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## Grasses: An Underestimated Medicinal Repository

Kavya Dashora <sup>1\*</sup> and Kumar Vinod C Gosavi <sup>1</sup>

1. CABI South Asia ; Department of Botany, Goa University, Goa  
[E-mail: [dashorakavya1@gmail.com](mailto:dashorakavya1@gmail.com); [kumarvinodgosavi@gmail.com](mailto:kumarvinodgosavi@gmail.com)]

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Grasses have been on this earth as monocotyledonous plants and have been a survivor on the planet despite of various ecological changes. Many grasses hold the medicinal value and are a repository of some unique medicinal properties. Man had been using these grasses in various forms from cultivating the cereals like the rice, wheat and maize and millets for food to growing sugarcane for sugar and jaggery. The bamboo grass, with its woody stem, is ideal as building material and in making paper. Lemon grass is used to perfume soaps and to flavor curries. Other grasses are used for making thatches for huts. It is very essential for humans to identify such important grasses and develop a strategy for their conservation.

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### 1. Introduction

Grass is the common word that generally describes monocotyledonous green plants. Grass is the world's most ubiquitous plant, an incredible survivor and is virtually indestructible. The family Poaceae (or Gramineae) are the "true grasses" and include most plants grown as grains, for pasture, and for lawns (turf). They include some more specialized crops such as lemongrass, as well as many ornamental plants. They also include plants often recognized to be grasses, such as bamboos, maize or some species of weeds called crab grass. The term came about in the early 15th century, from the Old English græs, derived from the same root as "grow". Numbering approximately 10,000 to 11,000 species belonging to about 700 genera for the world (Watson & Dallwitz, 1992; Clayton & Renvoize, 1989) species, the grasses form the climax vegetation in great areas of low rainfall throughout the world. The main

reason for their survival is that they are highly proliferating in strategy. Their shape and structure require very little space and if trampled upon generally regain their upright position. They even continue growing after being heavily grazed on by animals.

Plants having grass-like structures have existed for millions of years and had been providing fodder for cretaceous dinosaurs, whose fossilized dung contains phytoliths of a variety of grasses that include the ancestors of rice and bamboo. Grasses have adapted to conditions in lush rain forests, dry deserts, and cold mountain steppes, and are now the most widespread plant type. They find the multiple uses in many aspects of human life. Several species are cultivated for their food value. These are the cereals like the rice, wheat and maize and millets like the jowar, bajra and ragi. Another important grass is the sugarcane, which is an important source of sugar and jaggery. The bamboo grass, with its woody stem, is ideal

as building material and in making paper. Lemon grass is used to make perfumed soaps and to flavor curries. Other grasses are used for making thatches for huts.

Most grasses are annual or perennial herbs with fibrous roots and, often, rhizomes. The stems are always noded and are typically hollow and swollen at the nodes, although many genera have solid stems. The leaves have two parts: a sheath surrounding the stem (called the culm in grasses); and a blade, usually flat and linear. (Bracts and perianth modified in to glume, lemma, palea and lodicules). They do not have petals to attract insects, nor do they have nectar or scent, as they are wind-pollinated. The anthers hang on long stalks outside the flower and release pollen grains. These are carried by the wind to the feathery stigma of another flower. The inflorescence is subdivided into spikelets each containing one or more tiny florets. (In other flowering plants the inflorescences are clusters of separate flowers, never spikelets.) The dry seedlike fruit is called a caryopsis, or grain.

Although they are mostly used as fodder and forage, many of them have a significant medicinal properties and find the mention in ancient Indian medicine literature . some of the prominent medicinal grasses are discussed below.

#### a) *Coix lacryma-jobi* L.

It is a relative of maize grass belonging to family Poaceae. It grows along river and stream banks, border of ponds, in wet and moist land. It is good soil binder and grass. It is commonly called as job's tears. In Hindi it is commonly called as Vyjanti. The cultivated variety of Job's tears is used for its medicinal properties in Asia.

#### b) *Cynodon dactylon* (L.) Pers

Conch or green grass, botanically known as *Cynodon dactylon* (L.)Pers. is a hardy perennial grass and is one of the most commonly occurring weeds in India. In

Hindi it is known as *dhub*, *doob*, or *hariyalil*; other common names include *durba* (Bengali), *garikoihallu* (Kanarese), *durva* (Marathi), *durva* or *haritali* (Sanskrit), *arugampullu* (Tamil), *garikagoddi* (Telugu) and *dhubkhabbal* (Punjabi) (Sastry and Kavathekar, 1990). Although it is a potential weed, conch grass is a valuable herbal medicinal and used as first aid for minor injuries (Oudhia, 1999a,b). Conch grass grows in mostly all types of soil. Because of its wide spread roots, the grass does not perish in any adverse climatic condition. It is quite difficult to pull out the grass complete from ground. It is a highly aggressive species, crowding out most other grasses, leading it to be called 'devil's grass' in some areas. Farmers regard this grass as a weed and pluck them out whenever they find them in their paddy fields.

Farmers traditionally apply crushed leaves to minor wounds as a styptic to stop bleeding similar to *Tridax procumbens* L., *Achyranthes aspera* L. and *Blumea lacera* (Burm. f.) DC. (Oudhia, and Pal, 2000). *C.dactylon* has a renowned position in Indian systems of medicine and many parts of the plants are assumed to have medicinal properties. It is traditionally used for eye disorders and weak vision; the afflicted are advised to walk bare foot on dew drops spread over plant each morning. According to Ayurveda, India's traditional pharmacopoeia, it destroys foulness of breath, useful in leucoderma, bronchitis, piles, asthma, tumors, and enlargement of the spleen. According to Unani system of medicine, *C.dactylon* plant is bitter, sharp hot taste, good odor, laxative, brain and heart tonic, aphrodisiac, alexipharmic, emetic, emmenagogue, expectorant, carminative and useful against grippe in children, and for pains, inflammations, and toothache (Agharkar 1991). Virus-affected discolored leaves of *C.dactylon* are used for the treatment of liver complaints.. In

Homoeopathic systems of medicine, it is used to treat all types of bleeding and skin troubles (Oudhia et al. 1998).

### 1.2 Chemical composition

Conch grass is rich in protein, carbohydrates, fiber, calcium phosphorus and potassium. It provides 11.75 percent ash on burning, which has potassium and sodium salts in it. It contains more than 65% of chlorophyll. This helps in increasing the number of red blood cells in our body. It is an excellent detoxifier. It helps in maintaining the alkalinity of blood. This is one of the reasons conch grass is able to cure diseases.

### 1.3 Medicinal values

Siddha and Ayurveda systems use conch grass in preparing various concoctions. It is an excellent supplement for lactating mothers. It boosts prolactin and so increases the quality and quantity of breast milk. Homoeopathy works on the principle of *similia similibus curentur*, or like cures like. Homeopathic remedy prepared from this grass is used in treating almost all ailments that trouble the urinary tract. The remedy is also useful in treating nosebleed, blood vomiting etc. Recent research at University of Allahabad in India has shown the glycemetic potential of Conchgrass. The study conclusively proves that Conchgrass extract has significant hypoglycemic as well as antidiabetic effects. The result of the research suggests that it may provide a therapeutic avenue against diabetes and diabetes-related complications in future

#### c) *Cymbopogon martinii* (Roxb.) Will. Watson

Commonly known as lemongrass, it is a genus of about 55 species of grasses, native to warm temperate and tropical regions of the Old World and Oceania. It is a tall perennial grass. Common names include

**lemon grass, barbed wire grass, silky heads, citronella grass, fever grass or Hierba Luisa** amongst many others.

Lemon grass is native to India. The other species used popularly next to lemon grass is *Cymbopogon nardus* (L.) Rendle and *Cymbopogon winterianus* Jowitt ex Bor. They are very similar to *C. martinii* except that they grow to 2 m and has red base stems. These species are used for the production of citronella oil, which is used in soaps, cosmetics and perfumery industries. The principal chemical constituents of citronella oil are geraniol and citronellol, which have antiseptic properties, hence they are used in household disinfectants and soaps. Besides oil production, citronella grass is also used for culinary purposes, in tea and as a flavoring.

*C. citratus* is known to cause apoptosis (programmed cell death) in cancer cells. Through in vitro studies, the researchers examined the effect of citral, a molecule found in lemon grass, on both normal and cancerous cells. Using concentrations of citral equivalent to the quantity in a cup of tea (one gram of lemon grass in hot water), the researchers observed that citral induces programmed cell death in the cancerous cells, while the normal cells were left unharmed. Some of the very common lemon grass species used world wide are

- *Cymbopogon ambiguus* A. Camus (Australian lemon-scented grass)
- *Cymbopogon bombycinus* (R. Br.) Domin (Silky Oilgrass)
- *Cymbopogon citratus* (DC.) Stapf (Lemon Grass)
- *Cymbopogon flexuosus* (Nees ex Steud.) Will. Watson (East Indian lemon grass)
- *Cymbopogon nardus* (L.) Rendle (Citronella Grass)
- *Cymbopogon martini* (Roxb.) Will. Watson (Palmarosa)

- *Cymbopogon obtectus* S.T. Blake" ( Silky-heads)
- *Cymbopogon refractus* (R. Br.) A. Camus (Barbed wire grass )

#### d) *Vetiveria zizanioides* (L.) Nash

**Vetiver** is a perennial grass of the poaceae family and is native to India. In western and northern India, it is popularly known as **khus**, giving the earlier English names cuscus, cuss cuss, kuss-kuss grass, etc. This grass can grow up to 1.5 meters high with tall stems and long, thin and rigid leaves. The flowers are brownish purple in colour. It is a densely tufted grass with the culms arising from an aromatic rhizome up to 2 m; the roots are stout, dense and aromatic; leaves are narrow, erect, keeled with scabrid margins; inflorescence is a panicle, up to 15-45 cm long of numerous slender racemes in whorls on a central axis; 440 spikelets are grey to purplish, 4-6 mm long, in pairs, one sessile the other pedicelled; 2-flowered; the lower floret is reduced to a lemma, upper bisexual in sessile, male in the pedicelled spikelet; glumes are armed with stout, tubercle-based spines, lemmas awnless, palea minute.

*Khas* grass grows wild in almost all plain states in India up to an elevation of 1200 m. Only in some pockets of South India is the grass systematically cultivated but the yield from the cultivated crops meets only a small percentage of requirements. The grass grows luxuriantly in areas with an annual rainfall of 1000-2000 mm and temperature ranging from 22 to 43°C. Marshy riverbeds with sandy loam are best suited for this grass (Anon. 1976). It possess a unique rooting pattern. Unlike most grasses, which form horizontally spreading mat-like root systems, vetiver's roots grow downward, 2-4 meters in depth. This typical pattern has made it widely used in erosion control systems. Vetiver is closely related to other fragrant grasses such as Lemon Grass,

Citronella, and Palmarosa. Because of its aromatic properties, vetiver is widely cultivated in the tropical regions of the world.

Two species of *Vetiveria* are found in India, of which *V. zizanioides* is the common source of the wellknown oil of vetiver, which is used in medicine and in perfumery. *Khas* grass grows wild in many states, namely Haryana, Uttar Pradesh, Rajasthan, Gujarat, Bihar, Orissa and Madhya Pradesh and throughout South India. It is systematically cultivated in the North Indian states of Rajasthan, Uttar Pradesh and Punjab and in the South Indian states of Kerala, Tamil Nadu, Karnataka and Andhra Pradesh. The yield from the cultivated crops, however, meets only a very small percentage of the requirements of the country. The bulk of the roots used for cooling purposes and for the extraction of the oil are obtained from the wild.

It is also cultivated for the fragrant essential oil distilled from its roots and used in high end perfumes. Worldwide production is estimated at about 250 tons per annum . The oil is amber brown and rather thick. The odor of vetiver oil is described as deep, sweet, woody, smoky, earthy, amber, balsam. The best quality oil is obtained from roots that are 18 to 24 months old.

Like patchouli essential oil, the odor of vetiver develops and improves with aging. The characteristics of the oil can vary significantly depending on where the grass is grown and the climate and soil conditions. In the north of India, oil is distilled from wild-growing vetiver. This oil is known as *Khus* or *Khas* and is considered superior to the oil obtained from the cultivated variety.

#### 1.4 Medicinal values:

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. The Santhal tribes of Bihar and West Bengal use the paste of fresh roots for burn, snakebite and scorpion sting, and a decoction of the roots as a tonic for weakness; In West Bengal the tribal people use the root paste for headache, rheumatism and sprain, and a stem decoction for urinary tract infection; in Madhya Pradesh the leaf juice is commonly used as anthelmintic; the tribes of the Varanasi district inhale the root vapour for malarial fever. The root ash is given to patients for acidity by the Oraon tribe. Likewise, there are very many different applications of the plant for different ailments among different ethnic tribes (Jain 1991; Singh & Maheshwari 1983).

### 1.5 Domestic use

Mats made by weaving Vetiver roots and binding them with ropes/cords are used in India to cool rooms in a house during summer. The mats are typically hung in the doorway and kept moist by spraying with water periodically. It acts like an air-cooler when wind from a fan or outside hits it. It also adds a pleasant aroma in the house which is commonly described as "cool" and "refreshing".

### 1.6 Commercial uses

The commercial applications of the grass mainly pertain to the extraction of vetiver oil through distillation of the roots. Vetiver oil is one of the most valuable and important raw materials in perfumery and finds extensive applications in the soap and cosmetic industries, for pharmaceutical companies and as antimicrobial and anti-fungal agent (Singh et al. 1978; Dikshit and Husain 1984). Over 150 compounds have been isolated and characterized from vetiver oil so far. A major portion of oil consists of sesquiterpene alcohol (Thakur et al. 1989). A major application of the roots of vetiver particularly in North Indian plains pertains

to the preparation and sale of mats/screens for windows, doors and desert coolers during summer months when the temperature goes up to as high as 45°C.

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