

## Rosa Grass: A Boon Crop for Drought-Prone Areas

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Rosa Grass is a species of perennial aromatic plant from the family Poaceae. It originated in tropical Asia. It is the source of an essential oil known as geraniol oil, which is widely used as a fragrance compound in cosmetic and household products. Geraniol has a number of biological activities, such as antioxidant and anti-inflammatory properties. *C. nardus* cannot be eaten because of its unpalatable nature; cattle will starve even in its abundance.



**Botanical name:** *Cymbopogon nardus* (common name: Rosa grass or rose scented grass)

### About Plant/Morphology

*Cymbopogon nardus* (Rosagrass) is a perennial grass that forms dense tufts and displays vigorous tillering. It thrives in dry, drought-prone areas. The plant reaches a height of 100 to 160 cm when in bloom. Its leaves are upright, linear, and green, measuring 80 to 130 cm in length and 0.6 to 1.2 cm in width. Rosagrass blooms prolifically twice a year, specifically in March–April and September–October. However, it does not produce seeds.

### Major chemical constituents

1. Geraniol (45-60%)
2. Geranyl acetate (15-25%)
3. CIS-Ocimene (12-13%)

### Uses

1. The leaves are used to flavour soups, curries, and other dishes. Leaves can be used to make a fragrant beverage.
2. From the plant, an essential oil can be extracted. Steam or hydro-distillation is used to extract an essential oil from the aerial part of a plant. It is used to smell technical products such as detergents, soaps, sprays, and polishes, as well as varnishes, insecticides, and perfumes.
3. Insect repellent properties: Rosa grass oil has natural insect-repellent properties and is often used to keep mosquitoes, ants, and other insects at bay. It can be applied to the skin directly or used in combination with carrier oils or lotions.

### Reasons to Choose this Crop

The crop is very safe from many factors.

1. No grazing animals like neal gay, goats, sheep, pigs, etc. eat it, so there is no need to protect it day and night.
2. Crops can tolerate saline soil up to 8.5 pH and water up to 3500 TDS.

3. It can continue up to 5-7 years once planted.
4. One can harvest 3–4 cuttings per year.
5. It can successfully survive in good as well as poor soils.
6. Nearly free from all diseases and insect pest.
7. Drought-tolerant crop. It can also be done as rain-fed cultivation.
8. No one can cut and take away the grass, as cows and buffalo do not eat it.
9. Easy to storage and also easy to carry from farm to market as it is lesser bulky (essential oil) in nature as compare to others.
10. Need less labour compared to rest crops.
11. There is no tension over local crop theft, as oil has no straight application in daily life.
12. With proper irrigation practices, it can also be grown and is recommended for undulant and barren lands.

### Soil and climate

It is found at elevations up to 1,500 metres. It grows best in areas where annual daytime temperatures are within the range of 20–30°C but can tolerate 10–40°C. It prefers a mean annual rainfall in the range of 700–2,000 mm but tolerates 500–4,100 mm. Prefers a moisture-retentive soil in full sun. Prefers a pH in the range of 5–7, tolerating 4–8. A first harvest of the leaves for essential oils can be obtained after about 130–150 days; the plant can then be harvested every 55–70 days for about 5-8 years.

### Land Preparation

Land is prepared by normally 1-2 time ploughing. If needed, you can also do termite treatment. During the last ploughing, 5% BHC powder, 25/ha, should be mixed with the soil, and then levelling should be done.

**Improved varieties: RRL (J) CN-5** (*Cymbopogon nardus*), **Himrosa (IIIM(J)CK-10)** and **Tawirosa** (developed by CSIR-IIIM, Jammu).

### Planting Material

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 15–25 cm from the ground to minimise water loss through transpiration. 62,500 slips are required for planting in an area of one hectare. However, the number of slips may increase or decrease as per the spacing between row to row and plant to plant.



### Transplanting Time

Transplantation can be done throughout the year. The best time for planting is the onset of rains. In sub-tropical climates with assured irrigation, planting can also be done in the months of January–February, February–March, June–July, or August–September. Due to controlled soil moisture, the percentage of crop establishment is higher, and the plants do not face weed competition, which is not uncommon with rainy season planting.

## Spacing

Plantation is done at a 40x40 cm distance; however, in areas with fairly large growing periods, the planting distance may be increased to 60x60 cm. Approximately 60,000 to 65,000 slips are required for planting in an area of one hectare.



## Manures and fertilisers

Before planting, apply 10-15 t/ha of FYM/Compost. The fertiliser requirements of 170-200 kg nitrogen, 80 kg P<sub>2</sub>O<sub>5</sub>, and 40-60 kg K<sub>2</sub>O/ha are optimum. The time of fertiliser application should be followed by under-half nitrogen and full P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O at the time of plantation in the first year, and before hoeing and after rainfall in subsequent years, the remaining nitrogen should be applied in 3-4 splits after each harvest.

## Water Requirement

In sub-tropical areas where the rainy season lasts for 3-4 months, the crop requires less irrigation than other crops during the rainy period, and 6-8 irrigations are considered sufficient to meet the water requirement. In areas with prolonged rainy seasons, the crop is cultivated as a rain-fed crop.

## Weed Management

The plantation should be kept weed-free for 60-75 days, which is a critical period for weed competition. Weeds can be managed by manual removal or by selective herbicides such as simazine 1.5 kg, diuron 1 kg, or oxyfluorfen 0.25 kg/ha applied pre-planting in the first year and after hoeing in subsequent years of growth. Application of organic mulch (Rosagrass distillation waste) at 5 tonnes per ha, alone or in combination with herbicide, has been found to be advantageous.

## Insect and disease management

In general, it is nearly free from all disease and insect attack, but sometimes some disease infects the plant during excessive adverse conditions. Ex. 1. Leaf blight (*Curvularia andropogonis*) 2. Red Leaf Spot (*Colletotrichum graminicola*)

Rosagrass is relatively resistant to pests and diseases. However, common pests like aphids, mealybugs, and grasshoppers can occasionally affect the crop. Cultural practices like proper sanitation, crop rotation, and balanced nutrition can help minimise pest and disease problems.

## Harvesting

A first harvest of the leaves for essential oils can be obtained after about 130-150 days after planting. The plant can be harvested every 55-70 days from 2<sup>nd</sup> year onward up to 5-7 years. All the leaves should be removed 15-20 cm from the ground. After that, the harvested herb should have been tied to bundles for oil extraction. Crops can be stored up to 3 days after harvesting. Herbage should not be damped in the form of heap.

## Oil Extraction

For large-area crop oil extraction, oil is extracted by a large oil extraction unit.

1. Hydro-distillation:

## 2. Steam-distillation:

**Hydro-distillation:** To extract essential oils by hydro distillation, the aromatic plant material is packed in a still container, and enough water is added and brought to a boil. Otherwise, live steam is injected into the power plant load. Due to the influence of warm water and steam, the essential oil is released from the oil gland in the plant tissue. The water vapour/oil mixture is condensed by indirect cooling in water. From the condenser, the distillate flows into a separator, in which the oil separates automatically from the distilled water. The complete process takes 3 to 3.5 hours for oil extraction. The maximum quantity of oil is obtained in the first two hours, and quality oil is obtained in the last hour.



### Yield

1<sup>st</sup> year plantation gives an average of 25–35 t/ha of fresh herbage, while 2nd year plantation yields 50-65 t/ha of fresh herbage. 80-100 liters/ha oil can be obtained during the 1st year, while in the 2nd and subsequent years 160-200 liters/ha oil can be obtained.

### Net Profit

Oil recovery percentage from fresh herbage ranges from 0.4% to 1.0%.

We can produce annually 160 to 200 liters of oil per hectare.

Normally, Essential oil of rosa grass sells approximately Rs. 1200 to Rs. 1500 Per liter.

Depending on the cultivation, we can earn net profit Rs. 96,000 to 1,50,000 per hectare in the first year. In the improved variety, CN-5 profits from Rs. 1,80,000–2,40,000 per year in the 2nd and subsequent years.

### Cultivating states in India

J&K, Punjab, Haryana, UP, Rajasthan, Gujarat, Maharashtra, Uttarakhand, MP, Chhattisgarh & Tamil Nadu.