

# CULTIVATION OF CITRONELLA AND ITS OIL EXTRACTION

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## Abstract

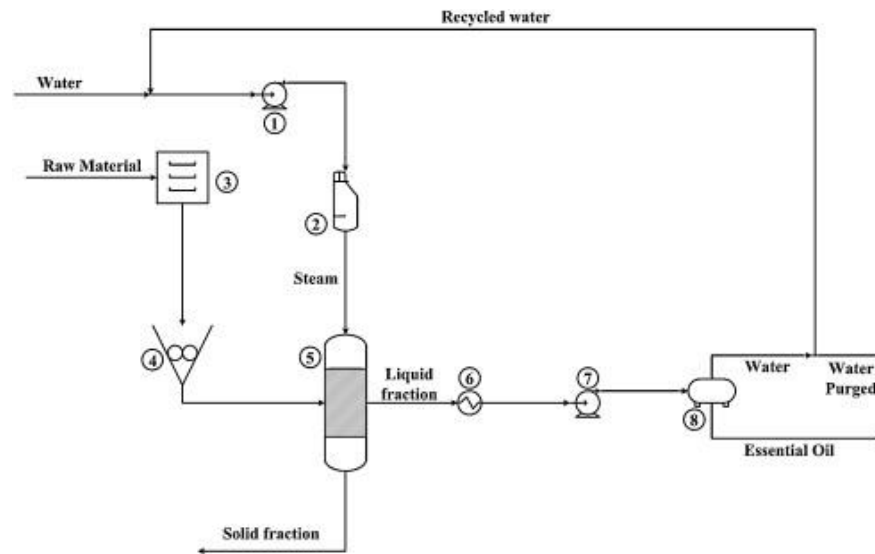
Citronella grass cultivation is commercially done for its aromatic oil. Oil contains Citral which has odour like lemon, that's why the grass is also known as Lemon grass. Scientific methods of cultivation give good yield and the appropriate time of harvest gives good quality of oil. Oil of Java citronella is of superior quality. Aromatic oil obtained by the method of steam distillation is useful in cosmetic industry, perfumes, soaps and detergents; also it is used for medicinal purpose. Thus farmers can get good money by cultivation of aromatic grasses.

## Introduction

Oil of Citronella is obtained by the distillation of green herb known as "Lemon grass or Citronella Grass". It is of two types- Ceylon type and Java type. Ceylon type oil is obtained from the species- *Cymbopogon nardus* Rendle and Java type oil is obtained from –*Cymbopogon winterianus* Jowitt. The oil contains Citral and has a strong odour like that of lemon that is the reason the name given is Lemon grass. The oil of Java type is superior over Ceylon type as it contains about 85-90% of Citral compared to Ceylon type is 50-60%. In India, first the successful cultivation of Citronella Java was done by CIMAP regional centre at Bangalore in 1961. Later on, the crop was introduced in north-eastern part of the country, now cultivation is done on large scale in the states of Assam, Meghalaya, Karnataka, Tamilnadu, Maharashtra, Uttar Pradesh, Bihar and Madhya Pradesh. Citronella Java cultivation in India yields about 800-1000 tones of oil annually.

## Cultivation of Citronella

Proper selection of land, which supports the plant growth for a longer period, is essential for optimum growth & satisfactory recovery of oil. For Citronella cultivation, deep, well drained, fertile soil is suitable, the areas with fear of water stagnation should be avoided for cultivation. Soil of around pH 6.0 is considered optimum and attitude of 150-200m is ideal, the plant grows satisfactorily up to the height of 700 m. Humid Climate with regular rainfall is most favorable for plant growth & oil production as well. Temperature of 38°C & 20°C do not support proper plant growth. Oil yield is north-eastern and southern part of India is higher.



## Land Preparation

Land is prepared by discing & filling the soil for several times. Termite treatment is important, during last ploughing 5% BHC Powder, 25 Kg / Hector, should be mixed with soil, after that leveling should be done.

## Plantation

Plantation remains for the period of 5 to 7 years. Planting material is obtained by dividing the clumps from the old plantation; the divided units are called 'Slips'. Before digging out the clumps, all the leaves should be removed 20-25 cm from the ground to minimize water loss from transpiration. Lengthy roots are trimmed and the dead leaves are removed from the slips to allow quick establishment of the slips in soil and to protect it from soil born insect and pests. Slips plantation is done on flat beds or ridges depending upon the texture of the soil. Slips are placed in holes of about 5-8cm deep and the soil surrounding the slips is properly pressed and watering should be done. Plantation is done at 60x60 cm distance, however in areas with fairly large growing period planting distance may be increased to 70x70 cm or even 90x90 cm. Closer planting helps plantation to compete against weeds. The best time for planting is the onset of rains, in sub-tropical climates with assured irrigation, planting can also be done in the month of Jan-Feb, Feb-March, June-July. Due to control soil moisture, the percentage of crop establishment is more and the plants do not face weed competition, which is not uncommon with rainy season planting.

## Manures and Fertilizers

Citronella being leafy crop removes large amount of nutrients from the soil, therefore it is general practice to supply sufficient organic manures and fertilizers. The fertilizer requirement depends on the fertility of the soil and the climatic conditions.

Before plantation, 3 tractors cow dung compost and 100kgs nimb cake / acre is applied to the soil, second dose after every cutting near the roots of the plants. After plantation root treatment is done, 5 litres of water, 1

litre gomutra (cow urine) and 7.5 gms of bovistin should be applied. The fertilizer requirement 120 kg nitrogen, 40 kg of  $P_2O_5$  and  $K_2O$  / hector is optimum. The time of fertilizer application should be followed as under- half of nitrogen and full  $P_2O_5$  and  $K_2O$  at the time of plantation in first year and before hoeing and after rainfall in subsequent years, the remaining nitrogen should be applied in four equal splits after each harvest.

### Weed Control

Citronella plants are susceptible for weed competition for few months after plantation, the problem is more in rainy season. The plantation should be kept weed free for 60-75 days, which is critical period for weed competition. Weeds can be managed by manual removal or by selective herbicides, Simazine 1.5 kg, Diuron 1kg or Oxyfluorfen 0.25 kg/ Ha applied pre planting in first year and after hoeing in subsequent years of growth. Application of organic mulch (citronella distillation waste) 5 tones/ ha, alone or in combination with herbicide has been found to be advantageous.

### Irrigation

Citronella requires moist condition for good growth. In sub-tropical areas where rainy season lasts for 3-4 months, the crop requires regular irrigation during rain free period and 8-10 irrigations are considered to be sufficient to meet the water requirement. In areas of prolonged rainy season, the crop is cultivated as rain fed crop.

### Diseases and Pests

There are two important diseases of Citronella, which affects the growth of plant and oil production, these are blight leaf and anthracnose. The causative organism of blight leaf is *Curvularia andropogonis*, the symptoms starts appearing in the month of July and August and continues till the month of October-November. The tips and margins of leaves turn brownish, in advanced stage major portion of leaf blade becomes brownish and leaf starts drying. Anthracnose disease is caused by *Colletotrichum graminicola*, symptoms appear on leaves with brown spots which enlarge with age. Application of dithiocarbamate is recommended for control of the disease. No serious insects or pest grow on Citronella, however plantation in north-eastern and southern parts are affected by steam borer which can be checked by application of Carbofuron 15 kg/ Hectar.

### Harvesting

First harvesting is done from newly established plantation from 4-6 months of plantation, after that the crop harvesting is done at the interval of 3-4 months. Thus minimum 3 and maximum 4 harvest are taken in a year. Some harvesters take 5 or more harvests in a year, but frequent cutting minimize longevity of the plantation and deteriorates the oil quality.

## Distillation

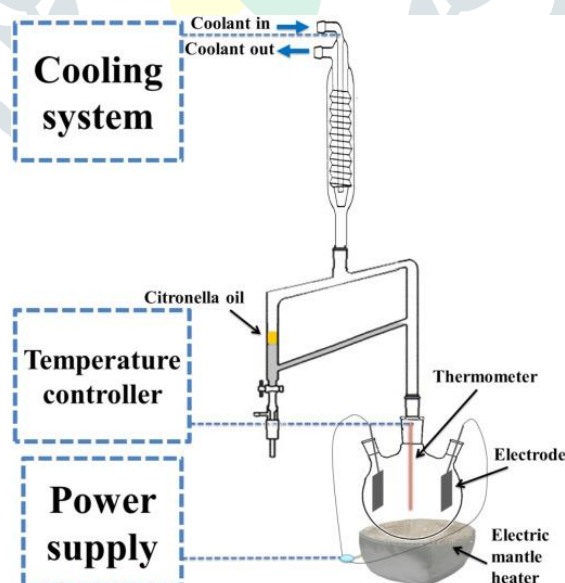
Freshly harvested leaves are taken for the purpose of distillation. During mild weather condition the harvested leaves can be spread in shade or left in field for 12 to 24 hours to make it semi-dry. This allows better packing of plant material in distillation stills and economises the consumption of fuel also. If the leaves are overgrown, then they may be chopped into pieces into distillation stills for better oil recovery. Distillation process is completed within 3 to 3.5 hours with boiler operated plant and it takes 4 to 5 hours with directly fire plant. Steam distillation or water distillation are done for recovery of oil from citronella leaves.

## Oil Content and Yield

Leaves of Citronella contains 0.8 % of aromatic oil, which varies greatly upon the fertility of land, climatic condition of the cultivated area, cultivation method and species of Citronella and the season of harvesting. Citronella oil recovery and content is lowest in rainy season and highest in dry months, as in hot season leaves are short but the blade size is wider.

## Uses of Citronella Oil

Citronella oil is widely used in perfume industry directly and indirectly. It is used extensively in soaps, detergents, house-hold cleaner, mosquito cream, Agarbatti, tea-blending etc. Oil also serves as starting material for certain important isolates such as Geraniol, Citronellol, these can be converted into some of most widely used aromatics. Oil contains  $\beta$ -ionone, which is precursor of Vitamin B12; it is also anti-biotic, anti-flatulent. Citronella oil is used in cough syrup to remove muscle fatigue; it is also used for wound healing.



## Conclusion

Citronella cultivation is done on commercial basis, for obtaining aromatic oil from the leaves. Selection of proper soil, climatic conditions, method of plantation, type of Citronella species, proper application of

fertilizers and manures, harvesting etc consideration is essential. The cultivation methods and the measures taken during cultivation of Citronella Java give good yield and better oil recovery from the leaves. The aromatic oil has odour like lemon because of presence of Citral in the oil, lemon has about 28% of Citral and about 80% in Citronella. The oil is used in perfumery, detergents and also for medicinal purpose. Thus the cultivation of Citronella Java is highly profitable for farmers in rainfed areas and areas with proper irrigation.

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