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# Phytoconstituents and Medicinal Uses of Asparagus Racemosus: A Review

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## A B S T R A C T
Asparagus racemosus (Asparagaceae) is a valuable medicinal plant native to tropical and subtropical India. It is utilised in Ayurveda, Unani, and Siddha medicine. It is regarded as a feminine tonic in Ayurveda and is commonly used in ailments such as dysentery, diabetic retinopathy, inflammations, tumour, bronchitis, mental disturbance, hyperacidity, certain viral disorders, neuropathy, conjunctivitis, spasm, persistent fevers, and rheumatism. It is also useful in female infertility because it boosts libido and treats sexual organ inflammation, improves folliculogenesis and ovulation, prepares the womb for conception, prevents miscarriages, and acts as a postpartum tonic by increasing lactation and normalising the uterus and changing hormones. It is also used to denote leucorrhoea and menorrhagia. It is also used to treat epilepsy, kidney diseases, chronic fevers, excessive heat, stomach ulcers, and liver cancer, as well as to enhance milk secretion in nursing mothers and to regulate sexual behaviours. Steroid saponins are the primary active ingredients of Asparagus racemosus.

**Keywords:** *Asparagus racemosus, medicinally important, endangered,galactogogue, Bioactive principle*

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## INTRODUCTION
The Himalayan region of India, in particular, is famed for its biological diversity and has long been a botanist's dream. Uttarakhand state has 53,485 square kilometres, accounting for about 15.5 percent of the total geographical area of the Western Himalayas. The high Himalayan hills and glaciers cover the majority of the state's northern borders, while the lower reaches are densely wooded. Currently, 95% of raw materials required by medicines and drug manufacturers are sourced from remote and untamed locations [1]. The pharmaceutical industry employs 280 medicinal plant species, 175 of which are indigenous to the Indian Himalayan region [2]. This area is home to roughly 1748 plant species of therapeutic value [3]. 80% of the developing world's population still relies on their surrounding vegetation/forests and pastures for health care. Because of their effectiveness, a lack of modern healthcare alternatives, and cultural preferences, they rely on medicinal plants [4]. Major tribal populations such as the Bhotias, Boaxas, Tharus, Rajis, Jaunsaries, Shaukas, Kharvar, and Mahigiri live in the Indian Himalayan Region (IHR). Since ancient times, these tribes have relied substantially and directly on indigenous vegetation for their everyday necessities such as food, fodder, and treatments for various illnesses and disorders. Lack of alternative revenue sources forces them to over-exploit the region's natural resources. No sustainable collection methods cause threat from harvesting and many valuable medicinal herbs are becoming rare due to their continuous utilization [5]. The genus *Asparagus* includes about 300 species around the world and, is common at low altitudes in shade and in tropical climates throughout India, Asia, Australia and Africa [6]. In Indian system of medicine *A. racemosus* is an important medicinal plant and its root paste or root juice has been used in various ailments and as health tonic [7, 8]. *A. racemosus* is a used for prevent ageing, increase longevity, impart immunity, improve mental function, nervous disorders, dyspepsia, tumors, inflammation, neuropathy and hepatopathy [9]. Literature review showed that root extract of *A. racemosus* has antiulcer activity [10], antioxidant, anti-diarrhoeal, anti-diabetic and immune-modulatory activities [11]. A study of ancient classical Ayurvedic literature claimed several therapeutic attributes for the root of *A. racemosus* and has been specially recommended incases of threatened abortion and as a galactagogue. Bitter-sweet, emollient, cooling, nervine tonic, constipating, galactagogue, aphrodisiac, diuretic, rejuvenating, carminative, stomachic, antibacterial, and tonic have all been associated with A. racemosus root [12]. The herb, also known as Shatavari, is used in many Ayurvedic rasayana preparations, including Chyawanprash, an excellent adaptogenic preparation [13-15]. Shatavari (Asparagus racemosus) is a climbing plant native to India's low forests. The word "Shatavari" refers to "a woman with 100 husbands," referring to the rejuvenating effect of Shatavar on female reproductive organs. Ayurvedic texts mention shatavari. Shatavari has phytoestrogenic characteristics and is widely used to treat menopausal symptoms and increase breastfeeding [16-17].

**Fig.1;** *Asparagus racemosus*

**Classification** (Thomson, 2002)

| | | |
|---|---|---|
| **Kingdom** | **:** | Plantae |
| **Division** | **:** | Magnoliophyta |
| **Class** | **:** | Liliopsida |
| **Order** | **:** | Asparagales |
| **Family** | **:** | Asparagaceae, Liliaceae |
| **Genus** | **:** | Asparagus |
| **Species** | **:** | Racemosus |
| **Botanical name** | **:** | Asparagus racemosus Willd |

**Regional name (**Thomson, 2002)

| | |
|---|---|
| **Hindi** | **:** Satavari, Satawar or Satmuli |
| **Sanskrit** | **:** Satavari |
| **Bengali** | **:** Shatamuli |
| **Marathi** | **:** Shatavari,Shatmuli |
| **Gujarati** | **:** Satawari |
| **Telegu** | **:** Toala-gaddalu, Pilli-gaddalu; |
| **Tamil** | **:** Shimaishadavari,Thanner Vittan Kizhango, Inli-chedi |
| **Malayalam** | **:** Chatavali |
| **Kannada** | **:** Majjigegadde,Aheruballi |
| **Kumaon** | **:** Kairuwa |
| **Madhya Prades** | **:** Narbodh ,Satmooli |
| **Rajasthan** | **:** Norkanto, Satawar |

**Taxonomy:**

*A. racemosus* is plant with a woody stem and has needle like leaves with small white flowers [18]. Tuberous roots 30-100cm thick leaves reduced to minute chaffy scales & spines [19]. The plant is a climber growing to 1-2m in length found all over India [20].

**Cultivation**

**Climate and Soil:**

Shatavari is native to the Indian subcontinent and can be found growing in surprisingly diverse environments from the humid tropical jungles of Sri Lanka to the foothills of the Himalayas. The plant is a climber; its thin branches and

feathery leaves can often be found bursting out of shrubs and trees that it uses to support its growth and search for light. Although it is happy growing in humid jungles, shatavari can also thrive in extremely arid conditions. Its capacity to capture and store moisture in dry soils is reflected in its potential for replenishing fluids in the human body and bringing balance to a stressed system. In Uttrakhand climate wise divided in tropical, subtropical and hot climate, and it was find suitable by scientist's to grow in all. Usually this plant prefers to grow in light, medium and heavy soils. But black well drained and fertile soil is good for cultivation and temperature required 25-40 0C [21, 22].

**Harvest:**

Month of May and June is suitable for plantations. Generally Shatavari crop does not affect with pest and diseases. Once harvesting 1.5-2 years after transplanting, this continues for 10-15 years [21, 22].

## 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 secondary phloem. The epidermal layers contain numerous epidermal hairs [23].

## BIOACTIVE CONSTITUENTS

Shatavari possess a wide range of phytochemical constituent which are mentioned below.

1. Shatavari roots contain 4 steroids saponin known as shatvarins. Shatvarin I to VI are present. Shatvarin I is the major glycoside with 3-glucose and rhamnose moieties attached to sarsapogenin, whereas in sahatvarin–IV two glucose & one rhamnose moieties attached [24-26].
2. Recently, Shatavarin V, Asparginins,curillins, Asparosides, Curillosides have also been reported. [27].
3. Oligospirostanoside referred to as Immunoside. [28].
4. Polycyclic alkaloid- Aspargamine A, a cage type pyrrolizidine alkaloid [29].
5. Isoflavones - 8-methoxy- 5, 6, 4-trihydroxy isoflavone-7-0-beta-D-glucopyranoside [29,30]. A cyclic hydrocarbon-Racemosol [31].
6. Furan compound- Racemofuran [32].
7. Carbohydrates- Polysaccharides, mucilage [33].
8. Flavanoids- Glycosides of quercitin, rutin and hyperoside are present in flower and fruits [34].
9. Sterols- Roots also contain sitosterol, benzaldehyde and undecanyl cetanoate [35].
10. Trace minerals - are found in roots-zinc, manganese, copper, cobalt along with calcium, magnesium, potassium zinc and selenium [36,23].
11. Kaepfrol- Kaepfrol along with Sarsapogenin from woody portions of tuberous roots could be isolated [33].
12. Miscellaneous- Essential fatty acids- Gamma Linoleinic acids, Vitamin A, Diosgenin, quercetin 3-glucourbnides [38].

## 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 dihydrophenanthrene. It is an important traditional digestive tonic for diarrhea, dysentery, dyspepsia and indigestion. Alcoholic and aqueous extracts of Asparagus racemosus root has hepatoprotective, antimicrobial and immuno-modulatory property against pathogenic bacteria, helminthes, virus, fungi and protozoa [39]. 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 [40].A significant increase in milk yield, after feeding lactate through increased growth of mammary glands, alveolar tissues and acini by galactogogue effect [41]. 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 [42]. 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 [43]. The rhizome is a soothing tonic that acts mainly on the circulatory, digestive, respiratory and female reproductive organs. The root is alterative, antispasmodic, aphrodisiac, demulcent, diuretic, galactogogue and refrigerants [44].

## MARKETED FORMULATION

Shatavari kalpa, Eranda paka, Bhrihatchagaladya Puga khanda, ghrita, Phalaghrita, Narayana taila, Shatavaryadi ghrita, Garbhachintamani rasa, Vishnu taila Shatavari modaka, Shatamoolyadi lauha, Shatavari panaka, Brihatashwagandha ghrita [45].

## CONCLUSION

Shatavari, also known as Satmuli, is a very important medicinal plant that is utilised in the treatment of many (allopathically) incurable ailments in Ayurveda and the Himalayan traditional medical system. This plant has traditionally been used as a reproductive tonic. Shatavari, also known as Satmuli, is a very important medicinal plant that is utilised in the treatment of many (allopathically) incurable ailments in Ayurveda and the Himalayan traditional medical system. This plant has traditionally been used as a reproductive tonic. It is also traditionally used to treat gonorrhoea, piles, diabetes, breastfeeding, anthelmintics (a substance capable of destroying or removing parasitic worms, particularly human intestinal helminthes), rheumatism, cough, diarrhoea, dysentery, gastric difficulties, and headache. After studying the chemistry of this herb, the Western world must now adopt these traditional remedies. The most essential point to note here is that we have numerous traditional herbs and therapies that can cure many incurable diseases, but these traditional medicines are rapidly fading because our government has no real programme for marketing these medicines.

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