

# Research Journal of Pharmaceutical, Biological and Chemical Sciences

## An Overview on *Vetiveria Zizanioides*

Mishra Snigdha \*, Sharma Satish Kumar, Mohapatra Sharmistha, and Chauhan Deepa

Department of Pharmacology, Sunder Deep Pharmacy College, Ghaziabad UP India-201001

### ABSTRACT

*Vetiveria zizanioides* (Linn.) Nash, a member of the family Poaceae commonly known as the *Khas-Khas*, *Khas* or *Khus* grass in India, is a perennial grass with thick fibrous adventitious roots which are aromatic and highly valued. This tufted grass grows throughout the plains of India ascending up to an elevation of 1200 m. Having wide ecological amplitude, this grass grows in a wide variety of ecological habitats covering all bio-geographic provinces of India. The used parts are roots, leaves, stem. Over 150 compounds have been isolated and characterized from vetiver oil so far. A major portion of oil consist of sesquiterpenoids, hydrocarbons and their oxygenated derivatives, phytochemical screening of the powdered leaves shows the presence of alkaloids, flavonoids, tannins, phenols, terpenoids and saponins. The roots are aromatic, antifungal action, cooling, antiemetic, diaphoretic, haemostatic, expectorant, diuretic, stimulant, hysteria, insomnia, skin diseases, asthma, amnesia, amenorrhoea, antispasmodic, kidney problems, gall stones, mosquito repellent and antioxidants.

**Keywords:** *Vetiveria Zizanioides*, Khas khas; Vetiver oil; Urinary problems.

\*Corresponding author



## INTRODUCTION

Herbal medicines are currently in demand and their popularity is increasing day by day. About 500 plants with medicinal uses are mentioned in ancient literature and around 800 plants have been used in indigenous system of medicine. India is a vast repository of medicinal plants that are used in traditional medical treatment. WHO too has not systematically evaluated traditional medicines despite the fact that is used for primary health care about 80% of the world population. However in 1991 WHO developed guidelines for assessment of herbal medicine. Suggestions for herbal medicine standardization are outlined. Safety of some herbal ingredients has been recently called into question, in part because of identification of adverse events associated with their uses and increasingly because of the demonstration of clinically relevant interactions between herbs and prescription drugs. But in the last few decades there has been an exponential growth in the field of herbal medicine. It is getting popularized in developing and developed countries owing to its natural origin and lesser side effects. *Vetiveria zizanioides*(Linn.) Nash, a member of the family Poaceae commonly known as the *Khas-Khas*, *Khas* or *Khus* grass in India, is a perennial grass with thick fibrous adventitious roots which are aromatic and highly valued [1]. Vetiver grass is also cultivated for the production of a commercially important essential oil used in perfumery and aromatherapy [2-5]. This tufted grass grows throughout the plains of India ascending up to an elevation of 1200 m. Having wide ecological amplitude, this grass grows in a wide variety of ecological habitats covering all biogeographic provinces of India. No wonder that this is one grass which has been extensively used by almost all the tribes [6].

The grass is known by several local names in different regions in India

### Some Vernacular Name:

Hindi and Bengali	Khas, Khas-Khas, Khus-Khus, Khus
Gujarati	Valo
Marathi	Vala
Telugu	Kuruveeru, Vettiveellu, Vettiveerum
Tamil	Vattiver
Kannad	Vattiveeru, Laamancha, Kaddu, Karidappasajje Hullu
Malyalam	Ramaccham, Vettiveru
Ayurvedic name	Ushira

### Taxonomical Position of *Vetiveria Zizanioides* [6]

Kingdom- Plantae, Subkingdom – Tracheobionta (vascular plant), Superdivision – Spermatophyte (seed plant), Division – Magnoliophyta (flowering plant), Class – Liliopsida (monocotyledon), Subclass – Commelinidae, Order – Cyperales, Family – Poaceae (grass family), Genus – *Vetiveria* bory (vetiver grass), Species – *Vetiveria Zizanioides* (L.) Nas.

Fig.1: Whole Plant of *Vetiveria Zizanioides*Fig.2: Dried Roots of *Vetiveria Zizanioides*

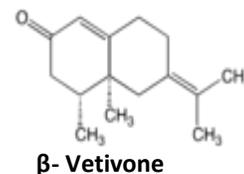
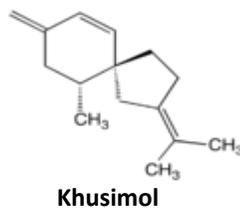
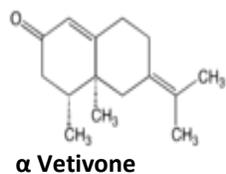
### Description of Plant

*Vetiveria Zizanioides* belongs to the grass family, vetiver is perennially growing grass that is indigenous to India. It is also known as khas in north and south India. This grass has tall stem, while the leaves are elongated, slender and somewhat firm. Vetiver produces brownish purple hued flowers, the roots of vetiver grow downwards upto 2 meters – 4 meters in depth. Presently countries like India, Haiti, and Reunion are the largest producer of vetiver worldwide.

### Chemical Constituents:

The chemical constituents present in the plant are Vetiverol, Vetivone [7], Khusimone, Khusimol, Vetivene, Khositone, Terpenes, Benzoic acid, Tripene-4-ol,  $\beta$ -Humulene, Epizizianal, vetivenyl vetivenate, iso khusimol, Vetiver oils, vetivazulene. [8] Zizaene, prezizaene, b-vetispirene, [9] Among these, the major active constituents identified are khusimol, vetivone, eudesmol, khusimone, zizaene, and prezizaene [10] which are considered to be the fingerprint of the oil [11-13].

The essential oil of vetiver, *Vetiveria zizanioides* (L.) Nash is one of the most important raw materials in perfumery both as a fixative and in its own right as a fragrance ingredient. Vetiver oil possesses sedative property and has been traditionally used in aromatherapy for relieving stress, anxiety, nervous tension and insomnia for a long time. Vetiver oil consists of a complex mixture of more than 150 sesquiterpenoid constituents. The composition and odor quality of the oil is dependent upon its origin. Among the 60 components identified to date, the sesquiterpene alpha-vetivone, beta-vetivone [14], and khusimol always occur in the oil in amounts up to 35%. As a result, they are considered to be fingerprints of the oil even though they do not possess the typical odor characteristics associated with vetiver.



### Medicinal Use:

Various tribes use the different parts of the grass for many of their ailments such as mouth ulcer, fever, boil, epilepsy, burn, snakebite, scorpion sting, rheumatism, fever, headache, etc. Apart from the medicinal uses, the culms along with the panicles form a good broom for sweeping. The culms and leaves are also extensively used by the tribes and villagers for thatching their huts, mud walls, etc. Some tribes (in Kerala) use the mats of the roots and leaves as bed for a cooling effect.

**Table.No:1 Some Traditional Uses of *Vetiveria Zizanioides***

Plant part	Tribes	Ailments
Root decoction	Santhals	As cooling in high fever, inflammation, sexual diseases
Root paste	<u>Lodhas</u>	Head ache, fever, Diarrhoea, chronic dysentery
Root ash, Leaf paste, stem juice	<u>Oraon</u> , South Indian tribes	Acidity, Boils, burn, epilepsy, scorpion bites, mouth ulcer, rheumatism, sprain
Root juice	Tribes of M.P.	Anthelmintic
Root vapour, Vetiver oil	Tribes of Varanasi,	Malarial fever, Stimulant, diaphoretic, refrigerant

### KNOWN PHARMACOLOGICAL ACTIVITIES

#### Antioxidant Activity:

Free radicals induce numerous diseases by lipid peroxidation and DNA damage. It has been reported that some of the extracts from plants possess antioxidant properties capable of scavenging free radicals *in vivo*. *Vetiveria zizanioides* is a densely tufted grass which is widely used as a traditional plant for aromatherapy, to relieve stress, anxiety, nervous tension and insomnia. In this regard, the roots of *V.zizanioides* was extracted with ethanol and used for the evaluation of various *in vitro* antioxidant activities such as reducing power ability, superoxide anion radical scavenging activity, deoxyribose degradation assay, total antioxidant capacity, total phenolics and total flavonoid composition [15].

#### Antifungal Activity:

The antifungal activity of ethanol and aqueous extracts of *Vetiveria zizanioides*. Ethanol and aqueous extracts of *Vetiveria Zizanioides* were prepared. Standard cultures of *Aspergillus*

nigar, *Asperigulls clavatus* and *Candida albicanus* were used for the study. The antifungal tests were conducted by using agar well plate method nystatin and griseofulvin were used as standard [16].

#### **Antibacterial Activity:**

The antibacterial activity is measured by zone of inhibition (mm). Totally four bacterial strains (two gram positive *S.aureus*, *B.subtilis* and two gram negative bacteria *P. aeurogenosa*, *E.coli*). Ethanolic extract of *Vetiveria Zizanioides* is known to posses flavonoids, alkaloids, terpenoids, saponins, tannins and phenols which either individually or combination exert antimicrobial activity. The study showed that EEVZ inhibited gram negative bacteria than gram positive bacteria. Flavonoids are found to be effective antimicrobial substance against a wide range of micro organisms, probably due to their ability to complex with extra cellular and soluble proteins and to complex with bacterial cell wall; more lipophilic flavonoids may disrupt microbial membrane. Antibacterial activity of tannins may be related to their ability to inactivate microbial adhesion enzymes and cell envelope transport proteins, they also complex with polysaccharides. The presence of tannins present in the roots of *Vetiveria zizanioides* implied that tannin may be the active compound which may be responsible for *in vitro* antibacterial activity in this study. Tannin in the plant extract was found to possess antibacterial [17].

#### **Hepatoprotective Activity:**

Methanolic extract of *Vetiveria Zizanioides* Linn shows hepatoprotective at the dose 300-500mg/kg p o damage induced by ethanol 20% at the dose of 3.76gm/kg p o [18].

#### **Antitubercular Activity:**

*Vetiveria zizanioides* L. Nash (Family: Poaceae) root (intact and spent) extracts and fractions were evaluated for antimycobacterial activity against *Mycobacterium tuberculosis* H(37)Rv and H(37)Ra strains using radiometric BACTEC 460 TB system. The ethanolic extract of intact as well as spent root was showed potent antituberculosis activity at a minimum concentration of 500µg/mL. The hexane fraction also showed antibacterial action by recording continuous decline in growth index (GI) of *Mycobacterium tuberculosis* at 50µg/mL. It was furthermore observed that root extract and hexane fraction showed activity even after the extraction of essential oil by hydro-distillation [19].

#### **Mosquito Repellent Activity:**

The nanoemulsions composed of citronella oil, hairy basil oil, and vetiver oil with mean droplet sizes ranging from 150 to 220 nm were prepared and investigated both in vitro and in vivo. Larger emulsion droplets (195-220 nm) shifted toward a smaller size (150-160 nm) after high-pressure homogenization and resulted in higher release rate. It was proposed that thin films obtained from the nanoemulsions with smaller droplet size would have higher integrity,

thus increasing the vaporization of essential oils and subsequently prolonging the mosquito repellent activity. In the laboratory oviposition deterrent test, the root extract of *Vetiveria Zizanioides* at each concentration greatly reduced the number of eggs deposited by the gravid *Anopheles stephensi* [20].

#### **Antihyperglycaemic Activity:**

The effect of root extract of *Vetiveria Zizanioides* in normal fasted rats after multiple doses showed significant antidiabetic activity at 2<sup>nd</sup> and 4<sup>th</sup> hour after administration compared to diabetic control, results were comparable with standard glibenclamide. The study indicates the ethanolic extract of *Vetiveria Zizanioides* roots possess better antihyperglycaemic activity than any other extract, in both normal and alloxan induced diabetic rats [21].

#### **Antidepressant Activity:**

The ethanolic extract of *Vetiveria Zizanioides* possesses antidepressant activity and the combination of Fluoxetine and ethanolic extract of *Vetiveria Zizanioides* is effective in tail suspension test and force swim test induced depressive behaviour [22].

### **CONCLUSION**

Vetiver is the most versatile, multifarious grass with immense potential. It is a plant known for its ability to produce essential oil from the roots which is especially used in the perfume industry. Various tribes use the different parts of this grass for several complications like mouth ulcer, boil, epilepsy, burn, snakebite, fever, rheumatism, headache, etc. Because of these activities it has found vast applications making it a green treasure. There is increasing interest in the health and wellness benefits of herbs and botanicals, this is with good reason as they might offer a natural safeguard against the development of certain conditions and be a putative treatment for some diseases.

### **REFERENCES**

- [1] Pushpangadan P. Ethnobotany in India A Status Report All India Co-ordinated Research project Ministry of Environment and Forests. New Delhi: Government of India; 1995.
- [2] Chopra RN, Nayar SL, Chopra IC. Glossary of Indian Medicinal Plants. New Delhi: Council of Scientific and Industrial Research; 1956 .p.31.
- [3] Jain SK. Econ Bot. 1965; 19:236–250.
- [4] Kritiker KR, Basu BD. Indian M Nadkarni KM. Indian plants and drugs with their medicinal properties and uses. New Delhi: Asiatic publishing House; 2001.
- [5] Medicinal Plants I–IV Vols. Dehra Dun: International Book Distributors Booksellers and Publishers; 1999.
- [6] Sharma R. Medicinal Plants of India - An Encyclopedia. New Delhi: Daya Publishing House; 2003.

- [7] Rangari D. Vinod, Pharmacognosy and Phytochemistry Vol.2 2<sup>nd</sup> edition Career publication .p.65
- [8] Ying Yong Sheng Tai Xue Bao 2004; 15(1) :170 -2
- [9] Sanjay Kumar Karan, Dilip kumar Pal, Sagar Kumar Mishra. Asian J Chem 2013; 25,No.3:1555-1557
- [10] Shalini Mitra, Vipin kumar Garg, Sudhir Kumar Chaudhary, Jitendra Kumar Arya. The Global Journal of Pharmaceutical Research 18 July, 2012;1(3):311-317.
- [11] Anon et al. The Wealth of India, CSIR, New Delhi, India 1976;(10): 451-457.
- [12] Martinez J, Rosa PTV, Menut C, Leydet A, Brat P, Pallet D, Meireles MAA. J Agr Food Chem 2004;(52): 6578-6584.
- [13] Champagnat, Pascal, Figueredo, Gilles, Chalchat, Jean-Claude, Carnat, Andre-Paul and Bessiere, Jean-Marie. J Essent Oil Res 2006; 18(4): 416-422.
- [14] Chopra RN, Nayar S, Chopra IC. Glossary of Indian medicinal plants, NISCAIR, 1st edition 1956:254.
- [15] Shubhra Devi et al. Tanzania journal of Health Research 2010;12: 276-283.
- [16] Dev Prakash et al. Journal of Pharmaceutical Research and Opinion 2011;1:3: 85-88.
- [17] V.Shubhra Devi et al. IJPSR 2010;1 (9): 120-124.
- [18] G.D. Chaudhary et al Indian journal of Natural Products and Resources Dec.2010;1(4): 397-408.
- [19] Dharmendra Saikia et al. Complement Ther Med. 2012 Dec;20(6); 434-436.
- [20] N.Arthi, K.Murgan, Effect of Vetiveria zizanioides L. Asian Pacific Journal of Tropical Disease 2011; 154-158.
- [21] Sanjay Kumar Karan et al. Journal of Pharmaceutical and Scientific Innovation 2012;1(6):35-38.
- [22] Glory Josephine I, et al. Journal of Pharm Biomed Sci 2012 Dec;25(25);171-175.