



ISSN Print: 2394-7500  
 ISSN Online: 2394-5869  
 Impact Factor (RJIF): 8.4  
 IJAR 2024; 10(4): 191-196  
[www.allresearchjournal.com](http://www.allresearchjournal.com)  
 Received: 04-02-2024  
 Accepted: 13-03-2024

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## A panoramic review on *Acorus calamus* / waj turki, its ancestral use and more

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DOI: <https://doi.org/10.22271/allresearch.2024.v10.i4c.11684>

### Abstract

**Background:** *Acorus calamus* Linn the botanical family Acoraceae, which is referred as a semiaquatic perennial, known as “sweet flag” or “calamus”. The prevalence of it is extremely high in Manipur, the Naga Hills, and along the borders of bodies of water. It is widely distributed across India, both cultivated and natural habitats, such as plains and lowlands, Elevations that reaches up to 2200 m in the Himalayan region. The mystical root was used by the Indian Ayurvedic medical tradition as a general sedative and to treat a variety of illnesses such as Asthma, fever, bronchitis. The plant is thought to have aphrodisiac properties according to folk botany traditions of Arabic, Roman, and later European cultures.

**Objective:** The present review is first of its kind to discuss the Unani perspective of *Acorus calamus* elaborating its ancestral uses and functions.

**Methodology:** The literature search encircled scientific databases, publications and ancient Unani literature books for traditional usage, chemical profiling, and pharmacological activities and so on.

**Results:** The rhizomes are believed to have antispasmodic, carminative, anthelmintic, aromatic, nauseating, expectorant, and sedative, nervine and stimulating qualities. They are also applied in the management of epilepsy, psychological disorders, long term diarrhoea, bronchial catarrh, glandular issues, dysentery, periodic fevers, and abdominal tumors. Saponins, flavonoids, and essential oils are among the constituents of the *A. calamus* Rhizome. In Unani system of medicine it is used in Convulsions, Palsy, GI disturbances, used as Emmenagogue, strengthens memory used in respiratory disorders and more as it possess properties of *Muqawi e asaab*, *Kasir riyah*, *Muqawwi meda*, *Muqawwi Bah*, *Mushil Safra Balgham*, *Souda*, *Munaqi e Dimagh* etc.

**Conclusion:** *Acorus calamus*, with its rich history in traditional medicine, presents a promising source for natural remedies supported by its active constituents and pharmacological activities. However, further molecular studies are needed to validate the potential of *A. calamus*.

**Keywords:** *Waj turki*, Memory power, Emmenagogue, Asarone, Unani

### Introduction

Unani medicine (Also called as Greco-Arab medicine) is an ancient system of medicine originated from Greece. It has drugs from natural identity and source [1]. The WHO has recognized the Unani System of Medicine (USM) as an alternative system to cater the health care needs of human population [2]. Unani pharmacotherapy implements the use of natural resources of medicine like plants, animals and naturally occurring minerals. The practice of Unani medicine depends on prescribing single natural medicines or their combinations in raw or compound formulations. The USM in the area of pharmacotherapy has very unique resources of knowledge and expertise [3].

*Acorus calamus* (Sweet flag) is a perennial monocot plant belonging to the family Acoraceae. The word “Acorus” was first used by Greek physician Dioscorides which means pupil” as it was used in inflammation and diseases of eyes [4].

It also known as Vacha in Sanskrit, is a mid-term, fragrant herb which is practiced in the Ayurvedic (Indian traditional) and the Chinese system of medicine [5].

Medicinal properties lie in the rhizome part of the plant and scented leaves [6].

It can be found in both temperate and sub temperate zones such as India, China, Indonesia, Japan, Australia, southern Russia, southern Siberia, southern Canada as well as the northern United States [7]. The plant has been used to cure several diseases like asthma, fever, cough, epilepsy, hysteria, skin diseases, depression, haemorrhoids, diarrhoea, insomnia, dysentery, kidney and liver problems, mental retardation, bronchitis and as a sedative. Further, in Western herbal medicine, the plant is mainly employed for gastrointestinal related problems like bloating, gas, colic and poor digestive function [8].

Recent studies on this plant shows its tranquilizing, anti-microbial, anti-diarrhoeal, anti-oxidant, anti-helminthic, anti-convulsant, anti-inflammatory effects. In India tetraploid Vacha variety is found containing about 75% of B- asarone [9]. The plant is mentioned in classical literatures by many great physicians like Hippocrates, Theophrastus, Galen, Ibn Sina (Avicenna), Razi (Rhazes) and Ibn Baitar. [4] Therefore it's a first kind of review on *Waj turki* focusing more on its traditional uses and functions.

### Materials and Methods

Thorough literature search was done out to collect the relevant data on *Acorus calamus* through publically available electronic databases including PubMed, Google scholar, scihub, science direct and other internet sources. Additionally the material was collected using books that were published in both Urdu and English as typical literature in unani medicine.

### Synonyms

*ood ul waj, iwaam ood al zanj* [7], *zanjabeel al ajm* [10-11]

### Vernacular names

- Arabic: *Ood al arj, vaj* [12-14]
- Persian: *Agar, turki, barj, karoon* [10-14]
- Bengali: *Safed bachh* Telugu: *Vasa* [12, 14]
- Gujrati: *Dekhand, leni, lehni* [10, 11, 12, 14]
- Sindhi: *Kani kaathi* [12, 14]
- English: *Sweet flag root, calamus, myrtle grass* [11, 12, 14, 15, 16]
- Hindi: *Ghorbach, bach* [10, 11, 13]
- Latin: *Ekras* [10]
- Kashmiri: *Vayi* [10], *Vachi* [16]
- Punjabi: *Vark* [10, 11]
- Tamil: *Vasambu* [15]
- Sanskrit: *Vachaa, Jatila* [17], *Uragandhaa, Ugraa, Golomi, Shadranthaa, Shataparvaa, Tikshnagandhaa, Kshudra-Patra, Maangalya, Ghor-Bach* [15]
- Unani: *Aqooroon, wovun, waj –e-turki, waj* [10, 11, 15]
- Roomi: *aqaroon* [10, 11]
- Kannada: *baje, vasa* [16]

### Taxonomical classification

Kingdom: Plantae  
 Subkingdom: Tracheobionta  
 Super division: Spermatophyta  
 Division: Magnoliophyta  
 Class: Liliopsida  
 Subclass: Arecida  
 Order: Arales  
 Family: Acoraceae  
 Genus: *Acorus* L.  
 Species: *Calamus* [6, 16, 17]

### Mahiyath / description in Unani

The plant thrives in marshy places and moist situations like the edges of the lakes and banks of streams. [10] It's a herb whose leaves are longer, thinner and rougher like *nargis* leaves. Flower is quite bluish and may be of variant colours. It's root is long, knotted whitish and aromatic [12]. Taste is bitter and strong [10]. According to *Jalinoos* (Galen) only its root is used medicinally [11]. It has 2 types: first one aromatic which is used medicinally on humans and it is called as *baal bachh*. Second type is thick and hollow and is usually used to treat horses that is why it is called as *ghoda bachh* [18].

### Mizaj/Temperament

*Garm o khushk* 2<sup>nd</sup> degree [12]

*Garm* 3<sup>rd</sup> degree *khushk* 2<sup>nd</sup> degree [19]

*Sheikh* (Avicenna) and *Gilani* says that its *garm o khushk* 2<sup>nd</sup> degree from first to middle *martaba* [18]

Some says *garm o khushk* 3<sup>rd</sup> degree [10]

*Garm* 2<sup>nd</sup> degree, *khushk* 3<sup>rd</sup> degree [14]

### AF'AL / Functions

- *Qatey o mujaffif Balgham* [10, 12, 14]
- *Kasir riyah* [10, 12, 13, 14, 19]
- *Munqi e dimagh o asaab* [12, 13, 14, 19]
- *Mudir bol o hayz* [10, 11, 12, 14]
- *Jali* [10, 12, 14, 19]
- *Muqawi e bah* [12, 13, 14]
- *Muqawi e meda* [14, 19]
- *Muqawi e asaab* [19]
- *Mufatteh sudda*
- *Mujaffif khoon*
- *Nafa e salabat tihaal*
- *Mushil safra, balgham, souda* [10]

### Istemaal/Uses

- It is helpful in *zat ul janab, zat us sadr, dard jigar*, spasm of muscles.
- It is beneficial in *taqteer ul boul*, insect bite. Its sitz bath is done to relieve pain.
- *Usaara* of its root is beneficial in diminished vision. Can be used as *surma* in all eye diseases.
- Its root is mixed along with *majoonath* and used.
- It is beneficial in *sehej ama* occurring due to cold, tooth ache [11].
- It is also believed that it is useful in chronic rheumatism, lightens skin colour.
- It is very much beneficial in *saqlul lisaan* if used along with *shehed* [19].
- It relieves left hypochondriac region pain [11].
- When taken as *nutool, zimaad* and orally it is beneficial in *beheq, bars, tashannuj* [10].
- Beneficial in *fataq* when used as *zimid* [12].
- It provides *hararath* to *sard mizaj meda* and dilute *balgham* produced in stomach [11].
- Provides *hararath* to *balghami khoon* [18].
- It provides benefit to *sard mizaj* person.
- It is beneficial in *sin* and *faliq*.
- It breaks down *riyah*, does *tanqiya* of *meda* and strengthens liver because of its *jali* nature [11].
- If used along with *shehed* beneficial in *nisyan* and *sudda e muzmin*.

- If 875 mg chewed and its *luaab* is swallowed then it is beneficial in *dard meda*, works as *munqi ama o meda*.
- If used as *abzan* works as *mudir bol* and is beneficial in *dard rehem* <sup>[10]</sup>.
- Its *joshanda* and *humool* works as *mudir bol o hayz* <sup>[11]</sup>.
- It cleanses brain from *rutubath balgham* and other morbid matter. Therefore beneficial in *nisyan, isterja, badhawasi*, convulsions, *fali*.
- If chewed during outbreak of viral fever, it provides protection.
- It is used along with *mulethi* in fever of children, cough, *qoulanj*.
- Improves memory power.
- As it is *muqawwi asaab*, beneficial in *zof bah aasabi* <sup>[12]</sup>.
- It works as *munaqi dimagh* if used with *mastagi* <sup>[13]</sup>.

#### Miqdare Khuraak/Dosage

1-3 Gram <sup>[14]</sup>

3.5 gram <sup>[10]</sup>

1.3 gram - 2.5 gram in *safoof* form <sup>[18]</sup>

60-120 mg powder <sup>[15]</sup>

#### Muzir/Adverse effect

Brain <sup>[10]</sup>

For all organs and faculties <sup>[13]</sup>

*Mani* <sup>[18]</sup>

**Musleh/Corrective:** *Berg baidanjeer*, bringing vomits and *jadwar o mushk* <sup>[13]</sup>. *Badiyan* <sup>[10, 19]</sup>

**Badal/substitute:** Equal weight *zeera kirmani*, 1/3<sup>rd</sup> *rewand chini*, 1/4<sup>th</sup> *ood ul qaranqil*. <sup>[10, 11]</sup>

**NAFA E Khas/Main Action:** In *Mudabbir* form, treatable for every disease. <sup>[13]</sup>

#### Murakkabath / Compound Formulations

*Majune waj, majune biladur, mufarrahe kabeer, anqaruyae kabeer, sagheer, itrifal kabir, itrifal khabs-eakbar, majune harmus, majun nisyan, roghan surkh, roghan biladur<sup>A</sup>, Arq ma ul lehem ambari ba nuskhah e kalaan, Majoone Yadallah* <sup>[19]</sup>.

**Nisbat sitara/relative star:** *Sitara e mazeeq* <sup>[13]</sup>.

**Habitat:** *Vacha* is indigenous to Eastern Europe and Central Asia. It is cultivated and distributed throughout the tropics and subtropics found in moist marshy regions of India and Burma. It is generally found in wet places in India, Assam, Manipur, Uttarakhand, Koratagere taluk of Karnataka, Sikkim and Naga Hills etc. <sup>[9]</sup>.

#### Ethnobotanical Description

*Acorus calamus* is a flowering plant having psychoactive chemicals. It is one of the perennials, semiaquatic herbs having creeping rhizomes. It is one of the common Nepalese herbs which grow up to 1-1.5 meters in height in most of the hilly region. The rhizome which is the major part used,

generally grows up to 40-50 cm long. It has 1 to 3 seeded berries which are angular, green, and oblong in shape. The woody branched, light brown and occasionally orange-brown colour cylindrical to flat in shape rhizomes with nodes and internodes, possess strong, aromatic odour and bitter taste. Scattering rootstock directly gives rise to tufts from the basal leaf. These sword-shaped and erect basal leaves of the *Acorus calamus* are more similar to those of *Iris* spp. but in comparison, the *Acorus calamus* has more green basal leaves than *Iris* spp. Generally, it is hermaphrodite (having male and female both in the same flower) which is usually pollinated by insects <sup>[20]</sup>. The fruits are found to be small and berry like with few seeds <sup>[16]</sup>.

**Microscopic Structure:** A section of rhizome shows single layer of epidermis; Cortex composed of spherical to oblong, thin-walled cells of different sizes, larger towards periphery, smaller, somewhat collenchymatous, more or less closely arranged cells towards inner side, rounded and form a network of chains of single row of cells, enclosing large air spaces, most of the cells contain small starch granules, but some of them contains essential oil, fibro-vascular bundles are numerous, especially just within the line of small cells just noticed, each bundle consists of a ring of spiral vessels surrounding a number of jointed tubes and secretory cells having light yellowish brown contents, present in this region; endodermis distinct; stele composed of round, parenchymatous cells enclosing large air spaces similar to those of cortex and several concentric vascular bundles arranged in a ring towards endodermis, a few vascular bundles scattered in ground tissues; starch grains simple, spherical measuring 3-6  $\mu$  in diameter, present in cortex and ground tissue <sup>[4]</sup>.

#### Chemical constituents

The dried rhizome of *Acorus calamus* contain the yellow aromatic volatile oils having asarone as a main constituent which contains the small quantity of sesquiterpenes and its alcohols; the rhizome also contains the choline, flavone, acoradin, galangin, acolamone, isocolamone and aerial parts of plant contains lutcolin6, 8 c-digluconide <sup>[17]</sup> amongst those, phenylpropanoids (chiefly, asarone and eugenol) and sesquiterpenoids have been considered the principal effective compounds of *A. calamus*. <sup>[5]</sup> The chemical constituents are of 67 hydrocarbons, 35 carbonyl compounds, 56 alcohols, eight phenols, two furans and four oxido compounds also detected, in an alcohol extract of *A. calamus* var. *calamus*, 243 volatile components, 45 of which were new records from sweet flag. <sup>[16, 17]</sup>

Methyleugenol, cismethylisoeugenol,  $\beta$ -asarone, geranylacetate,  $\beta$ farnesene, shyobunone, epishyobunone and isoshyobunone are the most abundant chemical compounds which are present in 20% of the essential oil <sup>[16, 17]</sup>.

The other chemical components include  $\alpha$  and  $\gamma$ asarone, calamenene, asaronaldehyde, acorenone, calamenone, n-heptanic acid, calanendiol, numerous sesquiterpenes, and other compounds in the plant. <sup>[16, 17]</sup> Tannins, starches, mucin, soft gums and resins are also present in this plant. <sup>[17]</sup>

**Table 1:** Macroscopical and organoleptic characters of *Acorus calamus* Linn. [21]

S. No.	Parameters	Leaf	Rhizome
1.	Color	Green	Externally- Light brown Internally- Buff
2.	Odor	Aromatic	Sweet aromatic
3.	Taste	Pungent	Pungent & bitter
4.	Size	0.2-1.0 m long; 0.8--2.6 cm wide	5.0-12.0 cm long; 0.8-2.0 cm thick
5.	Shape	Erect	Creeping
6.	Touch	Smooth	Rough

**Pharmacological Activities** [4, 5, 6, 16, 17, 22]

Recent pharmacological actions are listed in table below

Action	Form	Model used	After treatment
Anti-microbial	Extract	<i>in vitro</i>	Exhibited anti-microbial activity
Analgesic	Extract	Mice	Inhibited writhing reflex
Anthelmintic	Extract	Rat	Reduction of eggs in faeces, Reduction of worm count of animals
Anti-epileptic	Extract	Rat	Prevent the development of epileptogenesis
Anti-oxidant	Extract	<i>in vitro</i> and Rat	Scavenged free radicle, Reactivation of hepatic glutathione reductase enzyme
Anti-inflammatory	Extract	<i>in vitro</i>	Inhibited the production of pro-inflammatory cytokines
Anti-diarrhoeal	Extract	Mice	Reduced total weight of wet faeces
Anti-cancerous	Extract	<i>in vitro</i>	Inhibited cancerous cells
Anti-adipogenic	Extract	Rat	Shown hypolipidemic activity
Anti-diabetic	Extract	<i>in vitro</i> , Rat	Released insulin and inhibited $\alpha$ -glucosidase Reduced blood glucose level
Anti-hypertensive	Extract	Rat	Lowered systolic and diastolic blood pressure
Neuro-protective	Extract	Rat	Improved neuro-behaviour performance
Hepato-protective	Extract	Rat	Restoration of liver enzymes
Nephro-protective	Extract	Rat	Nephro-protective effect
Anti-cholinergic	Extract and essential oil	<i>in vitro</i>	$\beta$ asarone in the essential oil showed maximum AChE inhibitory potential
Anti-depressant	Extract	Mice	Reduction in immobility period in TST and FST
Anti-HIV	Extract	<i>in vitro</i>	Inhibition of HIV-1 reverse transcriptase
Bronchodilator	Extract	Isolated guinea-pig trachea and atria	Inhibited force and rate of contraction
Cardiac depressant	Extract	Isolated rabbit heart	Suppressed the force of ventricular contraction and heart rate
Coronary vasodilator	Extract	Isolated bovine coronary arterial ring	Inhibited U46619 (20Nm) - pre contractions
Anti-spasmodic	Extract	Isolated rabbit jejunam	Inhibited contractions
Anticellular	Extract	<i>in vitro</i>	Inhibited proliferation of human peripheral blood mononuclear cells
Immunosuppressive	Extract	<i>in vitro</i>	Inhibited production of NO, IL-2 and TNF-alpha
Neuro-modulatory	Extract	Mice	Reversed stereotypy behaviour, potentiated catalepsy
Radioprotective	Extract	Mice	Protected the cellular DNA from radiation-induced damage and enhanced DNA repair in whole-body irradiated mice.
Wound healing	Extract	Rat	Enhanced wound contraction, decreased epithelialisation time, increased hydroxyproline content
Insecticidal	Extract	<i>Sitophilus Zeamais</i>	Showed repellency and contact toxicity
Mosquito larvicidal	Extract	<i>Aedes aegypti</i> larva	Killed larval population
Licidal	Extract	<i>in vitro</i> (Goat lice <i>Damalinia caprae</i> )	Killed lice
Cyto-toxic	Extract	<i>in vitro</i>	Showed anti-tumor property
Anti-pyretic	Extract	Mice	Reduced rectal temperature

Antibacterial activity [23]: The leaf and rhizome part of *Acorus calamus* is found to possess the antibacterial activity. The methanolic extract of *Acorus calamus* showed the inhibitory action against the bacterial strains of *Salmonella typhi*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, and *Staphylococcus aureus* [16].

Anti-fungal activity [6]: B-asarone compound fraction obtained from the crude methanolic extract of *Acorus calamus* rhizomes has been reported to possess the antifungal activity against the yeast strain of *Candida Albicans*, *Cryptococcus Neoformans*, and *Saccharomyces Cerevisiae* and also against *Aspergillus Niger*. [16]

**Antiulcer and cytoprotective activity:** The ethanolic extract of the rhizome was studied in rats, for protection of the gastroduodenal mucosa against injuries caused by indomethacin, reserpine and cysteamine, and also in a pyloric ligation model. The extract produced a marked reduction in the volume and acidity of basal gastric secretions and ulcer index and helped to protect against chemically induced lesions. [16]

**Anti-obesity Effect** [5]:  $\beta$ -Asarone-treated adipose rats showed weight loss, but also inhibited metabolic transformations, as well as glucose intolerance, elevated cholesterol, and adipokine variance. [17]



**Fig 1a:** Whole plant of *waj turki*



**Fig 1b:** Rhizome of *waj turki*

### Discussion and Conclusion

*A. calamus* is one of the highly valued herbal, medicinal and economically important plant species. It belongs to the family Acoraceae and commonly known as Bach (Hindi) and Sweet flag (English). It is a semi-aquatic, perennial, aromatic herb with creeping rhizomes, growing wild. Leaves look grass-like or sword shaped. The rhizome is the main part of the plant, horizontal, jointed, vertically compressed, spongy, 1.25-2.5 #cm in thickness. All the different parts (Leaves, root and rhizomes) possess an essential oil, commonly called the Calamus oil having several medicinal and aromatic properties. The rhizome contains asarone as a main constituent which contains the small quantity of sesquiterpenes and its alcohols; the rhizome also contains the choline, flavone, acoradin, galangin, acolamone, isocolamone the rhizome has several medicinal properties and used as a stimulant, bitter, tonic, aphrodisiac, laxative, emetic, expectorant, emmenagogue, and diuretic. Rhizome part is also used in the treatment of insomnia, melancholia, neurosis, remittent fevers, epilepsy, delirium, hysteria, dyspepsia and in loss of memory. Current research investigates sweet flag value as an insecticidal, antibacterial, antifungal and nematocidal agent. It also possess properties of analgesic, anti-epileptic, anti-oxidant,

anti-inflammatory, anti-diabetic, anti-diarrhoeal, Neuro and hepato protective, anti-pyretic, anti-obesity and many more properties which are proved through in vitro studies and on animal models.

This article also discussed in detail ancestral use of calamus, its description, temperament, uses and functions. According to USM, it has *Muqawwi bah* properties along with *Kasir riyah*, *Munaqi dimagh*, *Muqawi asaab*, *Muqawi meda*, *Mushil safra*, *souda* and *balgham*, *Mudir bol o hayz* and can be used in respiratory disorders, GI disturbances, nervine disorders, to strengthen memory, as emmenagogue, in fevers as anti-pyretic and to improve vision and more.

However, use of *A. calamus* more than recommended dosage can cause adverse effects to brain, semen in male and all other organs and faculties.

Further clinical trials and Meta analyses are required to assess the efficacy and prove the potential of the drug.

### Acknowledgements

The authors are thankful to the Dept of *Ilmul Qabalat wa Amraz Niswan*, library staff of National Institute of Unani Medicine for providing necessary materials and guiding throughout.

### Conflict of interest

Authors declare that there is no conflict of interest

### References

1. Rahman SZ, Khan RA, Latif A. Importance of pharmacovigilance in Unani system of medicine. *Indian J Pharmacol.* 2008 Feb;40(1):17-20.
2. Husain, Sofi, Tajuddin, Dang, Kumar. Unani system of medicine-introduction and challenges. *Medical Journal of Islamic World Academy of Sciences.* 2010;18(1):27-30.
3. Migration. *Traditional & Complementary Medicine: Principles.* Global Information Hub on Integrated Medicine. Updated on March 6, 2021. [Online]. Available: <https://globinmed.com/tcm/unani-system-of-medicine-practice/>
4. Faheem A, Siddiqui A, Chaudhary SS, Aslam M, Fatima G. *Waj turki (Acorus calamus Linn.): A pharmacognostical review with unani description.* *IJBPAS.* August, 2022;11(8):3608-3621.
5. Sharma V, Sharma R, Gautam DS, Kuca K, aromatic herb with creeping rhizomes, growing wild. Leaves look grass-like or sword shaped. The rhizome is the main part of the plant, horizontal, jointed, vertically compressed, spongy, 1.25-2.5 #cm in thickness. All the Nepovimova E, Martins N. Role of Vacha (*Acorus calamus* Linn.) in neurological and metabolic disorders: evidence from ethnopharmacology, phytochemistry, pharmacology and clinical study. *J Clin. Med.* 2020 Apr 19;9(4):1176.
6. Yadav D, Srivastava S, Tripathi YB. *Acorus calamus:* A Review. *Int. J Sci. Res. Biol. Sci.* 2019 Aug;6(4):62-67.
7. Li KS, Wah CS. Antioxidant and antibacterial activity of *Acorus calamus*. L leaf and rhizome extracts. *Jurnal Gizi Klinik Indonesia.* 2017 Apr 28;13(4):144-58.
8. Das BK, Swamy AV, Koti BC, Gadad PC. Experimental evidence for use of *Acorus calamus* (Asarone) for cancer chemoprevention. *Heliyon.* 2019 May 1, 5(5).

9. Kharat SR, Sawant P, Pathan R. An overview on Vacha (*Acorus calamus* L.) with special reference to Ayurvedic and modern aspect. *Int. J Pharm Res. Appl.* 2023 Apr;8(2):594-601.
10. Hakeem Mohammed Azam Khan. Muhit Azam. *CCRUM.* 2012:857-858.
11. Ibn al-Baitar. *Al Jamiul Mufradath ul advia ul aghzia.* Central Council for Research in Unani Medicine. 2003;4:412-414.
12. Hakeem Naseer Ahmed Tariq. *Taj ul Mufradath. Idara Kitab us Shifa New Delhi.* 2010;749-50.
13. Hakeem Mohammed Abdul Hakeem. *Bustanul Mufradath. Idara Kitab us Shifa New Delhi.* 2002;123-4.
14. Kabeerudiin H. *Makhzanul Mufradath. Idara Kitab us Shifa New Delhi;* c2007. p. 411-412.
15. Khare CP. *Indian Medicinal plants: An Illustrated Dictionary.* Springer India Private Limited., 2007, 16.
16. Umamaheshwari N, Rekha A. Sweet flag: (*Acorus calamus*): An incredible medicinal herb. *J Pharmacogn Phytochem.* 2018;7(6):15-22.
17. Singh S, Yadav M, Manoj. Critical review of vacha (*Acorus calamus* L.) in ayurvedic & modern context. *World J Pharm Med Res.* 2022;8(3):182-187.
18. Ghani HN. *Khazainul Advia.* 2<sup>nd</sup> ed. New Delhi: Idarae Kitabul Shifa; c2011. p. 348-349.
19. Mohammed Imran Usmani. *Tanqihul Mufradath.* Famous Offset Press New Delhi, 2008, 239.
20. Oli BS, Rauniyar A, Chad D. A review on the significance of the medicinal plant *Acorus calamus*. *Asian J Pharmacogn.* 2021;5(3):30-8.
21. Kaushik R, Sharma B. Establishment of monograph of *Acorus calamus* Linn. Rhizomes. *J Drug Deliv. Ther.,* 2012 May 14, 2(3).
22. Amit K. Medicinal properties of *Acorus calamus*. *J Drug Deliv. Ther.* 2013 May 13;3(3):143-4.