

**A COMPARATIVE PHARMACOGNOSTICAL, PHYTOCHEMICAL,
CHROMATOGRAPHIC & HPLC STUDY OF DIFFERENT VARIETIES OF MUSALI IN
UTTARAKHAND REGION**

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ABSTRACT

Rasayana is a unique concept of *Ayurveda* which means vital nourishment representing a holistic approach, responsible for preventive aspects against ageing as well as curative aspect against diseases. The plant *Musali* are described in *Ayurveda* as a *Vajikarana*, *Rasayana*, *Brihana*, *Balya*, property. In *Samhita kala*, *Musali* is described as *Talamuli* but there is no description about the types of *Musali*. Moving in *Nighantu kala*, *Raj nighantu* explain the types of *Musali* i.e *Krishna musali* (*Curculigo orchioides* Gaertn.) and *Shweta musali* 1 & 2 (*Asparagus adscendens* Roxb. & *Chlorophytum tuberosum* (Roxb.) Baker). This present study is an attempt to find out the difference in macroscopic, microscopic, physicochemical, phytochemical (Qualitative & Quantitative) and chromatographic activities between different varieties of *Musali* in Uttarakhand region. *Musali* contain carbohydrates, alkaloids, saponin and proteins which make it a natural medicine for improving immune system, blood flow to all parts of the body, essential amino acid supplementation, curing fatigue, stamina and vigor. Saponin & Stigmasterol are considered as the major chemical constituents and are responsible for its various biological activities. Maximum Saponin content and HPLC analysis showed that the highest content of Stigmasterol was found in sample S2 followed by the other sample of *Musali*.

KEY WORDS: *Rasayana*, *Vajikarana*, *Brihana*, *Balya*, *Musali*, Saponin, Stigmasterol.

INTRODUCTION

Herbal drugs have been in use by different civilizations in different parts of the world for centuries to fight a large number of diseases, many of these are in common use even today. *Musali* is considered as the major herbal plant which has high economic importance due to mainly aphrodisiac & rejuvinate properties. The rhizome, as well as the tuberous roots of the plant has been extensively used in indigenous systems of medicine in India, Pakistan, China and some other Asian countries for the treatment of various diseases. The rhizome of this plant possess various medicinal as well as other properties such as cooling, diuretic, aphrodisiac, tonic haemorrhoids, leucorrhoea, pruritis, skin diseases, asthma, bronchitis, jaundice, wound healing etc.^[1]

1. Krishna Musali – *Curculigo orchioides* Gaertn.

Vernacular name^[2]

Sanskrit – *Hempuspi*, *Talamulika*, *Musali*

English – *Black musali*

Hindi	–	<i>Musalikand</i>
Gujrati	–	<i>Kalimusali</i>
Gwalior	–	<i>Mussulkund</i>
Bengali	–	<i>Talamuli</i> , <i>Sadamusali</i>
Telagu	–	<i>Naelatadi- chettu</i> , <i>gadda</i>
Tamil	–	<i>Nilap- panaik- kizhangu</i> , <i>Nilappanang- kilangu</i>
Malyalum	–	<i>Nelapana Kilongu</i>
Kannad	–	<i>Neladali</i>
Mah. & Kon.	–	<i>Bhuyimaddi</i>
Pers.	–	<i>Mosali</i>

Taxonomical Position^[3]

Kingdom	-	Plantae
Clade	-	Angiosperms
Class	-	Monocots
Order	-	Asparagales
Family	-	Hypoxidaceae
Genus	-	<i>Curculigo</i>
Species	-	<i>C. Orchioides</i>

Ayurvedic Properties^[4]**Rasa** – Madhur, Tikta**Guna** – Guru, Picchila, Snigdha**Virya** – Ushna**Vipaka** – Madhura**Doshaghната** – Vatapittashamaka**Rogaghната** – Daha, Grahani, Atisara, Arsha, Kamala, Kasa, Shwasa, Raktavikara, Shukrakshaya, Klaibya, Mootrakrichchhra, Pooyameha, Daurbalya, Krishata**Karma** – Kaphavardhaka, Deepana, Anulomana, Agnivaradhaka, Kasahara, Shwasahara, Snehana, Mootrajanana, Balya, Vrishya, Brihana

Botanical description – It is a small perennial herb, with an elongated tuberous rootstock with lateral roots. Sessile or short petiolate leaves occur in rosettes. The shape is linear lanceolate 15- 45 cm by 1.5-2.4 cm. Flowers are bright yellow. Herb plant, 3-6 leaves cluster, leather skin, needle head, diameter 1 cm, bloom in summer and autumn.^[5]

Distribution

The plant is distributed in the sub- tropical Himalayas from Kumaon eastwards, the khasia hills, Bengal, Assam, Konkan, the Western peninsula and Madras extending to Kanya- kumari. Plants was observed growing in the patches in the pine Ranikhet and adjoining areas (Kumaon hills).

2. Shweta Musali -1 – Asparagus adscendens Roxb.**Vernacular name^[6]**

Hind., Mah., Guj. – Sufed or Safeda Musali, Sataver

U.P. – Kairuwa

Tam. – Tannirvittang

Tel. – Tsallogadda

Mal. – Shedeveli

Sinh. – Hirtha- wariya

Arab. & Pers. – Shaqaqule – hindi

Taxonomical position^[7]

Kingdom – Plantae

Clade – Angiosperms

Class – Monocots

Subclass – Magnoliidae

Order – Asparagales

Family – Asparagaceae

Genus – *Asparagus*Species – *A. Adscendens*

Botanical description – It is a sub erect or curved prickly shrub. It produces white tuberous roots. Stem is tall, sub erect, terete, smooth, white and much branched. Spines are 1-2 cm long, stout and straight. Cladodes are in dense, slender, filiform & soft. Flowers are usually bisexual, small in many fid and inflorescence recemes.^[8]

Distribution

The western Himalayas and Punjab, from Himachal Pradesh to Kumaon, up to 1500 m.

3. Shweta Musali -2 - Chlorophytum tuberosum (Roxb.) Baker.**Vernacular name^[9]**

Hindi – Safed musali, Satmul, Hazarmuli

Guj. – Dholi musali, Ujlimusli, Sufed musli

Mal. – Shedeveli

Mar. – Safed musli, Sataver, Kuli, Safeta musli

Tam. – Tannirvittang, Tannirvittan- kizhangu, Vipurutti

Tel. – Tsallogadda

Arab. – Shaqaqule-hindi

Garhwal – Jhirma

Bom. – Sapheta musali, Sufed musli, Sataver

U.P. – Khairuwa

Taxonomical position^[10]

Kingdom – Plantae

Clade – Angiosperms

Class – Monocots

Order – Asparagales

Family – Asparagaceae

Subfamily – Agavoideae

Genus – *Chlorophytum*Species – *C. tuberosum***Ayurvedic properties^[11]****Rasa** – Madhura**Guna** – Guru, Snigdha**Vipaka** – Madhura**Veerya** – Sheeta**Doshaghната** – Vatapitta shamaka, Kaphavardhaka**Karma** – Shukrala, Mootrala, Balya, Brinhana, Rasayana**Rogaghната** – It is consider as most beneficial in Shukrakshaya and Klaibya. Also used in Mootrakrichchhra, Prameha, Daurbalya, Krishata.

Botanical description – It is a rhizomatous herb. Leaves are suberect lanceolate and many nerved. Inflorescence is an erect, dense- flowered recemes. Flowers are star like, white upto 2 cm across, sepals are acute, anthers are longer than filaments are green or yellow in colour, bracts are long. Seeds are black in colour with angular edges.^[12]

Distribution –

Found wild in E. Himalaya, Bihar, W. Bengal and Western Peninsula in all district upto 1500 m. Also occurs in Burma and Abyssinia.

MATERIAL AND METHODS**MATERIALS**

The plant materials taken for the study are:

- Genuine sample of different varieties of *Musali* in Uttarakhand region.

Collection of genuine sample from the field

- The genuine sample were collected after identifying the source of plant as per standard description.
- The genuine sample of *Krishna Musali* i.e. rhizomes of *Curculigo orchioides* Gaertn. were collected from two different region in Uttarakhand
- ✓ 1) In Garhwal region – Thdc colony (Rishikesh-Dehradun highway)
- ✓ 2) In Kumaun region – Sal forest, near Haldwani
- The genuine sample of *Shweta Musali* -1 i.e. root of *Asparagus adscendens* Roxb. were collected from
- ✓ 1) In Garhwal region – Rishikul campus, Uttarakhand ayurved university, Haridwar
- ✓ 2) In Kumaun region – Uttarakhand Forest Training Academy, Haldwani.

- The genuine sample of *Shweta Musali* – 2 i.e. tuberous root of *Chlorophytum tuberosum* (Roxb.) Baker. were collected from
- ✓ 1) In Garhwal region – Muni ki reti, Herbal garden Rishikesh
- ✓ 2) In Kumaun region – Uttarakhand Forest Training Academy, Haldwani.

From these sources as mentioned above, samples were collected, Herbarium were made and authenticated at Botanical Survey of India (BSI), Dehradun.

OTHER MATERIALS

Magnifying Lens, measuring tape for organoleptic study. Safranin, Eosin, Methylene Blue, Iodine, for staining and Microscope was used for the microscopic study.

Methods**Herbarium and authentication of collected genuine plant sample**

S.N	Name of the Plant	Time of Collection	Place of Collection	Herbarium Account No.
1.	<i>Krishna musali</i> (<i>Curculigo orchioides</i> Gaertn.)	July 2017	Thdc colony, Rishikesh –Dehradun highway	BSI, Dehradun (118073)
2.	<i>Shweta musali</i> – 1 (<i>Asparagus adscendens</i> Roxb.)	November 2016	Rishikul campus, UAU, Haridwar	BSI, Dehradun (118072)
3.	<i>Shweta musali</i> -2 (<i>Chlorophytum tuberosum</i> (Roxb.) Baker.)	June 2017	Muni ki reti, Herbal garden, Rishikesh	BSI, Dehradun (118069)

Labelling of all Samples

Genuine sample of <i>Krishna musali</i>	from Haridwar region	S1
Genuine sample of <i>Krishna musali</i>	from Haldwani region	S2
Genuine sample of <i>Shweta musali</i> -1	from Haridwar region	S3
Genuine sample of <i>Shweta musali</i> -1	from Haldwani region	S4
Genuine sample of <i>Shweta musali</i> -2	from Haridwar region	S5
Genuine sample of <i>Shweta musali</i> -2	from Haldwani region	S6

OBSERVATION AND RESULT

In our study Uttarakhand is divided in two regions

1. Garhwal region i.e Haridwar surrounding region
2. Kumaun region i.e Haldwani surrounding region.

Pharmacognostical Study

a) Macroscopy- Geographically there is no difference found with in the species of *Krishna musali* and *Shweta musali* 1& 2. Comparative Morphologically difference between the varieties of *Krishna musali* and *Shweta musali* 1 & 2 are given below in table form.

S.No	Features	<i>Krishna Musali</i>	<i>Shweta Musali</i> -1	<i>Shweta Musali</i> -2
1.	Habit	Perennial herb, 10-35 cm height	It is sub erect or curved, prickly shrub	Perennial herb up to 30 cm in height
2.	Leaves	Leaves basal, sessile or narrowed into short or long petioles with sheathing base, linear lanceolate, membranous, glabrous, broad and 15-30 cm long	Cladodes are dense slender, filiform and soft	Simple, 6-12 , membranous, sessile, 15-30 cm long, margin undulated
3.	Flower	Bright yellow colour, bisexual, lanceolates membranous bracts	Flower are small white and pink colour in later stage	White, 5-10 cm long stalk, bisexual, simple or shortly branched racemes
4.	Rhizome/ Tuberous root	Elongated, straight to slightly curved, tuber having several lateral roots, external surface blackish brown, range from 3-7 cm in length & 1-3 cm in thickness	Shrivelled, 7-16 cm long and 0.4-1.8 cm thick, ivory white colour, pointed at both ends and twisted	Fibrous , cylindric with a cluster of ellipsoid whitish fleshy tuber hanging from them , length 7-13 cm long and 0.5-1.7 cm thick

b) **Organoleptic study** – Comparative Organoleptic features of different varieties of *Musali*.

Organoleptic Parameters	<i>Krishna Musali</i>	<i>Shweta Musali -1</i>	<i>Shweta Musali -2</i>
Shape	Cylindrical, Straight to slightly curved	Cylindrical ,almost curved and tapering at distal end	Fusiform
Size	2.5-7 cm	5-13.5 cm	5-8.5 cm
Surface	Surface with numerous deep wrinkles and transverse cracks; with a few rootlets and root scars; nodes and internodes prominent	Surface light brown in colour with linear ridges	Outer surface more or less rough, texture slightly hard to spongy and light in weight
Colour	Cream colour internally, dark brown externally	Yellowish brown colour	Pale brown externally, whitish internally
Odour	Odourless	Odourless	Odourless
Taste	Mucilaginous and slightly bitter	Sweetish	Sweetish
Fracture	Fracture surface is irregular light yellow in middle	Fracture surface is smooth with thread in middle	Quite brittle with powdery fracture surface

c) **Microscopic study:** Comparative features seen in the Transverse section of different varieties of *Musali*.

S.No	Parameters	T.S of <i>Krishna Musali</i> (S2)	T.S of <i>Shweta Musali -1</i> (S4)	T.S of <i>Shweta Musali -2</i> (S6)
1.	Epidermis	Root hair present, thick layer of epidermis	Root hair present, thick layer of epidermis	Root hair present, thick layer of epidermis
2.	Cortex	12-15 layer of round shape of cortex, intracellular space present in parenchymatus cell	17-18 layer of round shape of cortex, intracellular space absent in parenchymatus cell	12-15 layer of round shape of cortex, Intacellular space absent in parenchymatus cell
3.	Endodermis	Thick layer, pericycle found inner side of endodermis	Thick layer, Pericycle found inner side of endodermis	Thick layer, Pericycle found inner side of endodermis
4.	Vascular bundles	Irregular arranged , vascular bundles were of collateral and closed type with metaxylem present on its outer side	Irregular arranged, Vascular bundle were of collateral and closed type with metaxylem present on its outer side	Irregular arranged, Vascular bundle were of collateral and closed type with metaxylem present on its outer side
5.	Pith	Well developed, 15-17 layer	Well developed, 7-10 layer	Well developed, 9-10 layer

d) **Powder Microscopy study**

Comparative features seen in the powder microscopy.

S.No	Features	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6
1.	Simple trichomes	+	+	+	+	-	+
2.	Strach grains	+	+	+	+	+	+
3.	Fragment of reticulate vessel	+	-	+	+	+	+
4.	Vascular strand	-	+	-	-	-	-
5.	Cork cells	-	-	-	-	+	-

2. Physicochemical study

Test	Sample S1	Sample S2	Sample S3	Sample S4	Sample S5	Sample S5
Foreign matter	0%	0%	0%	0%	0%	0%
Moisture content	4.65%	4.12%	5.87%	5.45%	3.58%	5.43%
pH value	5.7	5.3	5.9	5.3	5.7	5.5
Alcohol ex. Value	8.38%	9.12%	7.34%	8.24%	10.34%	6.82%
Aqueous ex. Value	23.45%	24.64%	17.65%	16.43%	14.95%	17.45%
Petroleum Ether ex. Value	2.23%	3.14%	1.93%	1.78%	2.98%	3.84%
Toatal Ash	7.34%	8.46%	9.48%	9.17%	5.48%	6.48%
Acid Insuluble Ash	1.23%	1.12%	3.56%	4.28%	0.34%	0.68%
Water Soluble Ash	4.53%	5.79%	7.32%	6.45%	4.31%	5.42%

3. Phytochemical study

Qualitative Analysis

A. Carbohydrate test for different samples

Name of test	Aqueous extract	Alcohol extract	Sample
Fehling Test	+ve	-ve	S1
	+ve	-ve	S2
	+ve	-ve	S3
	+ve	-ve	S4
	+ve	-ve	S5
	+ve	-ve	S6

B. Alkaloid analysis in different samples

Name of test	Aqueous extract	Alcohol extract	Sample
Dragondrof test	+ve	+ve	S1
	+ve	+ve	S2
	+ve	+ve	S3
	+ve	+ve	S4
	+ve	-ve	S5
	+ve	-ve	S6

C. Amino acids analysis in different samples

Name of test	Aqueous extract	Alcohol extract	Sample
Ninhydrine test	+ve	+ve	S1
	+ve	+ve	S2
	+ve	-ve	S3
	+ve	-ve	S4
	+ve	-ve	S5
	+ve	-ve	S6

D. Proteins analysis in different samples

Name of test	Aqueous extract	Alcohol extract	Sample
Biuret test	-ve	+ve	S1
	-ve	+ve	S2
	+ve	-ve	S3
	+ve	-ve	S4
	-ve	+ve	S5
	-ve	+ve	S6

E. Analysis of Saponin in different samples

Name of test	Aqueous extract	Alcohol extract	Sample
Foam test	+ve	-ve	S1
	+ve	-ve	S2
	+ve	-ve	S3
	+ve	-ve	S4
	+ve	-ve	S5
	+ve	-ve	S6

F. Analysis of Glycosides in different samples

Name of test	Aqueous extract	Alcohol extract	Sample
Borntragar's test	+ve	-ve	S1
	+ve	-ve	S2
	+ve	-ve	S3
	+ve	-ve	S4
	+ve	+ve	S5
	+ve	+ve	S6

G. Analysis of Phenolic compound in different samples

Name of test	Aqueous extract	Alcohol extract	Sample
Phenolic test	+ve	-ve	S1
	+ve	-ve	S2
	+ve	+ve	S3
	+ve	+ve	S4
	+ve	-ve	S5
	+ve	-ve	S6

H. Analysis of Flavonoids in different samples

Name of test	Aqueous extract	Alcohol extract	Sample
Shinods test	+ve	-ve	S1
	+ve	-ve	S2
	+ve	-ve	S3
	+ve	-ve	S4
	+ve	-ve	S5
	+ve	-ve	S6

I. Analysis of Steroids in different samples

Name of test	Aqueous extract	Alcohol extract	Sample
Salkowaski reaction	+ve	-ve	S1
	+ve	-ve	S2
	+ve	-ve	S3
	+ve	-ve	S4
	+ve	+ve	S5
	+ve	+ve	S6

J. Analysis of Tannin in different samples

Name of test	Aqueous extract	Alcohol extract	Sample
Ferric chloride test	+ve	+ve	S1
	+ve	+ve	S2
	-ve	+ve	S3
	-ve	+ve	S4
	+ve	+ve	S5
	+ve	+ve	S6

Quantitative Analysis**a) Quantitative analysis of different samples of *Musali***

Quantitative value	S1	S2	S3	S4	S5	S6
Saponin (mg/gm)	4.53	4.19	1.12	1.43	2.15	1.87
Protein (%)	6.12	5.78	7.34	7.92	8.76	8.12
Carbohydrate (%)	29.87	28.92	31.34	32.67	36.94	36.78

4. Chromatographic study**TLC (Thin Layer Chromatography) analysis for different samples**

Solvent system: n- Butanol : Acetic Acid : Water (4:1:5)

Sample: Ethanol Extract

Visualization: Dragendorff Reagent

TLC profile of sample on Silica Gel G60F254

S. No	Sample	R _f Value	No of Spots
1.	S1	0.24, 0.39, 0.50, 0.55, 0.65, 0.77, 0.97	5
2.	S2	0.24, 0.39, 0.50, 0.55, 0.65, 0.77, 0.97	5
3.	S3	0.24, 0.39, 0.51, 0.55, 0.65, 0.76, 0.96	6
4.	S4	0.24, 0.39, 0.52, 0.55, 0.65, 0.76, 0.96	5
5.	S5	0.24, 0.39, 0.51, 0.55, 0.67, 0.78, 0.88, 0.96	4
6.	S6	0.24, 0.39, 0.53, 0.55, 0.67, 0.78, 0.96	4

5. HIGH PERFORMANCE LIQUID CHROMATOGRAPHY (HPLC)

Sample chosen for HPLC study were genuine sample of *Krishna* and *Shweta musali* 1 & 2 from Uttarakhand region. In HPLC percentage of Stigmasterol in all genuine sample of *Musali* were calculated with the help of standard Stigmasterol.

Sample	Peak	Ret. Time	Peak Area	Stigmasterol %
S1	1	1.550	23213901	3.41 %
S2	2	1.550	22433812	2.92 %
S3	1	1.550	11192288	1.16 %
S4	2	1.550	10177952	1.05 %
S5	2	1.550	2337103	2.31 %
S6	2	1.550	23334307	2.42 %

STUDY PHOTOGRAPH

Samples of *Musali* from two different region of Uttarakhand
Haridwar region



Krishna Musali (Curculigo orchioides Gaertn.)



Shweta Musali -1 (Asparagus adscendens Roxb.)



Shweta Musali -2 (Chlorophytum tuberosum (Roxb.) Baker)

Haldwani region



Krishna Musali (Curculigo orchioides Gaertn.)



Shweta Musali -1 (Asparagus adscendens Roxb.)



Shweta Musali -2 (Chlorophytum tuberosum (Roxb.) Baker)



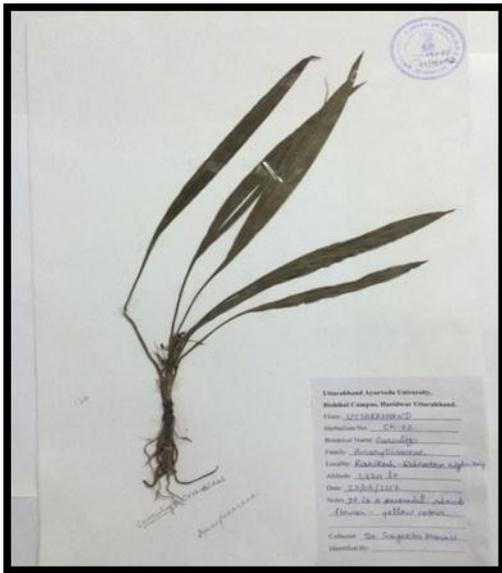
Rhizome of *Krishna Musali*



Root of *Shweta Musali* -1



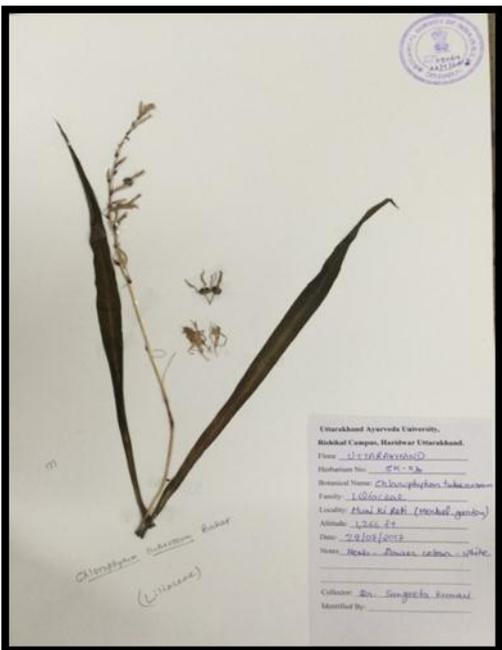
Root of *Shweta Musali* -2



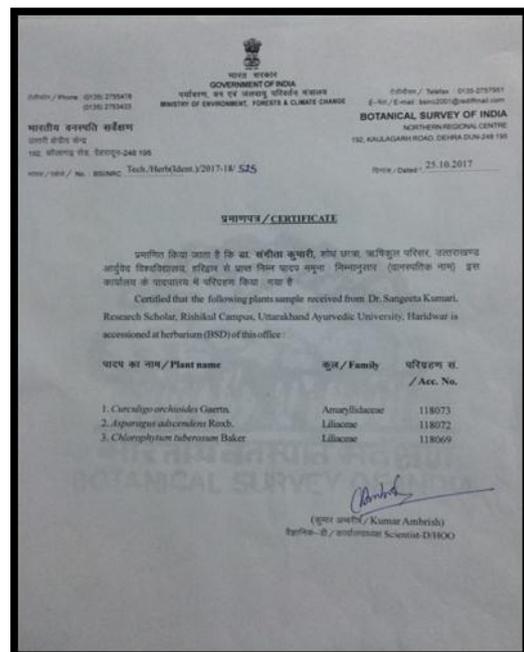
SPECIMEN of *Krishna Musali*



SPECIMEN of *Shweta Musali* -1



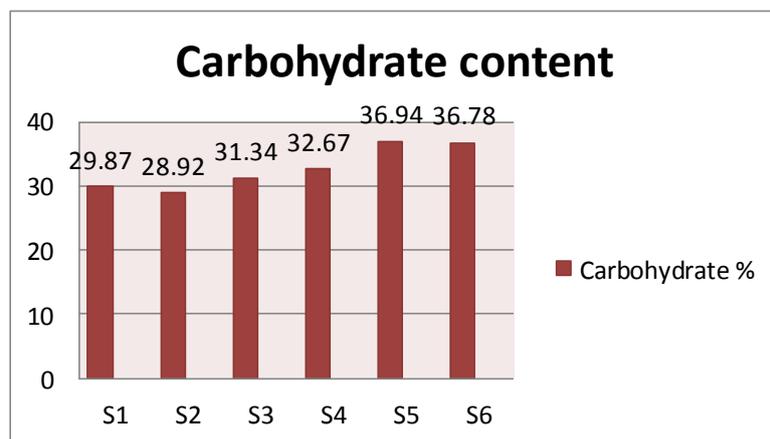
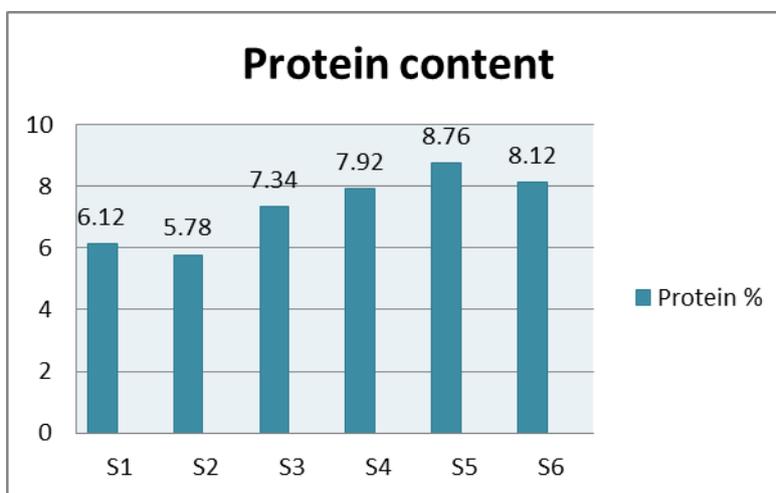
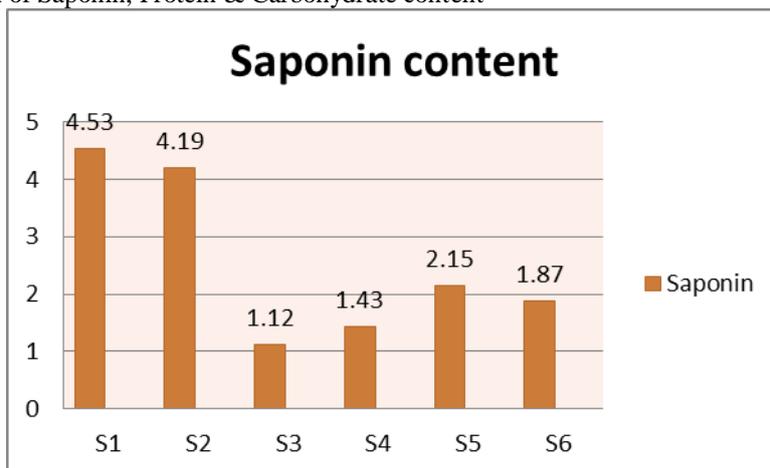
SPECIMEN of *Shweta Musali* -2



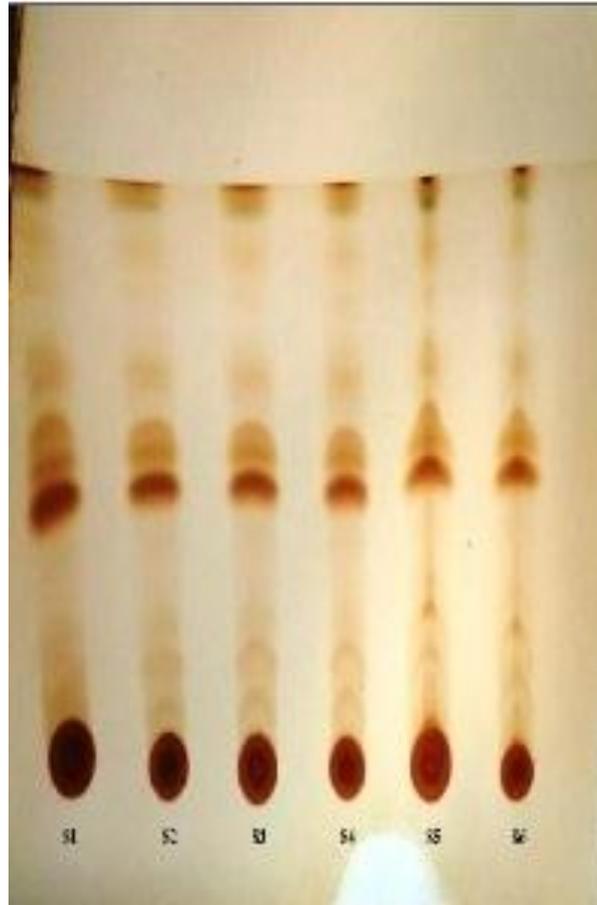
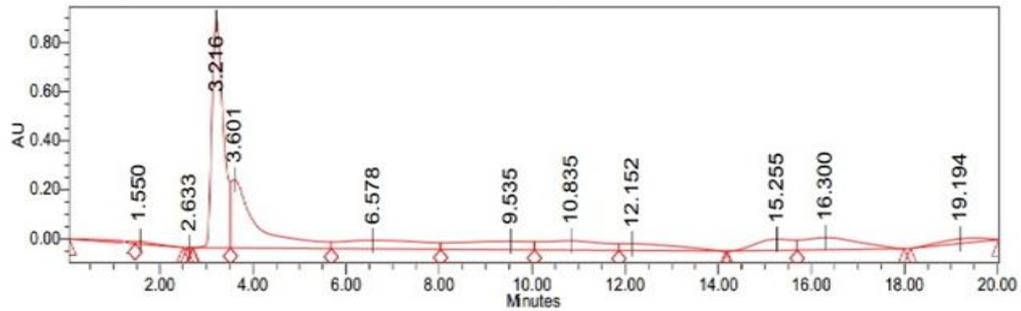
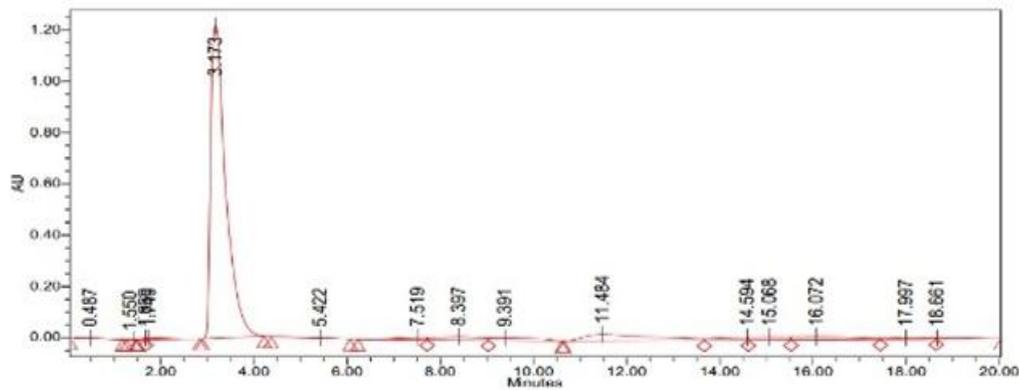
HERBARIUM AUTHENTICATION CERTIFICATE

PHYTOCHEMICAL STUDY OF DIFFERENT SAMPLES OF MUSALI FROM UTTARAKHAND

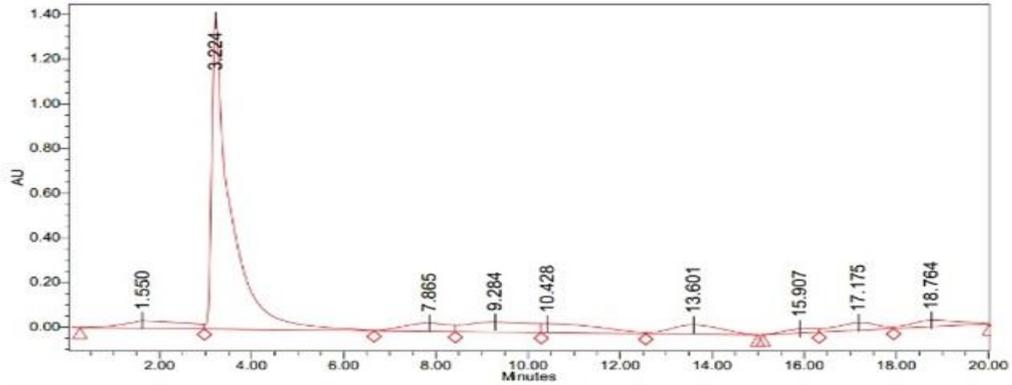
Quantitative estimation of Saponin, Protein & Carbohydrate content



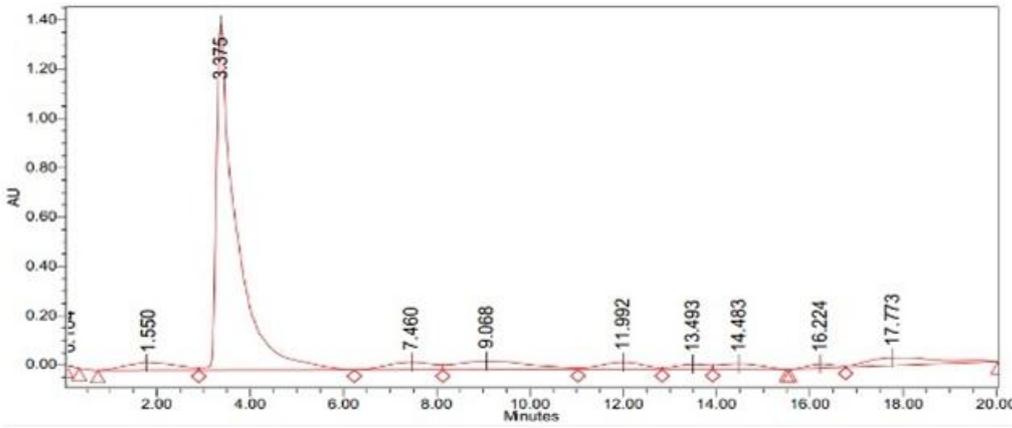
THIN LAYER CHROMATOGRAPHY

TLC analysis of different samples of *Musali* from UttarakhandHPLC of Genuine Sample of *Krishna Musali* from Haridwar regionHPLC of Genuine Sample of *Krishna Musali* from Haldwani region

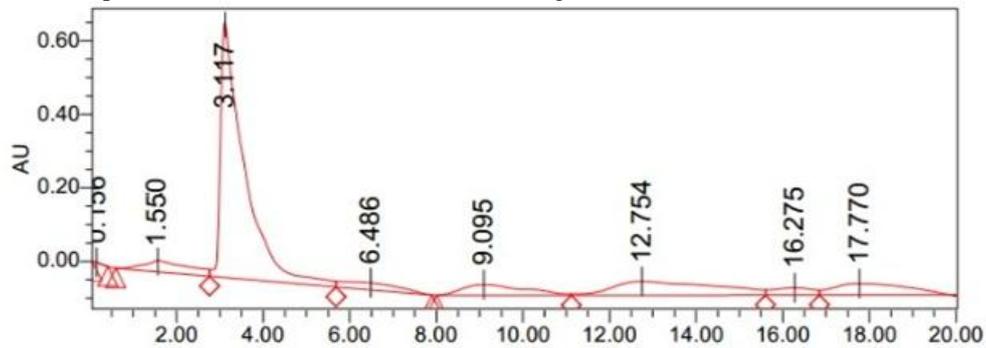
HPLC of Genuine Sample of *Shweta Musali* -1 from Haridwar region



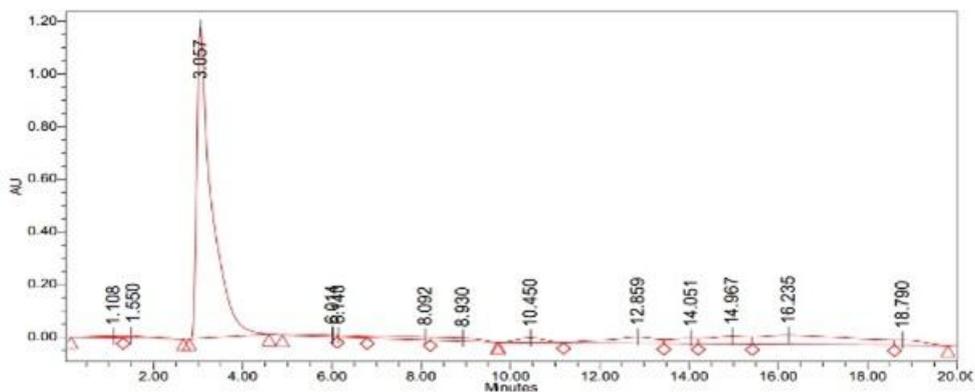
HPLC of Genuine Sample of *Shweta Musali* -1 from Haldwani region



HPLC of Genuine Sample of *Shweta Musali* -2 from Haridwar region



HPLC of Genuine Sample of *Shweta Musali* -2 from Haldwani region



DISCUSSION

In our study sample of *Krishna Musali* (*Curculigo orchiooides*) were collected from wild area of Shal forest of Haridwar & Haldwani region. The Pharmacognostical and Phytochemical analysis of above sample shows almost equal result. It might be due to same geographical feature of the collected area.

Same findings were obtained in the collected sample of *Asparagus adscendens* & *Chlorophytum tuberosum*.

In comparative analytical phytochemical studies of *Curculigo orchiooides*, *Asparagus adscendens* and *Chlorophytum tuberosum*, we found high percentage of Saponin & Stigmasterol in *Curculigo orchiooides*. As these two compounds have been found responsible for it's Spermatogenesis and Aphrodisiac action in several previous researches (Chauhan NS and Dixit VK) so we may consider to use *Curculigo orchiooides* when *Vrishya karma* of *Musali* is needed although *Asparagus adscendens* and *Chlorophytum tuberosum* also contain these phytochemicals but in comparative lesser amount than *Curculigo orchiooides*, so both *Asparagus adscendens* & *Chlorophytum tuberosum* can be use for *Vrishya karma* as substitute of *Krishna Musali* i.e *Curculigo orchiooides*.

In another finding like primary metabolites studies *Chlorophytum tuberosum* is found to possess higher percentage of Protein & Carbohydrate which could be said responsible for it's *Brihana & Balya karma*. So where, there is a need of *Brihana & Balya karma*, one should use *Chlorophytum tuberosum* of any region of Uttarakhand. Protein and carbohydrate percentage was found slightly lesser in *Asparagus adscendens* & *Curculigo orchiooides*.

So in need of *Vrishya karma* our first preference should be *Curculigo orchiooides*, secondly *Asparagus adscendens* and at last *Chlorophytum tuberosum* must be considered in case of unavailability of *Curculigo orchiooides*.

But for *Brihana & Balya karma* *Chlorophytum tuberosum* should be choosen first, then *Asparagus adscendens* and at last *Curculigo orchiooides* should be used in absence of *Chlorophytum tuberosum*.

CONCLUSION

In this study an account of different morphological , physicochemical and phytochemical parameters of both the variety of *Musali* has been presented for their ready and easy recognition, which may help in proper identification of these whole plant.

✓ After analyzing and comparing the morphological features of both variety of *Musali* from two different region of Uttarakhand, we can identify the samples of *Musali* are morphologically almost same due to same geographical & climatic condition.

- ✓ The Study investigated the Saponin, Protein, Carbohydrate content and Stigmasterol in different variety of *Musali*.
- ✓ So in need of *Vrishya karma* our first preference should be *Krishna Musali* (*Curculigo orchiooides*), secondly *Shweta Musali -1* (*Asparagus adscendens*) and at last *Shweta Musali -2* (*Chlorophytum tuberosum*) must be considered in case of unavailability of *Krishna Musali*.
- ✓ But for *Brihana & Balya karma*, *Shweta Musali-2* (*Chlorophytum tuberosum*) should be choosen first, then *Shweta Musali -1* (*Asparagus adscendens*) and at last *Krishna Musali* (*Curculigo orchiooides*) should be use in absence of *Shweta Musali-2*.

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