Ministry of Food Processing Industries
Government of India

NIFTEM
KNOWLEDGE • INNOVATION • OUTREACH

LEMON GRASS-PROCESSING

AATMANIRBHAR BHARAT

PM Formalisation of Micro Food Processing Enterprises Scheme (PM FME Scheme)

INTRODUCTION

Scientific Name : *Cymbopogon citrates / Cymbopogon flexuosus*

Family: *Graminae* (Poaceae) and the genus *Cymbopogon*

Common name: Lemongrass

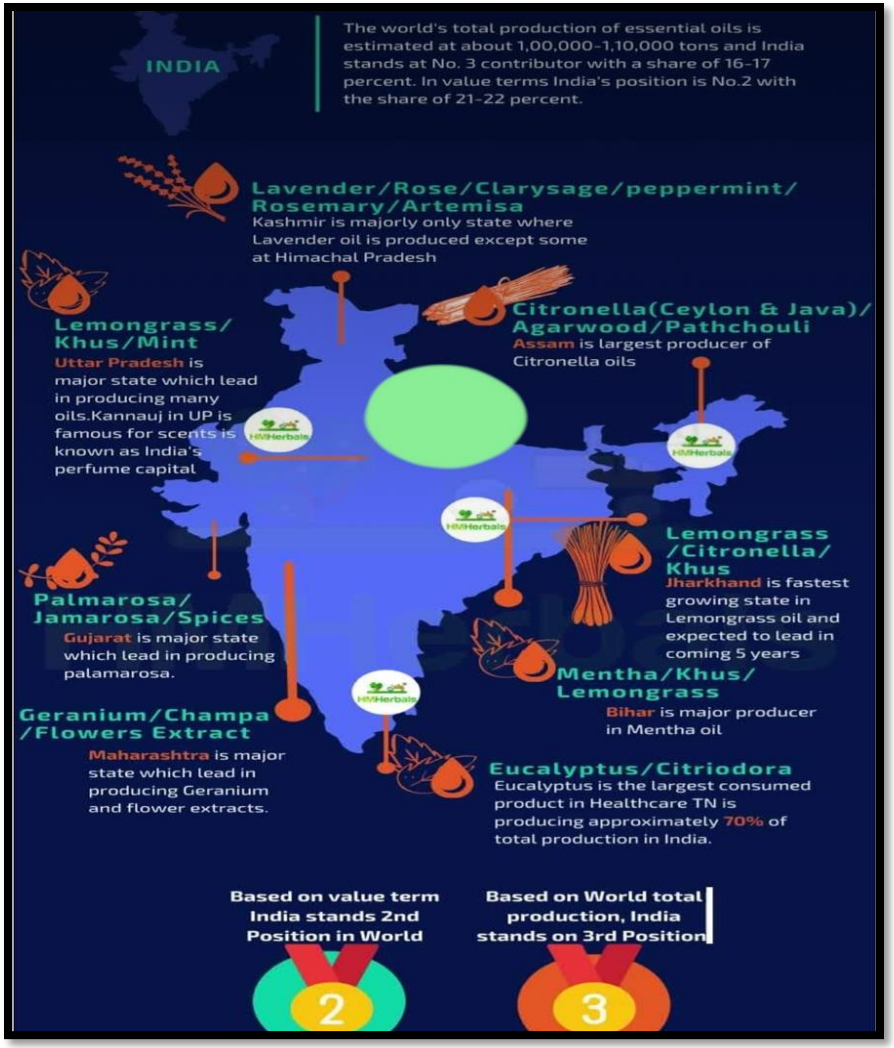
Origin : South Asia, South-east Asia, Australia

INTRODUCTION

- Lemongrass is a generally fast growing tropical and sub tropical grass .The name of the lemongrass derives from lemon like fragrance of the oil present in shoot of the plant.
- Lemongrass has numerous therapeutic and medicinal uses and widely used as herbs in many countries. This plant is full of citrus flavor and can be dried, powdered or used fresh.
- Lemongrass whole plant or essential oil is commonly used in herbal teas, infusions, soups, fish, and seafood and curry preparation.

WORLDWIDE PRODUCTION OF LEMONGRASS

- Lemongrass is a popular crop in countries like China, India, Sri-Lanka, Guatemala, Madagascar and Zambia. Trends in imports and exports reflect India to be a largest producer of lemongrass worldwide and exports 80% of its total production. Trends also show US as the largest importer of essential oil as per 2008 JEA market brief of essential oil.



SPECIES AND VARIETIES

- ***Cymbopogon flexuosus* :** This verity is commonly known as East Indian, Cochin or Malabar grass based on the colour of the stem this lemongrass Varity is sub grouped into two groups:
- ***C. flexuosus* var. *flexuosus*** *:* It is red grass and has reddish or purple in colour stem and leaf sheath. This variety is superior in quality as its essential oil has more than75-80% citral compound.
- ***C. flexuosus* var. *albescens:*** This lemongrass Varity is white and has white colour of the stem.this plant is inferior in quality as it shows poor alcohol solubility The essential oil obtained from it contains less than 65-70% citral compound.

SPECIES AND VARIETIES

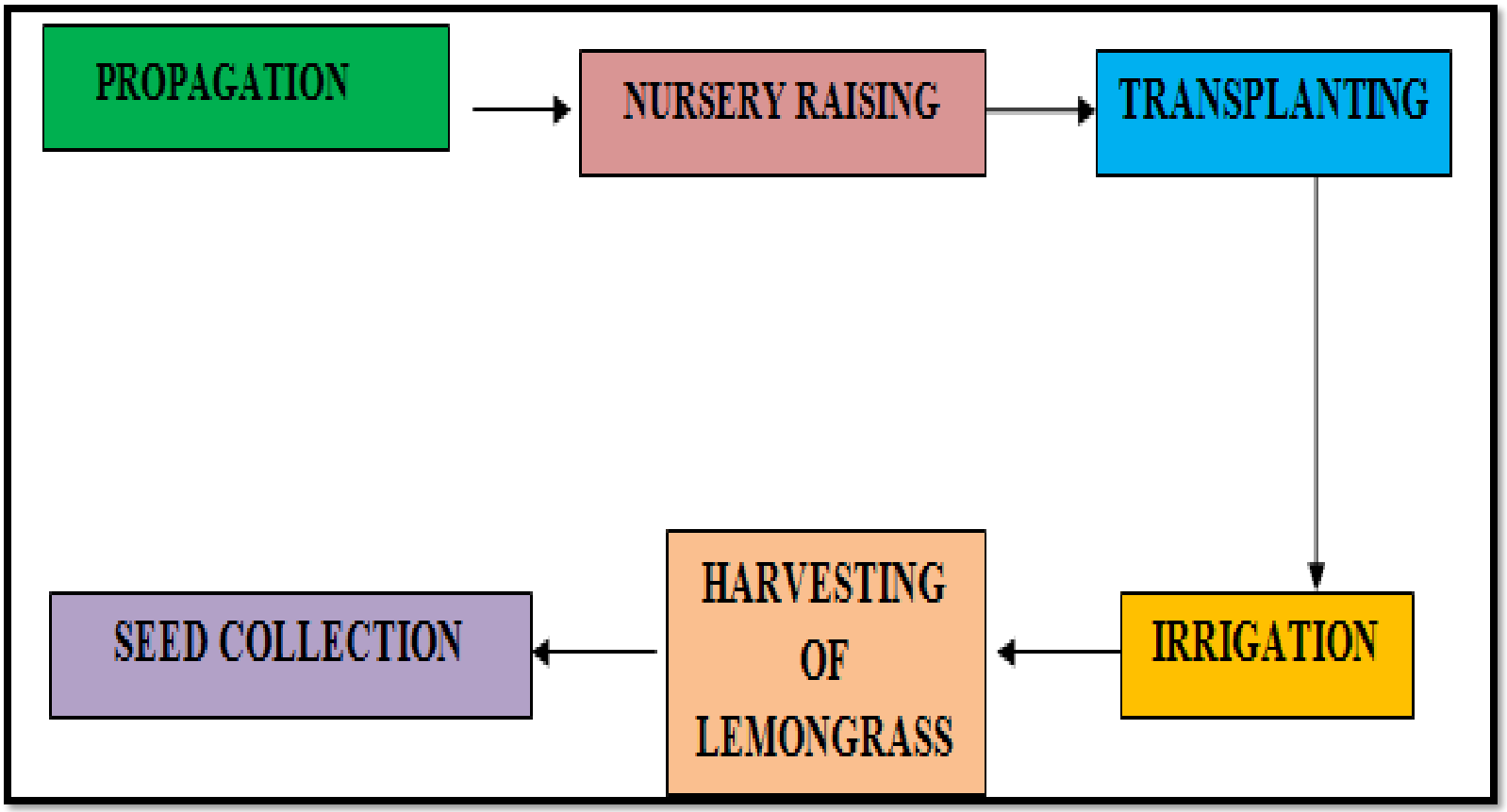
- ***Cymbopogon citratus* :** This verity is commonly known as West Indian or American lemongrass. It is a stem less Varity. The essential oil obtained from it contains 74-76% citral and gives poor alcohol solubility.

- ***Cymbopogon pendulus* :** This verity of lemongrass is commonly known as Jammu lemongrass and is white stemmed and dwarf . The essential oil of this lemongrass contains around 75-80% citral and gives medium solubility in alcohol.

CULTIVATION

- **Climate** *:* Lemongrass grows in tropical and sub tropical environments having sunny, warm, humid conditions. Additional irrigation is alternative for growth of lemongrass in environments where rainfall is scanty. 25-30°C temperature during daytime is considered ideal for maximum production of lemongrass essential oil, with very less extreme lower night temperature.
- **Soil:** Lemongrass grows on various soil types ranging from loam to laterite soil. Calcareous and water-logged soils are not considered good for cultivation of lemongrass varieties. Good drainage is one of the most essential components for lemongrass cultivation.

CULTIVATION



CULTIVATION

- **Propagation:** Propagation of lemongrass takes place from seeds. Seeds are generally mixed with dry sand in the ratio of 1:3 and later sown in the field. Alternative to this method, seedlings first can be raised in a controlled environment of nursery in one-tenth of the area of the main field and than transplanted in field after 45 days.
- **Nursery raising:** The seeds are uniformly distributed over the beds and thin layer of soil are spread over seeds, for raising healthy seedlings bed has to be irrigated timely.
- **Transplanting:** The best season for transplanting seedlings is monsoon season. Seedlings raised in nursery beds are transplanted in the field at 6-7 leaf stage when they are 50-70 days old.

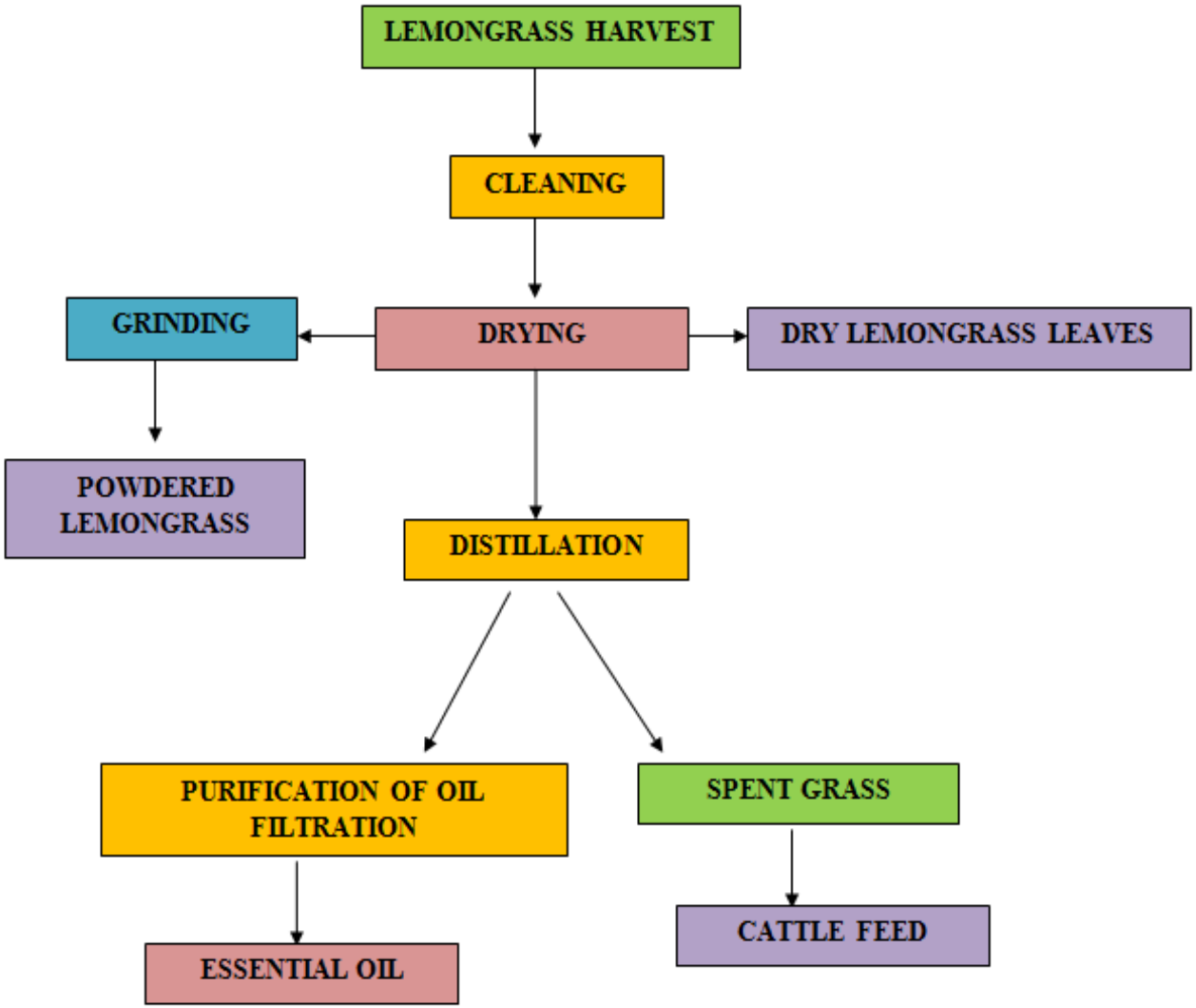
CULTIVATION

- **Irrigation:** Proper irrigation is essential for cultivation of lemongrass in situation of drought, the crop should be irrigated timely on alternate days for approximately a month after plantation of seedlings.
- **Harvesting of the herb:** Sickles are used for cutting grass once the harvesting time approaches. Crop is ideally cut 10 cm above the ground level. Total numbers of harvests in a year depends on the climate conditions of the area.
- **Seed collection:** The whole inflorescence is cut and dried in the sun and seeds are collected by thrashing against the floor or beating with sticks. After six months seeds lose viability thus fresh seeds are recommended for plantation.

PHYSIOCHEMICAL CHARACTERISTICS

Characteristic	Range
α-pinene	(0.13%)
β-pinene, delta-3-catrene	(0.16%)
Myrcene	(12.75%)
Dipentene	(0.23%)
β-phellandrene	(0.07%)
β-cymene	(0.2%)
Methyl heptanene	(2.62%)
Citronellal	(0.73%)
β-elemene	(1.33%)
β-caryophyllene	(0.18%)
Citronellyl acetate	(0.96%)
Geranyl acetate	(3.00%)
Citral b	(0.18%)
Citral a	(41.82%)
Geraniol	(1.85%)
Elemol	(1.2%)
β-caryophyllene oxide	(0.61%)

LEMON GRASS PROCESSING



LEMON GRASS PROCESSING

- **Drying:**

- The crop is cut in small pieces and filled into the stills.
- Prior to distillation process grass is set to wilt for 24 hours , wilting process improves the overall yield of essential oils.
- Drying of crop also decreases moisture content by 30% which further helps in distillation process.
- For some products like herbal tea or infusions where the dry leaves or powdered lemongrass is final product, dried and powdered lemongrass packaging takes place after drying step in appropriate packaging material.

LEMON GRASS PROCESSING

- **Grinding:**
  - Pulverizer machines are used to grind dry lemongrass into smooth fine powder or coarse material as per the requirement.
  - Dry lemongrass crop enter the grinding chamber though the feed inlet and then grinded by the high speed rotating tool.
- **Distillation:**
  - Lemongrass essential oil is collected by steam distillation. There are commonly three types of distillation : Hydro distillation, Hydro and Steam distillation and Steam distillation

LEMON GRASS PROCESSING

- **Hydro distillation:** This method is most suitable for dried plant material where less possibility of plant damage from boiling water exist. The dried lemongrass to be distilled is kept in a vessel half filled with water. The vessel is then heated by direct fire, steam jacket, or closed steam coil, *etc*.

- **Hydro and Steam distillation:** This method is suitable for both fresh and dried crop .in this method steam kept at low pressure which maintains lower temperature in comparison to other methods of distillation process. In this method, the plant material is in contact with steam not boiling water. Steam used in this method is always fully saturated, wet and never superheated.

LEMON GRASS PROCESSING

- **Steam distillation:**

- In this method saturated or superheated steam is incorporated through open or perforated steam coils**.** The two separate layers form in this process having one layer of oil another layer of water. The increase the self life of essential oil, following points should be taken into consideration:

1. Pre- treatment of essential oil to eliminate metallic impurities.
2. Clarification of essential oil by NaCl .
3. Oil should be stored in hard or dark colored glass bottles, while large quantities should be stored in heavily tinned metal containers.
4. The oil should be stored at a dark places.

LEMON GRASS PROCESSING

- **Purification of oil (Filtration) :**

- Anhydrous sodium sulphate is mixed with oil and generally kept for 4-5 hours or overnight than the mixture is flittered to eliminate insoluble component present in the essential oil. Steam rectification process should be incorporated in purification step where due to rusting colour of the oil changes.

- **Spent grass**

- The remaining residue obtained after extraction of the oil is called spent grass. It can be used for cattle feed or manuring crops.

EQUIPMENT FOR LEMON GRASS OIL PROCESSING

- **WEIGHING MACHINE:** For getting good quality of product, all the ingredients should be properly weighed with the help of digital weighing machine.

EQUIPMENT FOR LEMON GRASS OIL PROCESSING

- **GRINDING MACHINE:** Pulverizer machines are used to grind dry lemongrass into smooth fine powder or coarse material as per the requirement. Dry lemongrass crop enter the grinding chamber though the feed inlet and then grinded by the high speed rotating tool.

EQUIPMENT FOR LEMON GRASS OIL PROCESSING

- **SIEVE :** It used for sieving powder so that only fine powder can be utilized for manufacturing purpose. Without sieving coarse powder will be mixed up.

- **DISTILLATION UNIT:** Steam distillation unit is used to extract essential oil from lemongrass. This equipment uses indirect heat to extract lemongrass oil from fresh or dry lemongrass plant.

EQUIPMENT FOR LEMON GRASS OIL PROCESSING

- **FOOD GRADE CONVEYOR:** These are conveyors with food grade belt to maintain food safety standards set by monitoring authorities.

- **HPLC AND GLC SYSTEMS:** Quality of the essential oil is may be evaluated by HPLC and GLC systems, these highly sophisticated chromatographic equipments helps to quantify chemical and bioactive components of the oil.

EQUIPMENT FOR LEMON GRASS OIL PROCESSING

- **OTHER MATERIAL AND HYGIENE EQUIPMENT :** They are simply used to hold and transfer the given material efficiently.

- **POWER DISTRIBUTION EQUIPMENTS:** They are used to safely receive and distribute power.

USES OF LEMONGRASS IN FOOD PROCESSING

- **Herbal teas :** Dried lemongrass leaves are widely used as a lemon flavour ingredient in herbal teas, prepared either by decoction or infusion of 2-3 leaves in 250 or 500 ml of water. Lemongrass iced tea is prepared by steeping several stalks in a few quarts of boiling water. This can also be combined with green or black teas.

USES OF LEMONGRASS IN FOOD PROCESSING

- **Health food :** Lemongrass is commonly used in Asian cooking. In Thailand and Indonesia, freshly ground lemongrass is added to spice pastes. The Vietnamese like to prepare their food at the dinner table, mixing meat with fresh herbs, and lemongrass is an essential herb at the table

- **Uses of essential oil :** Lemongrass is cultivated for its oil which is used in culinary flavouring. It is used in most major categories of food including alcoholic and non alcoholic beverages, frozen dairy desserts, candy baked foods, gelatins and puddings, meat and meat product and fat and oils.

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