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Traditional and Medicinal Uses of Vetiver

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In the India the vetiver plant is known as the “Khus” or “Khus-khus” and is used both in medicine and in the industry of perfumery, of frozen foods and refrigeration in the preparation of all kinds of drinks. The grass is characterized by a sweet and pleasant flavor combined with a little earthy. On the other hand is a very fresh herb has a cooling effect similar to some other herbs such as mint or peppermint. Vetiver is a tall, tufted, perennial, scented grass with a straight stem, long narrow leaves and a lacework root system that is abundant, complex and extensive. It has versatile uses, particularly as an inexpensive yet effective and eco-friendly tool to combat soil erosion. Medicinal and aromatic plants (MAP) are two related groups of plants having in their part chemical constituents which are active in curing ailments (i.e. MP) or in providing flavors and/or fragrances (i.e. AP). Harvested vetiver leaves, culms and roots are utilized after some degree of processing in various ways, e.g. as input of agriculture-related activities (mulch, compost, nursery block / planting medium, animal feed stuff, mushroom cultivation, botanical pesticides, and allelopathy), handicraft and art works, medicinal applications, fragrance, input of construction-related activities (roof thatch, hut, mud brick, vetiver-clay composite storage bin, veneer / fiber board, artificial pozzalans, ash for concrete work, and straw bale), containers (pottery, melamine utensils, water containers), bouquet, energy sources (ethanol, green fuel), industrial products (pulp and paper, panel), and miscellaneous other utilization.

Keyword: Vetiver, Allelopathy, Medicinal use, Essential oil, Aromatherapy.

1. Introduction

Vetiver or khus (*Vetiveria zizanioides*) is a tall, perennial grass which grows wild in drier, periodically flood inundated tracts, of western and north-central India. It produces spongy, much branched, root system (khus roots) with fine rootlets, containing a fragrant oil which is a perfume by itself. The dry aromatic roots are also used to make curtains, mats, fans and other fancy goods as the product emits a sweet cooling aroma for a long period when moistened. The oil is used as a valuable fixative in blending of perfumes, cosmetics and scenting of soaps.

Its cultivation is largely scattered over small holdings in Kerala, Karnataka, Tamil Nadu and Andhra Pradesh and to a lesser extent in Uttar Pradesh. Considering the high quality of oil produced in India compared to Indonesia, Pakistan, Senegal, Sri Lanka Brazil and Haiti, the north Indian type vetiver oil has a good potential for export. It also highlights the utilization of vetiver as MAP in Thailand that includes the utilization of vetiver in traditional medicine, in pest control, and as fragrant materials.

1.2 Distillation Process

The essential oil is extracted from the roots by steam distillation. Freshly harvested roots on distillation give higher yield of oil than stored roots; the yield decreases progressively with the period of storage. The roots are soaked for 18-20 hours in water prior to distillation to render the root material soft and thereby further facilitate release of oil. Fresh roots when cut to lengths 2.5 cm – 5 cm increases recovery. As the most valuable quality constituents are contained in the high boiling fractions, the roots must be distilled for a prolonged period ranging from 20-24 hours. North Indian varieties yield 0.4 to 0.8 of oil. During distillation two fractions-lighter and heavier oils are obtained. In the start highly volatile lighter fraction released first and a considerable amount of which may escape before it gets cooled and collected in liquid phase. To avoid this loss a piece of *markin* cloth after cleaning is tied at delivery outlet in the swollen balloon shape in the receiver keeping it submerged in water. The lighter fraction that is likely to escape along with the steam/gas or running distillate water would be trapped in the cloth. As the distillation progress the heavier fraction will get deposited in the cloth and the lighter will pass through cloth and get collected in the receiver. At the end of the distillation the cloth is squeezed to get the oil. This piece of cloth is repeatedly used till tear off. Before thrown off, the cloth may be washed by diethyl ether (solvent) to get back the adhering oil. This practice helps in increased recovery of oil. Traditionally copper vessel with S.S condenser is found good for vetiver since the oil react with free copper turns bluish in colour which fetches more price in perfumery market. The traditionally distilled oil which often called “Ruhe khus” done in Kannauj type “Deg Vopka” although recovery is comparatively low fetches the highest price in perfumery market.

1.3 Medicinal and Health Benefits of Vetiver Essential Oil

The health benefits of Vetiver Essential Oil can be attributed to its properties like anti inflammatory, anti septic, aphrodisiac, cicatrisant, nervine, sedative, tonic and vulnerary.

This Essential Oil is very popular in aromatherapy and has many medicinal properties, which are described in brief below.

1.4 Anti Inflammatory

The very soothing and cooling effect of this essential oil calms and pacifies all sorts of inflammations. But it is particularly good in giving relief from inflammations in circulatory system and nervous system. It is found to be an appropriate treatment for inflammations caused by sun stroke, dehydration and loo (name given to very hot and dry winds prevalent during summers in the dry regions of India and few neighbouring countries).

1.5 Anti Septic:

In tropical countries like India and its neighbours, microbes and bacteria grow very fast due to their favourable hot and humid climate found in this region. Then it becomes obvious that your wounds are most likely to get septic in these places since there are plenty of bacteria here. But Mother Nature is very kind and she has provided the remedies too, right in those places. One such remedy is this Vetiver and the essential oil extracted from it. This oil efficiently stops the growth of *Staphylococcus Aureus*, the bacteria responsible for causing septic, and eliminates them, thereby helping cure septic and giving protection against it. Being totally safe, this oil can be applied externally on wounds or taken orally, to protect wounds as well as internal organs from septic.

1.6 Aphrodisiac:

Mixed in sorbets and beverages as a flavouring agent, this oil has an aphrodisiac effect. It enhances libido and gives arousals. Since sex has more to do with the psychology (brain) than the physiology, remedy for most of the sexual disorders like frigidity, lack of libido, impotence etc. lays in the brain. Certain components of this oil stimulate those portions of brain and the problems are over.

1.7 Cicatrisant:

Cicatrisant is a property by virtue of which a substance speeds up the eradication or disappearance of the scars and other marks from the skin. It promotes growth of new tissues in the affected places which replace the dead and discoloured tissues and helps achieve a uniform look. This is also useful for the post delivery stretch marks, fat cracks, after spots left by pox, burns etc.

1.8 Nervine:

A tonic for the nerves is called a nervine, like our Essential Oil of Vetiver is. It takes care of the nerves and maintains them in good health. It also heals the damages done to the nerves by shock, fear, stress etc. Further, it helps get rid of nervous disorders, afflictions, epileptic and hysteric attacks, nervous and neurotic disorders such as Parkinson's Disease, lack of control over limbs etc.

1.9 Sedative:

The Essential Oil of Vetiver is a well known sedative. It sedates nervous irritations, afflictions, convulsions and emotional outbursts such as anger, anxiety, epileptic and hysteric attacks, restlessness, nervousness etc. and even benefits patients of insomnia.

1.10 Tonic:

The effect of a tonic on the body is quite similar to that of overhauling and servicing on a vehicle. A tonic tones up every system functioning in the body, namely the digestive system, respiratory system, circulatory system, excretory system, immune system, endocrinal system, nervous system and the neurotic system. Thus, in nutshell, it keeps the metabolic system in order, rejuvenates the body, gives strength and boosts immunity.

1.11 Vulnerary:

This property of Vetiver Essential Oil helps heal wounds by promoting growth of new tissues at the wounded place and also by keeping it safe from infections by inhibiting growth of microbes and promoting crowding of leucocytes and platelets at the place.

1.12 Healing:

Vetiver essential oil helps in the formation of new tissue is used so as to accelerate the healing and recovery of skin wounds as well to remove stains, marks on the skin and the scars themselves. Also we used to repair the cracks and grooves in the skin caused by different circumstances such as pregnancy, diets, allergies, burns.

1.13 Calming:

In addition to various beverages for culinary purposes and aphrodisiacs, with vetiver essential oil is made soothing infusion used to relax and recover from severe strain. Help to overcome situations of shock, fear, high levels of stress, panic, etc.

1.14 Other Benefits:

Other benefits that will tend to award to the use of vetiver essential oil are for example the strengthening of bones, the treatment of rheumatism, gout, arthritis, muscle aches, dryness, cramps and dry skin.



Fig 1: Vetiver roots in soil (left and middle) and in water (right)

1.15 How (else) is Vetiver used?

Vetiver's stunning mass of deep, strong, fibrous roots and thick thatch of stiff leaves have led to its extensive use in a variety of areas:

- **As a nurse crop** - Vetiver stabilizes and replenishes nutrients in highly degraded areas. Rehabilitated sites welcome the return of native plants.
- **As a privacy barrier** - Vetiver forms a tall, dense barrier that defeats prying eyes and creates a serene green paradise. It creates a beautiful, economical perimeter on small, urban lots.



Fig 2: To absorb contaminants in water and soil.

Private companies and municipalities use Vetiver systems to protect and heal degraded environments. Vetiver roots absorb pollutants and clarify water.



Fig 3: As a graffiti barrier

A strip of Vetiver growing against a hollow tile or concrete wall will separate even the most determined tagger from your “canvas.”

As a grass wall and boundary marker - Vetiver hedges are so stable that surveyors rely on them to establish property lines.



Fig 4: To terrace, and retain nutrients

Between slender rows of Vetiver, farmers can grow crops that benefit from the accumulation of silt and plant nutrients. Vetiver's vertical roots nurture adjacent crops.

As an excellent batch material - Mature leaves produce long-lasting absorbent mulch

that reduces evaporation and helps mycorrhizae to accumulate. (Quick: close your eyes and spell "mycorrhizae.")

As a bios wale - A Vetiver grass channel is an attractive alternative to traditional concrete drainage ditches, and effectively filters and attenuates stormwater runoff.



Fig 5: To divert water

-Vetiver hedges can be configured and installed at strategic points to divert water and slow the velocity of rainfall runoff.

As a constructed wetland- Installed as a leach field, Vetiver absorbs nutrients generated by cesspools, piggeries, dairy and poultry farms. Vetiver clarifies effluent and eliminates odors.

As livestock feed - Vetiver's nutritional value is similar to Napier grass (*Pennisetum*

pupureum). Hawaii farmers introduced Vetiver to local cows in the 1940s. The cows didn't like it. But then they didn't much like Napier grass, either.

As a carbon sink- Given the concern regarding global warming and CO₂ emissions, 44,500 acres of land protected by Vetiver hedges will provide a CO₂ sink for the carbon produced by 100,000 cars traveling 12,500 miles a year.

As biofuels - Dry biomass yields exceed 370 t/ha per year). Harvested three to four times each year, average production ranges between 120-130 t / ha per harvest. Annual yield is generally 10 - 20% higher with four harvests.

Vetiver leaves are high in cellulose; their major chemical components are hemicellulose (ca. 38%) and cellulose (ca. 27%) (Kethacanon *et al.*, 2003). Vetiver

leaves can be used as a substrate for ethanol production through alkali pretreatment followed by enzyme hydrolysis and yeast fermentation, which generates an ethanol yield of 13% after one-cycle column distillation.

As a food additive - Vetiver is used domestically in cooking; it's infused in tea and also used in baking.



Fig 6: As a fragrance The cosmetic industry uses Vetiver essential oil and extracts widely. The plant also has medicinal properties.



Fig 7: As textile

-Crafters use Vetiver leaves and roots to create an extensive range of beautiful woven handicrafts. Like its sister, bamboo, which creates luxurious textiles, Vetiver would seem suited to producing soft, durable fabric.



Fig 8: As Landscaping

Vetiver is a beautiful ornamental plant for gardens, patios, decks, etc. The bush of the vetiver plant is so large that it hides unsightly structures. Grown as a hedge, i.e. planting close together in line, it forms a dense, uniform, and attractive hedge under tropical and subtropical climates. It also forms an aesthetically beautiful barrier to unsightly view.

1.16 Agriculture-related Activities

1.16.1 Mulch

In tropical countries with high and intensive rainfall, mulching is one of the most important conservation methods. Similar to other mulching materials, vetiver leaves provides shade to the plot, thereby decreasing the temperature and at the same time conserve moisture of the plot and keep weeds under control. Vetiver leaves are excellent materials for mulching; they are durable and long lasting. Vetiver mulch can be applied to vegetable plots, at the base of fruit trees, and field crop plots.

1.16.2 Composition

Vetiver leaves and culms are completely decomposed to become soft, disintegrated, and dark brown to black in color. Vetiver compost contains major nutrients from the decomposition process, i.e. N, P, K, Ca, and Mg with a pH of 7.0. In addition, vetiver compost also provides humic acid that enhances soil fertility.

1.16.3 Animal feed

The young vetiver leaves can be ground to feed fish and livestock, but mature leaves cannot be used for such purposes because their nutritive value is lower than other grasses, and because of the high roughness and silica content. The analysis also indicated that vetiver has the content of crude protein lower than that of other grasses used for animal feed. In the State of Karnataka, India, vetiver is planted along the

field boundaries and cut every two weeks or less for use as fodder. Vetiver was found to have relatively higher structural carbohydrates as compared to native grass and rice straw. On the other hand, it also had optimal levels of crude protein, considered to be enough to maximize intake and digestion of the vetiver forage. It was concluded that vetiver may be used as ruminant feed if it is mixed with other good quality feed and forages.

1.16.4 Mushroom Cultivation

Vetiver leaves contain chemical compounds such as cellulose, hemicellulose, lignin, and crude protein as well as various minerals in which certain mushrooms can feed on. Many investigators have been successful in cultivating mushrooms using vetiver as the medium for their growth. Oyster, shiitake, and straw mushrooms are among those that can be produced using small pieces of vetiver as a medium.

1.17 Botanical Pesticides

1.17.1 Insecticides: With the evidence that vetiver has no serious insect pests, it is obvious that the insects have an absolute distaste for vetiver, as were reported in the following cases: Levy (1940) observed that the vetiver plant grown in close proximity to the sugar cane could inhibit to a very substantial degree the attack upon the sugar cane of certain insects such as the cane borer. Likewise, a farmer in *Louisiana* reported that in a plot of crop where vetiver was used as mulch, no insects of any kind ever came near. It has also been found that the tops of vetiver, in the same formation of mixture with the residue of the roots, will make an absolute repellent for the insects that may damage strawberries grown in southern U.S. Recently, Maistrello and Henderson (1999) found a group of compounds, such as nootkatone, in vetiver roots, which were able to disrupt termite

behavior and physiology as a consequence of direct physical contact, ingestion, or exposure to the vapors. They also found that ingestion of wood treated with vetiver oil or nootkatone causes the progressive death of the protozoa living inside the termite gut, ultimately results in a progressive decline of its colony through starvation, as these termites rely on the protozoa for the digestion of their wooden food.

1.17.2 Fungicides: In New Zealand, noticed that fungal attacks on the vetiver mulched plants have virtually disappeared and there seem to be little, if any other pest action around the host plants.

1.17.3 Agaricides: In Thailand, found that 10% vetiver oils of different ecotypes were variably able to control cow ticks at both the larval and adult stages. Furthermore, extract

of dry root was able to control adult stage of ticks better than larval stage.

1.17.4 Allelopathy: It has been observed that in the vicinity of the vetiver clumps, there is a few other plants growing. It was hypothesized that certain substances excreted by the vetiver plant may have allelopathic action in that they inhibit the growth of other plants. Root and stem extracts of vetiver could inhibit the germination of soybean seeds. It was concluded that vetiver extract contains in vetiver oil has allelopathic effect in inhibiting the germination of seeds of any plant growing in its vicinity. It was further suggested that this could be applied to control the weeds of crop plants without the use of chemical herbicides.

Weed control: When spread evenly on the ground, whole or desiccated Vetiver leaves



Fig 9: Vetiver controls erosion and its mulch suppresses weeds in coffee plantation

form a thick matt that suppresses weeds. Vetiver mulch successfully controls weeds in coffee and cocoa plantations in the

Central Highlands and tea plantations in India.



Fig 10: Vetiver mulch controls weeds in a tea plantation, southern India

1.17.5 Perfumery

Vetiver oil is a viscous light-brown oil with a rich green-woody earthy and nut-like fragrance. In its diluted form, vetiver oil is used to provide sweet note and soothing cool effect. It has been utilized as raw material for various fragrant products such as perfumes, deodorants, lotions, soaps, cosmetics, etc. Having complex chemical composition and oil odor, high solubility in alcohol that improves its miscibility with other perfumery material, vetiver oil is a unique perfumery resource.

2. Conclusion

Vetiver has traditionally been used as medicinal and aromatic plants in many countries, especially in Asia. Recently it has received widespread recognition as being an ideal plant for soil and water conservation as well as environmental protection. This, however, has met with difficulty in promoting vetiver grown as hedgerows for soil and water conservation since the farmers complain that they do not obtain any direct benefit (i.e. cash return) from planting vetiver. However, it is argued that the indirect benefits the farmers could obtain are enormous.

It ends with the discussion on the main objective of planting vetiver, environmental implication, socio-economic aspects, and industrial potentials. As a campaign to go

‘back to nature’ is everywhere, the utilization of vetiver as a medicinal plant to produce pharmaceutical products on a commercial scale has great potential for development. A new concept, that of growing vetiver as an income generating plant, has recently been launched by the Royal Project Foundation of Thailand. This approach is interesting since vetiver provides a very good income to the farmers if grown specifically for its roots.

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