RESEARCH ARTICLE e-ISSN: 2349-0659 p-ISSN; 2350-0964

An Overview of *Selinum vaginatum* – A Medicinal Plant Species: Broad Features, Phytochemical Constituents, and Pharmacological Action

Amit Chaudhary[1], Arjun[2]*, Sunita Devi[3]

Abstract

In this review, we have studied about *Selinum vaginatum*. We studied about the essential oil which was extracted from the roots of this plant and also we know about the medicinal uses of *S. vaginatum*. This plant is found in Northwest Himalayan region including the Kashmir, also in Kailash Parvat and in Himachal. This plant particularly found in specific region of Himachal including the Parvati Valley and also in Lahaul district. We performed the extraction of essential oil using gas chromatography technique, which was also examined through flame ionization detector and a capillary column. We also performed the mass spectroscopy technique using which the molecular weight is obtained. In macroscopic study, we studied about the organoleptic properties, which include color, taste, and odor. In microscopy, we performed T.S of a part of the drug in which we observed that its bark contains 4–8 layers. It contains terpene, coumarin, volatile, and other compounds included valerenic acid. The pharmacological actions of *S. vaginatum* are antibacterial, antioxidants, antifungal, anticonvulsant, anticarcinogenic, antiviral, and vasodilator action. This herb was used traditionally in the treatment of various neurological disorders including mental weakness, epilepsy, convulsions, and hysteria. It is used to treat painful toothache, and according to tribal people, the entire plants were kept in houses to get rid of any evil spirit.

Key words: *Selinum vaginatum*, Pharmacological, Essential oil, Microscopy, Photochemical constituents

Asian Pac. J. Health Sci., (2022); DOI: 10.21276/apjhs.2022.9.2.50

Introduction

Continuation on the apply of herbal drugs as well as products for remedial any ailment and treatment of diseases has been re-established in the current decades.[1] The plant *Selinum vaginatum* is also well known as in Ayurveda Bhutberi, Bhootkeshi, and Bhutakeshi.[2] The genus commonly referred in India, is known for its aromatic values and medicinal.[3,4] Recently the herbal drugs are being chosen over the allopathic medications mainly in cases of neuro protection, as these medications are cost-effective and acquire least side effects.[5] The usual medicine practice is extensive in countries such as Thailand, China, India, Sri Lanka, Japan, and Pakistan. Concerning 40% of the entirety medicinal utilization is attributed to traditional tribal medicines single handedly by China. Aromatic plant and medicinal Selinum belongs to Apiaceae family.[6] *S. vaginatum* was moreover reportedly originate in the Kali Ganga HEP project site with a latitude of 300 36′40″ and longitude of 7905′10″ in the Banj oak forests;[7] it is native to Indian along with is originate in the high Himalayan altitude region, in Himachal Pradesh district at an altitude of 2700–3700 m, Holi range of Rampur, Chamba and Rohru division of Shimla district, and Chhota and Bara Bhangal area of Kangra.[1] A worldwide whole of 35 species of *Selinum* have been distributed. This is a species of dwarf to medium-sized perennial, branched herbs as well as shrubs and is signify through five species rising in different parts of Kumaon and Garhwal regions of Uttarakhand, India.[4,6] The species of this plant is perennial and branched. The plants belonging to this genus are usually found on the slopes rich in humus in the zone of South Africa, Himalaya, and Andean mountains. In India, there are about five species of *Selinum*, *Selinum vaginatum*, *Selinum wallichianum*, *Selinum candollei*, *Selinum striatum*, and *Selinum elatum*.[8-11] The parts of plant mostly root, fruits, as well as leaves are used in the treatment of different varieties of ailments similar to diarrhea, Nervine sedative, such as hysteria dysmenorrhea[12] cuts, antispasmodic, diuretic[13] wounds, and swelling, is hypotensive action,[14] analgesic, and vomiting.[4,15] *S. vaginatum* substitute roots of *Nardostachys jatamansi* are puzzling as they illustrate good similarity in their morphological characteristics as well as odor; therefore, at the time, they are used as each other's substitute in drug market in the Indian herbal.[16-20] *Selinum* also has a very extensive history of use as medicine in Ayurvedic and Unani system and also has been used as an insecticide, with antispasmodic and in constipation, digestion, and menstruation.[21] The essential oil chief constituents in the oil from alternative part of *S. candollei* be α-pinene and 14-hydroxy-δ-cadinene.[22] In the root, oil of *S. vaginatum* were reported to be the major constituents from Tungnath in Uttarakhand, India, β-phellandrene and bornyl acetate.[6] *S. vaginatum* of rhizomes

[1]Department of Pharmaceutics, School of Pharmacy, Abhilashi University, Mandi, Himachal Pradesh, India

[2]Department of Pharmacognosy, School of Pharmacy, Abhilashi University, Mandi, Himachal Pradesh, India

[3]Department of Pharmacology, School of Pharmacy, Abhilashi University, Mandi, Himachal Pradesh, India

Corresponding Author: Arjun, Department of Pharmacognosy, School of Pharmacy, Abhilashi University, Mandi, Himachal Pradesh, India. E-mail: arjunsharma97370@gmail.com

How to cite this article: Chaudhary A, Arjun, Devi S. An Overview of *Selinum vaginatum* – A Medicinal Plant Species: Broad Features, Phytochemical Constituents, and Pharmacological Action. Asian Pac. J. Health Sci., 2022;9(2):251-257.

Source of support: Nil

Conflicts of interest: None

Received: 02/11/21 **Revised:** 03/12/21 **Accepted:** 31/01/22

were originated to be loaded in content of essential oil. Roots of *S. vaginatum* contained coumarins akin to selinidin, angelicin, vaginidine, and dried roots essential oil obsessed β-pinene and limonene.[12,20] The essential oil from the underground parts of *S. vaginatum* from Rohtang in Himachal Pradesh, India, was reported to be dominated by bornyl acetate, camphene, and α-pinene.[23] The entire taxonomical classification along with synonyms of *S. vaginatum* is discussed in Tables 1 and 2.

Broad Features

S. vaginatum can be simply distinguished based on their anatomies[24] and *S. vaginatum* rhizome of roots has a characteristic odor like as *N. jatamansi*. The plants belonging to this genus are originated in humus-rich slopes of Himalayas and Andean mountains at the height of 6000–14,000 ft in South African. It is as well referred to as *Selinum*, is an average or most likely a dwarf plant with 35 species of perennial plants.[25] Moreover, the aerial parts of plant and roots are collected in the month of September at full flowering stage India, at an elevation of about 3400 m.[26] This is in common, is an rigid, glabrous, tall and hairy, perennial herb among biennial tubers so as to can be simply distinguished through its clusters of little, white flowers on long, thin stems.[27]

Table 1: The other names of the plant are as follows[30,31]

S. No.	*Language/aspect*	*Name*
1.	Scientific name	*Selinum vaginatum*
2.	Ayurveda	Rochanatagara, Mansri Vishesa, Rochana-Tagara
3.	Synonym	Akasamamsi, Mura, Bhurigandha, Gandhamadam
4.	Hindi	Bhutakesi, Muramaansi
5.	Trade name	Bhutkeshi
6.	Bengali	Bhutakesi
7.	Kashmir	Pushwari, Peshavari, Bhutakeshi
8.	Marathi	Mura
9.	Malayalam	Moramamsi
10.	Oriya	Bhutakesi
11.	Kannada	Mura
12.	Garhwal	Taggar
13.	Oriya	Bhutakesi
14.	Telugu	Bhutakesi

Table 2: The taxonomical classification of the plant is as follows[24]

S. No.	*Taxonomical category*	*Classification*
1.	Kingdom	Plantae (comprising all living or extinct plants)
2.	Phylum	Tracheophyta
3.	Subkingdom	Tracheobionta
4.	Superdivision	Spermatophyta
5.	Division	Magnoliophyta, flowering plants
6.	Class	Magnoliopsida
7.	Subclass	Rosidae
8.	Order	Apiales
9.	Family	Umbelliferae
10.	Genus	*Selinum* L. – *Selinum*
11.	Species	Vaginatum
12.	Other species of *Selinum*	• *Selinum capitellatum* var. *scabrum* (Jeps.) Munz • *Selinum capitellatum* (A. Gray) Benth. and Hook. f. • *Selinum carvifolia* (L.) L. – Cambridge Milk-parsley or Little-leaf Angelica • *Selinum longicalycinum* M.L. Sheh • *Selinum pyrenaeum* (L.) Gouan • *Selinum papyraceum* C.B. Clarke • *Selinum wallichianum* (DC.) Raizada & H.O. Saxena syn. • *Selinum tenuifolium* Wall. ex C.B. Clarke • *Selinum cryptotaenium* Boissieu

Separation of the Essential Oil

The separation of oil attained through the fresh plant material by the steam distillation of with a copper still fitted among spiral glass condensers and obtained two distillate such as aqueous and oil distillate and saturated suitable solvent. The oily layer is separated and dried. The solvent is distilled off at low pressure and at optimum temperature to obtain the essential oil. The sample of oil is set aside at required temperature till the samples are more analyzed.[28]

Study of the Essential Oils and Detection of the Components Gas Chromatography (GC)-Flame Ionization Detector Analysis

A GC analysis of essential oil samples is performed on a ultra GC equipped through flame ionization detector and a Rtx-5MS fused silica capillary column. The injector as well as detector temperatures are maintained at required in that order and dilute the sample injection volume with compatible solvent after that the oven initial temperature was maintained afterwards run the programmed at a rate and according to time and also observed the total elapsed time as per minutes with carrier gas.

GC–Mass Spectroscopy (MS) Study

GC–MS analyses are carried out on Shimadzu GCMS-QP2010 Ultra among the subsequent conditions: Capillary column and carrier gas, injection in split mode, and injector temperatures. The MS is scanned in the electron impact conditions, ion temperature source, mass scan mode scan/second, and mass range solution of oil in gas was injected. The detection of being compounds was carried out through computing their retention indices with homologous n-alkane series, furthermore, a contrast among available mass spectral data along with established in comparing their calculated retention indices. Intended for quantification purposes, relative area percentages attained with FID are used devoid of the apply of correction factors.[29]

Macroscopic and Microscopic Studies

S. vaginatum rhizomes are illustrious on the foundation of macroscopic parameters such as organoleptic character, odor, and taste. The ruptures seen on the roots are brittle and short as well as the color of the roots are intense black-brown [Figure 1]. The plant organoleptic features are as follows: Strongly aromatic odor and the taste are bitter and camphor like and characteristic odor. The plant rhizome roots are enclosed among brittle hairs on the ends. The roots transverse section illustrate it has the cork possesses 4–8 layers of cells, which are filled with some material with schizogenous canals, abundantly present, and pith being absent. The surface view of the rhizome shows schizogenous canals, fragments of fibers, medullary rays, and starch grains and circular outlines [Figure 2]. Schizogenous canals are not abundantly present while the xylem vessels have scalariform thickening.[30]

Figure 1: Roots of *Selinum vaginatum*

Figure 2: Plant of *Selinum vaginatum*

Phytochemical Constituents Studies

S. vaginatum of rhizomes distinguished through adulterants by anatomical variations and have a characteristic odor and also have antispasmodic properties, diuretic aromatic odor. The petroleum roots extracts have oroselol, selenidin, and angelicin.[25,32] A green-yellow-colored essential oil was collected from *S. vaginatum* when the distillation was completed. Using GC/FID and GC/MS, 37 constituents are collected through entire volatile. The important component of the essential oil attained from *S. vaginatum* is bornyl acetate. While the others significant components are 3, 5-nonadiyne, limonene, elemol, camphene, alphapinen etc.[24,33] The plants dried roots were filled in filter paper and refluxed for cycles of optimum time RBF using required solvent. The remaining marcs were washed with required solvent and concentrated to half of its volume. The valerenic acids are verified to be without difficulty soluble in solvent and are present in *S. vaginatum* roots.[34] The chief active constituents as well as their chemical structures extracted with different solvent mediums.[16,30,35,36] The plants root has been reported for the usually treatment of different diseases such as eye troubles, sleep disorders, skin ailments, epilepsy, nervous disorders, obesity, and snake poisoning. The roots have consist strongly of essential oils, sesquiterpenoids, chlorogenic acid, and valerianananoids A-C.[37,38] The major active constituents and their chemical structures extracted using various solvent mediums are presented in Table 3 and Figure 3.

Phenolic Content

S. vaginatum compounds of phenolic, profile, and antioxidant activity exposed antioxidant polyphenolics, ferulic acid, and chlorogenic.[39] The valerenic acid also found in rhizome of *S. vaginatum*.[40] The extensive quantity of chlorogenic acid and protocatechuic acid found in *S. vaginatum*.[28]

Volatile Compounds

The essential oil contents are found in the plants of *S. vaginatum*. The essential oil component of *S. vaginatum* consists from two remote places, Tungnath and Rohtang; it originates so as to out of 28, only 12 compounds were found to be commonly in both and compared and observed through with GC–MS and GC-FID analysis and originate that the part of *S. vaginatum* beard 37 constituents undergrounded.[21] The variation involved due to the environmental factors as well as the genetic makeup. Identification of essential oil components of *S. vaginatum* consists with GC–MS and GC-FID; various components were quantified and identified as isobornyl isobutyrate, tricyclene hydroxy-4-methylpentan-2-one, elemol, carvone, thymol, pogostol, alpha-pinene, guaiol, verbenol, borneol, beta-pinene, trans-verbenone, trans-carveol, thymolmethyl ether, Terpinen-4-ol, eudesmol isomer, camphene beta-myrcene, 14-hydroxymuurolene, p-cymene, limonene, p-Cymen-8-ol, etc.[22,23]

Terpene Compounds

It is obtained from the roots of *S. vaginatum* named vaginatin through a new sesquiterpene.[41]

Coumarin Compounds

The isolated from *S. vaginatu*m several coumarin compounds are found such as selinitin, angelicin and oroselol. The hydrolyzed products of selinidin provide rise to selinitin.[42] Innovative coumarin named selinidin (I) among diuretic property, while selinidin was indulgenced with aqueous alkali medium, it gave selinidin (II) as well as tiglic acid in poor yield other than it go through complete hydrolysis among medium of alcoholic alkali, to provide tiglic acid and selinitin in equal quantities.[43] Furthermore, two new constituents of coumarin were isolated from *S. vaginatum* such as vaginidin and selinidin.[44]

Other Compounds

The occurrence of valerenic acid was reported from rhizome of *S. vaginatum* with the help of accurate high-performance thin-layer chromatography.[45]

Pharmacological Actions

Antibacterial Action

From *S. vaginatum,* antibacterial action of the essential oils has been experimental. The pharmacological action is defensible through formative the minimum inhibitory concentration (MIC) with the help of the disc diffusion method minimum bactericidal concentration. The entire of bacterial strains is cultured (prepared on nutrient agar) for 24 h individually. The Gram-negative bacterial strains are tested with *Pasteurella multocida*, *Klebsiella pneumonia*, *Escherichia coli*, *Erwinia chrysanthemi*, *Xanthomonas phaseoli*, *Salmonella enteric*, and *Agrobacterium tumefaciens*. The Gram-positive bacterial strains are tested with *Bacillus subtilis*, *Staphylococcus aureus*, and *Enterococcus faecalis* and the essential oil composed as of the aerial parts and roots of *S. vaginatum* in which elemol, farnesol, γ-terpinene, and β-pinene which had the antibacterial potential beside *K. pneumonia*, *B. subtilis*, *E. faecalis*, *S. enteric*, and *E. chrysanthemi*.[43]

Antioxidant Activity

In the antioxidant activity, content was originate 143 μmol ascorbic acid corresponding per gram.[46] The extract of methanol

Table 3: Major chemical compounds found in *S. vaginatum* as reported by variable extractions

S. No.	*Plant name*	*Plant part*	*Extraction medium*	*Technique used*	*Major isolated compound*	*Reference*
1.	*S. vaginatum* Clarke	Roots	Light petroleum extract	UV & IR spectrum	Selinidin (I) C9H20O5	Seshadri and Sood (1964)[36]
2.	*S. vaginatum*	Roots	Petroleum ether extract	TLC & UV-visible spectrum	Selinidin, angelicin, coumarin ester, selinidin, and oroselol	Seshadri *et al*. (1966)[16]
3.	*S. vaginatum*	Roots	Petroleum ether extract	UV, IR, & NMR spectral studied	Lomatin, vaginidin, oroselol, selidinin, angelicin	Seshadri and Sood (1996)[35]
4.	*S. vaginatum*	Roots	Methanol extract	UV, IR, TLC fingerprinting	Valerenic acid (VA)	Batra *et al*. (2016)[34]

S. vaginatum: *Selinum vaginatum*, TLC: Thin-layer chromatography

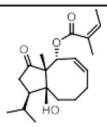
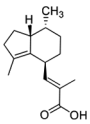
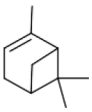
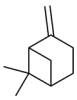
S. No.	*Name*	*Chemical structure*	*Obtained from*	*Occurrence in other main host plants*
1.	Vaginatin		Roots of *Selinum vaginatum*	*Ferula communis (*Family – Umbellifers)
2.	Vaginidin		Roots of *Selinum vaginatum*	N/A
3.	Selinone		Roots of *Selinum vaginatum*	N/A
4.	Selinidine (I)		Roots of *Selinum vaginatum*	N/A
5.	Oroselol		Roots of *Selinum vaginatum*	*Nardostachys jatamansi* (Family – Honeysuckle)
6.	Lomatin		Roots of *Selinum vaginatum*	*Raulinoa echinata* Cowan (Family – Rutaceae)
7.	Valerenic Acid		Roots of *Selinum vaginatum*	*Valeriana officinalis*, (Family – Caprifoliaceae)
8.	Angelicin		Roots *of Selinum vaginatum*	*Angelica archangelica* (Family – Apiaceae)
9.	4-hydroxy-4-methylpentan-2-one		Roots of *Selinum vaginatum*	*Oenothera glazioviana* (Family: Onagraceae)
10.	Alpha – Pinene		Roots of *Selinum vaginatum*	*Rosmarinus officinalis* (Family – Lamiaceae)
11.	Beta – Pinene		Roots of *Selinum vaginatum*	*Pinus kesiya* (Family – Pinaceae)
12.	Carvone		Roots of *Selinum vaginatum*	*Carum carvi* (Family –Umbellifers) *Mentha spicata* (Family: Lamiaceae) Dill (Family- Umbellifers)

Figure 3: Chemical constituents in roots of *Selinum vaginatum*

from *S. vaginatum* roots has revealed major antioxidant properties. It consists with phenolic contents which have been helpful in the treatment action of syncope, epilepsy hysteria, etc. The whole content of the antioxidant of *S. vaginatum* root extract was calculated through the assist of phosphomolybdenum complex verified spectrometrically. The enhancement of encouraged neural injured caused with methylmercury was recorded through the essential oil dosing of *S. vaginatum* (Edgew).[47]

Table 4: Traditional and tribal uses of various parts of *Selinum* and their reported biological roles

S. No.	*Plant*	*Parts used*	*Medicinal action reported by traditional uses*	*Reference*
1.	*S. vaginatum*	Roots	Some chemical constituents were reportedly showing anti-inflammatory action	[54]
2.	*S. vaginatum* C.B. Clarke	Roots	It has shown hypotensive action, it has analgesic and sedative aphrodisiac effects as well	[30]
3.	*S. vaginatum*	Whole plant	The plant has diuretic activity, anti-spasmodic action and is used as fragrance	[22]
4.	*S. vaginatum* C.B. Clarke	Whole plant	In the treatment of epilepsy, mental weakness, and convulsions	[39]
5.	*S. vaginatum*	Root	In treating skin diseases	[19]
6.	*S. vaginatum*	Root	The paste of root or extract of the plant root is used to relieve swelling and skin diseases	[48]
7.	*S. vaginatum*	Root	Churna of the dried roots is used in the treatment of epilepsy, vertigo, phthisis, asthma, syncope, Raktagata hypertension, bleeding disorder, thirst, and disease due to vata dosha	[31]

Antifungal Action

The essential oil for the antifungal action attained from after steam distillation from the roots of *S. vaginatum*. A variety of oil concentration was organized with distilled water and compatible salts. The mycelium plugs were set aside on the center of every plate whereas in the control group plate and required salt is added in the same amount was applied. Various plates were experienced subsequent to incubation for required days at required temperature as well as tested awaiting the fungus in the control plates attained the outside edge. After that, inhibition of the strain of fungal was calculated. MIC was then intended through the agar dilution. The roots of *S. vaginatum* consist of essential oil which inhibit the growth of *Rhizoctonia solani*, *Aliciella tenuis*, S. although *Fusarium oxysporum*, *Colletotrichum graminicola* were somewhat less affected with this oil.[48]

Essential Compounds in *S. vaginatum* and Its Reported Pharmacological Actions in Other Plants

From *Valeriana officinalis*, bornyl acetate presents in *S. vaginatum***.** In the species of that, alpha-pinene and beta-pinene are in there. Consequently, it has exposed anti-convulsing activities and insecticidal effects seed germination inhibition effects. In *S. vaginatum,* some essential compounds are also found due to there is a strong probability so as to these compounds here in the use of herb are liable for its medicinal uses. In *S. vaginatum,* sesquiterpenes are present which have been revealed by investigations and it has potential pharmacological uses and also used in ethnomedicinal systems and the chemical present in it has opened new avenues for research in the medical sector. The compounds found in the species of *S. vaginatum* are responsible for the therapeutic uses for oxidative stress which is cause of seizures. Antioxidants present in phenolic compounds have shown various biological responses such as anti-carcinogenic, antibacterial, antiviral, and vasodilator actions.[49,50]

Traditional Uses

S. vaginatum has been reported in Table 4 with a variety of conventional herbal medicines for the treatment of neurological disorders such as mental weakness, epilepsy, convulsions, syncope, and hysteria.[43]

Tribal Uses

In investigate, it was citied that roots of *S. vaginatum* were used in indulgence painful toothache as well as according to the local viewpoint, the entire plant is frequently kept in houses to rid of any evil spirit.[47] The plants leaves are regarded as nutritious along with are used as fodder for sheep and goats. The roots acquire a strong musky odor as well as are used with locals to produce incense dhoop and sticks, which is used whereas performing worship to God. Also used a pinch of powdered roots as a spice to add flavors to the cooked dishes.[48,49] The admired medicinal plants in the Uttarakhand Hariyali Devi landscape were acknowledged where *S. vaginatum* was also a noteworthy herb commonly used with the local inhabitants of that area.[50] The plant has been reported traditionally in numerous regions of India as well as has been used for valuable treatment of diseases as the ancient time, a lot of ethnic have been relayed on the herbs so as to produce in their vicinity or nearby areas. The medicinal plants used in Shimla in Himachal Pradesh within Migratory Shepherds where it was noted so as to skin allergy. *S. vaginatum* leaves juice was used for the treatment.[51,52] For the treatment of fever and worms, it is used as carminative and it occurs in the Dudu valley-Jammu and Bhaderwah Hills of Jammu. A investigate was carry out concerning the usage of ethnomedicine which is herbal remedies in Uttarakhand where the Bhotia tribe of Mana village employed *S. vaginatum* to enlarge lactation in cows. The tribal people utilize the roots of the plant or even the plant as an entire, this plant was set on fire and then the smoke released from this was given to cows to stimulate lactation. To identify further on the medicinal practices as well as herbs used through the Jaad Bhotiya Community of Uttarakhand in West Himalayas, a review was carry out where the roots of *S. vaginatum* were reportedly utilized with swelling muscles and locals in curing skin diseases. Bhotia tribe people from Bageshwar District of Kumaon region in the Himalayas too utilize the smoke of roots for inducing lactation in cows. The local populace of four villages – Banaun, Manali, Dhungari, and Nasogi were examined from the Manali region in Northwest Himalayas. *S. vaginatum* – known as Matoila in the local language, was employed with the natives of these villages. The roots were used as a Nervine sedative the shepherds and priests, were engaged to the forest reserve for the detection of herbal plants they employ for treatments many medicinal plants. *S. vaginatum* was recognized as a healer for mental disorders. The tribals of Kugti wildlife sanctuary make use of rhizome of *S. vaginatum* for evil spirit action. They consider that the

rhizomes of the plant can be employed for warding off evil spirits. The local person knows the value about the recipe of folk medicine of *S. vaginatum*. The powder roots of were certain as half teaspoon 2 times a day for 6 months for treating situation such as hysteria, convulsion, and epilepsy. Plants leaves also employ for medicinal value. The leaves were dehydrated in shade then cleaned through hot water thrice. This was obsessive as a vegetable 2 times a day for treating conditions such as diabetes, urinary complaints, colic, and blood dysentery. Leaves also used in improving treating menstrual problems and lactation. Root powder roots are *Paeonia emodi* and *Acorus calamus*, are assorted, and given as half teaspoonful 2 times a day for hysteria and epilepsy and also given for 7–21 days, treats pharyngitis. In Uttarakhand Urgam Valley of Chamoli Garhwal, the half tablespoon of root of powder used as a coolant by locals. The ethnobotanical information about the Gujjar tribe was obtained in Gurjar villages situated in high-altitude regions of Churah subdivision in the West Himalayan district of Chamba and it was observed that incense sticks were prepared using all the parts of this plant *S. vaginatum*. This medicinal plant is found in Himachal Pradesh's Parvati Valley located in district Kullu and we studied its morphological features along with some information regarding the medicinal benefits of this plant, which was provided by the local people residing in the valley. This plant was used as a potential source of medicines and for making ornaments and fodder. *S. vaginatum* was termed by the local people as Bhutkeshi or Bhutjata and this drug treated patients suffering from mental disorders. The essential oil obtained by the roots of this plant is used to make incense sticks and also possesses analgesic, hypotensive, and sedative activity. And at last, we came to know that they used this plant for various purposes as a Nervine sedative, in liquor preparation and in the treatment of skin diseases.[43] In the Indian Pharmacopoeia as well as in the Unani Medicine, the rhizome of *S. vaginatum* is mentioned in API-VI volume. The locals of Lahaul Valley commonly called *S. vaginatum* as Matosal. These people used the rhizomes of *S. vaginatum* which follows the Amchi System of Medicine. Lahaul Valley, which is situated in the Northwest Himalayan region, is a cold-deserted area. The rhizomes of *S. vaginatum* were used for treating hysteria, cough, asthma, and as analgesic, treating asthma and as an antibiotic. According to a report generated by Conservation Concern Medicinal Plants for Himachal Pradesh, the plant *S. vaginatum* of the Himalayan region was put under the category of critically endangered species *S. vaginatum* is called Matoila by the locals of Northwest Himalayan region and is used for the treatment of dysmenorrhea and hysteria by the locals of the Parvati Valley.[53]

Conclusion

After studying this article on the "Himalayan herb," *S. vaginatum* one will be able to understand the active constituents and the pharmacological actions associated with these components. Its roots of rhizomes are mainly used as Nervine tonic, antibacterial, and anticonvulsant. There are many biological actions which are still unexplored. The entire plant was used through the tribal people to get rid of evil spirits. The essential oil are extracted using GC and MS. Here, we have discussed about various components of this drug which is still undefined and it will be of great help to various scientists so that they would emphasize on various such paints and testing on such components can be done *in vivo* and *in vitro*.

References

1. Deepti K, Vijender S, Mohammed A. Amelioration of diabetes and its related complications in streptozotocin induced diabetic rats by herbal formulations. Int J Pharm Phytopharm Res 2019;9:1-13.
2. Ahmad MS, Shawky A, Ghobashy MO, Felifel RH. Effect of some medicinal plants on life cycle of citrus brown mites (*Eutetranychus orientalis*). Int J Pharm Res Allied Sci 2018;7:13-7.
3. Naithani BD. Flora of Chamoli. Vol. 1. Howrah: Botanical Survey of India; 1984.
4. Joshi RK. Volatile oil composition of aerial parts of *Selinum tenuifolium* Wall ex C.B. Clarke from western Himalaya of Uttarakhand, India. J Med Plants Stud 2016;4:8-1.
5. Ali A, Ahmad FJ, Pillai KK, Vohora D. Evidence of the antiepileptic potential of amiloride with neuropharmacological benefits in rodent models of epilepsy and behavior. Epilepsy Behav 2004;5:322-8.
6. Chauhan RS, Nautiyal MC, Tava A. Variability in the essential oil composition of *Selinum vaginatum* C.B. Clarke. (*Apiaceae*) in North-West Himalaya, India. J Essent Oil Bear Plants 2014;17:906-10.
7. American Diabetes Association. Diagnosis and classification of diabetes mellitus. Diabetes Care 2011;1 Suppl34:S62-9.
8. Anonymous. The Wealth of India: Raw Materials. New Delhi, India: National Institute of Science Communication and Information Resources CSIR; 1972. p. 9.
9. Naithani BD. Flora of Chamoli, Botanical Survey of India, Howrah; 1984. p. 1.
10. Stracheyi R. The Catalogue of the Plants of Kumaun and of the Adjacent Portion of Garhwal and Tibet. New Delhi: Periodical Experts; 1974. p. 82.
11. Hooker JD. The Flora of British India. Vol. 2. London: L. Reeve & Co; 1879.
12. Anonymous. The Wealth of India-Row Materials. Vol. 9. New Delhi: CSIR; 1972. p. 270-1.
13. Tewari M, Mathela CS. Chemical compositions of the leaf and root oil of *Selinum tenuifolium* Wall. Indian Perfum 2003;47:343-5.
14. Saraswat N, Sachan N, Chandra P. A Detailed Review on the rarely found Himalayan herb Selinum vaginatum: Its Active constituents, pharmacological uses, traditional and potential benefits. Pharmacophore. 2020;11:40-52.
15. Mohan M, Singh P, Gupta VK, Lohani H, Gupta S. Chemical composition of *Selinum tenuifolium* Wall ex CB Clarke: A new source of α-bisabolol from North-Western Himalaya. J Essen Oil Bea Plants 2013;16:439-42.
16. Chauhan NS. Medicinal and Aromatic Plants of Himachal Pradesh. New Delhi, India: Indus; 1999.
17. Mathela CS, Sinha GK. Study on some essential oils from aromatic plants of Nainital. Indian Perfum 1976;20:23-4.
18. Joshi KK, Joshi SD. Medicinal and Aromatic Plants Used in Nepal, Tibet and Trans-Himalayan Region, United States of America, Bloomington, Indiana; 2006.
19. Sharma PK, Chauhan NS, Lal B. Observations on the traditional phytotherapy among the inhabitants of Parvati valley in western Himalaya, India. J Ethn Pharmacol 2004;92:167-76.
20. Rastogi RP, Mehrotra BN. Compendium of Indian Medicinal Plants, New Delhi. Vol. 1; 1900. p. 369.
21. Srivastava PR, Dixit P, Singh L, Verma CP, Saxena G. Status of *Selinum* spp. L. a Himalayan medicinal plant in India: A review of its pharmacology, phytochemistry and traditional uses. Curr Pharm Biotechnol 2018;19:1122-34.
22. Chauhan RS, Nautiyal MC, Tava A. Essential oil composition of underground parts of *Selinum candollii* D.C. and their possible uses. J Essent Oil Bear Plants 2012;15:864-7.
23. Chauhan RS, Nautiyal MC, Gilles F, Chalard P. Volatile composition of underground parts of *Selinum vaginatum* and possible uses. J Chem Nat Compd 2012;48:901-2.
24. Tewari M, Mathela CS. Chemical compositions of the leaf and root oils of Selinum tenuifolium Wall. Indian Perfumer 2003;47:343.
25. Seshadri TR, Sood MS. Chemical comparison of the roots of *Selinum*

vaginatum and *Nardostachys jatamansi*. Phytochemistry 1967;6:445-6.
26. Joshi D, Nailwal M, Mohan L, Melkani AB. *Ligularia amplexicaulis* (Wall) DC. Essential oil composition and antibacterial activity. J Essent Oil Res 2018;30:189-96.
27. Himalayan Voices. Himalayan Voices is a Non-Profit Initiative, The Goal Being to Create Awareness on the Himalayas; 2018. Available from: https://www.himalayanvoices.org/sites/default/Selinum%20vaginatum [Last accessed on 2018 Apr 24].
28. Maisonneuve SA, Ruffine S. European directorate for the quality of medicines. Eur Pharm 1975;3:68-71.
29. Adams RP. Identification of Essential oil Component by Gas Chromatography/Mass Spectrometry. 4th ed. Carol Stream, Illinois, USA: Allured Publishing Corporation; 2007.
30. Singh V, Dubey P, Srivastava S. Botanical standardization of the Jatamansi, their substitute and adulterant species. Indian J Trad Knowled 2011;10:599-603.
31. Government of India. The Ayurvedic Pharmacopoeia of India. Vol. 6. New Delhi: Government of India Ministry of Health and Family Welfare Department of AYUSH; 2008.
32. Mesta CK, Paknikar SK, Bhattacharyya SC. The structure of vaginatin: a new sesquiterpene from the root extractive of Selinum vaginatum. Chem Commun 1968;584:585.
33. Martins AP, Salguiro LR, Vila R, Tomi F, Camgueral S. Composition of the essential oils of Ocimum canum, O. gratissimum and O. minimum. Planta Med 1999;65:187.
34. Batra S, Kumar A, Sharma A. Authentication of morphologically similar rhizome drugs based on TLC fingerprint profiles and valerenic acid content. IJPSR 2016;7:3428-31.
35. Seshadri TR, Sood MS, Handa KL. Chemical components of the roots of *Selinum vaginatum*-1. Coumarins of the petroleum ether extract. Tetrahedron 1966;23:1883-91.
36. Seshadri TR, Sood MS. Constitution of selinidin: A new coumarin from *Selinum vaginatum* Clarke. Tetrahedron Lett 1964;45:3367-73.
37. Mathela CS, Chanotiya CS, Sammal SS, Pant AK, Pandey S. Compositional diversity of terpenoids in the himalayan *Valeriana* genera. Chem Biodivers 2005;2:1174-82.
38. Ming DS, Yu DQ, Yang YY, He CH. The structures of three novel sesquiterpenoids from *Valeriana jatamansi* Jones. Tetrahedron Lett 1997;38:5205-8.
39. Pandey MM, Katara A, Pandey G, Rastogi S, Rawat AK. An important Indian traditional drug of Ayurveda jatamansi and its substitute Bhootkeshi: Chemical profiling and antioxidant activity. Evid Based Complement Alternat Med 2013;2013:142517.
40. Vandelook F, Bolle N, Jozef A, Assche V. Multiple environmental signals required for embryo growth and germination of seeds of *Selinum carvifolia* (L.) L. and *Angelica sylvestris* L. (*Apiaceae*). Seed Sci Res 2007;17:283-91.
41. Mesta CK, Paknikar SK, Bhattacharyya SC. The structure of vaginatin: A new sesquiterpene from the root extractive of *Selinum vaginatum*. Chem Commun 1968;584:584-5.
42. Joshi D, Melkani AB, Nailwal ML, Bisht L, Prasad R. *Selinum vaginatum* C. B. Clarke: Terpenoid composition and antibacterial activity of whole aerial parts and root essential oil. J Essential Oil Bear Plants 2018;21;1176-85.
43. Thiagarajan K, Gamit N, Mandal S, Ayyathan DM, Chandrasekaran R. Amelioration of methylmercury induced neural damage by essential oil of *Selinum vaginatum* (Edgew) C. B. Clarke. Pak J Pharm Sci 2018;31:399-404.
44. Kumar P, Kumar S, Javed MS, Tewari AK, Bisht KS. Phytochemical investigation and *in-vitro* antifungal activity of essential oil from the roots of *Selinum vaginatum* C. B. Clarke. EJMP 2019;27:1-11.
45. Rice-Evans CA, Miller NJ, Paganga G. Structure-antioxidant activity relationships of flavonoids and phenolic acids. Free Radic Biol Med 1996;20:933-56.
46. Mattila P, Hellström J. Phenolic acids in potatoes, vegetables, and some of their products. J Food Compos Anal 2007;20:152-60.
47. Malik ZA, Bhat JA, Ballabha R, Bussmann RW, Bhatt BA. Ethnomedicinal plants traditionally used in health care practices by inhabitants of Western Himalaya. J Ethnopharmacol 2015;172:133-44.
48. Nand K, Suneet N. Ethnobotanical uses of wild medicinal plants by the local community in the Asi Ganga subbasin, Western Himalaya. J Complement Med Res 2018;9:34-46.
49. Rana D, Bhatt A, Lal B. Ethnobotanical knowledge among the semi-pastoral Gujjar tribe in the high altitude (Adhwari's) of Churah subdivision, district Chamba, Western Himalaya. J Ethnobiol Ethnomed 2019;15:10.
50. Gokhale Y, Pala NA, Negi AK, Bhat JA, Todaria NP Sacred landscapes as repositories of biodiversity. A case study from the Hariyali Devi sacred landscape, Uttarakhand. Int J Conserv Sci 2011;2:37-44.
51. Radha SP, Puri R, Pundir A. Survey of wild medicinal plants used by migratory shepherds in summer hill of district Shimla in Himachal Pradesh. Biobulletin 2019;5:18-24.
52. Radha, Puri S. Study of wild medicinal plants used by tribal migratory shepherds in hills of Shimla district, Himachal Pradesh. Plant Arch 2019;19:785-90.
53. Saraswat N, Sachan N, Chandra P. A detailed review on the rarely found Himalayan herb *Selinum vaginatun*: Its active constituents, pharmacological uses, traditional and potential benefits. Pharmacophore 2020;11:40-52.
54. Srivastava A, Tiwari SS, Srivastava S, Rawat AK. HPTLC method for quantification of valerenic acid in Ayurveda drug jatamansi and its substitutes. J Liq Chromatogr Relat Technol 2010;33:1679-88.