



## Review on Ethanopharmacological Reports of Lemon Grass (Linn.)

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### ABSTRACT

Lemon grass is an aromatic medicinal grass belonging to the genus *Cymbopogon*. Lemon grass (*Cymbopogon citratus*) is a member of family (Poaceae). It is widely used in the herbal teas and other non-alcoholic beverages in baked food. Lemongrass essential oil has been used since ancient times in folk medicine as a remedy to improve circulation, stabilize menstrual cycles, promote digestion or increase immunity. The essential oil is also used as a fragrance in the perfumes and cosmetics like creams, soaps and in pharmaceuticals etc. It grows mainly in tropical and subtropical parts of the world. The method found to be the most suitable for the extraction of lemongrass essential oil is steam distillation, since it allows obtaining the oil without altering product quality. The chemical composition of the essential oil of *C. citratus* varies according to the geographical origin, farming practices, plant age, photoperiod, harvest period, genetic differences, and extraction methods. The chemical constituents of the essential oil which have constantly been detected and determine its biological activity are aldehyde, hydrocarbon terpenes, alcohols, ketones, and esters. Lemon grass essential oil contains a high content of citral that is used as a source for the production of beta carotene and vitamin A etc. It shows a wide spectrum of biological activities. High antibacterial and remarkable anti-fungal activities make the lemongrass oil a potential food preservative.

These studies established the therapeutic potential of *C. citratus* in modern medicines and a possible candidate for the drug discovery. The present review aims to document the morphology, distribution, phytochemistry and medicinal properties of *C. citratus* and its future prospects for the further scientific investigation for the development of effective therapeutic compounds. The health restorative capacity of lemon grass may be ascribed to the diverse secondary metabolites it produces. This review attempts to give an overall description of lemon grass, highlighting its medicinal properties which make it a potent herb for pharmacognostic applications.

**Keywords:** *Cymbopogon citratus*, Essential oil, lemongrass Bioactive compounds, Phytochemistry, Ethanopharmacological Reports.

### INTRODUCTION

The genus *Cymbopogon* belongs to the grass family, Poaceae (*syn. Gramineae*). The Poaceae family has about 700 genera and 11,000 species

(Berteaux and Maffei, 2010) widely distributed in all regions of the world. *Cymbopogon* is a genus comprising about 180 species,

subspecies, varieties, and sub-varieties. The name *Cymbopogon* is derived from the Greek words 'kymbe' (boat) and 'pogon' (beard), referring to the flower spike arrangement (Shah, *et al.*, 2011). Lemon grass (*Cymbopogon citratus*), is an odorous tropical grass which yields oil that smells of lemon, used in cooking, perfumery and medicine (Concise Oxford Dictionary Tenth Edition).

There are two main types of Lemon grass, East Indian lemon grass *Cymbopogon flexuosus* which is considered to have its origins in southern India, and West Indian lemon grass *Cymbopogon citratus* which is thought to have its origin in Malaysia and is largely grown in Central and South America and parts of Africa, South East Asia and the Indian Ocean Islands. Both species yield essential oil rich in citral (Bertea and Maffei, 2010).

### PLANT PROFILE



**Plant-Lemon Grass (*Cymbopogon Citratus*)**

**Table 1: Plant Taxonomy (Shah *et al.*, 2011)**

<b>Kingdom</b>	Plantae
<b>Division</b>	Magnoliophyta
<b>Class</b>	Liliopsida
<b>Order</b>	Poales
<b>Family</b>	Poaceae
<b>Genus</b>	<i>Cymbopogon</i>
<b>Species</b>	<i>Citratus</i>
<b>Botanical Name</b>	<i>Cymbopogon citratus</i> (Spreng.)

**Table 2: Vernacular Name**

<b>Common name</b>	Lemon grass stalk, <i>Andropogon citrates</i>
<b>Hindi</b>	Sera, Verveine
<b>English</b>	Lemongrass, Citronella, Squinant
<b>Thailand</b>	Ta-khrai
<b>Italian</b>	Cimbopogone
<b>USA</b>	Citronella
<b>Egypt</b>	Lemon grass

**Part Used as Drug** (Leaves and whole plant.)**Table 3: Description** (Weiss, 1997; Singh, 1999; Handa, 2001).

<b>Leaves</b>	Strap-like leaves are (1.3–2.5 cm) wide, (0.9 m) long and have acute tips.
<b>Leaf color</b>	Green
<b>Leaf arrangement</b>	Mostly emerge from the soil and are usually without a stem
<b>Leaf type</b>	Simple
<b>Leaf margin</b>	Entire
<b>Leaf shape</b>	Linear
<b>Leaf venation</b>	Parallel
<b>Leaf type and persistence</b>	Fragrant
<b>Leaf blade length</b>	About 18–36 in
<b>Fall characteristic</b>	Showy
<b>Properties</b>	The evergreen leaves are bright bluish green and release a citrus aroma when crushed.
<b>Flowers</b>	The lemongrasses plants that you are likely to encounter are cultivars and do not typically produce flowers or flowering panicles are rarely formed
<b>Inflorescence</b>	Inflorescences are 30-60 cm long and nodding, the partial inflorescences are paired racemes of spikelets subtended

**Origin and Distribution**

Lemongrass is distributed in Africa, Indian sub-continent, South America, Australia, Europe and North America. In India, they grow in Kerala, Assam, Maharashtra, Uttar Pradesh, Jammu and Kashmir, Sikkim, Assam, Bengal and Madhya Pradesh (Handa, 2001). The habitat parameters (Weiss, 1997; Singh, 1999)

**Table 4: Habital Parameter**

S.No.	Habitat parameters	Requirements
1	<b>pH Range</b>	5.5 to 7.5
2	<b>Temperature</b>	25-30°C optimum for maximum oil production
3	<b>Annual Rainfall Range</b>	2500-3000 mm
4	<b>Soil Range</b>	Mostly rich loam to poor laterite
5	<b>Altitude</b>	4200 m
6	<b>Light conditions</b>	Sunny, warm and humid conditions
7	<b>Rainfall</b>	High

**Cultivation and Production**

**Climate** :- *C. citratus* flourish in sunny, warm, humid conditions of the tropics. It can be grown with supplemental irrigation in the area where rainfall is poor (Weiss, 1997). Maximum plant height was recorded during rainy season and least during second harvest non-rainy season. The yield of oil fluctuates greatly with the season, the condition of the plant material, its

moisture content and the age of planting (Singh, 1999).

**Soil** :- Lemongrass flourishes in a wide variety of soil ranging from rich loam to poor laterite. In sandy loam and red soils, it requires good manuring. Calcareous and water-logged soils are unsuitable for its cultivation (Farooqi and Sreeramu, 2001). Plants growing in sandy soils have higher leaf oil yield and citral content (Weiss, 1997).

**Propagation** :- Lemongrass is generally propagated through seeds. Seed is mixed with dry river sand in the ratio of

1:3 and sown in the field at the rate of 20 to 25 kg/ha. Seedlings can be raised in a nursery in one-tenth of the area of the main field and transplanted after 45 days. *C. citratus* is propagated through division of clumps (Anonymous, 1981).

**Transplantation** :- The seedlings raised in the nursery beds are transplanted in the field at 6-7 leaf stage. 50-70 days old seedlings are planted during the monsoon season (Farooqi *et al.*, 1999).

**Irrigation** :- In case of drought, the crop should be irrigated every alternate day for about a month after planting. It is recommended that 4 to 6 irrigations are given during the period from February to June under North Indian conditions, for optimum yield (Singh *et al.*, 1997).

**Harvesting of the herb** :- Harvesting is done by cutting the grass 10 cm above the ground level, with the help of sickles. The number of harvests in a year depends on the climatological factors such as temperature, rainfall and humidity and level of soil fertility (Handa, 1997). Cutting can begin as soon as the nights dews have evaporated from the plants, as wet grass left for later distillation quickly ferments. Sunny days are preferable, since cloudy and misty conditions tend to depress leaf oil content (Chandra *et al.*, 1970)

**Seed collection** :- The seeds collected during the months of January-February are usually sown in the nursery during April-May. Seeds germinate in 5-7 days. Seed viability will be lost in a few months. Germination is very poor if sown after October (Thomas, 1995).

### **Chemical Constituents**

The chemical composition of the essential oil of *C. citratus* varies according to the geographical origin. The compounds as hydrocarbon terpenes, alcohols, ketones, esters and mainly aldehydes have been registered (Abagez *et al.*, 1983; Trease, 1996). The essential oil mainly consists citral (Ming *et al.*, 1996). Citral is a mixture of two stereoisomeric monoterpane

aldehydes {trans isomer geranial (40–62%) and cis isomer neral (25–38%)} (Sarer *et al.*, 1983; Rauber *et al.*, 2005).

### **Ethanopharmacological Reports**

1. Decoction of leaf is taken orally with tea for sore throat and as an emetic (Filipoy, 1994).
2. Hot water extract of the entire plant is used externally for healing wounds and bone fractures (Spring, 1989), taken orally as an emmenagogue (Quisumbing, 1951; Burkhill, 1966) and also as a stomachic (Wasuwat, 1967).
3. Hot water extract of the dried root is taken orally for diabetes (Praditvarn *et al.*, 1950; Ngamwathana *et al.*, 1987)
4. Leaves tea is widely used as an antispasmodic, analgesic and antipyretic, anti-inflammatory, diuretic and sedative relief (Leite *et al.*, 1986; Souza-Formigoni *et al.*, 1986).
5. Hot water extract of the dried leaves is taken orally as a hypotensive for catarrh and rheumatism (Carbajal *et al.*, 1989) as a renal antispasmodic and diuretic (Locksley *et al.*, 1982).
6. Essential oil 2-3 drops in hot water are normally taken orally for gastric troubles. For cholera, a few drops of oil with lemon juice are taken orally. Hot water extract of the dried leaves is used for bathing in cases of severe headache and fever (Rao *et al.*, 1982; John, 1984; Nair, 1977)
7. Aerial part of lemon grass used to treat fever and digestive disorders.
8. Leaves of lemon grass is used to treat diabetes, inflammation, nerve disorder, cold, flu, stomach and digestive disorders, to relieve a cough, carminative, expectorant and depurative, anxiolytic and hypersensitive.
9. Decoctions with other leaves plants used for treat in malaria.
10. Rhizome of lemon grass are used to chewed and used as Toothbrush and pest control.
11. Rhizomes Tea made to treat a cough, flu, cold, fever and diabetes (Avoseh *et al.*, 2015).

## Lemon Grass for Health Benefits

Various benefits of lemongrass for health are given below:

**Antioxidant properties** - It possess antioxidants propertie (Balakrishnan *et al.*, 2014).

**Antimicrobial properties** - Lemongrass extracts exhibits antimicrobial potency against *Streptococcus mutans* and thus used to prevent tooth decay (Moore-Neibel *et al.*, 2012).

**Antiinflammatory properties** - Antiinflammatory property of Lemongrass is attributed to the presence of compounds citral and geranial which helps in preventing the release of certain inflammation-causing markers in our body (Olorunnisola *et al.*, 2012).

**Anticancer properties** - Presence of bioactive citral in Lemongrass helps fight cancer either by apoptosis or boosting immune system (Ghosh, 2013).

**Promotes healthy digestion** - Lemongrass tea is reported to treat stomach discomforts, indigestion and gastric ulcers by protecting stomach lining (Skaria *et al.*, 2006).

**Reduce high cholesterol** - Lemongrass extract assisted in lowering high cholesterol levels in humans (Elson *et al.*, 1989).

**Treats obesity** - Lemongrass tea helps in losing excess of weight in obese patients (Schreuder, 2013).

**Skin treatment** - Research indicated that lemongrass essential oil is used as a therapeutic agent for the treatment of inflammatory skin conditions (Silva *et al.*, 2006).

**Repellent** - Lemongrass extract is used in the preparation of insect repellents due to the presence of compounds citral and geraniol (Oyedele *et al.*, 2002).

**Controls dandruff** - Lemongrass oil is used in hair tonics to reduce dandruff through its antimicrobial and anti-inflammatory properties (Boukhatem *et al.*, 2014). It also inhibits the growth of fungi *M. furfur* that is associated with dandruff (Chaisripipat *et al.*, 2015).

**Prevents anemia** - Research reported that since Lemongrass is an enriched source of iron and

other minerals, it promotes erythropoiesis to prevent the symptoms of anemia (Ekpenyong *et al.*, 2015).

**Treats oral issues** - Lemongrass extracts help in inflammation of gums and cavities (Rajesvari, 2013).

## CONCLUSION AND FUTURE PROSPECTIVE

*Cymbopogon citratus* is an aromatic grass that produces various bioactive compounds which exhibits a wide range of therapeutic activities. The present review aims to document the morphology, distribution, phytochemistry and medicinal properties of *C. citratus* and its future prospects for the further scientific investigation for the development of effective therapeutic compounds. Finding of this study can be employed as suitable quality control measures to ensure the quality, safety, and efficacy of this herbal drug material and also this studies may be employed as supplement information in respect of identification parameters in the way of acceptability and quality control of this plant. Now everyday phytochemical and pharmacological studies are conducted of these plants. The present literature supports the possible of *C. citratus* as a medicinal plant. It has already found applications in the cosmetic and perfumery industries due to its strong fragrance. The therapeutic value of lemon grass and its essential oil may enable its use in herbal medicine in future.

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