



**FACULTY OF AGRICULTURAL SCIENCES AND ALLIED INDUSTRIES**

**Java Citronella -Importance, chemical composition origin, distribution, area, production, climate and soil requirements, varieties, propagation techniques, planting and after care, nutritional requirements, plant protection, harvesting and extraction of essential oil.**

### Importance and chemical composition

Java Citronella (*Cymbopogon winterianus*) is an aromatic grass belonging family Poaceae, which upon as the steam distillation gives an essential oil known to the trade as the oil of Java citronella. This is used extensively as a source of imported perfumery chemicals like citronellal, citronellol and geraniol, which finds use in soap, toiletries, mosquito repellents, perfumery, cosmetic and flavouring industries throughout the world. Citronella oil is classified in trade into two types, i.e. Ceylon citronella oil obtained from *Cymbopogon nardus* a rather inferior type, while the Java citronella oil obtained from *C. winterianus* is considered a superior type. Java citronella oil has higher alcohol content (90-95%) than the Ceylon type (60-71%). Citronella is used as a starting material for further derivatives.

### Origin and distribution

- Both the Ceylon and Java types of citronella have probably originated from Managrass of Ceylon, which occurs today in two wild forms: *C. nardus* var. *linnael* (typicus) and *C. nardus* var. *confertiflorus*.
- The Java citronella which is called **Mahapengeri** in Ceylon is the result of a selection from the Ceylon citronella.

- It is distributed in tropical and subtropical countries like India, Taiwan, Guatemala, Honduras, Malaysia and Brazil.
- The NBRI, Lucknow introduced citronella into India.

## Varieties

- Jorhat- C2, Java -2, and CIMAP- Bio-13 are the high yielding varieties of this crop for Southern and Eastern India.
- Whereas Manjusha and Mandakini are the varieties released by the CIMAP, Lucknow for the North Indian plains.
- An elite mutant clone of Manjusha M3-8 named 'Manjari' which has been found to possess 50-90% more oil, high citronellol and low elemol content on an average, over the other varieties.
- Manjari is an erect growing herb with yellowish green leaves and a dark purple stem.
- It is profuse tillering and rapid growing ability hence produces a high herb yield.

## Soil

The plant has been found to grown well under varying soil conditions but sandy loam soil with abundant organic matter is the most suitable. Heavy clay and sandy soils are not conducive to the good growth of this plant. Citronella thrives well in a wide range of soil pH ranging from 5.8 to 8.0. However, a pH of around 6.0 is the most suitable. The plants are reported to grow well at altitudes between 1000-1500m.

## Climate

Citronella thrives best under tropical and subtropical conditions. It requires abundant moisture and sunshine for its good growth. However the distribution of rainfall is important rather than the total amount. Well distributed rainfall ranging from 200- 250cm and high atmospheric humidity appears to influence the plant's growth, yield and quality of oil favourably. In areas where the rainfall is low the plant can be grown with supplementary irrigation.

## Land Preparation

The land is brought to a fine tilth by ploughing and harrowing and the field is laid out in 6m x 6m size beds, providing irrigation channels. Ridges and furrows are made at 60cm intervals.

## Propagation

Citronella flowers profusely in South India at higher altitudes and sporadically in the plains of the North and North – eastern regions. Viable seeds, however, are not formed because of irregularities in meiosis and therefore the species can be propagated only by vegetatively. The slips are taken from healthy, vigorously growing young bushes. The bush is gently dug out and separated into a number of slips and each slip contains 1-3 tillers. The fibrous roots and leaves should be trimmed off the slips before planting. It is observed that one year old clump on an average gives about 50 slips.

## Planting

The slips are planted in May- June when they establish well in this region. Late planting, particularly after July, sometimes results in heavy casualty. The slips are planted at a distance of 60cm x 60cm apart. However in areas where the soil is very fertile and the climatic conditions support luxurious growth spacing of 90cm x 90cm may be followed. It is better if the slips are planted on ridges to avoid water –logging. The field should be irrigated immediately after planting, if there are no rains within the next 24 hours.

## Manures and Fertilizers

In the red laterite soil of Karnataka and other Southern States where the plant grows through out the year 10t of FYM is applied. A fertilizer dose of 80-120 kg N, 80 kg P<sub>2</sub>O<sub>5</sub> and 40kg K<sub>2</sub>O is given. Nitrogen is applied in 4 equal split doses, the first about a month after planting and then after each harvest at an interval of about 4 months. The CIMAP, Lucknow, has recommended a spray of 0.5% Fe through ferrous sulphate + Citric acid to check the spread of chlorosis.

## Irrigation

Citronella requires sufficient moisture for good growth and yield of leaves. In the areas where the annual rainfall is about 200-250cm, well distributed over the year and humidity is high, supplementary irrigation is not necessary. In the drier months, however, irrigation may be provided and this increases the yield. Under Karnataka conditions about 8-10 irrigations are required in the dry period.

## Interculture

Citronella plantations should be kept weed –free. When the plants have established themselves and grown into bushes the problem is not that severe. However in newly established plantations and after each harvest, weeds spring up in the inter-row spaces and weeding is essential.

## Pests and Diseases

### Pests:

Termites, mites and thrips are minor pests occurring in the crop. These are controlled by spraying chlorpyrifos termite control formulation (TC)( 5 ml/litre).

### Diseases:

**Leaf blight** caused by *Curvularia sp* can be controlled by spraying Mancozeb at intervals of 10-15 days.

**Sheath rot disease** caused by *Rhizoctonia solani* is controlled by spraying Hexaconazole 5%

Among the insects termites are reported to cause the most damage to the plants. The termite menace can be controlled by the application of 25kg/ha Aldrin to the soil at the time of planting.

## Harvesting, distillation and Yield

The crop is ready for the first harvest after about 9 months of planting. Harvesting is done by using an ordinary sickle at about 20-45 cm above the ground. Under Karnataka conditions, the crop is harvested in the month of March, June and September. The crop flowers during October – November and the flowering stalks should be nipped off to discourage flowering. If the flowering stalks are allowed to grow, the plants will tend to age very soon and their life span may be reduced. Generally the crop once planted yields a profitable income for about 3-4 years and should be

replanted after this period. Well maintained plantations may thrive longer.

The yield of leaves may range from 15-20t/ha in the first year and 20-25t/ha in the second and third years. The yield of oil obtained during the first year is about 100-150 kg/ha and in subsequent years about 200-250 kg/ha oil may be obtained.