



Synthesis Of Shatavari :A Review

1Mr. Shahrukh Diltaj Pathan, 2Miss. Trupti Thange

1Student , 2Professor

1Dr. Babasaheb Ambedkar Technological University

Abstract

The effects of interaction of *Asparagus racemosus* (shatavari) with milk constituents and physico-chemical and functional characteristics of milk was studied. Addition of freeze dried aqueous shatavari extract at a concentration of 1 g /100 ml of milk showed a decrease in pH, rennet coagulation time and an increase in acidity, viscosity and heat stability at maximum. The extract also imparted brown colour to milk and showed an increase in a^* (redness) and b^* (yellowness) values but a decrease in L^* (lightness) value. Proteins in milk were modified by reaction with shatavari extract. The derivatives formed were characterized in terms of SDS-PAGE. Electrophoretic pattern of sodium caseinate and whey containing 1% shatavari herb extract did not show any difference in band pattern i.e. there was no difference in mobility based on size of the proteins, but the intensity (width) of bands differed

Introduction

Shatavari means “who possesses a hundred husbands or acceptable to many”. It is considered both a general tonic and a female reproductive tonic. Shatavari may be translated as “100 spouses”, implying its ability to increase fertility and vitality. In Ayurveda, this amazing herb is known as the “Queen of herbs”, because it promotes love and devotion. Shatavari is the main Ayurvedic rejuvenative tonic for the female, as is Withania for the male. *Asparagus racemosus* (family Asparagaceae) also known by the name Shatavari is one of the well known drugs in Ayurveda, effective in treating madhur rasam, madhur vipakam, seet-veeryam, som rogam, chronic fever and internal heat[1],[2]. This herb is highly effective in problems related with female reproductive system. Charak Samhita written by Charak and Ashtang Hridayam written by Vagbhata, the two main texts on Ayurvedic medicines, list *Asparagus racemosus* (*A. racemosus*) as part of the formulas to treat women's health disorder[3]–[6]. *A. racemosus* is a well known Ayurvedic rasayana which prevent ageing, increase longevity, impart immunity, improve mental function, vigor and addvitality to the body and it is also used in nervous disorders, dyspepsia, tumors, inflammation, neuropathy, hepatopathy.

Reports indicate that the pharmacological activities of *A. racemosus* root extract include antiulcer, antioxidant, and antidiarrhoeal, antidiabetic and immunomodulatory activities. A study of ancient classical Ayurvedic literature claimed several therapeutic attributes for the root of *A. racemosus* and has been specially recommended in cases of threatened abortion and as a galactogogue. Root of *A. racemosus* has been referred as bitter-sweet, emollient, cooling, nervine tonic, constipating, galactogogue, and aphrodisiac, diuretic, rejuvenating, carminative, stomachic, antiseptic and as tonic. Beneficial effects of the root of *A. racemosus* are

suggested in nervous disorders, dyspepsia, diarrhoea, dysentery, tumors, inflammations, hyper dipsia, neuropathy, hepatopathy, cough, bronchitis, hyperacidity and certain infectious diseases[7],[8]. The major active constituents of *A. racemosus* are steroidal saponins (Shatavarins I-IV) that are present in the roots. Shatavarin IV has been reported to display significant activity as an inhibitor of core Golgi enzymes transferase in cell free assays and recently to exhibit immuno-modulation activity against specific T-dependent antigens in immuno compromised animals[9].

A. racemosus

A. racemosus is common throughout Sri Lanka, India and the Himalayas. It grows one to two metres tall and prefers to take root in gravelly, rocky soils high up in piedmont plains, at 1 300-1 400 m elevation[10,11]. Some plants parts.



Shatawari plant



Close-up on flowers

Scientific classification

Kingdom: Plantae

Clade: Angiosperms

Clade: Monocots

Order: Asparagales

Family: Asparagaceae

Subfamily: Asparagoideae

Genus: *Asparagus*

Species: *A. racemos*

VERNACULAR NAME :

English Wild asparagus

Hindi Satavar

Marathi Shatavari

Telugu Pillipichara

Bengal Shatamuli

Gujrati Ekalkanto, Satavari

Kannad Callagadda , Majjige gadde

Tamil Satavali

M.P. Narbodh, Satmooli

Rajasthan Satawar

Oriya Chhotaru, Mohajolo

Telugu Satavari, Callagad

It was botanically described in 1799[12]. Due to its multiple uses, the demand for *A. racemosus* is constantly on the rise. Due to destructive harvesting, combined with habitat destruction, and deforestation, the plant is now considered endangered in its natural habitat. *A. racemosus* is recommended in Ayurvedic texts for prevention and treatment of gastric ulcers, dyspepsia and as a galactogogue. *A. racemosus* has also been used successfully by some Ayurvedic practitioners for nervous disorders[13]. Shatawari has different names in the different Indian languages, such as Shatuli, Vrishya and other terms. In Nepal, it is called Kurilo. The name Shatawari means “curer of a hundred diseases” (shat: “hundred”; variety: “curer”).

Description

Asparagus racemosus is a climber having stems up to 4 m long. Its roots are both fibrous and tuberous.[2] Shatavari has small pine-needle-like phylloclades (photosynthetic branches) that are uniform and shiny green. In July, it produces minute, white flowers on short, spiky stems, and in September it fruits, producing blackish-purple, globular berries. It has an adventitious root system with tuberous roots that measure about one metre in length, tapering at both ends, with roughly a hundred on each plant.

Therapeutic uses

The plant, *Asparagus*, is reputed to be a tonic and a geriatric. The tubers are anti-diarrhoetic, diuretic, nutritive, tonic, aphrodisiac, appetizer and alterative. They are also reported to increase lactation. In addition, the plant

is considered slightly sweet, and is useful in the diseases of blood, kidney, liver, scalding urine, rheumatism, gleet, and gonorrhoea.

Morphological characteristics



Asparagus racemosus

Shatavar is a scandent, much-branched, spinous under-shrub with tuberous roots. The roots are fascicled, fleshy, spindle-shaped, light ash-coloured externally and white internally, more or less smooth when fresh, but on drying, develop longitudinal wrinkles and lack any well-marked odour. Branches are modified into cladodes with long basal decurved spines.

Floral characteristics

Flowers are white, fragrant, and minute, about 3 mm long and occur in solitary or fascicled, 2.5–5 cm long, racemes. Fruit is a three-lobed, red coloured berry, up to 6 mm in diameter, with mottled seeds and oily endosperm. Flowering and fruiting occur in December–January.

Climate and soil

The plant prefers annual average rainfall of 600– 1000 mm or less, of which 85% is received during July to September. A well-drained fertile sandy-loam to clay-loam soil, with a pH of 6–8 is best suited for its cultivation with staking support. Shatavar can be grown in open land as well as under shade, but very high moisture levels result in rotting of root.

Propagation material

Both seeds and crown rhizomes can be used for propagation. However, seeds are preferable on account of high production that makes up for low germination percentage in cultivation. Seeds may be collected from March to May when their colour changes from red to black.

Chemical constituents

Asparagine A, a polycyclic alkaloid was isolated from the dried roots[9][10] and subsequently synthesized



to allow for the construction of analogs.[11]

Steroidal saponins, shatavaroside A, shatavaroside B, filiasparsoside C, shatavarins, immunoside, and schidigerasaponin D5 (or asparanin A) were isolated from the roots of *Asparagus racemosus*. [12][13]

Also known is the isoflavone 8-methoxy-5,6,4'-trihydroxyisoflavone 7-O- β -D-glucopyranoside. [14]

Agro-technique

Nursery technique

- Raising propagules Seeds are sown during the first week of June in well-prepared and raised nursery beds containing good amount of FYM (farmyard manure). The beds should ideally be 10 m × 1 m in size. Seeds are sown in lines 5 cm apart and covered with a thin layer of fine sand. The beds are lightly watered at regular intervals using a rose water cane.
- *Propagule rate and pretreatment* About 7 kg of seeds are required for raising seedlings for 1 hectare of crop. The seeds of satavar have a hard seed coat. To obtain early and higher germination percentage, presoaking in water is required for softening the seed coat. Higher germination is also achieved by soaking the seeds in cow urine for 24 hours. The redgermination commences after 20 days of sowing and is completed in 30 days.

Planting in the field

- *Land preparation and fertilizer application* : The land should be given a deep disc ploughing, followed by harrowing and levelling. The field is normally divided into plots, keeping one irrigation channel in between two rows of plots. Ridges and furrows are made about 45 cm apart in the plots. About 10 tonnes of well-decomposed FYM is thoroughly mixed in the soil one month before transplanting. Shatavar further requires a fertilizer dose of 60 kg nitrogen, 40 kg phosphate, and 40 kg potash per hectare for optimum growth and higher tuberous root yield. One-third of nitrogen and entire dose of phosphate and potash should be placed 10–12 cm deep in the rows before transplanting.
- *Transplanting and optimum spacing* : The seedlings are ready for transplanting after 45 days of sowing. These are transplanted in field at the onset of monsoon in July. Ridges and furrows are made 45 cm apart and seedlings are transplanted on ridges, keeping the plant-to-plant distance at 15 cm. The ridge method of transplanting is superior in comparison to seeflat method. Optimum number of seedlings required per hectare using the recommended spacing is about 150 000.
- *Intercropping system* : Shatavar is normally grown as a monocrop, but it can be grown in inter spaces available in orchards having low light interception. Plants need staking material, thus poles or shrubs serve for support.
- *Interculture and maintenance practices* : The balance two-third N is applied in two equal split doses at ridges during September and in late February. The fertilizer is broadcast in between the rows and mixed in soil followed by irrigation, if the soil is dry. Shatavar initially grows slowly for 60 days, which keeps inter-row space virtually vacant, allowing easy weed growth. It is necessary to carry out three weeding and hoeing operations to keep the field free from weeds for initial twomonth period. After two months, Shatavar grows enough to cover the inter-row spaces and prevents weed growth.

Irrigation practices : Water requirement of Shatavar crop is not much. It can be grown without irrigation in areas that receive 800–1200 mm of well-distributed rainfall. Irrigating the field once immediately after transplanting is a must for establishment of seedlings in field. The second irrigation is done after seven days of seedling establishment. If there is no rainfall and dry spell prevails for more than 15 days,

one more irrigation should be given. During winters, irrigation at 30-day intervals is enough for good growth. Irrigation should be done during seed formation stage and before harvesting of the tuberous roots for obtaining higher seed yield and easy digging of tuberous roots. Deficient soil moisture during March–June brings down root yield significantly. Hence, three to four irrigations during this period are essential.

Harvest management

- *Crop maturity and harvesting* : The crop matures in 12 months after planting; however, for seed harvesting, it is recommended to be harvested only after 20 months. Rabi season, that is, November–December, is the best time for harvesting tuberous roots when the above-ground parts start turning pale yellow. The crop, when harvested in 12 months, yields about 4–5 tonnes/hectare, while harvesting after 20 months yields about 6 tonnes/hectare of tubers along with 35 kg/hectare of seeds, which are not obtained in the 12-month-old crop.

Post-harvest management : After harvesting, the tubers are washed well in running water thereafter, these are dried in open sun for one to two days. The tuberous roots are then kept in luke warm water for one hour to soften the outer covering of the tubers. It facilitates removal of outer skin. The harvested roots are peeled manually by pulling their outer thin covering. These peeled tubers are then kept in shade for four to five hours, followed by further drying at 40 °C in hot air oven for 20 minutes or more, depending upon their moisture content. The roots should be completely dry for storage. If the tuber breaks with a cracking sound, it means that it has completely dried. Dried tuberous roots are packed in cardboard boxes and stored. Boiled tubers turn yellowish and fetch much higher market rate. Dry root in pieces of 5–15 cm × 1–2 cm are marketed as 'A' grade.

- *Chemical constituents* : Sapogenins are the active principles found in the tuberous roots. Chemical evaluation studies suggest that the sapogenin content varies in the range of 0.7%–0.9% in the tubers.
- *Yield and cost of cultivation* : The tuberous root yields 10%–12% of dry matter after removal of outer wall. An average shade-dried tuberous root yield of 3 tonnes per hectare is obtained from 20-month-old plants under experimental conditions. A two-and-a-half-year-old crop gives a dry yield of 4–5 tonnes per hectare. It gives a seed yield of 30–35 kg/hectare. The estimated cost of cultivation is about Rs 100,000 per hectare, including land preparation, nursery raising, cost of planting material, FYM, cost of transplanting, harvesting, peeling and processing for market, and so on. The calculated yield of 20 month-old crop of Shatavar is 3 tonnes/hectare, which can fetch net returns of approximately Rs 62,500 /hectare. Dry root in 5–15 cm × 1–2 cm pieces are marketed as 'A' grade variety.



Reference

- AOAC .Official methods of analysis. 17. Washington DC: Association of Official Analytical Chemists; 2000.
- Berridge NJ. Some observations on the determination of the activity of the rennet. *Biochem J.* 1952;77:57–62.
- Corredig M, Dalgleish DG. Effect of different heat treatments on the strong binding interactions between whey proteins and milk fat globule in whole milk. *J Dairy Res.* 1996;63:441–449. doi: 10.1017/S0022029900031940.
- Davies DT, White JCD. The stability of milk protein to heat. I. Subjective measurement of heat stability of milk. *J Dairy Res.* 1966;33:61–81.
- Goyal RK, Singh J, Lal H. *Asparagus racemosus*—an update. *Indian J Med Res.* 2003;57:408–414. [
- Grandison A, Ford GD, Owen AJ, Millard D. Chemical composition and coagulating properties of renneted Friesian milk during the transition from winter ration to spring grazing. *J Dairy Res.* 1984;50:69–78. doi: 10.1017/S0022029900023335.
- Haslam E, Lilley TH. Natural astringency in foodstuffs-A molecular interpretation. *CRC Cri Rev Food Sci Nutr.* 1988;27:1–40. doi: 10.1080/10408398809527476.
- ISI . Handbook of Food Analysis. Part XI. Dairy Products. New Delhi: Bureau of Indian Standards; 1981.
- Kapoor LD. Handbook of Ayurvedic Medicinal plants. New York: CRC Press; 2001.
- Laemmli VK. Cleavage of structural proteins during the assembly of the head of bacteriophage T₄. *Nature.* 1970;227:680–685. doi: 10.1038/227680a0.