



A COMPREHENSIVE REVIEW: OF PHARMACOGNOSTICAL, PHYTOCHEMICAL AND ANTITUMOR ACTIVITY OF THE LEAVES OF ASPARAGUS RACEMOSUS WILLD

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ABSTRACT

Asparagus racemosus (Shatavari) is a valuable customary therapeutic plant, viewed as developed all through the tropical and subtropical pieces of India. Today it is a broad conviction on the level of the overall population that normal substances are intrinsically better than synthetic substances and have run a standard job in the wellbeing upkeep framework for the counteraction of infections. The major bioactive constituents which give the restorative worth of the spice are a gathering of steroidal saponins, sarsasapogenins, flavonoids, kaempferol, quercetin, rutin and polyphenols. The tuberous underlying foundations of this herbaceous plant are broadly applied in the drug as well as on biotechnological scale, in arrangement of different natural arrangements since it has remarkable potential, and guard framework. It is utilized in very nearly 67 Ayurvedic arrangements and regularly alluded as 'Rasayana' in Ayurveda because of its therapeutic purposes. This survey manages the *A. racemosus*, and bioactive constituents bestow restorative worth to the spice.

INTRODUCTION

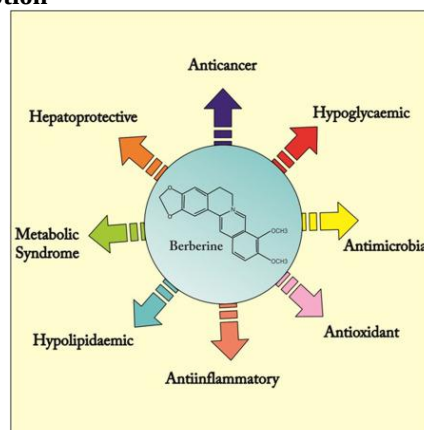
Asparagus racemosus is a significant therapeutic plant of tropical and subtropical India. Its therapeutic use has been accounted in the Indian and English Pharmacopeias and in native frameworks of medication. The sort *Asparagus racemosus* incorporates around 300 species all over the planet. The class is remembered to be therapeutically significant in view of the presence of steroid saponins and sapogenins in different pieces of the plant. Out of the 22 types of *Asparagus* kept in India; *Asparagus racemosus* is the single most generally utilized in conventional medication. Utilization of *Asparagus racemosus* was referenced in the old writing of Ayurveda. It is used to correct the gynecological issues like abnormalities in monthly cycle and sexual brokenness. Indeed, even till today the formulations containing *Asparagus racemosus* are utilized to change the feminine abnormalities by Ayurvedic expert numerous details containing *Asparagus racemosus* are by and by accessible in the commercial center for work. Helpful use of the *Asparagus* is due to the phytoestrogenic parts present in it.

Although many plants are utilized to treat cancers in Indian conventional frameworks of medication, the vast majority of these plants are not deductively assessed. On the off chance that a fundamental and concentrated ethno pharmacological review is carried on at least one plants

utilized in customary framework, make certain to give viable anticancer medications. Considering the wide spread interest on *Asparagus* the current work has been attempted for the examination of anticancer movement of the leaves of *Asparagus racemosus* Willd.

The sort *Asparagus* comprised of around 300 species all over the planet, out of which 22 species are kept in India. *A. racemosus* is broadly conveyed across the globe furthermore, its dissemination goes from tropical Africa, Java, Australia, Sri Lanka, Southern pieces of China and India, in any case, it is chiefly developed in India.

Description



Racemosus is a significant restorative plant which is viewed as a 'rasayana' which means plant drugs advancing general prosperity by expanding cell essentialness and resistance.^[3] Utilization of *A. racemosus* is referenced in the antiquated writing of Ayurveda (Charaka samhita).^[4] Customarily, *A. racemosus* is demonstrated in epilepsy, vata disorders,^[5] cerebrum tonic, helps in controlling heart problems and hypertension.^[6] It is widely utilized in male genital dysfunctions, oligospermia, spermatogenic inconsistencies and other male issues, for example, excruciating micturition.^[7,8] It is too investigated in Ayurvedic plans for stomach related inconvenience, heartburn, amoebiasis, heaps and debility^[9,10] In females,

endorsed by the specialists in ongoing early terminations, shortcoming of the uterus, unreasonable draining during menstruation.^[11] Ongoing reports and tests revealed Shatavari as antidiarrheic,^[12] antispasmodic, aphrodisiac,^[9] antidysentery, demulcent, diuretic,^[13] galactagogue, nutritive, adhesive, refrigerant, stomachic properties and functions as a tonic for human beings.^[14] It is likewise known to build up the safe framework and safeguard indispensable organs like heart,^[15] brain^[16] furthermore, different organs of the body. This survey is a conversation about the development, morphology, organic exercises, security profile and protection strategies for this plant.

MORPHOLOGY AND CULTIVATION



Figure 1. Pictures of *A. Racemosus* Showing Flowers, Leaves, Fruits, Tuberous Roots

Traditionally the decorticated roots of the plant have been used as a remedy for diseases of spleen, liver and other internal organs, including preventing miscarriage.^[17] In India, conventionally the roots have been extensively used in male genital dysfunctions, oligospermia, spermatogenic irregularities and other male disorders such as painful micturition.^[7,8] It is also explored in Ayurvedic formulations for digestive discomfort, indigestion, amoebiasis, piles and debility^[9,10] In females, prescribed by the doctors in habitual abortions, weakness of the uterus, excessive bleeding during menstruation.^[11] Recent reports and experiments disclosed Shatavari as antidiarrheic,^[12] antispasmodic, aphrodisiac,^[9] antidysentery, demulcent, diuretic,^[13] galactagogue, nutritive, mucilaginous, refrigerant, stomachic properties and works as a tonic for human beings.^[14] It is also known to reinforce the immune system and protect vital organs like heart,^[15] brain^[16] and other organs of the body. This review is a discussion about the cultivation, morphology, biological activities, safety profile and conservation techniques for this plant. *A. racemosus* (Shatavari) is a climbing plant comprising of tuberous roots.^[5] As per Indian

pharmacopeia, *A. racemosus* contains at the very least 0.1 percent of Shatavarin IV, as determined on the dried weight basis.^[14] The taste is at first dull and afterward somewhat unpleasant followed by a sweet taste. *A. racemosus* has little pin-needle like phylloclades (photosynthetic branches) which are uniform and gleaming green for all intents and purposes. The roots, 5-15 cm long and 2 cm in thickness, are showcased as pieces. These are gleaming white or on the other hand powdery gray remotely and white inside. Roots are pretty much smooth when new, and begin to create longitudinal kinks upon drying.^[10] Infinitesimally the internal parenchymatous zone of cortex is made out of 18-24 layers in the upper piece and 42-47 layers in the center tuberous part of the roots. Cells are thinwalled and made out of cellulosic strands; with roundabout to oral blueprints and unmistakable entomb cell spaces. In some roots 3-4 layers of cortex quickly contiguous the endodermis are changed into a sheath of stone cells round the endodermis. The quantity of vascular groups goes from 30-35 in the upper levels and 35-45 in the center tuberous segments of the roots.^[16] The roots after crushing are light brown in variety with a coarse surface.

The plant favors light (sandy), medium (loamy) and weighty (earth) soil. Black, very much depleted and fruitful soil are exceptionally ideal for *A. racemosus* cultivation^[4] what's more, can likewise be developed in free and medium dark soil. Crops mostly need tropical, hot climatic circumstances and require least water system with the evasion of over-watering. Raised beds which are around 3m are reaped in the long stretch of May or June. The hour of relocating is in the long stretch of July-August. It produces minute blossoms in the long stretch of July which are white and unisexual in nature.^[19] In September, it starts to bear natural products which are globular or on the other hand unclearly 3 lobed, thick berries which are purplish dark when they are aging, seeds are hard and brittle.^[14]

Plant Characteristics

Kingdom : Plantae
Clade : Angiosperms
Clade : Monocots
Order : Asparagales
Family : Asparagaceae
Sub family : Asparagoideae
Genus : Asparagus
Species : Asparagus racemosus L

Various common names at various region

Sanskrit : Satavari
Hindi : satavari, shatawar
Bengali : Shatamuli
Tamil : Inli-Chedi
Telugu : Pilli-gaddalu
Kumaon : kairuwa

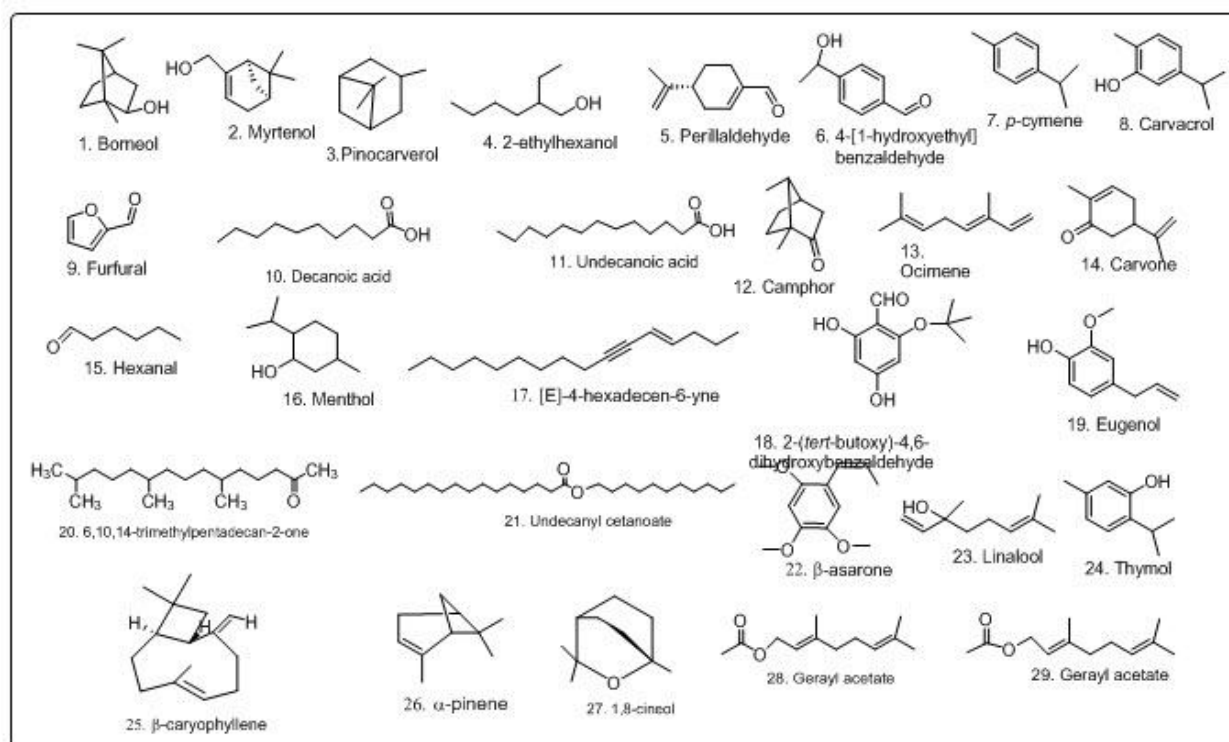
Rajasthani: Norkanto or Satawar

Gujrati : Satawari

Nepali : Kurilo

Asparagus racemosus (normally called as Shatawar) is a spice has a place with family Asparagaceae and is a much-extended prickly under bush with tuberous short rootstock containing various tuberous roots.^[20] The stems are furnished with various recurved spines, sickle-formed cladodes with scale leaves, little white blossoms and globose berries. This plant is widely grown in India's tropical and subtropical regions, as well as in the Himalayas up to 1500 meters above sea level.^[21] One of the significant restorative spices contain estrogen like compound constituents called phytoestrogens.^[22] This plant has a rich history of customary restorative use, with its tuber, leaves, and natural products being utilized for different helpful purposes. It has been applied in the treatment of conditions like gonorrhea, heaps, diabetes, stiffness, hack, the runs, gastric issues, migraines, and even to improve lactation.^[23] At the point when analyzed through pharmacological examinations in creature models, *Asparagus racemosus* separate has exhibited its viability in different limits, including going about as a cell reinforcement, hostile to anaphylactic specialist, adaptogen, hostile to push cure, antiulcer arrangement, antidiarrheal treatment, antitussive (hack suppressant), antibacterial substance, and a radioprotective specialist. Furthermore, it has been investigated as a substrate for inulinase creation. Remarkably, one of its most critical traits is its capacity to regulate the insusceptible framework.^[24]

Phyto-constituents of *Asparagus racemosus*



This plant is additionally used to treat dyspepsia, clogging, stomach fits, nervousness, disease, dementia and diabetes. The investigation of *Asparagus racemosus* fills in as a necessary connection in the investigation of restorative plants' true capacity. By examining its cell reinforcement, antimicrobial, and anticancer properties, this examination adds to the more extensive comprehension of how plants offer a different exhibit of bioactive mixtures. The increasing difficulties posed by synthetic drugs and the emergence of drug resistance underscore the significance of traditional medical systems in providing safe and effective treatments for various human ailments. This highlights the desperation to saddle the rich pharmacological potential inborn in plant-based materials, for example, those found in *Asparagus racemosus*, to address contemporary medical care requests.

Restorative plants have as of late accepted focal situation as a rich regular wellspring of novel medications. This is because medicinal plants produce bioactive, safe, and biodegradable secondary metabolites.^[25] Conventional clinical frameworks are still broadly utilized for various reasons. Populace development, inadequate medication supply, restrictive treatment costs, symptoms of a few manufactured drugs, and the improvement of protection from presently involved drugs for irresistible infections have all added to a more noteworthy accentuation on the utilization of plant materials as a wellspring of meds for many human diseases. In vitro examinations in research centers have connected these mixtures to calming, hostile to diabetic, anticancer, antimicrobial and cell reinforcement properties, as well as different other pharmacologically critical exercises. Many plants make an additive difference, suggesting the presence of antioxidative and antimicrobial constituents in their tissues. It has been accounted for that antioxidative status has an opposite relationship with the occurrence of human illnesses including disease. Plants are an expected wellspring of new cell reinforcement compounds since they produce huge measures of cell reinforcements to forestall oxidative pressure brought about by photons and oxygen. Moreover, Various medication opposition in human pathogenic microorganisms has arisen lately because of the unpredictable utilization of business antimicrobial medications usually utilized in the treatment of irresistible sicknesses. This present circumstance constrained researchers to search for new antimicrobial substances from various sources, including restorative plants, which are wealthy in clever antimicrobial specialists. The accentuation lies on the auxiliary metabolites of restorative plants, appreciated for their assorted designs and low poisonousness. Plant extracts and phytochemicals appear to be low-risk and effective treatments for cancer, bacterial diseases, and diseases caused by oxidative stress, according to a number of studies.^[27] Thus, this concentrate exceptionally expects to evaluate the cell reinforcement, antimicrobial, and anticancer capability of *Asparagus racemosus*, uncovering its beforehand neglected airborne

parts' phytochemistry and anticancer properties in both ethanolic and watery concentrates. Besides, apparently, we are quick to exhibit the phytochemistry and anticancer characteristics found in ethanolic and fluid concentrates got from the under explored flying parts of *Asparagus racemosus*.

Anti-cancer property: The root and leaf extract was displayed to have a defensive impact in the mammary cell carcinoma. Steroidal parts of the *A. racemosus* were researched for the apoptotic action and surmised to have the ability to growth cell demise. Anticancer action of shatavarins (containing Shatavarin IV) (12) which was detached from the foundations of have been assessed by MTT measure utilizing MCF-7 (human bosom malignant growth), HT-29 (human colon adenocarcinoma) and A-498 (human kidney carcinoma). The exploratory outcomes recommended that the concentrate (containing Shatavarin IV) have intense enemy of malignant growth movement.

The current examination was done to assess the anticancer movement of major shatavarins (shatavarin IV) from AR-2B part of *Asparagus racemosus* roots. In vitro cytotoxicity concentrate on utilizing MCF-7, HT-29, and A-498 cell lines showed powerful movement with AR-2B (5.05% shatavarin IV) as well as its separated compound AR2B-pooed IV (shatavarin IV).

The dependable rules for passing judgment on the intensity of an anticancer medication is prolongation of the life expectancy of cancer bearing creatures. Due to the rapid expansion of the ascitic tumor volume, EAC tumor-carrying mice also experience a significant increase in body weight.^[17] The mice bearing EAC growth when orally controlled with AR-2B showed a huge expansion in the life expectancy and a critical reduction in body weight. Therapy with AR-2B likewise showed a huge decline in the cancer volume, stuffed cell volume, and practical growth cell count, in this way demonstrating the anticancer idea of AR-2B. These findings suggest either that AR-2B has a local or direct cytotoxic effect on the tumor cells.

CONCLUSION

The significant downside of malignant growth chemotherapy experienced are myelosuppression and anemia.^[18,19] The weakness experienced in the growth bearing mice is because of the decrease in the RBC count or hemoglobin rate and this might happen because of lack of iron or due to hemolytic or myelopathic conditions. Treatment with AR-2B reestablished the hematological profiles in our review. Overproduction of free radicals leads to oxidative stress, which damages macromolecules like lipids and can cause lipid peroxidation in living cells. Tissue degeneration would result from an increase in peroxidation. Lipid peroxide shaped in the essential site would be moved through the flow and cause harm by engendering the course of lipid peroxidation. Malondialdehyde (MDA), the final result

of lipid peroxidation was accounted for to be higher in malignant growth tissues than in non-sick organs. Since *Asparagus racemosus* root instigated rise of cancer prevention agent action could be answerable for anticancer activity.^[20-22] From the above discoveries it very well may be inferred that shatavarins (containing shatavarin IV) rich portion AR-2B (containing 5.05% shatavarin IV) from *Asparagus racemosus* roots showed powerful anticancer movement.

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