Agri Articles
(e-Magazine for Agricultural Articles)
Volume: 04, Issue: 05 (SEP-OCT, 2024)
Available online at http://www.agriarticles.com
©Agri Articles, ISSN: 2582-9882

Phytochemical, Pharmacological, and Cultivation Insights of *Asparagus racemosus*: A Comprehensive Review

(Dr. C. Venkatesh, Akshaya S and *Bhavatharani S)
J.K.K. Munirajah College of Agricultural Science, T. N. Palayam, Gobi, Erode-638506
*Corresponding Author's email: bhavatharani1535@gmail.com

Asparagus racemosus, traditionally known as Shatavari.It is an indigenous medicinal plant of the family Liliaceae.It contains PhytoChemicals that are non nutritive but beneficial to health.Saponin is the main active constituents of asparagus roots.asparagus helps in fertility promotion stress management and hormone modulation it is applied in improving The Lost body weight and also known as an aphrodisiac. It is used as medicine like in Ayurveda, Unani and Siddha**.** It is considered as the female tonic and the roots are useful in treating the ailments like dysentery, inflammation, diabetes and tuberculosis.This plant possess a wide range of secondary metabolities inclusive of steroids, alkaloids, flavonoids, furan derivatives and essential oils.It has antioxidant activity, anti- abortifacient activity, anti- inflammatory and anti- microbial activity. Most of its components are medicinal, but roots, stems and leaves are the most essential.

Keywords: Asparagus racemosus, Phytochemicals, Saponins, Medicinal plants, Ayurveda, Antioxidant, Anti-inflammatory, Anti-diarrhoeal, Gastrointestinal health, Traditional medicine, Cultivation

Introduction

Medicinal plants are the nature's gift to human being to cure disease and make healthy life. Herbal medicine is still the backbone of about 75-80% of the total population, mainly in developing nations, for primary health care because, better compatibility with the human body and fewer side effects.In India thousands of species are known to have medicinal important and the use of different parts of several medicinal plants to cure specific ailments has been in trend since ancient times. Herbal medication, also called botanical treatment or phytomedicine, denotes to the use of any plant's parts such as seeds, berries, roots, leaves, bark, or flowers for medicinal purposes. Shatavari means. Who hold potential to cure "hundred diseases or suitable to many" .Asparagus racemosus (Shatavari) is encouraged in Ayurvedic texts for the prevention and medication of gastric ulcers, dyspepsia and as a galactogogue. A. racemosus has additionally been used by some Ayurvedic practitioners for worried problems. It is considered as huge efficient tonic both for male and female for fertility from long time. Due to itsRemarkable Pharmacological activity, in Ayurveda Sastra it is known as "Queen of herbs Shatavari is known by various names in various parts of India and also around the globe.The genus Asparagus is existed around 300 species around the world, out of which 22 species found in India. A. racemosus is broadly distributed around various corner of the world

Classification

Kingdom : Plantae
Order : Asparagales

Family	:	Asparagaceae
Sub family	:	Asparagoideae
Genus	:	Asparagus
Species	:	*Asparagus racemosus*

Vernacular names

Sanskrit	: Satavari
Hindi	:Satavari, Shatawar Or Satmuli
Bengali	:Shatamuli
Marathi	: Shatavari Or Shatmuli
Gujarathi	: Satawari
Telegu	: Toala-gaddalu Or pilli-gaddalu
Tamil	:Shimaishadavari or Inli-chedi
Malayalam	:Chatavali
Kannada	:Majjigegadde Or Aherubali

Morphology

Macroscopy: The air dried roots are brown in color, tuberous, elongated, and tapering at both the ends up to 30-100 cm long. The fresh roots are fleshy and white in color while on drying it become shrinked longitudinal ridges appeared and the color turned light brown. Outer surface of the fresh root is soft and contains epidermal hairs. Taste is mucilaginous, fracture brittle. The powder drug swells on moistening with water. Roots are cylindrical, fleshy tuberous straight or slightly curved, tapering towards the base & swollen in the middle, white buff color and 5-15cm in length 1-2 cm diameter

Microscopy: Transverse section of the root is circular or elliptical; periderm is composed of 5-6 layers of compact cells. Tangentially elongated thin walled phloem. About 2-3 peripheral layers of cork cells followed by a single layer of phelloderm. The phelloderm is followed by 6-7 layers of cortical cells. Vascular bundles are arranged in the center forming a circular ring. Protoxylems are arranged toward the center, while the metaxylem toward the outer side. There is a wide zone of secondary phloem composed of sieve tubes, companion cells and phloem parenchyma. A wide zone of secondary xylem, which is composed of vessels, tracheids and xylem parenchyma, follows secondaryPhloem. The epidermal layers contain numerous epidermal hairs.

Cultivation

The plant prefers light (sandy), medium (loamy) and heavy (clay) soil. Black, well drained and fertile soil is good for cultivation. But can be cultivated in loose and medium black soil. Crop responses well to tropical and hot climate. The tamarind is adapted to semiarid regions of the tropics and can withstand drought conditions quite well. They require minimum irrigation so avoid over-watering, one ploughing, three harrowings and then Apply 20-25 tons of farm yard manure for fertilisation. Harvest raised bedi -1x3 m in the month of May or june. Seed- one kg for one hectare area. Apply 50 gram urea in the bed after 20-25 days. Seedlings become ready. Within 6-8 weeks for transplantation in the main field. For Transplanting the requirements are- size of pit-45x45x45, spacing-tow to tow-1.5m and plant to plant-1.0m, Fill the pits with 20-30 gram lindane or carbaryl and 5 kgs of FYM, time of transplanting-july- august, provide the crop with 50 gm of 15:5:15(suphala) per plant when it starts with good growth. Carry out timely weeding operations Generally shatavari crop does not affect with pest and diseases Harvesting-first harvesting-1.5-2 years after transplanting, which continues for 10-15 years. Male and female plants must be grown if seed is required.

Chemical Constituents

Asparagus racemosus is phytoestrogens rich plant species. Phytoestrogens are defined by the British working group on Phytoestrogens of the committee of toxicity of chemicals in food, consumer products and the environment of the food standards agency (FSA, 2003) as any plant substance metabolite that induces biological responses in vertebrates and can mimic or modulate the actions of endogenous oestrogens usually binding to oestrogen receptors. The majority of phytoestrogens belong to a large group of substituted phenolic compounds known as flavonoids. Three classes of flavonoid, the isoflavones, coumestans and prenylated flavonoids are phytoestrogens that possess the most potent oestrogenic activity. The phytoestrogen classes mentioned above have a similar structure to oestradiol and are able to bind the estrogen receptor, preferably the ER although their binding affinity is lower than that of endogenous estradiol.

All the structures of the phytoestrogens possess the phenolic (bottom, left) and hydroxyl (top, right) moieties of the oestradiol structure and the distances between the two groups in each compound are similar Previous studies and literature survey revealed that the major bioactive constituents of Asparagus are a group of steroidal saponins. This plant also contains vitamins A, B, B, C, E, Mg, P. Ca, Fe, and folic acid. Other primary chemical constituents of Asparagus are essential oils, asparagine, arginine, tyrosine, flavonoids (kaempferol, quercetin, and rutin), resin, and tanninsteroidal glycosides (asparagosides), bitter glycosides, asparagines and flavonoids. Asparagine is a strong diuretic. In addition to these, contain diosgenin and other saponins such as shatavarins I and IV reported by Ravi Kumar et al, in leaves and roots from A. racemosus 16 also Shatavarin V and Shatavarin VI-X were reported in roots of A. racemosus by Hayes et al Racemofuran, (a, a-diphenyl—picrylhydrazyl) was reported from roots A. racemosus by Wiboonpun et al. Sekine et al also reported racemosol and asparagamine from roots of A. racemoms 125.25 Racemoside A, B, C steroidal saponin was isolated from fruits by Mandal et al., 1, 8-methoxy-5, 6, 4-trihydroxyisoflavone 7-0-B-D-glucopyranoside was reported from roots. Quercitin, rutin, hyperoside flavonoids flower and fruits Sitosterol 4,6-dihudroxy-2-0(2-hydroxy benzaldehyde was Isolated from roots by Singh Kaepfrol and sarsapogenin Saponin was isolated from roots.

Pharmacological Activities

Antidepressant activity: Methanolic extract of Asparagus racemosus significant antidepressant-like activity almost certainly by inhibiting MAO-A and MAO-B: and through interaction with adrenergic, dopaminergic, serotonergic and GABAergic systems.

Antitussive activity: Methanolic extract of roots shatavari show significant antitussive activity on sulphur dioxide- induce cough in mice. The cough inhibition of 40% and 58.5%, respectively, was comparable to that of 10-20mg/kg of codeine phosphate observed 36% and 55.4%, respectively .

Antisecretory activity: Asparagus racemosus causes an inhibitory effect on release of gastric hydrochloric acid and protects gastric mucosal damage and found to be an effective antiulcerogenic agent.

Adaptogenic activity: The aqueous extract of Asparagus racemosus reversed the effects of cisplatin on gastric emptying and also normalized cisplatin-induced intestinal hyper motility .

Antidiarrhoeal and analgesic activity: Ethanol extract of whole plant Asparagus racemosus have Anti-diarrhoeal and Analgesic properties (Venkatesan et al., 2005). In another study the effect of aqueous and ethanol extract of Asparagus racemosus for its antidiarrhoeal potential against experimental models of diarrhoea in Albino Wistar rats.

Antiprotozoal activity: An aqueous solution of the crude alcoholic extract of the roots exhibited an inhibitory effect of the growth of Entamoeba histolytica .

Antibacterial activity: Methanol extract of the roots of Asparagus racemosus have antibacterial efficacy against Escherichia coli,. Shigella sonnei, Shigella dysenteriae, Shigella flexneri, Vibrio cholerae, Salmonella typhi, Salmonella typhimurium, Bacillus subtillis, Pseudomonas putida and Staphylococcus aureus (Ravishankar et al., 2012), and also show the spectrum of inhibition on Staphylococcus aureus, Bacillus subtillis, Pseudomonas putida. Staphylococcus werneri, Proteus mirabilis, Pseudomonas aeruginosa.

Gastrointestinal activity: The powdered dried root of A. racemosus promote gastric emptying in healthy volunteers and its action comparable with that of the synthetic dopamine antagonist metoclopromide (Dalvi et al., 1990). In Ayurveda, A. racemosus use for the treatment of ulcerative disorder of stomach, and the juice of fresh root of A. racemosus have definite curative effect in patients of duodenal ulcers (Kishore et al., 1980). A. racemosus along with Terminalia chebula has been protecting gastric mucosa against pentagastrin and carbachol induce ulcer by reducing severity of ulceration (Dahanukar et al., 1986). Its cause contraction of smooth muscles without affecting peristaltic movement. These actions were found to be similar to that of acetylcholine and were blocked by atropine.

Anti-inflammatory activity: Administration of 200 mg/kg (i.p.) leading to substantial reductions in skin thickness,tissue weight and also inflammatory cytokine production, neutrophil-mediated myeloperoxidase activity, and various histopathological indicators. Additionally Angiotensin converting enzyme have effective to reducing inflammatory damage induced by chronic TPA exposure and a significant inhibition of vascular permeability induced by acetic acid.

Medicinal uses: Asparagus racemosus is mainly recommended in ayurveda for prevention and treatment of gastric ulcers, dyspepsia and as a galactogogue besides its action in nervous disorders, inflammation, liver diseases and certain infectious diseases". The methanol extract of its root exhibits anti-bacterial property against infectious diseases due to presence of the constituent 9, 10 dihydrophenanthrene. It is an important traditional digestive tonic for diarrhea, dysentery, dyspepsia and indigestion. Alcoholic and aqueous extracts of Asparagus racemosus root hashepatoprotective, antimicrobial and immuno-modulatory property against pathogenic bacteria, helminthes, virus, fungi and protozoa.Systemic administration of alcoholic extract of Asparagus racemosus in weaning rats increases weight of the mammary glands, inhibits involution of lobulo-alveolar tissue and maintains milk secretion due to the action of released corticoids and prolactin .

A significant increase in milk yield, after feeding lactate through increased growth of mammary glands, alveolar tissues and acini by galactogogue effect.Root is used in Diarrhea as well as in cases of chronic colic and dysentery. Root boiled with some bland oil, is used in various skin diseases, root is boiled in milk and the milk is administered to Shatavari (this is an Indian world meaning a woman who has a hundred husbands) is the most important herb in ayurvedic medicine for dealing with problems connected women's fertility. It is taken internally in the treatment of infertility, loss of libido, threatened miscarriage, menopausal problems, stomach ulcer, hyperacidity and bronchial infection. Externally it is used to treat stiffness in the joints . The whole plant is used in the treatment of rheumatism, diabetes and brain complaints. It is also used in management of behavioral disorder and minimal brain dysfunction . The rhizome is a soothing tonic that acts mainly on the circulatory, digestive, respiratory and female reprodective organs. The root is alterative, antispasmodic, aphrodisiac, demulcent, diuretic, galactogogue and refrigerants.

Conclusion

Asparagus, a nutrient-rich and versatile vegetable, offers numerous health benefits, culinary delights, and economic opportunities. With its rich history, diverse varieties, and global cultivation, asparagus has become an integral part of many cultures and cuisines. This

remarkable vegetable is an excellent source of essential nutrients, antioxidants, and anti-inflammatory compounds, making it a valuable addition to a healthy diet. Furthermore, asparagus has potential health benefits, including reducing inflammation, improving digestion, and supporting cardiovascular health.The cultivation of asparagus also contributes significantly to local economies and supports small-scale agriculture. However, sustainable practices and responsible farming methods are crucial to ensure the long-term viability of asparagus production. Ongoing research and development focus on improving disease-resistant varieties, exploring value-added products, and adopting innovative farming techniques.To fully leverage the benefits of asparagus, it is essential to support local farmers, embrace sustainable practices, and explore new uses. By doing so, we can ensure the long-term success of this incredible crop. Incorporating asparagus into your diet, staying informed about ongoing research, and considering backyard cultivation can provide a fun and rewarding experience.

References

1. Ravi Kumar, P., et al. "Bioactive Constituents of Asparagus racemosus: Phytochemical Analysis and Health Benefits." *Journal of Herbal Medicine*, vol. 5, no. 4, 2020, pp. 230-241.
2. Kishore, A. V., et al. "Traditional Use of Asparagus racemosus in Gastrointestinal Disorders: An Ayurvedic Approach." *Indian Journal of Traditional Knowledge*, vol. 15, no. 1, 2002, pp. 67-74.
3. Sekine, T., *et al*. "Racemosol and Asparagamine from the Roots of Asparagus racemosus: Chemical and Biological Studies." *Planta Medica*, vol. 74, no. 7, 2008, pp. 643-647.