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# COMPARATIVE PHYTOCHEMICAL ANALYSIS OF DRIED ROOTS OF ASPARAGUS RACEMOSUS.

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**ABSTRACT** The present study was undertaken for comparative phytochemical analysis of dried roots of Asparagus racemosus (Shatavari) between tAr1 and tAr2. The present study revealed the presence of protein, reducing sugar, non-reducing sugar in different root extract namely petroleum ether, hexane, ethyl acetate and acetone. Estimation of true protein, reducing sugar, non-reducing sugar in different root extract such as petroleum ether, hexane, ethyl acetate and acetone were performed along with the estimation of total carbohydrate, tannin and oil in roots powder of A. racemosus. So present study was conducted for evaluate the highest Phytochemical composition between tAr1 and tAr2 of roots powder and different root extract of Shatavari. So, the present study findings revealed that the highest value of Phytochemical was recorded in tAr2 as compared to tAr1.

**KEYWORDS :** Asparagus racemosus, Phytochemical, composition, oil.

## INTRODUCTION

*Asparagus racemosus* locally called as Shatavari in Hindi and Marathi. It belongs to family Asparagaceae and genus Asparagus. Shatavari is a monocot medicinal plant and vegetatively propagated in nature (Singh *et al*., 2013). The major active constituents of *A. racemosus* roots are steroidal and saponins. The major chemical constituents were essential oils, asparagine, arginine, tyrosine and tannin. Its powdered root contains 2.95% protein, 5.44%, 52.89% carbohydrate, 17.93% crude fiber, 4.18% inorganic matter and 5% oil (Negi *et al.,* 2010). The leaves and the tuberous roots of Asparagus are medicinally important in several diseases. Asparagus spp.is distributed throughout tropical and sub-tropical parts of India up to an altitude of 1500 m (Velvan *et al.,* 2007).

*Shatavari* is a well-known Ayurvedic rasayana (Kumar *et al.,*2016) and has been used in inflammation, nervous disorders, dyspedia, diabetes and diarrhea etc. (Mandal *et al*., 2000). Root has long been used in Ayurveda as tonic remedy to promote fertility (Potduang *et al*., 2008). Since it the active principle that imparts medicinal value to a plant, consistency in quality and quantity needs to be maintained, to ensure uniform drug efficacy by cultivation of superior genotypes. It has been well documented that geographical conditions affect the active constituents of the medicinal plant and hence their activity profiles(Oleszek,2002). Shatavari is a well-known nutritive aphrodisiac, astringent medicine for all age group having no side effects. It's had pharmacological action, biological activity and can be used in clinical studies.

## MATERIALS AND METHODS:

### Plant Material Collection And Cultivation

The present experimental work was performed in Agriculture farm of M.G.C.G.V., Chitrakoot University. For this study the Shatavari $tAr_1$ and $tAr_2$ collected from Chitrakoot Forest and D.R.I Chitrakoot (M.P) during both the year 2016-17 and 2017-18 and transplanted in the Agriculture farm of M.G.C.G.V.V., Chitrakoot, Satna (M.P) during first week of July month and harvested after one year. The roots of *Shatavari* were collected for the analysis of physiochemical and phytochemical was conducted on Biochemistry and Biotechnology Lab in the Department of Crop Sciences, Faculty of Agriculture, Nana Ji Deshmukh New Agriculture Campus, Mahatma Gandhi Chitrakoot Gramodaya Vishwavidyalaya, Chitrakoot, Satna (M.P.).

### Preparation of Plant extract

The collected fresh roots of Shatavari were washed thoroughly with distilled water and under shade dried. The dried root was grind well into a fine powder in a mixer grinder and sieved (Sieved no.45).The powder was store in air tight containers separately for further analysis. Weighted 5.0 g powder of Shatavari in 250 ml iodine flasks containing 100 ml solvents such as hexane, petroleum ether, acetone and chloroform separately. The flasks were kept in dark for 24 hours and filter by using Whatsmann filter paper No.1. These extracts were used for preliminary phytochemical screening and estimation of soluble protein, reducing sugar, non-reducing sugar, total carbohydrate and oil respectively.

### Materials And Methods

The Physicochemical analysis of powder of roots of *Shatavari* was performed by standard method (Anonymes and Lohar, 2007).Phytochemical screening of different root extracts such as Petroleum ether extract (PEE), Hexane extract (HE), Ethyl acetate extract (EAE) and Acetone extract (AE) were carried out by method described by ( Raval *et al.,* 2012). The soluble protein was estimated by Lowery's method with some modification (Lowery's ,1951). Reducing sugar was estimated by Dinitrosalicyclic acid (DNS) method (Miller,1972).The determination of total carbohydrate or soluble sugar by Anthrone method (Hedge and Hofreiter,1962)and the content of non- reducing sugar can also be calculated by subtracting the reducing sugar from total carbohydrate contents. Tannin estimation (%) by Folin Denis method (Schanderl, 1970).Determination of oil content (in %) by Soxhlet extraction method in Petroleum ether (B.P. 60-80$^{o}$C) was used for the extraction purposes (A.O.A.C (1970)).

### Experimental Analysis

### Physiochemical Analysis

Physiochemical parameters showed the identity, purity and strength of the plant powder. The percentage yield (w/w) of different physiochemical parameters was performed triplicately which showed in table 1.

**Table1-1: The percentage yield (w/w) of physiochemical parameters of *A.racemosus*.**

| S. No. | Parameters | Root of *Shatavari* | |
|---|---|---|---|
| | | $tAr_1$ | $tAr_2$ |
| 1. | Loss on drying at 105$^{o}$C | 7.664167 ± 1.16791 | 8.759667 ± 0.04391 |
| 2. | Total ash value | 0.01640±0.00206 | 0.47150 ± 0.05175 |
| 3. | Acid insoluble ash value | 0.60±0.03200 | 0.65±1.660 |
| 4. | Water soluble ash value | 0.3242±0.11950 | 0.7405±0.131 |

**Table1-2: Preliminary Phytochemical screening of different root extracts of *Shtavari* of the $tAr_1$ and $tAr_2$.**

| Name of Phytoconstituents | Root of *Ar1* (2016-17) | | | | Root of *Ar2* (2017-18) | | | |
|---|---|---|---|---|---|---|---|---|
| | PEE | HE | EAE | AE | PEE | HE | EAE | AE |
| Carbohydrate (Fehling's test) | + | + | + | + | + | + | + | + |
| Saponin (Foam test) | - | + | - | + | + | + | + | + |
| Tannin (Lead acetate test) | + | + | + | - | - | + | | + |
| Terpanoids (Liebermana-Burchard test) | - | - | + | - | - | + | - | + |
| Flavonoids (Alkaline reagent test) | + | + | + | - | - | - | - | + |
| Steroids (Salkowski method) | + | + | + | + | - | - | + | + |

*+ = Present and *– = Absent

**Table1-3: Estimation of soluble protein by Lowery's method**

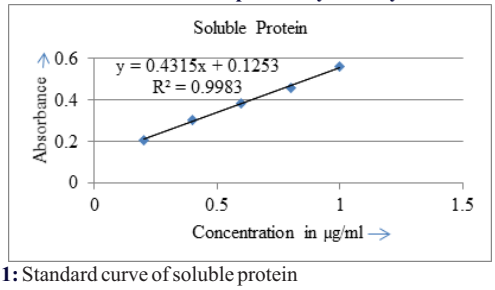


**Fig.- 1:** Standard curve of soluble protein

**Sample table of soluble protein**

| S.No. | *Shatavari* root extracts | Conc. in µg/ml | |
|---|---|---|---|
| | | $tAr_1$ | $tAr_2$ |
| 1. | Petroleum ether | 0.010 ± 0.035 | 0.012± 0.035 |
| 2. | Hexane | ND | ND |
| 3. | Ethyl acetate | 1.360 ± 0.012 | 1.460± 0.120 |
| 4. | Acetone | 1.200± 0.017 | 1.690± 0.030 |

*ND = Not detected

**Table1-4: Estimation of reducing sugar by DNS method**

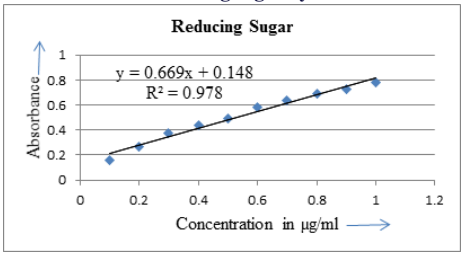


**Fig.- 2:** Standard curve of Reducing Sugar

**Sample table of Reducing Sugar**

| S.No. | *Shatavari* root extracts | Conc. in µg/ml | |
|---|---|---|---|
| | | $tAr_1$ | $tAr_2$ |
| 1. | Petroleum ether | ND | ND |
| 2. | Hexane | ND | ND |
| 3. | Ethyl acetate | 1.940± 0.012 | 2.390 ± 0.169 |
| 4. | Acetone | 2.930± 0.047 | 3.180± 0.124 |

**Table1-5: Estimation of total carbohydrate by Anthrone method**

| S.No. | *Shatavari* root extracts | Conc. in µg/ml | |
|---|---|---|---|
| | | $tAr_1$ | $tAr_2$ |
| 1. | Petroleum ether | ND | ND |
| 2. | Hexane | ND | ND |
| 3. | Ethyl acetate | 1.940± 0.012 | 2.390 ± 0.169 |
| 4. | Acetone | 2.930± 0.047 | 3.180± 0.124 |

**Fig.- 3:** Standard curve of total carbohydrate Sample table of total carbohydrate

| S.No | Name of sample | Conc. in µg/ml | |
|---|---|---|---|
| | | $tAr_1$ | $tAr_2$ |
| 1. | ***Shatavari* root** | 3.460 ± 0.016 | 3.710 ± 0.012 |

**Sample table of non-reducing sugar**

| S.No | *Shatavari* root extracts | Conc. in µg/ml | |
|---|---|---|---|
| | | $tAr_1$ | $tAr_2$ |
| 1. | Petroleum ether | ND | ND |
| 2. | Hexane | ND | ND |
| 3. | Ethyl acetate | 1.52 | 1.32 |
| 4. | Acetone | 0.53 | 0.53 |

*SD= Standard deviation and *ND=Not Detected

**Table1-6: Estimation of tannin by Folin – Denis method**

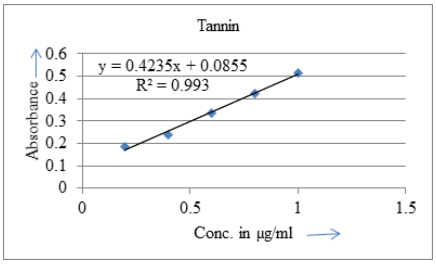


**Fig.- 4:** Standard curve of tannin Sample table of tannin

| S.No | Name of sample | Conc. in µg/ml | |
|---|---|---|---|
| | | $tAr_1$ | $tAr_2$ |
| 1. | ***Shatavari* root** | 1.85 ± 0.01 | 2.11 ± 0.08 |

**Table1-7: Estimation of Oil by Soxhlet method**

| S. No | Name of sample | Percentage (%) | |
|---|---|---|---|
| | | $tAr_1$ | $tAr_2$ |
| 1. | ***Shatavari* root** | 1.0 | 1.5 |

## DISCUSSION

The present study carried out on comparative Phytochemical analysis of dried roots of *Shatavari* between accession $tAr_1$ and $Ar_2$.The percentage yields of physicochemical analysis such as LOD, total ash, acid insoluble ash and water soluble ash values, of $tAr_1$ during the year 2016-17 was 7.6641 ± 1.1679, 0.0164 ± 0.0020, 0.6000±0.0320 and 0.3242 ± 0.1195 recorded and during the year 2017-18 $tAr_2$ value was 8.7596±0.0439, 0.4715±0.0517, 0.6500±1.6600 and 0.7405±0.1310 recorded respectively. Among both accessions the highest LOD, total ash, acid insoluble ash and water soluble ash values was found in the $tAr_2$.

The preliminary phytochemical screening of petroleum ether, hexane extract, ethyl acetate and acetone were carried out and showed the presence of carbohydrate in all four extracts of both the accessions but the saponin were found positive in hexane and acetone extracts in $tAr_1$ but absent in others while in $tAr_2$ saponin was found positive in all four extracts. Tannin was observed in petroleum ether, hexane extract, ethyl acetate extracts of $tAr_1$ while absent in acetone extract and in case of $tAr_1$ tannin was found positively in petroleum ether and acetone extracts only but absent in hexane and ethyl acetate extracts. Terpanoids was observed only in ethyl acetate extracts in sample $tAr_1$ but absent in other extracts while in $tAr_2$ terpanoids was observed in hexane and acetone extracts but absent in other extracts. Flavonoids were present in petroleum ether, hexane and ethyl acetate extracts in accession $tAr_1$ while in $tAr_2$ flavonoids were found only in acetone extracts but absent in other extracts in both sample. Whereas steroids were found positively in all four extracts in $tAr_1$ and in case of $tAr_2$, steroid was found in ethyl acetate and acetone extracts but absent in petroleum ether and hexane extracts.

The highest true or soluble protein value was recorded in ethyl acetate extract (1.360µg/ml) followed by acetone (1.200µg/ml) and pet ether (0.010µg/ml) extracts but not detected in hexane extract in $tAr_1$. While in $tAr_2$, the highest soluble protein was found in acetone extract (1.690µg/ml) followed by ethyl acetate (1.460µg/ml) and pet ether (0.012µg/ml) extracts but not detected in hexane extract in $tAr_2$. Among both accession highest soluble protein was found in acetone extract (1.690µg/ml) in $tAr_2$ and lowest in pet ether extract in $tAr_1$.

The highest reducing sugar value was recorded in acetone extract (2.930µg/ml) followed by ethyl acetate (1.940µg/ml) but not detected in hexane and pet ether extracts in $tAr_1$. While in $tAr_2$ the highest reducing sugar was found in acetone extract (3.180µg/ml) followed by ethyl acetate (2.390µg/ml) extract but not detected in hexane and pet ether extracts, in $tAr_2$. Among both accessions highest reducing sugar was found in acetone extract (3.180µg/ml) in sample $tAr_2$ and lowest in

ethyl acetate (1.940µg/ml) extract in sample $tAr_1$.

The highest total carbohydrate value 3.710±0.012 was recorded in the sample of $tAr_2$ and lowest was 3.460±0.016 sample of $tAr_1$. The highest non-reducing sugar was recorded in ethyl acetate (1.52 µg/ml) and lowest in acetone extract (0.53µg/ml) in the sample of $tAr_1$ while in sample $tAr_2$, the highest value was recorded in ethyl acetate(1.32µg/ml) extract and lowest in acetone extract (0.53 µg/ml).Whereas the highest tannin content was recorded in the $tAr_2$ that was 2.11µg/ml and lowest was 1.85µg/ml in $tAr_1$.The oil content was recorded 1.0% in $tAr_1$ and 1.5% in $tAr_2$.

## CONCLUSION

The experimental findings of phytochemical analysis of powder and different roots extracts of *Shatavari* indicates that plant are rich in true protein, soluble sugar, reducing sugar, non-reducing sugar, tannin and oil. The acetone extract showed the presence of highest number of Phytoconstituents. They may be used in clinical, medicinal and pharmaceutical field. In future, solvent based study on same part of plant, it is advisable to select acetone solvent for conducting his/her study.

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