



FACULTY OF AGRICULTURAL SCIENCES AND ALLIED INDUSTRIES

Palmarosa- 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

- The oil of palmarosa (*Cymbopogon martinii*) (Family: Poaceae) is obtained from the floral shoots and the above ground parts of the variety motia. This variety is also referred as “Rosha grass” or “Russa grass” and yields oil with a high geraniol content (75.90%), which is also called East Indian Geranium Oil or Russa Oil. Another variety, sofia, called ginger grass is also grown wildly in India and it yields oil of lower geraniol content. The oil known as Ginger Grass oil is of an inferior grade and fetches a much lower price than the palmarosa oil. Oil of palmarosa is one of the most important essential oils.
- Oil of palmarosa chiefly contains 70-80 % geraniol. Java oils also have almost the same geraniol content, but their ester content is higher. Oil of palmarosa is used in perfumery, particularly for flavouring tobacco and for the blending of soap, due to the lasting rose note it imparts to the blend. In soap perfumes it has a special importance by virtue of geraniol being stable in contact with alkali. It also serves as a source of very high grade geraniol.

Origin and Distribution

- Rosha grass is a native of most parts of subtropical India and it grows in warm humid areas.

- It occurs in patches, in open scrub forests, in part of Madhya Pradesh, Maharashtra, Tamil Nadu and parts of Uttar Pradesh.
- Out side India, the crop is grown commercially in Indonesia, the East African countries, Cuba and Brazil.

Varieties

- Some of the high yielding varieties under this crop are Sel. IW-31243 and IW-31245, released under the All India Co-ordinated project on the improvement of Medicinal and Aromatic Plants, and Trishna and Tripta from the CIMAP Lucknow.
- PRC-1 is another important variety recommended for cultivation.

Soil

- A well drained loamy soil with a pH of 6 to 7 with irrigation facilities is ideal for the cultivation of palmarosa. A rise in pH above 8.5 is found to decrease the growth and consequently the oil yield, but has no adverse influence on the quality of oil produced. It also grows well in well-drained clayey loam soils, free from water-logging. If the soil is not well drained or if after heavy irrigation, the water remains standing in the hot weather, the growth of the grass is badly affected.

Climate

Palmarosa is a crop which grows well in a warm tropical climate with an elevation of up to 300m. Locations with an annual variation in temperature between 10 to 36° C and the rainfall around 150cm, with ample sunshine are the best suited for its cultivation. Areas which are affected by severe frost are not suitable, as the frost kills the grass and reduces the oil content.

Land Preparation

The field is prepared well before the onset of the monsoon. It is ploughed and harrowed to a fine tilth. All the stubble and roots of weeds are removed. At the time of the last ploughing, FYM @ 10t/ha is incorporated into the soil.

Healthy and established seedlings which are 15cm high are carefully removed from the nursery and planted in rows at 60 cm x 60cm apart. In fertile areas, the spacing should be increased. It has been demonstrated at the CIMAP, Lucknow, that a closer plant spacing of 30 x 30 cm improves the palmarosa oil production by 44% over the planting at 60 x 30cm.

Propagation

It is best raised by

- i) transplanting the nursery raised seedlings
- ii) by root cuttings of healthy plants and
- iii) through slips.
- For commercial planting the crop is propagated through seeds.

Nursery raising

The nursery beds are prepared in May. Raised beds are preferable as the seeds are not washed off by irrigation. Liberal amounts of FYM should be added to the seed bed. As the seeds are small and light, they are mixed with fine soil in the ratio of 1:10 for even distribution and ease in sowing. They are sown in lines at 15-20cm apart. The seeds should not be sown densely as this will lead to crowding of seedlings, resulting in poor growth of the plants. About 2.5 kg of seeds are adequate to give enough seedlings for planting one hectare. The beds are watered lightly and regularly. Germination starts within two weeks. Later on a weak solution of urea (0.2 -0.5%) may be given for their good growth. In about 3 to 4 weeks the seedlings are ready for transplanting.

Slips

Plants that give yield and high quality oil should be used for taking slips. In this way it is possible to raise plantations yielding high quality oil, which is not possible when the plantation is raised from seeds as the seeds give rise to many morphologically indistinguishable but different varieties. However, the rate of

establishment of rooted slips is very poor as compared to nursery transplants. Slips can be planted in June- July during the rainy season.

Planting

The seedlings are transplanted into the prepared fields as soon as the rainy season sets in (June- July). They can be transplanted even earlier, if the weather is not very warm and irrigation is available.

Manures and fertilizers

As the grass is perennial it is necessary to replenish the soil. In rich soils, manuring may not be required for the first two years. By manuring already rich soils, the vegetative growth is increased and the oil content is reduced. However for deficient soils a mixture consisting of 20kg N, 50kg P₂O₅ and 40kg K₂O/ha is used as a basal dose at the planting. About 40kg/ha of N is applied in three split doses after each harvest. The mixture of N, P and K should be repeated at the time of the appearance of fresh leaves each year.

A foliar spray of FeSO₄ and MnSO₄ has been found to improve the plant growth, herbage and oil yield of palmarosa. The CIMAP, Lucknow, has also recommended an application of 10kg/ha of Zn which is reported to significantly increase the number of tillers, herbage and oil yield without affecting the oil content and quality. Similar results were obtained by the application of 20kg/ha of sulphur in the form of elemental sulphur or ammonium sulphate.

Irrigation

The irrigation required depends upon the climatic conditions. The grass requires irrigation after about 8-10 days during the growing season. With an ample supply of water, growth is luxuriant, but if drought prevails the growth is arrested, the leaves wither and the oil content is reduced. However, before harvesting irrigation should be discontinued.

Weeding

Odour is an important factor of the oil quality and it is essential to keep the fields clean of other growing plants, particularly those which impart their own odour. Therefore, the plantation should be kept free from weeds by regular weeding and hoeing. Particular care is required in the initial stage of growth, so that the weeds do not overpower the grass. Diuron (1.5kg a.i./ha), Isoproturon 90.25kg a.i./ha and oxyfluofen (1.5kga.i./ha) are the weedicides recommended to control weeds in palmarosa.

Pests and diseases

The crop is not attacked by any pest or disease of a serious nature. Leaf blight and the symptoms of yellowing of leaves and necrosis and leaf spot are reported in the crop.

Harvesting and yield

- The essential oil is distributed in all the parts of the grass, viz. the flower heads, leaves and stems. The flower heads containing the major portion. The grass is harvested when it is 4 months old and in full bloom. Usually the grass is cut at a height of 5-8 cm from the ground level and the whole plant is used for distillation. The maximum yield of oil is obtained when the entire plant is at full flowering stage.

The number of harvests depends upon the climatic conditions. During the first year, usually one crop is obtained during October-November, whereas 2-3 crops are obtained in the subsequent years. An oil yield of 250-300kg can be expected per ha. per year.

Palmarosa plantations remain productive for about 8 years. However the yield of grass and oil starts decreasing from the fourth year onwards. It is therefore recommended that the plantation is kept only for 4 years.