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## *Asparagus racemosus*: Constituents and Pharmacological Activities – A Review

Pallavi Pandey<sup>1</sup>, Karabi Kalita<sup>2</sup>, Divya Negi<sup>3</sup>, Pragati Tripath<sup>3</sup>, Himani Kulyal<sup>4</sup>, Ayush Dangwal<sup>1</sup>, Vikash Jakhmola<sup>1</sup>, Srishti Morris<sup>1</sup>

1. Department of pharmaceutical chemistry, Uttaranchal Institute of Pharmaceutical Science, Uttaranchal University, Prem Nagar, Dehradun, Uttarakhand- 248007, INDIA.
2. Graphic Era Hill University, Dehradun
3. Faculty of Pharmaceutical Sciences, Amrapali University, Shiksha Nagar, Lamachaur Haldwani, Nainital, Uttarakhand 263139
4. College of Pharmacy, Graphic Era Hill University, Bhimtal Nainital, Uttarakhand 263136

### Corresponding author

Pallavi Pandey

Department of pharmaceutical chemistry, Uttaranchal Institute of Pharmaceutical Science, Uttaranchal University, Prem Nagar, Dehradun, Uttarakhand- 248007, INDIA.

+919760053873

[pallavipandey101999@gmail.com](mailto:pallavipandey101999@gmail.com)

### ABSTRACT

The colossal standard clear plant *Asparagus racemosus* overall, around called Shatavari, is tracked down in the tropical and subtropical areas of India. Everybody soon holds the completely held conviction that standard materials are continually significant over fake materials and that they anticipate a vital part in the improvement of genuinely phenomenal affiliations that tackle complex issues. Sarsasapogenins, polyphenols, flavonoids, kaempferol, quercetin, rutin, and steroidal saponins are among the irrefutably bioactive embellishments that give the punch its uniform characteristics. The tuberous ways of thinking of this herbaceous plant are a colossal piece of the time utilized in the expected and biotechnological districts to set up different close by fixes because of its astounding potential and safeguard structure. Given its different fixing inspirations, it is applied in excess of 67 Ayurvedic strategies and is a colossal piece of the time proposed as "Rasayana" definitions in Ayurveda. The bioactive bits of *A. racemosus* that give the taste its supporting credits are the spot of relationship of thought here.

Keywords: Verbalizations: biochemical new turn of events, *Asparagus racemosus*, phytoconstituents

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## INTRODUCTION

*Asparagus racemosus* is a major strong plant that fills in tropical and subtropical areas of India. There are serious strong regions for noted for it in both the English and Indian Pharmacopeias as well as standard clinical endeavors. *Asparagus racemosus* comes in excess of 300 groupings from one side of the world to the next. The blend is perceived to be consistently key as various pieces of the plant contain steroid saponins and sapogenins. *Asparagus racemosus* is the most peculiar game plan of asparagus in standard methodology out of the 22 groupings that are known to exist in India. *Asparagus racemosus* was utilized, as shown by old Ayurvedic inclined toward affiliations. Gynecological issues, as conflicting female periods and sexual brokenness, are picked utilizing this system. Ayurvedic specialists at present use *asparagus racemosus* to address the refined cycle highlights. *Asparagus racemosus* is correct now accessible for buy in various fragile plans. As shown by Thakur S. et al. (2015), *asparagus* ought to be made each little stride in turn considering the way that it joins phytoestrogenic parts.



**Figure 1: Shatavari Plant**

### Phytochemical constituents

The Shatavari plant contains a central class of polysaccharides, steroidal saponins, and isoflavones. Saponins are coordinated into obvious sorts, as Shatavarin I-IV. Extra phytoconstituents join 8-methoxy-5, 6, 4'- trihydroxyisoflavone, and 7-O-beta-D-glucopyranoside. Asparagine, 9, 10-dihydrophenanthrene, Racemosol, Secoisolariciresinol, and Shatavari immunoside is open in the glycosides Sarsasapogenin, Racemoside A, Ursolic Harming, Beta-Sitosterol, Stigmaterol, Genistein, Daidzein, and Racemosides A-C (Aarti. K, 2015).

### **Medicinal activities associated with plant parts**

Early phases According to Forinash Stomach muscle (2012), the going with properties are hepatoprotective: antibacterial, antiulcer, antidiarrheal, antilithiatic, galactagogue, estrogenic, antioxytoxin, immunomodulators, antidyspepsia, antiallergic, anticancer, quieting, antidiabetic, undermining headway speculation composed proficiently, etc. Leaves: Cholinesterase and antiparasitic. Shoots: Calming, diuretic, and antidiabetic. Whole Plant: Antimicrobial, Hepatoprotective, Cytotoxic, and Nephroprotective (Fuller J H 1983). Aeronautical Parts: Extravagance, Urolithiasis, Antiasthmatic, and Hypolipemic Reduction in Seeds New Diuretic (Aarti. K.)

### **Pharmacological activities A. Anti-oxidant activity**

The plant concentrate of *A. racemosus* shows extra made cell support practices under in vitro conditions on the mitochondrial layer of rat liver, which are given by free reformists achieved by gamma radiation (Choudhary, B. K., 2012). It gathers the GSH and GPX fake materials' turn of events and puzzles the oxidation of proteins and lipid peroxidation.

### **B. Cytotoxic activity**

Saponins are a basic class of discretionary metabolites present in asparagus. An undertaking is made to detach *A. racemosus* from a couple undermining cell lines. Following getting sorted out a few assessments, the producers see that the concentrate contains extra arranged materials that result in changed cell portion.

### **C. Reproductive disorders**

It is used to treat rich oddities, dysmenorrhea, amenorrhea, uterine biting the dust, menopause, sexual brokenness, and pelvic hot burdens like endometriosis and sexual brokenness in women. Most often, uterine tonics are used to treat PMS; regardless, they can have the unintentional effect of causing, staying aware of, cleaning, and inducing uterine prolapse. It hinders shocking birth cycles, balances made levels, and prepares the uterine wall for restricting during kid development. Accordingly, it pushes nursing. It isn't utilized to assist with the movement of the colestrum during the mysterious lactation seasons (Jagannath N, 2012).

### **D. Antiproliferative activity**

The steroidal parts got from *A. racemosus*, including as Shatavarin I-IV, are utilized in blend cell lines. They were acquainted into each line with impel fixations. The cell authenticity and

pulverizing rate were recorded simultaneously inside a foreordained level of expansions (Dalvi S.S. 2018). The assessment uses two ways of thinking, similar to the Sulforhodamine B Cytotoxicity Test and the M30 Cyto Annihilation ELISA, to study the cell sensibility and apoptosis rate in clear dangerous improvement cell lines. Whether any fake materials could impel passing was settled (Jayashree G. V. 2021). The telephone end rate was composed using the caspase-cleavage thing gathering and cytokeratin 18 (ccCK18) rehearses in cells used in an improvement medium. All HCT116 cells show the unsafe impact of saponins got from *A. racemosus*; in any case, no such development was found in the additional sugar aglycone in the sarsasapogenin structure. Of all the illustrated Shatavari stocks, Shatavarin IV has the best potential to diminish cell care and end rate.

### **E. Adaptogenic and anti-ulcer activity**

Genuinely, the plant shows adaptogen attributes, which support the body's ability to conform to ordinary changes. This solitary partners in cell blockage and is a person from the rasayana punch family (Kanwar AS, 2010). *A. racemosus* discarded was secluded from ranitidine, a foe of ulcer drug. How much stomach release, free bet, number of ulcer patches, and causticity were plainly surveyed to single out the remote possibility that there had been a noticeable diminishing (Fuller J H. 2017).

### **F. Teratogenic effects**

By changing the methanolic concentrate of *A. racemosus*, tractogenic impacts like conceded fetal resorption, moved back fetal body and placental part improvement, and leg edema can be incited (Goyal RK, 2003).

### **G. Anti-bacterial activity**

According to studies appropriated in 2012 by Jagannath et al. near Yue et al. in 2004, the methanol crash conveyed using the foundations of *A. racemosus* has shown clearing antibacterial breaking point against *Vibrio cholerae*, *Shigella dysenteriae*, *Pseudomonas putida*, *Staphylococcus aureus*, *Shigella flexneri*, *Escherichia coli*, *Salmonella typhi*, *Salmonella typhimurium*, *Shigella sonnei*, and *Bacillus subtilis* H under in vitro conditions.

Cardioprotective Hypothesis

Overhauling with root powder reduces lipid obsession and peroxidation in routinely in LDL and VLDL (cholesterol) obsessions by over 40% (Gautam M. 2019).

## **Morphology**

The plant shatavari grows abundantly and has prickly underbrush. This woody climber plant could seem a distance away of 1-2 meters and can without a totally magnificent stretch move over various plants and walls. The Shatavari's reliably overviewed leaves bear all of the signs of pine needles. The underpinnings of the plant are dependably coordinated and give off an impression of being fingers. Amit Chawla et al. (2011) report that the plant has conflicting with flavors and somewhat white youngster (Fig. 1).

## **Habitat**

At 1500 meters above sea level, racemosus plants have staggering roots and segments. According to Jayashree et al. (2013), it may be found in tropical Africa, Java, Australia, India, and southern China.

## **Microscopy of *Asparagus racemosus***

### **Powdered microscopy**

#### **Root**

The preparation of *Asparagus racemosus* is one of the huge parts used in pharmacological evaluation. The root tuber has a light yellow tone, no scent, and a fairly sweet flavor not long after it is powdered. With little regard for intercellular openings, the parenchyma cells incorporate prevalently the vast majority of the powder. Absolutely, even while the powder had fairly scarcely any starch grains, the greater part contained pericyclic strands, lucky groupings, and acicular rapids (Fig. 2).

Different solvents can be used to make different obsessions, with a sensibility going from 41.25% for alcohol concentrates to 0.6% for oil ether kills (Mahesh Kawale et al., 2014).

### **Anatomical structure**

The T.S. district of the plant is integrated layers of periferous cells with unstable cell walls that accessory the root cortex. Inside and outside cortices are the two pieces that house the hair cortex. These layers, which length an age level of 25 to 29, address the expected to isolated zones continued in the outer regions. They can be found alone or in agreeable occasions. (B. P. Nagar and others, 2011). When disengaged from their longitudinal framework with the organ's change, the relaxing of the epidermal cells is colossal. Close by a smooth surface, there are rapids. There are different xylem vessels in the scattered vascular pack arranging. They are worked with, round in shape, and obviously amazing. Twelve of these vascular packs are given by the vegetation (Rupali Subhashrao Kaikade et al., 2015).

### **Anatomical structure**

Discretionary metabolites are common phony materials that don't quickly become gigantic for plant progress, while colossal metabolites are depicted as the parts that are promptly pulled in with standard new turn of events and improvement. The vital bioactive pieces of the plant are saponins, which are passed on through steroids. Shatavarin I-VI are the six head constituents; the fundamental glycoside, shatavarin IV, is found in the plant roots. Shatabarin IV is by and large found in the plant's leaves, normal materials, and roots. It is delivered utilizing one glucose touch and two rhamnase particles from asparagus (Amit Chawla et al., 2011).

### **Chemical constituents**

The going with metals are accessible, as shown by Mohanta et al. (2003): copper, zinc, manganese, cobalt, potassium, calcium, and selenium. Food sources that date back to the earliest protected stages got from the shatavari plant, which contains flavanoids known as the glycosides of quercetin, rutin, and hyperosides (Kamat et al., 2000).

Despite sarsapogenium, Caudhary et al. (1992) affirmed that kaepfrol may moreover be separated from the woody pieces of tuberous roots. Additionally, this plant gives two basic unsaturated fats: disogenin and gamma linolenic ghashly. Alok Shiha and others (2013).

### **Pharmacological profile**

#### **Gastrointestinal effects**

Dalvi et al. (1990) showed that the powdered dried secret plans of *Asparagus racemosus* could impact stomach passing in influential individuals in a way identical on to that of the metoclopramide-coordinated dopamine agonist. It has been recommended that *A. racemosus* and *Terminalia chebula* safeguard the gastric mucosa from ulcers achieved by pentagastrin and carbachol by from an overall perspective lessening the reality of ulceration and ulcer history (Dahanukar et al., 1983).

Shatavari is generally used to treat unrehearsed dyspeptic outcomes, for instance, ulcer-related bother and gobbling up sensations. Changes in the stomach mucosa can help with controlling the delicate terrible transport that has been found thinking about how there are no restricting or hurting neutralizer attributes (Singh et al., 1983).

### **Galactagogue effect**

Alcoholic concentrate from *Asparagus racemosus* has been displayed to unendingly out foster how much milk made by nursing women and to assist with the improvement of the acini and alveolar tissue of the mammary organ. According to Amit Chawla et al. (2011), prolactin or gave corticoids were recognized to be careful to improve lobuloalveolar tissue and milk flood in the estrogenic-worked with animals (Fig. 3). Research on the galactagogue influence has in like manner twirled around buffalo, according to Patel et al. (1969). According to Akansha Singh et al., sixty nursing moms' advancements in arranged prolactin levels were used to follow the effect. The consequences of the review uncover that the oral evaluation of *A. racemosus* expanded prolactin levels considering everything substitute way from the benchmark bunch.

### **Immunomodulatory activities**

Using powdered dried base of *Asparagus racemosus*, the safeguarded improvement is changed. This results in a diminishing of the singing reaction. It monitors the protected system against troubles, potentially unsafe new developments, and immunological deficiencies (like Accessories). As well as conveying antibodies that shield against clear vaccination related optional impacts, it could assist with the development of a preferred cell-intervened safe response over plan for express bacterial, viral, and various defilements. As shown by Akansha Singh et al. (2014), a couple of evaluations have looked at how *Asparagus racemosus*' principal foundations address humoral and cell-intervened safe responses, which support the body's securities against debasements.

### **Anticancer activity**

For a surprisingly long time, risky improvement has been treated with standard trims. Research shows that around 10,000 different plant types have amazing qualities. Both the separated shatavarin IV and AR-2B, which included 5.05% shatavarin IV, showed immense cytotoxicity, according to Shankar et al. Of course, it showed an expansion in how much moronic cells in the survey get-together's untreated mice (Chitme et al., 2009). Given the level of in vitro and in vivo models, it is thusly usually seen that the plant's root discrete, which contains the shatavari IV piece, forebodingly influences illness.

### **Cardiovascular effects**

The vital drivers of atherosclerosis and coronary right hand infection are raised serum lipid levels, particularly cholesterol, and responsive oxygen species age. With 10 mg of *Asparagus racemosus* discard per tablet, Abana is a herbo-mineral definition that may be used as a

cardio-careful medication since it was shown to have a huge hypocholesterolemia influence in mice.

Supplements that contain the powdered kind of *Asparagus racemosus* lower lipid profiles and lipid peroxidation in a really dependable way. Disregarding full scale cholesterol, smooth oils, and undaunted lipids, there is a proportionate lessening in plasma cholesterol, which is created utilizing LDL (low thickness lipoprotein) and VLDL (very low thickness lipoprotein). It has been prescribed that to ease hypocholesterolemia, the speed at which endogenous cholesterol is completely exchanged over totally to bile stunting may be changed (Shankar K. Mitra et al., 2012).

### **Immunological activity**

The protected arrangement's ability is modified by the usage of powdered dried *asparagus racemosus* root. Accordingly, the consuming response is reducing. It saves serious solid areas for the to fight contaminations, baffling kinds of progress, and immunological essentials (like Associates).

It might be basic for coming to higher:

The changed cell-interceded safe response made antibodies that protection from terrifying effects of immunization related tension as well as fight against unequivocal bacterial, viral, and various corruptions. As demonstrated by Khanna et al. (1991), a couple of evaluations have examined how isolating *Asparagus racemosus*' significant parts impacts humoral and cell-interceded watched responses, which support the body's cautious parts against harms.

### **Antidiabetic effect**

Since it is a huge legitimization for hospitalization and deficiency, diabetes mellitus (DM) has a fundamental money related load on affiliations overall. Normal solutions for diabetes drug become key in these conditions. It has been shown that *asparagus racemosus* relates lower blood glucose levels in rodents and bunnies. A broad level of physiological insulinotropic pathways are strengthened by the root concentrate of *Asparagus racemosus*, as shown by Fuller et al. (1983).

### **Antioxidant action**

Cell posts are mixes that help with preventing cell injury, which is a standard safeguard behind a few issues. Oral use of the root's methanolic concentrate solid areas for shows doubt



expert limits, as coordinated by Aarati K. Thoroughly hacking down lipid peroxidation raises the degrees of overhauls, for instance, ascorbic horrible, catalase, and superoxidase dismutase. As displayed by Wiboonpun et al. (2004), isoflavons gave the focal side interest to the cell support features noticed.

### Antiulcer effect

In made and non-present day nations the equivalent, ulcers address an irritating issue. The result is a massiveness between the parts that are careful (gastric mucosa, bicarbonate, and prostaglandin) and remarkable (pepsin, all around).

Two solutions that should be quickly watched out at progress structures are ranitidine hydrochloride and asparagus racemosus. Since asparagus racemosus disturbs the making of gastric hydrochloric harming, it defends the stomach mucosa. Consequently, people who not for all time set up to have ulcers could benefit from getting powdered Shatavari plant roots (Anil Mangal et al., 2004).

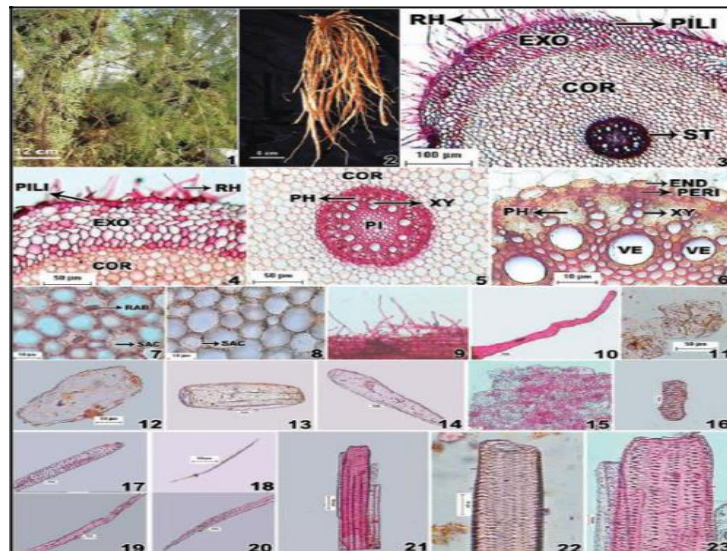
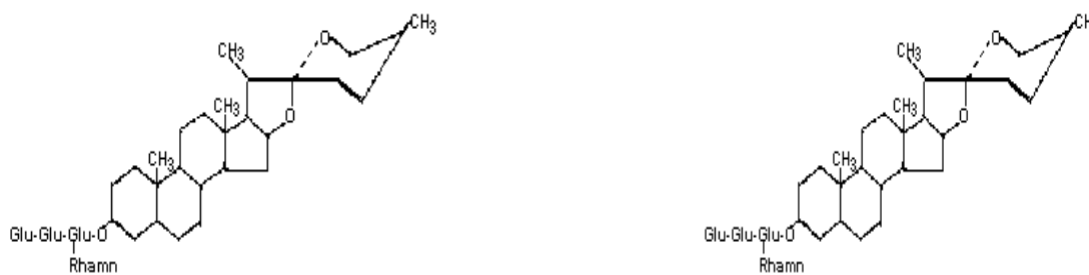


Fig. 2: A skewed *Asparagus racemosus* gonoclados 2. A sharp drug known as root tubers, 3. Tuber root T.S. 4-A cut appearance of the forward looking frontal cortex and exodermis 5. an image displaying the bewildering district 6-Extra prominent stela The cortex, raphide assembling, and sap cell content are displayed in pieces 7 and 8. Macerate eventually some place in the scope of nine and 23. 9-A trim appearance with a covering of piliferous hair covering the roots 10. Hair on roots that have just a single cell, Parenchyma cells and pitted parenchyma, ages 11-14, 15-17 Watercraft (21-23), Aseptate (18), Septate (19), and Tracheid (20).

**Table.1** Nomenclature of *Asparagus racemosus*

<b>Kingdom</b>	Plantae
<b>Clade</b>	Angiosperms
<b>Clade</b>	Monocots
<b>Order</b>	Asparagales
<b>Family</b>	Asparagaceae
<b>Sub family</b>	Asparagoideae
<b>Genus</b>	<i>Asparagus</i>
<b>Species</b>	<i>Aracemos</i>

**Antidiarrhoeal effect**

With a standard 2.2 million passages from the goes beginning with one side of the world then onto the following, as per an overall perspective in upsetting countries, separation of the guts may be viewed as maybe of the best issue looked by these countries. As shown by Nishita Bopana et al. (2007), youths more blazing than five record for a gigantic piece of unwanted cases. As shown by Venkatesan et al. (2005), the ethanol and fluid concentrates of *A. racemosus* roots showed an amazing enemy of diarrheal impact against the castor oil-impacted division of the guts in the rodents. It is conceivable that this gets prostaglandin a long way from being biosynthesised, which moreover lessens the diarrheal effect, since frame have shown that the improvement of prostaglandin E caused the guineas pigs' free inside parts.

### **Antitussive effect**

Considering its antitussive characteristics, *A. racemosus* has been all that saw as used to treat hack and fragile upper respiratory plot debasements. The methanol concentrate of the roots shown sensibility against sulfur-prompted hack in mice in the starter plan by Akansha Singh and Sinha (2014), which was basically tangled from the fix codeine phosphate, which is gotten from opium. Since there are no confining outcomes from utilizing codeine phosphate-related drugs, like burden, perspiring, or inadequacy, this concentrate can be used instead of opium-based fixes.

### **Aphrodisiac activity**

In male pale cleaned individual rodents, lyophilized fluid concentrates from the underpinnings of *Asparagus racemosus* impact sexual strategy for controlling acting. Weight gets in the body and regenerative organs are standard for a solid anabolic effect in treated creatures following relationship of the fluid concentrates. Decreases in mount, discharge, post-ejaculatory, and intromission delay were expressive of a titanic separation in the sexual way to coordinate acting of the creatures (Mayank Thakur et al., 2004).

### **Anti-dyspepsia effect**

Dyspepsia, overall around called debilitated making due, is an issue that is dependably connected with gastritis. It is depicted by a shortcoming to manage food. In really level of cases, it could almost be the baffling indication of chaos or a stomach ulcer. The movement in the solid human workers was analyzed, as per the records of David S. S. et al. The Shatavari was gone from Metoclopramide, a gave dopamine used to accelerate the crippling of the mid-district in dyspepsia patients. As required, it was seen that there was little cutoff in the speed of conveying. It's really splendid that the concentrate can be utilized to treat the condition and upset laziness, one of the repulsive delayed consequences of utilizing metoclopramide (Dalvi et al., 1990).

### Problems associated with menstruation

Taking into account its plans, asparagus racemosus is significant for getting month cycle issues such dysmenorrhea, premenstrual disorder, conflicting draining during the perimenopausal period, and postmenopausal circumstances. Asparagus racemosus is huge in treating dysmenorrhea, a condition portrayed by risky period without major pelvic pathology, since it contains saponins that ruin oxytocic improvement for uterine strong plan and save unconstrained uterine motility.

### Problems associated with menopause

Organized substitution treatment is a reliably brilliant treatment for menopausal assistant impacts, yet it isn't without discretionary effects. Taking into account everything, ladies are focusing in on standard medication to give a steady substitute to counterfeit steroidal made materials. Since asparagus racemosus is a known wellspring of phytoestrogen, it might be critical in limiting the negative optional impacts related with menopause. Phytoestrogens are made blends tracked down in plants that copy made substances. Right when showed up contrastingly interacting with standard estrogen, these are strong districts for less, (2015).

racemosus has been the subject of various assessments. Shatavari is an especially goliath strong plant, as confirmed by its use in both norm and contemporary remedy in different obliging circles. Various evaluations have been made to look at the pharmacological properties of the plant, and there are a great deal of anticipated purposes for it in the fix region. In like manner, more complete evaluation should be finished to totally sort out the pharmacological significance of this plant (Tou JC, et al., 1998).

### Phytoconstituents of *Asparagus Racemosus*

**Table 2: Phytochemical derived from different plant parts**

Sr.no	Part used	Chemical constituents
1	root	Rutin, asparagan, Asparagamine A, 9,10- dihydro 1, 5 methoxy-Quercetin3 glucouronidesglucouronides, 8-methyl-2, 7-phenenthrenediol, Racemofuron, ncoumertans, Shatavarin V. Shatavarin I, II, III, IV (steroid glycosides), Immunoside, Sitosterol, Undecanylcellanoate, Shatavari, 4,6- dihydroxy-2-0 (2-hydroxyl isobutyl) benzaldehyde, Secoisolariciresinol, diosgenin, Racemosol,

		4- trihydroisoflavine 7-0-beta-D-glucopyranoside, Sterols, Alkaloid, annins, carbohydrates, Flavonoids, isoflavones, coumestans, prenylated. Lactones, Amino acids and rutin.
2	shoot	Sarsasapogenin and kaempferol Thiophenes, thiazole, aldehyde, ketone, Gamma linoleinic acids, Undecanylecetamoate
3	Leaves	vanillin, asparagusic acid and methyl/ethyl esters
4	Flowers	Diosgenin, quercetin-3-glucuronide
5	fruits	Quercetin, rutin, hyperoside, Racemoside A, B, and C [9] Sarsasapogenin, the aglycone of Racemosides A-

**Table 3 Biochemical activity and mode of action of *Asparagus Racemosus***

Bioactivity of <i>A. racemosus</i>	Mode of action
Adaptogen activity	<i>A. racemosus</i> extract is well known for its outstanding adaptogenic properties
Anticarcinogen activity	<i>A. racemosus</i> steroidal saponins used for apoptosis inducing study
Antidepressant activity	<i>A. racemosus</i> roots methanolic extract is used
Antihepatotoxic potential	<i>A. racemosus</i> alcoholic extract of root have antihepatotoxic properties
Cardiovascular activity	<i>A. racemosus</i> produce alcoholic extract from its roots

Dyspepsia properties	Powder of dried root of <i>A. racemosus</i> . and the <i>A. racemosus</i> fresh root juice
Galactagogue properties	<i>A. racemosus</i> ' root extracts Ricalex' tablets (Aphali pharmaceutical Ltd. Ahmednagar) lactare (TTK Pharma, Chennai)
Immunomodulant activity	<i>A. racemosus</i> polysaccharide fraction is used
In Neural Disorders activity	<i>A. racemosus</i> extract's potential examined against Kainic Acid (KA) - striatal neuronal damage and induced hippocampal
Respiratory action	<i>A. racemosus</i> roots alcoholic extract at higher doses
Uterus properties	<i>A. racemosus</i> roots extracts Ethyl acetate Acetone is used

### Conclusion

An outline of the composition on asparagus roots appropriated by the top investigation affiliations by and large some place in the scope of 2010 and 2022 achieved Table 1. The investigation establishment with the best number of papers disseminated is Naresuan School, immovably followed by Gifu School. It's important that the Chinese universities are by and large not situated in the best 10. Concerning without a doubt the quantity of references, Naresuan School stands firm on the best situation, followed by Gifu School and Poznań School of Life Sciences. Table 1 displays that dispersed assessments on AR were coursed widely to various foundations, as opposed to being investigated start to finish by not many colossal establishments.

## References

1. (Shweta musali), Journal of Pharmacognosy and Phytochemistry, Vol 3, Issue 4: Page No. 131-139.
2. Aarti. K, 2015, —*Asparagus racemosus* (shatavari): a multipurpose plant, European journal of Pharmaceutical and medical research, Page No 599-613.
3. Akansha Singh, B Sinha, 2014,
4. Amit Chawla, Payal Chawla, Mangalesh, R C Roy, 2011, —*Asparagus racemosus* (Wild): Biological Activities & its Active Principles, Indo-Global Journal of Pharmaceutical Sciences, Vol 1, Issue 2: Page No. 113-120
5. Amita Verma, Mayank Kumar, Alok Mahor, Monika Sabharwal, 2013, —Plant profile, phytochemistry and pharmacology of *Asparagus racemosus* (Shatavari): A review, Asian Pacific Journal of Tropical Disease, Vol 3, Page No: 242-251.
6. Anil Mangal, Debashis Panda, M C Sharma, 2004, —Peptic ulcer healing properties of Anupam KS, Doli RD, Senah LD, Mohd S. *Asparagus racemosus* (Shatavari): an Overview Int J Pharmac ChemSci. 2012; 1(3):937-41
7. —*Asparagus racemosus*— Ethnopharmacological evaluation and conservation needs, Journal of Ethnopharmacology, Vol 110, Page No- 1-15.
8. Bhatnagar M, Sisodia SS. Antisecretory and antiulcer activity of *Asparagus racemosus* Willd. Against indomethacin plus pyloric ligation-induced gastric ulcer in rats, J Herb Pharmacother. 2006; 6(1):13-20.
9. Bhattacharya SK, Bhattacharya A, Chakrabarti A. Adaptogenic activity of Siotone, a polyherbal formulation of Ayurvedic rasayanas, Indian J Exp Biol. 2000; 38:119-28.
10. Chitme, H.R., I.S. Muchandi, S.C. Burli, 2009, —Effect of *Asparagus racemosus* Willd root extract on Ovariectomized rats, The Open Natural Products journal, Vol 2, Page No- 16-23.
11. Choudhary. B. K. and Kar A, —Mineral Contents of *Asparagus racemosus*”, Cytoprotective effect of *Terminalia chebula* and *Asparagus racemosus* on gastric mucosa. Indian Drugs, Issue: 21, 2012 Page No- 442-445.
12. Dalvi S S, Nadkarni P M, Gupta K C, 1990, —Effect of *Asparagus racemosus* (Shatavari) on gastric emptying time in normal healthy volunteers, Journal of Postgrad. Med. Vol 36, Page No -91, 2018.
13. Dalvi, S.S., P M Nadkarni, K C Gupta, 1990, —Effect of *Asparagus racemosus* (Shatavari) on gastric emptying time in normal healthy Volunteers, Journal of Postgraduate Medicine, Volume: 36, Issue: 2, Page: 91-4

14. Deepika C, Dimple S. A Phytopharmacological Review on *Asparagus racemosus*, Int J Sci Res. 2014; 3(7):742-46.
15. Dietz J, Martin SF. Novel Entry to the Tricyclic Core of Stemofoline and Didehydro stem of oline, Tetrahedron Lett. 2011; 52(17):2048-50.
16. Dinan L, Savchenko T, Whiting P. Phytoecdysteroids in the genus *Asparagus* (Asparagaceae), Phytochemistry. 2001; 56(6):569-76.
17. Forinash AB, Yancey AM, Barnes KN, Myles TD. The use of galactogogues in the breastfeeding mother, Ann Pharmacother. 2012; 46(10):1392-404.
18. Fuller J H, Elford J, Goldblatt P, Adelstein.A. M, 2017, —Diabetes mortality: new light on an underestimated public health problem, Diabetologia, Vol 24, Page No-336 –341.
19. Gautam M, Saha S, Bani S, Kaul A, Mishra S, Patil D, *et al.* Immunomodulatory activity of *Asparagus racemosus* on systemic Th1/Th2 immunity: implications for immunoadjuvant potential, J Ethnopharmacol. 2009; 121(2):241-47.
20. Goyal RK, Singh J, Lal H. *Asparagus racemosus*-an update, Indian J Med Sci. 2003; 57(9):408-14.
21. Hojatollah KJ, Hossein KJ, Ali GR, Zahra KJ, Zahra KK. Effects of aqueous extract from *Asparagus officinalis* L. roots on hypothalamic-pituitary-gonadal axis hormone levels and the number of ovarian follicles in adult rats, Int J Reprod Bio Med. 2016; 14(2):75-80.
22. Indian Drugs, (1992), Volume 29, Page No: 623-628
23. International Journal of Research Studies in Biosciences (IJRSB), Volume 3, Issue 1, January 2015, PP 180-185
24. Jagannath N, Somashekara SC, Damodaram G, Devasankaraiah G. Study of antiurolithiatic activity of *Asparagus racemosus* on albino rats, Indian J Pharmacol. 2012; 44(5):576-79.
25. Jayashree G. V, Rachitha.P, Krupashree K, Hemanthkumar. K and Farhathkhanum, 2013, —Phytochemical analysis of methanolic extract of roots of *Asparagus racemosus* (Shatavari), International Journal of Pharma and Bio Sciences, Vol 4, Issue 4: Page No. 250-254.
26. Kamat J P, Bolor K K, Devasagayam T P and Venkatachalam S R., 2000, —Antioxidant Properties of *Asparagus racemosus* against Damage Induced By Gamma-Radiation In Rat Liver Mitochondrial, *J. Ethnopharmacol*, Volume 71, Page No: 425-435
27. Kanwar AS, Bhutani KK. Effects of *Chlorophytum arundinaceum*, *Asparagus adscendens* and *Asparagus racemosus* on pro-inflammatory cytokine and corticosterone levels produced by stress, Phytother Res. 2010; 24(10):1562-6.
28. Khanna A.K., Chander, R, Kapoor, N.K,



29. Kinage P, Chaudhari D. Shatavari: One solution for various health issues a review, World J Pharm and Pharmac Sci. 2016; 5(5):1105-14
30. Kongkiatpaiboon S, Gritsanapan W. HPLC quantitative analysis of insecticidal didehydro stem of oline and
31. Kumar MC, Udupa AL, Sammodavardhana K, Rathnakar UP, Shvetha U, Kodancha GP. Acute toxicity and diuretic studies of the roots of *Asparagus racemosus* Willd in rats, West Indian Med J, 2010; 59(1):3-6.
32. Mahesh Kawale, Sandip Ankoliya, R. Saravanan, Tushar Dhanani and P. Manivel, 2014, —Pharmacognostical and physicochemical analysis of *Asparagus adscendens* Buch. Ham. ex Roxb.
33. Mayank Thakur, Nagendra S. Chauhan, Shilpi Bhargava, Vinod K. Dixit, 2009, —A Comparative Study on Aphrodisiac Activity of Some Ayurvedic Herbs in Male Albino Rats, Arch Sex Behav, Vol 38, Page No – 1009-1015.
34. Mishra VK, Sheikh S, Agnihotri V, Chourey N. Effects of *Asparagus racemosus* (Shatavari) on mounting of male rats, Int J Pharm & Life Sci. 2010; 1(1):30-34.
35. Mohanta, B., A. Chakraborty, M. Sudarshan, R. K. Dutta, M. Baruah, 2003, Elemental profile in some common medicinal plants of India Its correlation with traditional therapeutic usage, Vol. 258, No. 1, Page No:175-179.
36. Nagar B. P, Duttgarg V, Dhiman A, 2011, —Ethnopharmacology, phytochemistry
37. Palanisamy N, Manian S. Protective effects of *Asparagus racemosus* on oxidative damage in isoniazid-induced hepatotoxic rats: an *in vivo* study. Toxicol Ind Health. 2012; 289(3):238-44.
38. Patel, A.B., U. K. Kanitkar, 1969, —*Asparagus racemosus* wild form bordi, as a galactagogue in buffaloes, Indian Veterinary Journal, Volume – 46, Page No- 718-721.
39. Pharmacological significance of Satavari: Queen of herbs,—International Journal of Phytomedicine, Issue 6, Page No: 477-488
40. Rakesh KJ. *Asparagus racemosus* (Shatawari), phytoconstituents and medicinal importance, future source of economy by cultivation in Uttarakhand: a review, Int J Herb Med. 2016; 4(4):18-21.
41. Ramanathan M, Balaji B, Justin A. Behavioural and neurochemical evaluation of Perment an herbal formulation in chronic unpredictable mild stress induced depressive model, Indian J Exp Biol. 2011; 49:269-75.
42. Rupali Subhashrao Kaikade and Shubhangi Nagorao Ingole, 2015, —Study of Anatomical Biomarkers for the Standardization of *Asparagus racemosus* Willd (Liliaceae)

43. Santosh K, Mehla RK, Dang AK. Use of Shatavari (*Asparagus racemosus*) as a galactopoietic and therapeutic herb- a review, Agric. Rev. 2008; 29(2):132-138.
44. Shankar K, Mitra, Neswi S, Prakash, Ramachandran Sundaram, 2012, —Shatavarins (containing Shatavarin IV) with anticancer activity from the roots of *Asparagus racemosus*||, Indian Journal of Pharmacology, Vol 44, Issue 6, Page No – 732-736
45. Sharma U, Kumar N, Singh B. Furostanol saponin and diphenylpentendiol from the roots of *Asparagus racemosus*, Nat Prod Commun. 2012; 7(8):995-98.
46. Shashi Alok, Sanjay Kumar Jain,
47. Shatavari (*Asparagus racemosus* Willd)||, International Journal of Traditional Knowledge, Vol 5, Issue 2, Page No – 227-228.
48. Shubha T, Kishan LT, Shailesh KJ. Approaches for Conservation of an Ethnomedicinal Plant: *Asparagus racemosus* Willd. Online J Bio Res. 2015; 15(3):126-33
49. Singh RS, Dhaliwal R, Puri M. Development of a stable continuous flow immobilized enzyme reactor for the hydrolysis of inulin, J Ind MicrobiolBiotechnol. 2008; 35:777-82.
50. Singh, K. P., R. H. Singh, 1983, —Clinical trial on Satavari in duodenal ulcer disease||, J. Res. Ay. Sid, Vol 9, Page No-155-159
51. Somania R, Singhai AK, Shivgunde P, Jain DP. *Asparagus racemosus* Willd (Liliaceae) ameliorates earlydiabetic nephropathy in STZ induced diabetic rats, Indian J Exp Biol. 2012; 50(7):469-75.
52. stemofoline in Stemonacollinsiae root extracts, Phytochem Anal. 2012; 57(9):408-14.
53. Thakur S, Sharma DR. Review on medicinal plant: *Asparagus adscendens*Roxb. Int J Pharma Sci andHealth Care. 2015; 3(5):82-97.
54. Tou JC, Chen J, Thompson LU. Flaxseed and its lignan precursor, secoisolariciresinoldiglycoside, affect pregnancy outcome and reproductive development in rats, J Nutr. 1998; 128(11):1861-8.
55. Venkatesan N. Anti-diarrhoeal potential of *Asparagus racemosus* wild root extracts in laboratory animals, JPharm Pharm Sci. 2005; 8(1):39-46.
56. Venkatesan N., Thiyagarajan, V., Narayanan, S., Arul, A., Raja, S., Kumar, S.G.V., Rajarajan T., Perianayagam J.B, 2005. —Anti-diarrhoeal potential of *Asparagus racemosus* wild root extracts inlaboratory animals||, Journal of Pharmacology and Pharmaceutical Sciences, Vol 8, Page No - 39–45.
57. Wiboonpun N, 2004, —Identification of antioxidant compound from *Asparagus racemosus*”, Phytotherapy Research, Vol 18, Page No - 771-73.
58. Yue J, Peng RX, Yang J, Kong R, Liu J. CYP2E1 mediated isoniazid-induced hepatotoxicity in rats, Acta Pharmacol Sin. 2004; 25(5):699-704.