork-borer, 200 microliters of each extract were moved into different walls, and the plates were incubated for 48 to 72 hours at 27 to 30 degrees Celsius. Following incubation, plates were examined for the development of a transparent incubation zone surrounding the well, which would indicate the existence of antifungal activity. Alternanthera sessilis demonstrated antifungal efficacy against two fungal strains, suggesting that it has excellent potential against fungi.[6]

Anti-Oxidant Activity

It is well known that noxious weed oil has potent antioxidant qualities. Recent studies have revealed that the oil may have anti-microbial, anti-viral, anti-cancer, and antipyretic qualities. Toxic weeds can be a significant source of these vital chemical compounds, which are necessary for maintaining a balanced and healthy lifestyle. However, despite these purported benefits, it's crucial to remember that noxious weeds' leaves are tainted with heavy metals like lead and cadmium, so using them excessively might have negative health effects. Folk medicine practitioners in Bangladesh utilize Alternanthera sessilis to treat extreme pain. It is common practice to use noxious weed stems to relieve discomfort and lower elevated blood glucose levels in diabetic patients. One of the main causes of physical limitations is wounds. It has been shown that toxic weed aids in wound healing. The phytochemical components of noxious weeds are quite diverse. Time, growing methods, and storage all have a substantial impact on these components.[6]

Anti- Ulcer Activity

Using three distinct models of rat ulceration—pylorus ligature, aspirin-induced, and cold-restraint stress-induced stomach lesions—Roy Amit et al. examined the in vivo antiulcer activity32 of the chloroform insoluble ethanolic extract of the whole plant of A. sessilis. The amount of gastric secretion, pH, free acidity, total acidity, ulcer index, and percentage inhibition of gastric ulcers in the pylorus ligature model were the parameters used to evaluate antiulcer efficacy. In contrast, the ulcer index and percentage of stomach ulcer inhibition were established in aspirin and cold-resistant stress-induced mice. Using famotidine (20 mg/kg) as a reference medication produced noteworthy outcomes.

Anti-microbial activity

According to Johnson et al., the disc diffusion technique has demonstrated the bactericidal capability of ethanolic extracted Alternanthera sessilis leaves, internodal segments, and calli. Salmonella typhii, Bacillus subtilis, Streptococcus pyogenes, and Proteus vulgaris were used to test A. sessilis' antibacterial activity. Compared to the common antibiotics gentamycin and ampicilin, which served as positive antibacterial controls, the antibacterial activity demonstrated a superior zone of growth inhibition.

Wound healing activities

The screening of the chloroform extract leaf of Alternanthera sessilis Linn26 for wound healing activities was completed by Sunil et al. In all animals, the chloroform extract of

Alternanthera sessilis leaves was first consumed orally at a dosage of 200 µg/mL. The excision wound model showed a shrinkage of the wound area ($P < 0.005$) at day 16, a time required for full epithelization in 16 days ($P < 0.0001$), and a scar area following complete epithelization of 33.2± 0.0730 ($P < 0.0008$). The incision wound model also showed a strong wound breaking strength. Significant findings were found, including the presence of phytoconstituents called sterols, which may have a role in wound healing.

Anti- Inflammatory activity

Rajani and colleagues used a carrageenan-induced rat paw edema model to assess the anti-inflammatory properties of ethanolic and aqueous extracts of Alternanthera sessilis Linn16 at 200 and 400 mg/kg body weight. According to the description of Indomethacin's anti-inflammatory mechanism in the suppression of the inflammatory process generated by carrageenan, Alternanthera sessilis' mode of action could be connected to the inhibition of prostaglandin formation. This discovery shown and is thought to be applied in anti-inflammatory therapies.[7]

Anti-Pyretic Activity

Albino rats were used in experiments to test the ethanolic extracts of Alternanthera sessilis leaves for their antipyretic properties. In contrast to yeast, which shown a dose-dependent increase in body temperature, these ethanolic extracts, when administered at dosage concentrations ranging from 200 mg/kg to 400 mg/kg of body weight, demonstrated a considerable drop in normal body temperature. The presence of lupeol and β-sterols in these extracts is thought to be the reason for the significant decrease in yeast that caused the tested animals' body temperature to rise.

Anthelmintic Activity

Cattle helminthes are a major problem in tropical and subtropical areas because they reduce appetite, slow growth, and impair digestive efficiency, which typically leads to decreased productivity, an increased mortality rate, weight loss, and a decrease in the amount of meat and wool produced. When tested on live nematodes, many extracts of Alternanthera sessilis showed concentration-dependent anthelmintic activity. $P<0.05$ indicated that these findings were statistically significant. The concentration of 50 mg/ml produced the highest activity after 4 hours. The current experimental study showed that EA was the main component responsible for the observed activity of ASE and that it had somewhat stronger anthelmintic

potentials. Alternanthera sessilis has been shown in research to have anti-anthelmintic properties.

Anti-Diabetic Activity

Nowadays, diabetes mellitus is a condition that is frighteningly growing around the world. The incidence of diabetes cases worldwide has skyrocketed in the last 20 years, indicating a new issue. Both qualitative and quantitative analysis were performed using aqueous and alcoholic extracts on streptozotocin-induced and normal rats for screening in order to assess Alternanthera sessilis' potential anti-diabatic properties. Rats were also used to investigate hypoglycemic and anti-diabetic effects. According to the results, alcoholic extracts of Alternanthera sessilis decreased blood glucose levels from 109.32 to 71.67. These extracts' noticeable effects began to manifest after 4 hours and persisted for 12 hours. The entire study's results made it abundantly evident that alcoholic and aqueous extracts had the capacity to lower blood glucose levels in rats with diabetes, which is a very positive finding. Subsequent research showed that the primary causes of this action are triterpenoids, glycosides, and phytosterols. However, as compared to aqueous extracts, alcoholic extracts are far more effective.

Nootropic activity

The nootropic potential, or memory-enhancing benefits, of Alternanthera sessilis (Amaranthaceae) leaves on mice was described by Rajiv Gupta et al.32. Adult Swiss albino Wistar mice were given methanolic extracts of Alternanthera sessilis leaves at a concentration of 100 mg/kg each, and the impact on the development, maintenance, and recall of spatial recognition memory was assessed. The mouse models under study showed larger responses to the higher dosages, which were equivalent to those obtained with the conventional medication.[8]

CONCLUSION

The perennial plant Alternanthera sessilis, which belongs to the Amaranthaceae family, is used in traditional medicine and to make essential oils. It is also frequently eaten as a leafy vegetable. Alkaloids, saponins, steroids, and triterpenoids are among the many bioactive components found in its ethanolic leaf extract that give it its analgesic, stimulant, nephroprotective, and antioxidant qualities. It has been shown to have central and peripheral analgesic effects, increase protein levels, and decrease gentamicin-induced blood indicators.

But because its leaves may collect heavy metals like cadmium and chromium, more research is necessary to identify the active ingredients and guarantee safe use.

REFERENCE

1. Sravani VL, Abbas Z, Surya P. A review on *Alternanthera sessilis*. Indo Am J Pharm Sci., 2017; 4(9): 2845-52. doi:10.5281/zenodo.888221
2. Shehzad A, Qayyum A, Rehman R, Nadeem F, Shehzad MR. A review of bioactivity guided medicinal uses and therapeutic potentials of noxious weed (*Alternanthera sessilis*). Int J Chem Biochem Sci., 2018; 14: 95-103.
3. Walter TM, Merish S, Tamizhamuthu M. Review of Alternanthera Sessilis with Reference to Traditional Siddha Medicine. Int J Pharmacogn Phytochem Res., 2014; 6(2): 249-254.
4. Rajesham VV, Jabeen R, Raghavendra M, Ali PR, Rao TR. Nephroprotective Activity of Ethanolic Extract of Alternanthera sessilis Leaves in Gentamicin-induced Nephrotoxicity in Wistar Albino Rats. Int. J. Pharm. Investigation., 2022; 12(3): 346-50.
5. Nayak PS, Nayak S, Kar DM, Das P. Pharmacological evaluation of ethanolic extracts of the plant Alternanthera sessilis against temperature regulation. J Pharm Res., 2010; 3(6): 1381-1383.
6. Mohapatra SS, Kafle A, Chatterjee J, Mohan P, Roy RK, Reddy I. Analgesic activity of hydroethanolic extract of Alternanthera sessilis in mice. J Pharmacogn Phytochem., 2018; 7(4): 1836-1839.
7. Hossain et al.: A preliminary evaluation of antihyperglycemic and analgesic activity of Alternanthera sessilis aerial parts. BMC Complementary and Alternative Medicine, 2014; 14: 169.
8. Mondal et al.: Central-stimulating and analgesic activity of the ethanolic extract of Alternanthera sessilis in mice. BMC Complementary and Alternative Medicine, 2014; 14: 398.