

**Package of Practice**

# **Citronella Cultivation**



**ADVANCING**  
**NORTH EAST**

**An Initiative of North Eastern Council (NEC)**

**Implemented by North Eastern Development Finance Corporation Limited (NEDFi)**

## CITRONELLA

**SCOPE OF THE CROP:** Essential oils have gradually treaded beyond their conventional application in therapeutics and aromatherapy. The global food sector and beverage sector is witnessing an increasing adoption of citronella oil in production of new beverages.

Increasing applications of perfumery chemicals such as geraniol have a great influence on the global scales of citronella oil. As reported, by the end of 2022, more than 3/4<sup>th</sup> value of the global citronella oil market will be procured from sales of naturally-sourced citronella oil.

**VARIETIES:** Mandakini, Manjusha, Manjiri, CIMAP Bio-13, Java-2 and Jorhat-2

**BACKGROUND OF THE CROP:**

**SCIENTIFIC NAME:** Cymbopogon winterianus

**FAMILY:** Poaceae

It is a tufted aromatic perennial herb with fibrous roots, smooth leaves and bearing a large inflorescence.

**ESSENTIAL PARTS:** Citronella oil and Citronella leaves

**CONSTITUENTS OF ESSENTIAL OIL:** Citronella oil contains geraniol ( 18-20 %), limonene ( 9-11 %), methyl iso-eugenol ( 7-11 %), citronellol ( 6-8 %) and citronellal ( 5-15%).

**OIL EXTRACTION:** Oil can be obtained by steam distillation of dried grass for 12-24 hours. Yield is about 200 kg per hectare and average recovery of citronella oil is 1%.

**USES AND HEALTH BENEFITS:**

- Used as an insect repellent and antifungal agent
- Oil is used as a source of perfumery chemicals such as citronellol, citronellal and geraniol. These chemicals find extensive use in soaps, candles, perfumery, cosmetics and flavouring industries.
- Citronella provides relief from spasms, helps remove toxins, reduces fever, prevents fungal growth, helps fight depression, as a diuretic etc

**CHALLENGES:**

- The plant needs bright sunshine for development of essential oil
- Areas having less rainfall can provide supplemental irrigation during citronella production.
- Java citronella requires sufficient moisture for good growth and yield of leaves.

**CULTIVATION AND MANAGEMENT:**

- **SOIL:** Sandy loam soil with abundant organic matter is suitable with ph: 5.8-6.0

- **CLIMATE:** It requires abundant moisture and sunshine with good rainfall of about 2000-2500 mm
- **PROPAGATION:** It is propagated vegetatively by slips by splitting well-grown clumps. The clump is separated into number of slips and each slip contain 1-3 tillers
- **SEASON OF PLANTING:** Onset of monsoon
- **SPACING:** 60cm X 60 cm apart
- **IRRIGATION:** Irrigation should be provided twice a week during the first month of planting and thereafter once in 5 days.
- **MANURING:** Under Northeast India and North India, 80-120 kg N /ha/ year is recommended and 40/kg/ ha of phosphorus and potassium each.
- **HARVESTING:** Harvesting is done by a sharp sickle at about 20-45 cm above the ground. The leaves are ready for first harvest about 6 months after planting. The second and subsequent harvests can be done 2.5-3 months interval. Under favourable conditions, upto 4 harvests can be obtained in a year.
- **YIELD:** The yield of fresh leaves is about 15-20 tonnes /in first year and 20-25 tonnes /ha in second as well as third year. The yield of oil obtained during first year is about 100 kg/ha and 150 kg/ha during second and third years. Under very favourable conditions, yield of 200-250 kg/ha can be obtained.
- **DISEASES:** Generally, leaf bight and anthracnose affects citronella. Dithane M-45 or Z-78 sprays control leaf blight and anthracnose can be controlled by application of Dithiocarbamate.



FIG 1: CITRONELLA LEAVES



FIG 2: CITRONELLA OIL

SOURCE: GOOGLE IMAGE

FARM ECONOMICS:

| FARM ECONOMICS OF CITRONELLA CULTIVATION IN 1 ACRE AREA |  |                     |
|---|--|---------------------|
| CAPITAL INVESTMENT                                      |  |                     |
| SL NO   | PARAMETERS   | APPROX AMOUNT IN Rs |
| <b>A</b>  | INITIAL EXPENSES                                   |                     |
| <b>1</b>  | LAND HOLDING                                       | OWN LAND            |
| <b>2</b>  | LAND DIGGING                                       | 20,000              |
| <b>3</b>  | FENCING  | 10,000              |
| <b>4</b>  | COST OF POWER TILLER (SELF DRIVEN)                 | 1,60,000            |
| <b>5</b>  | SOIL LEVELLING AND TILLERING INCLUDING DIESEL COST | 15,000              |

Model Project Profile

|              |  |                            |
|--------------|--|----------------------------|
| 6            | STOREHOUSE CONSTRUCTION COST 100 SQ FT @ 200/-PER SQ FT  | 20,000                     |
|              | TOTAL  | 2,25,000                   |
| <b>B</b>     | <b>IRRIGATION AND IMPLEMENTS</b>   |                            |
| 1            | TUBEWELL/ SUBMERSIBLE PUMP COST  | 10,000                     |
| 2            | PUMP AND ELECTRICAL INSTALLATION   | 20,000                     |
| 3            | AGRICULTURAL EQUIPMENTS  | 4,000                      |
| 4            | DRYING PLATFORM ( OIL EXTRACTION)  | 25,000                     |
|              | TOTAL  | 59,000                     |
|              | <b>TOTAL CAPITAL INVESTMENT</b>  | <b>2,84,000</b>            |
|              | RECURRING COST   |                            |
| <b>C</b>     | <b>ESSENTIAL CREDENTIALS</b>   |                            |
| 1            | COST OF LABOUR ( 1. LAND PREPARATION COST-12 MANDAYS@ 350/-PER MANDAYS, 2. PLANTING-12 MANDAYS @350/-PER MANDAYS, 3.FENCING-12 MANDAYS @ 350/-PER MANDAYS, 4. HARVESTING ( 5 TIMES A YEAR /2 TIMES IN 1ST YEAR)-12MANDAYS @ 350/-PER MANDAYS PER HARVESTING, TOTAL-60 MANDAYS, 5. OIL EXTRACTION-12 MANAYS @ 350/-PER MAN DAYS FROM 2ND YEAR | 21000                      |
| 2            | FERTILISER AND OTHER AGRO CHEMICALS LUMPSUM  | 15000                      |
|              | TOTAL  | 36,000                     |
| <b>D</b>     | <b>PLANTING AND MULCHING MATERIAL</b>  |                            |
| 1            | CITRONELLA SLIPS ( 20,000 SLIPS / ACRE) ( 3/-/SLIPS)   | 60,000                     |
| 2            | MULCHING ( USING BLACK POLYTHENE MULCH)  | 20,000                     |
| 3            | MISCELLANEOUS  | 20,000                     |
|              | TOTAL  | 1,00,000                   |
|              | <b>TOTAL RECURRING COST</b>  | <b>1,36,000</b>            |
|              | GRAND TOTAL (CAPITAL COST + RECURRING COST)  | 4,20,000                   |
|              | <b>INCOME STATEMENT</b>  |                            |
| <b>SL NO</b> | <b>PARAMETERS</b>  | <b>APPROX AMOUNT IN Rs</b> |
| 1            | TOTAL PRODUCTION OF OIL - 90 KG/ ACRE AFTER 1 YEAR, SELLING PRICE-1100/ KG   | 99,000                     |

## Model Project Profile

|                           |   |                           |
|---------------------------|---|---------------------------|
| 2                         | FRESH HERB PRODUCTION, 8 TONNES/ ACRE AFTER 3-4 CUTTINGS IN A YEAR, SELLING PRICE OF HERB- 200 / KG (deduct the amount procured after sales of oil as, the total 8 ton of herbs consists of 90kg oil in it) | 1501000                   |
|                           | TOTAL INCOME  | 16,00,000                 |
| PROFIT AND LOSS STATEMENT |   |                           |
| <b>SL NO</b>              | <b>PARAMETERS</b>   | <b>APPROXAMOUNT IN Rs</b> |
| 1                         | CAPITAL INVESTMENT  | 2,84,000                  |
| 2                         | RECURRING COST  | 1,36,000                  |
| 3                         | TOTAL INVESTMENT UPTO 1 YEAR  | 4,20,000                  |
| 4                         | TOTAL INCOME  | 16,00,000                 |
| 5                         | TOTAL PROFIT AFTER 1 YEAR   | 14,64,000                 |

**NOTE:** Citronella can be harvested upto 3-4 times in a year under favourable conditions and first harvest can be taken 6 months after planting

### MEANS OF FINANCE

| Particulars         | Amount In Rs..... |
|---------------------|-------------------|
| Margin Money ( 25%) | 105000            |
| Bank Loan (75%)     | 315000            |
| Total Project Cost  | 420000            |

### PROJECTED PROFITABILITY STATEMENT

(Amount in Rs.)

|   | PARTICULARS/YEAR  | 1ST YEAR | 2ND YEAR  | 3RD YEAR  |
|---|---|----------|-----------|-----------|
| A | INCOME  |          |           |           |
|   | TOTAL PRODUCTION OF OIL - 90 KG/ ACRE AFTER 1 YEAR, SELLING PRICE-1100/ KG  | 0        | 99,000    | 99,000    |
|   | FRESH HERB PRODUCTION, 8 TONNES/ ACRE AFTER 3-4 CUTTINGS FROM 2ND YEAR, SELLING PRICE OF HERB- 200 / KG (deduct the amount procured after sales of oil as, the total 8 ton of herbs consists of 90kg oil in it) ( 25% PRODUCTION IN 1ST YEAR) | 400000   | 15,01,000 | 15,01,000 |

Model Project Profile

|     |  |          |           |           |
|-----|--|----------|-----------|-----------|
|     | TOTAL INCOME   | 400000   | 16,00,000 | 16,00,000 |
| B   | EXPENDITURE  |          |           |           |
| B-1 | CITRONELLA SLIPS ( 20,000 SLIPS / ACRE) ( 3/- /SLIPS)  | 60,000   |           |           |
| B-2 | MULCHING ( USING BLACK POLYTHENE MULCH)  | 20,000   |           |           |
| B-3 | MISCELLANEOUS  | 20,000   | 5000      | 5000      |
| B-4 | LABOUR ( 1. 1. LAND PREPARATION COST-12 MANDAYS, 2. PLANTING-12 MANDAYS 3.FENCING-12 MANDAYS , 4. HARVESTING ( 5 TIMES A YEAR /2 TIMES IN 1ST YEAR)-12MANDAYS PER HARVESTING TOTAL-60 MANDAYS@ RS.350/- , (1ST YEAR) 5. OIL EXTRACTION-12 MANAYS @ 350/-PER MAN DAYS FROM 2ND YEAR (TOT :72 MANDAYS FROM 2ND YR) | 21,000   | 25200     | 25200     |
| B-5 | FERTILISER AND OTHER AGRO CHEMICALS LUMPSUM  | 15,000   | 15,000    | 15,000    |
|     | TOTAL EXPENDITURE  | 1,36,000 | 45200     | 45200     |
| C   | GROSS PROFIT (A-B)   | 2,64,000 | 15,54,800 | 1554800   |
| D   | Interest on bank loan  | 26775    | 25288     | 12644     |
| E   | Depreciation (10%-wdvm)  | 23900    | 21510     | 19359     |
| F   | Total D+E  | 50675    | 46798     | 32003     |
| G   | Net profit (C-F)   | 213325   | 1508003   | 1522797   |

FINANCIAL ANALYSIS

(Amount in Rs.)

| Particular / Year | 1st year | 2nd year | 3rd year |
|-------------------|----------|----------|----------|
| Expenses          |          |          |          |
| Initial Cost      | 2,84,000 |          |          |
| Recurring cost    | 1,36,000 | 45200    | 45200    |
| TOTAL COST        | 420000   | 45200    | 45200    |
| BENEFIT           |          |          |          |
| TOTAL BENEFIT     | 400000   | 1600000  | 1600000  |
| NET BENEFIT       | -20000   | 1554800  | 1554800  |
| DF @ 15 %         | 0.87     | 0.76     | 0.66     |
| PWC               | 365400   | 34352    | 29832    |
| PWB               | 348000   | 1216000  | 1056000  |

Model Project Profile

|                     |                |        |        |
|---------------------|----------------|--------|--------|
| <b>NPW</b>          | <b>2190416</b> |        |        |
| <b>BCR (@15%DF)</b> | <b>6.1:1</b>   |        |        |
| DF@50%              |                | 0.44   | 0.3    |
| PWC                 |                | 19888  | 13560  |
| PWB                 |                | 704000 | 480000 |
| <b>NPW</b>          | <b>1137152</b> |        |        |
| <b>IRR (%)</b>      | <b>87.78</b>   |        |        |

REPAYMENT SCHEDULE

PROJECT PERIOD : 3 YEARS

MORATORIM PERIOD : 10 MONTHS INCLUDING PROJECT PERIOD

BANK ROI : 8.5%

(Amount in Rs.)

| PARTICULARS                         | 1st year | 2nd year | 3rd year |
|-------------------------------------|----------|----------|----------|
| Opening Balance                     | 315000   | 297500   | 148750   |
| Interest @8.50 p a                  | 26775    | 25288    | 12644    |
| Principal                           | 17500    | 148750   | 148750   |
| Total Return (Principal + Interest) | 44275    | 174038   | 161394   |
| Closing Balance                     | 297500   | 148750   | NIL      |

DEBT SERVICE COVERAGE RATIO

(Amount in Rs.)

| PARTICULARS/ YEAR     | 1ST    | 2ND     | 3RD     |
|-----------------------|--------|---------|---------|
| (A) Total Income:     |        |         |         |
| Net Profit            | 213325 | 1508003 | 1522797 |
| Depreciation          | 23900  | 21510   | 19359   |
| Interest on loan      | 26775  | 25288   | 12644   |
| Total=                | 264000 | 1554800 | 1554800 |
| (B) Total Commitment: |        |         |         |
| Bank Loan             | 17500  | 148750  | 148750  |
| Interest loan         | 26775  | 25288   | 12644   |

## Model Project Profile

|               |       |        |        |
|---------------|-------|--------|--------|
| Total =       | 44275 | 174038 | 161394 |
| DSCR (A/B)=   | 5.96  | 8.93   | 9.63   |
| Average DSCR= | 8.18  |        |        |

## DEPRECIATION SCHEDULE

(Amount in Rs.)

| Particulars   | 1st yr | 2nd yr | 3rd yr |
|---|--------|--------|--------|
| Asset Value (On ITEM : A(4,6,) & B of capital cost) | 239000 | 215100 | 193590 |
| Depreciated value (10%-WDVM)                        | 23900  | 21510  | 19359  |
| Closing value                                       | 215100 | 193590 | 174231 |