

LEMON GRASS: BOTANY, ETHNOBOTANY AND CHEMISTRY-A REVIEW

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INTRODUCTION

Lemon grass belongs to the section of *Andropogon* called *Cymbopogon* of the family Gramineae. A very large genus, including about 500 described species out of which eight species occur in Pakistan. Due to the production of lemon grass oil as major component, two of the species i.e. *Cymbopogon citrates* and *C. flexuosus* are generally called Lemon grass (Anonymous, 1950).

DESCRIPTION

A large perennial herb, with slightly branched partly aerial rhizome, reaching half inch in diameter and strongly ringed with the closely placed scars of the leaf-sheaths, the remains of which persist on the upper portion and giving off numerous tough fibres. Stem reaching 6 feet or more in height, erect, stout, cylindrical, smooth and shining. Leaves are very large and long, numerous erect lower ones sometimes reduced to their sheaths. Spikelets very small, arranged in couples, one stalked, containing one male flower, the other sessile with one hermaphrodite and often one barren flower (Burger et al. 1986). In Pakistan, *C. jwarancusa* (Schult.), *Andropogon jwarancusa* (Jones.) is highly aromatic grass growing upto six feet high with densely tufted roots. The leaves are about two feet long and 0.2 inch broad. It occurs in Himalayas from Kashmir to Assam ascending up to 10,800 feet. The grass yields about 1% essential oil (acid value 0.7, saponification value 1.0). The oil obtained from the grass of Hazara district is reported to contain 90% of pepratone. The oil from the grass growing in Sind contains 44% ketone. *C. martini* (Roxb. Wat. Syn. *A. martini* (Poxb.) is a tall perennial sweet scented grass 5-8 feet high, occurring in the drier localities of India-Pakistan from Kashmir through Punjab hills to Almora. The varieties are known as motia and sofia which are morphologically indistinguishable. The two varieties have different habit and grow under different ecological conditions. Motia grass yields the commercially important palmorasa oil also known as rusa oil or East Indian Geranium oil. Faisalabad in Punjab province is suitable for the growth of the lemon grass yielding oil of good quality.

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Palmarosa or motia oil is used as a base for the several perfumes and in cosmetics as soap perfume. With sandal wood, oil it is used in ointments and lotions for warding off mosquitoes. In medicine, it is used as remedy for lumbago and stiff joints and in skin diseases (Wealth of India, B.N Shastari 1950).

HABITAT

This beautiful grass is a native of Ceylon. Here it grows up to the level of 300 feet

in well drained sandy soil, An annual rainfall of 203 to 254 cm and average temperature of 75 to 80°F are reported to be favourable in its growth. It is also cultivated in West Indies, Guatemala, Haiti and India and to a very limited extent in Pakistan (Jiang, 1993). *C. flexuosus* Stapf. is considered to have originated in Kerala [India]. The plant is very hardy and grows under a variety of conditions. The most ideal conditions are warm and humid climate with plenty of sunshine.

Maximum age of lemon grass is 18 to 24 months, while it is necessary to renew its plantation after every 6 to 8 years (Anonymous, 1950; Atal and Kapur, 1982).

CHEMISTRY

East Indian (*C. flexuosus*) and W. Indies (*C. citrates*) grass differ only in that the latter contains myrcene in addition to citronellol and geraniol. The principal difference is in the harsh odour of the former and milder, subdued odour of the latter (Atal and Kapur, 1982; Perry, 1980]. Fresh lemon grass contains 0.26 to 0.52% essential oil containing 78 to 85.5% citrol, where dry material yields 0.4% essential oil containing 72 to 73% citrol (Chopra, 1985). In addition to citrol lemon grass contains a variety of compounds including terpenes, flavonoids, saponins, and alkaloids depending upon the habitat (Crowford, et al. 1975). Only the essential oil of *C. citratus* contains 25 components e.g., myrcene, limonene, methyl heptenone, citrol, terpeneol, linalool, geraniol, nerol and citronellol (Kasumov and Babaev, 1983) are major ones.

Similarly lemon grass from equatorial Africa and Cameron Islands contains myrcene, dipentane, camphorene, bicyclic camphorene, together with other monocyclic terpenes, sesquiterpenes, methylheptenol, linalool, terpeneol, geraniol, nerol, farnesolvaleraldehyde, isovaleraldehyde, methyl heptenone, citronellol, decylaldehyde and an aldehyde or ketone giving semi carbazone (Ekundayo, 1985).

On the other hand, Japanese lemon grass oil contains 60 to 70% of citrol with some terpenol and barneol, but scarcely any heptenone, terpenes or sesquiterpenes. The components of Vietnamese lemon grass oil (*C.flexuosus* Staph.) contains citrol as principal component (80 to 85%) while numerous sesquiterpenes are also reported (Fedinand, 1966).

MEDICINAL USES

Medicinal use of lemongrass is known to mankind since antiquity. Its oil has been used to cure various ailments like cough, cold, spitting of blood, rheumatism, lumbago, digestive problems, bladder problems, leprosy, and as mouth wash for the toothache and swollen gums. It is also been claimed to be stimulating, diuretic, anti purgative and sudorrific to reduce fever (Chopra, 1985; Perry, 1980).

To cure cholera, colic and obstinate vomiting only 3-6 drops of the oil are effective medicine of choice [Chopra, 1095]. The oil has been found to possess bactericidal and anti fungal properties, which is comparable to penicillin in its effectiveness (Kokate and Verma, 1971). The oil also contains male sex hormone agent (Kisaki, *et al.* 1998). It is also reported to have strong activity against two dermatophytes, namely *Trichophyton rubrum* and *Microsporium gypsum* (Kasumov and Babaev, 1983). Similarly pharmacological investigation on the essential oil of *C.citratius* revealed that it has a depressant effect on the CNS (Perry, 1980). It has analgesic and antipyretic properties. The extract juice from the lemon grass contains inhibitor of the promotion stage of carcinogenesis induced by cotton oil. It is an oral anti tumor drug for the cancer and in combination with cyclodextrin lengthened the survival time (Oshiba, *et al.* 1991; Zheng, *et al.* 1993). Gallstone dissolving preparations have been made of oil (Igimi and Ide, 1993). The lemon grass contains high percentage of Vitamin C, which is a characteristic of plants used as drug e.g., belladonna and jaborandi. Lemon grass oils show activity towards the phyto pathogenic fungi. A combination of lemon grass oil is given for use on human and domestic animal pathogens (Rao and Narasimha 1971; Haung, 1995).

CONCLUSIONS

With the increasing awareness and interest in traditional medicines the scientist has been tempted to explore and establish the folklore uses of lemon grass on the scientific grounds. As a result of the researches carried out in various countries it has been established that lemon grass possesses antibacterial (Elson and Underbakve, 1989; Ibrahim, 1992; Onawunmi, *et al.*, 1984; Onawunmi, *et al.* 1985; Morris, *et al.* 1979; Dube, *et al.* 1984), antifungal (Bentley, and Trimen, 1880; Rao and Narasimha, 1971; Josper and Liguari, 1958), nematocidal (Sangwan, *et al.*, 1985), insect repellent (Naves, 1931; Jiang, 1993), antioxidant, antipuretic, anti thrombiotic and serum

cholesterol lowering properties (Elson and Underbakve, 1989; Burger, et al. 1986). Recently it has also been claimed that lemon grass shows some promising anti cancer activities (Oshiba, et al. 1991; Zheng et al., 1993). The effect of chronic ingestion of a diet treated with different concentrations of lemon grass oil by albino rats was evaluated for the toxicity of the oil. After 60 days it was observed that chronic ingestion of this oil had no significant effect on the blood glucose, protein cholesterol, blood urea, Hb5, TLCV, DCC, SGOT, SGPT and alkaline phosphate activity values. Instead the rats consumed more diet and showed pronounced increase in their body weight (Mishra, et al., 1992). No detrimental effect of the lemon grass has been reported and therefore use of lemon grass as lemon tea has a great potential and brighter prospects as a recipe for numerous ailments and its growth should be increased in the countries where it is scarce, especially countries like Pakistan.

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