

# Value Added Product from Lemon Grass - Jelly

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## ABSTRACT:

Lemon grass (*Cymbopogon citratus*) also known as citronella is a perennial herbaceous plant belonging to the Poaceae family. It is widely distributed in tropical and subtropical regions. Lemon grass has a pungent flavour and warm properties, rich in bioactive compounds including citral, flavonoids, phenols and other volatile components that contribute to its antibacterial, antioxidant and therapeutic properties. Lemon grass is widely used in the herbal teas & other non-alcoholic beverages such as fruit juices, lemonade, energy drinks. Value added products such as jelly formulated using lemongrass extract or concentrate by thermal and non-thermal method of lemon grass juice extraction which serve as functional confectionery offering natural flavouring along with health promoting benefits. The incorporation of lemon grass extract in jelly based formulations improve the flavour, extend shelf life aids in natural antimicrobial action and promote health benefits.

**Keywords:** Lemon grass, antioxidant activity, bioactive compounds, anti-inflammatory effects.

## INTRODUCTION:

Lemon grass is a tropical perennial tall plant with enormous leaves. It is one of the sources of aromatic oil which is most widely used in cosmetic, pharmaceutical, herbal and food industries because of its lemon-like smoky and sweet fragrance. (12). Lemongrass is a tropical perennial plant which yields aromatic oil. The name lemongrass is derived from the typical lemon-like odour of the essential oil present in the shoot. The herb originated in Asia and Australia. Lemon grass, popularly known as citronella grass, is a plant species that belongs to the family Poaceae and to the genus *Cymbopogon*. The genus *Cymbopogon* is composed of about 140 species. In India, it is cultivated in about 4000 ha and the annual production is around 250 The well rainfed root system of the plant helps in soil and water conservation. Lemongrass leaves are widely used as a lemon flavour ingredient in herbal teas and other formulations. Lemongrass is commonly used in Asian cooking.

Value added products such as jelly is a semisolid transparent food product which is made by boiling the lemon grass juice extract with sugar and a gelling agent (usually pectin) undergoes cooking to form a gel-like consistency. As consumers are more interested over jelly due to variety of flavours, suitable for all age groups & growing demand for natural and herbal products, easy availability and affordable cost. Lemongrass oil is used in culinary flavouring. It is used in most of the major categories of food including alcoholic and non-alcoholic beverages, frozen dairy desserts, candy baked foods, gelatins and puddings,

meat and meat products and fat and oils. It is used to improve the flavour of some fish and can be used to flavour wines, sauces, etc. Additionally, lemongrass is frequently used in the food, fragrance, pharmaceutical, and cosmetic industries (Asri Hashim et al., 2019). Lemon grass is a good source of folic acid, magnesium, zinc, copper, iron, potassium, calcium, and manganese. It also contains vitamins A and C. In recent years, consumers have become much more concerned about the quality and safety of food as they look for safer, healthier, and more wholesome food options(12). lemon grass jelly is prepared using extract of lemon grass juice by thermal method of boiling and non thermal method with sugar, pectin, and citric acid with mild citric flavour & pleasant aroma offers numerous health benefits such as aids digestion, improves immunity, antimicrobial properties relieves stress and rich in antioxidants

**Table 1.1: Botanical Classification of Lemon grass (18)**

Kingdom	Plantae
Order	Poales
Family	Poaceae
Subfamily	panicoideae
Genus	Cymbopogon - also known as Lemon Grass.

There are more than 50 varieties of grass species of lemon grass and is mostly cultivated as ornamental lemon grass, used in several Thai cuisines. Cosmetic industries, for its rich fragrance. It is also widely used in ayurvedic industries for its rich medicinal properties.



**Fig 1: Lemon Grass**

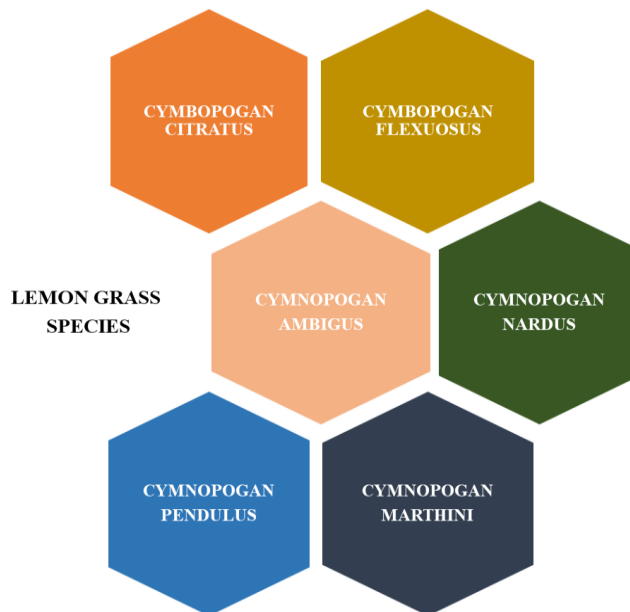
**Table1. Nutritional Content of Lemon grass (19).**

S.No	Nutritional component	Quantity
1.	Carbohydrate	55.0%
2.	Crude fat	5.10%
3.	Crude fiber	4.56%
	Energy	360.g/100gm

**1.1 PHYTOCHEMICAL CONSTITUENTS OF LEMONGRASS:**

Various bioactive constituents, including ketones, alcohols, phenols, terpenes, flavonoids, saponins, steroids, tannins, alkaloids, terpenoids, polyphenols, esters, aldehyde, and fatty acids, have been identified. According to research, the most crucial compounds found in, *Cymbopogon* are essential oil and flavonoids, which play a key role in the plant's therapeutic and pharmacological properties. The primary source of essential oil extracted from lemongrass is predominantly located in the plant's leaves, which contain up to 5 % dry weight of essential oils. The main component, citral, gives the oil a unique lemon-like fragrance (9).

**Common Species of Lemon Grass:**



**Table 1.3: Benefits of Lemon grass**

<b>Benefits of Lemon Grass</b>	
Cymbopogon Citratus	In food and feed technology, plant protection (as repellent, biofungicide, bioinsecticide, bioherbicide, etc.) and for veterinary medicine purposes. The most comprehensive research on biological activity of lemongrass has been carried out in the field of medicine, entomology and plant protection (1).
Cymbopogon Flexuosus (8)	It is traditionally used as indigenous medicine for its antimicrobial, antioxidant, antifungal and anti-inflammatory properties(7).
Cymbopogon Ambigus	It is an Australian native herb, because of its strong lemony odour and medicinal properties, it is most widely used in treating chest infections, headaches and muscle cramps. Because of its high antioxidant and radical scavenging capabilities this grass is being widely used in the food industry(17).
Cymbopogon Nardus	Commonly known as Citronella grass, it is an aromatic plant and is widely used in the manufacturing of soaps, products of aromatherapy and perfumes. Prime components responsible for the aroma and its functional properties are citronellal, citronellol and geraniol. It is also recognized for its anti-inflammatory effect(15).
Cymbopogon Pendulus	commonly known as jammu grass and is most widely used for its antiseptic and antifungal properties. Elemicin, an oil rich component present in it, is used in the manufacturing of antibacterial drugs(3).
Cymbopogon Marthini	It is known for its rich oil content. This plant synthesizes various secondary metabolites/phytochemicals, which are mostly used in the pharmaceutical industries

Cymbopogon Marthini	It is known for its rich oil content. This plant synthesizes various secondary metabolites/phytochemicals, which are mostly used in the pharmaceutical industries for its therapeutic uses. It is rich in monoterpenes which is known for antimicrobial, antihelmintic, antiparasitic and anti-inflammatory, antioxidant properties(13).
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### ADD-ON BENEFITS OF LEMONGRASS

The following given pointers highlight the benefits of lemongrass:

#### 1. Benefits of Lemongrass for High Cholesterol

Lemongrass positively impacts cholesterol levels by raising HDL (good) cholesterol and lowering LDL (bad) cholesterol, thus improving the overall lipid profile. It has high antioxidants that minimise the destruction of cells in the body. This supports heart health and reduces the risk of cardiovascular diseases.

#### 2. Benefits of Lemongrass for Hypertension

Lemongrass is known to have a mild diuretic effect, helping to lower blood pressure by promoting the elimination of excess water and sodium from the body. Its potassium content helps relax blood vessels, reduce fatigue, improve blood flow, and regulate high blood pressure naturally without needing medication.

#### 3. Benefits of Lemongrass for Diabetes

Lemongrass helps manage diabetes. It boosts insulin sensitivity and regulates blood sugar. Its antioxidants protect the pancreas from oxidative stress. This may improve glucose metabolism and lower the risk of diabetes complications.

#### 4. Benefits of Lemongrass for Cough

Lemongrass is beneficial for relieving cough due to its antibacterial and anti-inflammatory properties. It helps soothe the respiratory system, reduce throat irritation, and clear mucus. Its antioxidant content supports the immune system, helping the body fight infections that cause cough, while providing relief from congestion and other symptoms.

#### 5. Benefits of Lemongrass for Flatulence

Lemongrass helps digestion and reduces gas since it inhibits the contraction of muscles in the digestive muscles. It also increases the secretion of digestive enzymes. This eases bloating and gas. Thus, it is effective for treating digestive problems.

#### 6. Benefits of Lemongrass for Rheumatoid Arthritis

Lemongrass contains anti-inflammatory materials. They alleviate symptoms of inflammation, swelling, and pain due to arthritis. It has a healing effect for arthritic pains. It enhances the range of joint motion, improves mobility, and provides comfort.

#### 7. Benefits of Lemongrass for Dandruff

Lemongrass essential oil has benefits that help get rid of dandruff. It works as an antifungal and also as an antibacterial. This makes it worthwhile to reduce itch and flakiness on the scalp. It helps nourish the scalp and does not support the growth of dandruff.

### 8. Benefits of Lemongrass for Fungal Infections (Thrush)

The antifungal activity of lemongrass is significantly high. It is an herbal treatment for oral thrush and other mouth fungal infections that aid in eradicating fungal development and bringing back a healthy mouth.

### 9. Benefits of Lemongrass for Swelling

Lemongrass contains elements that help to reduce inflammation. They assist in lowering inflammation and edema in the body. Lemongrass is suitable for treating pain and quick recovery. Additionally, due to its anti-inflammatory properties, lemongrass is effective in managing injury, infections, and various chronic conditions.

### Applications of lemon grass in food industries:

- Lemon Grass Essential oil is obtained from *Cymbopogon Citratus* and *Cymbopogon Flexuosus*, because of its superior quality and yield(5).
- It has wide spectrum activities of antimicrobial, antifungal and antioxidant when compared to other essential oils obtained from plants (10). Because of its bioactive properties it is widely used as natural alternatives in the food systems in place of synthetic preservatives(2).
- Nutraceutical potentials:(16):Since ancient times Lemon grass oil has been used as a medicine to improve circulation, promote digestion and enhance immunity (11). It also has several therapeutic benefits and is most widely used in pharmaceutical and cosmetic industries (20). Its unique taste and flavor is an added benefit in food industries for production of flavouring agents (4,6).
- Lemon grass has been widely used to enhance flavor in wines, spices, confections and also used in tea processing industries because of its fresh, rich lemony aroma qualities. In nations like Africa, Latin America, lemon grass is used as a fragrant herb (9).

## 3. Materials and Methodology

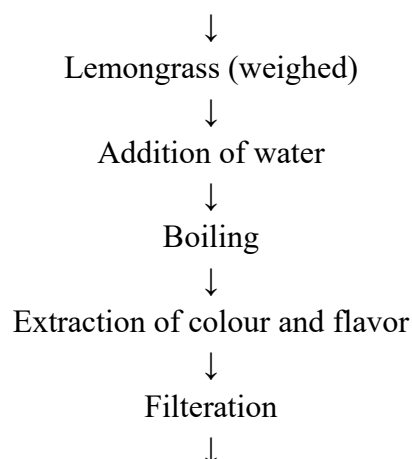
### 3.1. Plant material:

Fresh lemon grass leaves had been collected from the college campus and subjected for cleaning to remove or make free from dust and soil. The stalks has been separated, and the cleaned leaves are prepared for further use in product formulation

### 3.2. Pretreatment of lemongrass:

#### Procedure 1:

#### Preparation of Lemongrass Extract and Its Concentration



lemon grass extract

**Flowchart 3.2.1:** Pretreatment method: Thermal method of lemongrass juice extraction.

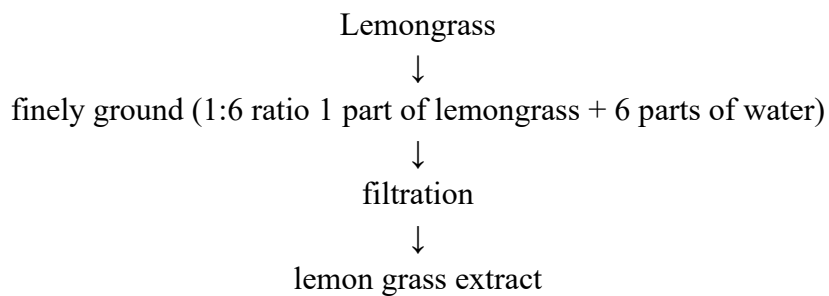


**Fig:3.2.1** Lemon Grass Juice extraction using boiling method.

**Explanation:**

The weighed lemongrass (35.5) has been placed in a bowl, and 1000ml of water was added using a volumetric cylinder. The mixture is boiled for 5-10 minutes until a yellowish extract is obtained. The mixture is filtered to separate the plant residue, yielding approximately 720mL of clarified lemongrass extract

**Procedure 2:**



**Flowchart 3.2.2:** Pretreatment method: Non-thermal method of lemongrass juice extraction.

**Explanation:** An accurately weighed sample of 40.86 g of lemongrass was taken, and approximately 250 mL of water was added gradually to facilitate grinding. The ground mixture was then filtered through muslin cloth to obtain the concentrated lemongrass extract. A total 235ml of extract was obtained after grinding after filtration

**3.3 MANUFACTURING OF JELLY:**

Jellies are viscous or semisolid foods made from a mixture of not less than 45 parts by weight of fruit juice ingredients and 55 parts by weight of saccharine ingredients. The mixture is concentrated by heat to such a point that the soluble solids content of the finished jelly is not less than 65%.

**3.3.1 INGREDIENTS FOR JELLY MANUFACTURING PROCESS:**

Fruits, sugar, water, pectin and citric acid.

**Table 3.3.1: KEY INGREDIENTS & QUALITY PARAMETERS**

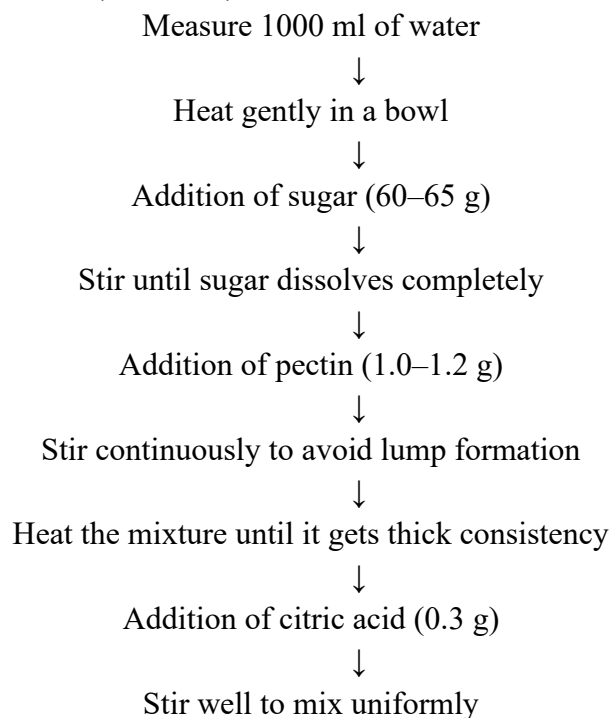
Key Ingredient	Quality Parameter
<b>Pectin</b>	Essential for gel formation. Optimal concentration: 0.5% to 1.5%, pH range: 3.1–3.3.
<b>Sugar</b>	Regulates gel strength and sweetness. Final jelly: sugar saturation for texture and preservation
<b>Acid (e.g., Citric, Malic, Tartaric)</b>	Controls pH and enhances pectin gelation. Target pH: ~3.0 for best consistency.

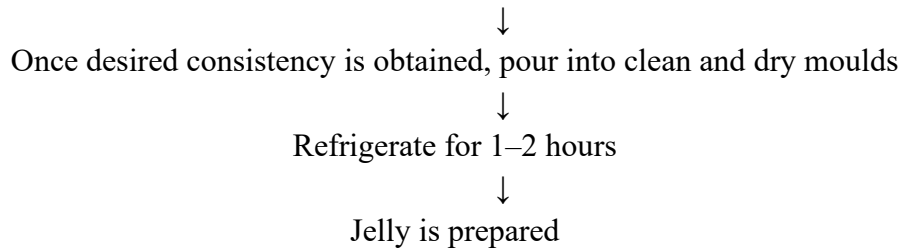
### 3.4 JELLY PREPARATION:

**Table3.4.1: Standard formulation for Jelly preparation**

Ingredients	Quantity
Water	1000ml
Sugar	60-65gms
Pectin	1.0-0.2gms
Citric Acid	0.3gms

#### Procedure for Jelly Preparation: (standard)





**Flowchart No 3.4.1:** Standard procedure for preparation of Jelly.

**PREPARATION OF JELLY USING LEMONGRASS EXTRACT** (from both non-thermally and thermally extracted extract).

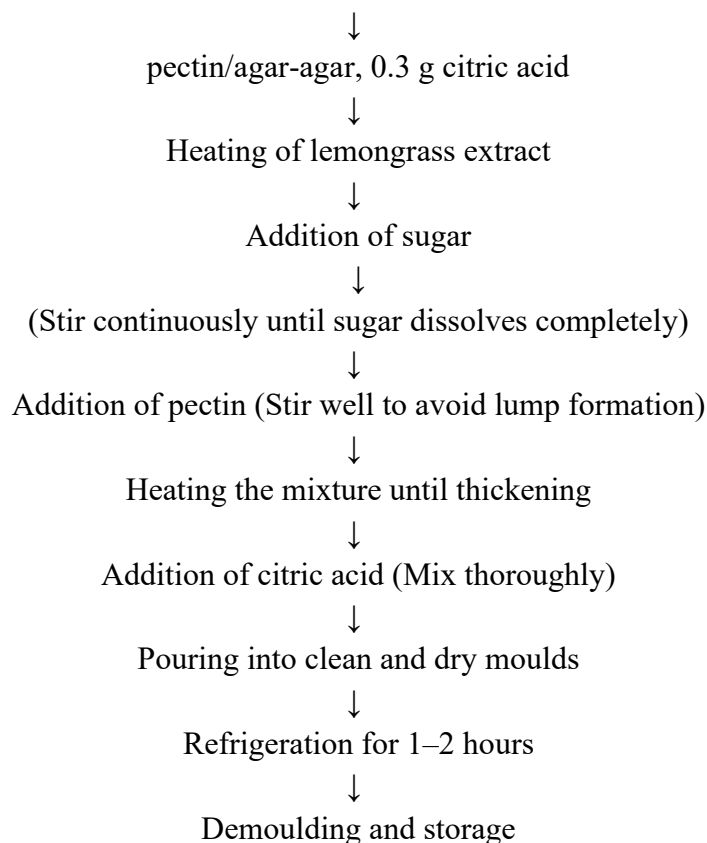
**Measurement of Ingredients:**

**Table 3.4.2 : Formulation for lemongrass Jelly**

Ingredient	Quantity
Lemon grass extract	30mL
Sugar	25 g
Pectin	1g
Citric acid	0.3g

**3.5 Manufacturing process of lemongrass Jelly:**

Measurement of ingredients (30 mL lemongrass extract, 25 g sugar, 1–1.5 g



**Flowchart No 3.5 :** Processing flowchart of Lemongrass Jelly

**Explanation:**

The measured quantity of lemongrass is transferred into a clean stainless steel vessel and heated gently over a low flame to avoid scorching and to facilitate proper dissolution of ingredients. Once the extract was warmed, the required amount of sugar was added gradually with continuous stirring until it dissolved completely, ensuring a uniform syrup base. Subsequently, pectin in the form of agar-agar was slowly incorporated into the mixture with constant stirring to prevent lump formation and to ensure even dispersion throughout the medium. The mixture was then continuously heated with regular stirring until it thickened and achieved a jelly like consistency, indicating proper gel formation.

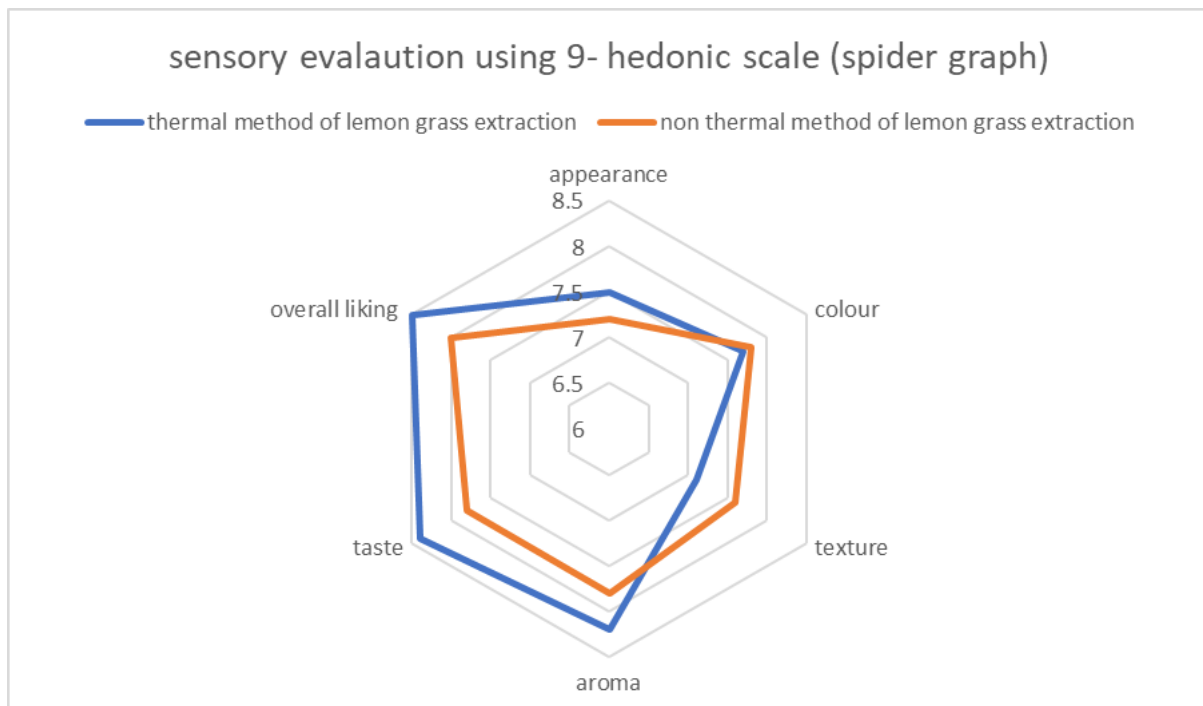
At the final stage of cooking, citric acid was added and mixed thoroughly to enhance gel strength, improve flavor balance and aid in preservation. Immediately after attaining the desired consistency, the hot jelly mixture was poured into clean and dry molds. The filled moulds were then refrigerated for 1-2 hours to allow complete setting. After proper gel formation, the jelly was carefully demoulded



**Fig No 3.5: Lemon grass Jellies.**

**3.6 Sensory Evaluation:**

Sensory Evaluation was conducted using a 9-point hedonic scale to assess appearance, taste, texture, flavour, and overall acceptability. The evaluation panel consisted of twenty semi trained panelists aged between 22-35 years. Samples were coded and served under controlled conditions, and mean scores were calculated.



**Graph No 3.6: Sensory analysis of Jellies -**

Sample a: Jelly- from thermally extracted lemongrass juice

Sample b: Jelly- from Non-thermally extracted lemon grass juice

The spider graph Figure: illustrates the sensory evaluation scores of jellies are made from concentrated & extracted from lemon grass based on a 9-point hedonic scale for key attributes such as Appearance, Colour, Flavour, Taste, Texture, and Overall Acceptability (OAA). The sample A (lemon grass concentrated made jellies) received consistently higher scores across most attributes when compared to sample B (lemon grass extracted jellies) Appearance and colour scores were notably higher, indicating better visual appeal and consumer preference. Flavour and texture also scored superior in concentrated made jellies reflecting a more pleasant mouthfeel and balanced formulation

### 3.7. CONCLUSION

The development of value-added lemon grass jelly represents a promising approach to have the economy and functional potential of *Cymbopogon citratus*. Lemongrass is widely recognized for its bioactive compounds and its contribution as antioxidant, antimicrobial and digestive properties. Converting fresh lemongrass extract into jelly not only improves shelf life and consumer convenience but also increases its marketability through product diversification.

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