

Rose geranium production



**agriculture,
forestry & fisheries**

Department:
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REPUBLIC OF SOUTH AFRICA

Rose geranium production



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Pelargonium cv. rosé
(Photo: W.S. Mokgobu)

Part I: General aspects

1. CLASSIFICATION

Scientific name: *Pelargonium cv. rosé*

Common names: Rose geranium

Family: Geraniaceae

2. ORIGIN AND DISTRIBUTION

The genus *Pelargonium* comprises about 270 distinct species. Most of the known species are endemic to the Western Cape. Although this plant is indigenous to South Africa, it is widely cultivated in Egypt, India and China, and, to a lesser extent, in Central Africa, Madagascar, Japan, Central America and Europe.

Pelargonium cv. *rosé*, commonly called rose geranium, is a hybrid species that was developed from crossing *P. capitatum* with *P. radens*. The resultant hybrid was then introduced as a farming crop for the production of essential oil. The earliest plantings were made at Reunion Island and the ISO standard, i.e. Bourbon oil with the citronellol/geraniol ratio of close to 1:1, for the oil quality was developed. The essential oil was produced, and named 'Bourbon', after the previous name of the island. Reunion was formerly the main producer of this type of oil.

There is some confusion about the use of the name geranium, as the correct plant species is *Pelargonium*. The true *geraniums* are of a different species which is also used medicinally and resembles the *Pelargoniums*. Because the common name rose geranium has been in use so long it is difficult to change it in the trade.

3. PRODUCTION LEVELS

South Africa

Yields of more than 70 tons have been realised with good management near Nelspruit in Mpumalanga. Oils produced in South Africa conform to the Bourbon standard, and therefore a better price can be negotiated on the global market. As there is still conflicting information available on the yield of rose geranium, recent trials have shown that yield is highly dependent on management, fertilisation, moisture and climate.

In the frost-free Lowveld areas of Mpumalanga, 3 to 4 harvests are possible. In the cooler areas of the country, 2 to 3 harvests per season may be cut. The expected plant mass of harvested pelargonium is 15 to 50 metric tons fresh material per ha at a density of 30 000 to 60 000 plants per ha. Under extreme dryland conditions between 5 to 22,5 kg essential oil per ha at 0,1 to 0,45 % oil recovery from steam distillation from a herbage yield of 5 metric tons per ha is realised.

Internationally

Previously, Reunion Island was the main producer of Bourbon essential oil. It has since scaled down production dramatically, leaving a gap in the market. With regard to essential oil production, there are three major competitors for South Africa namely Egypt, India and China.

4. MAJOR PRODUCTION AREAS IN SOUTH AFRICA

Rose geranium is mainly grown in the Mpumalanga Lowveld, KwaZulu-Natal, Western Cape and Limpopo provinces. Limited plantings occur in Gauteng, North West, Eastern Cape, Free State and wherever the growing conditions are suitable.

5. DESCRIPTION OF THE PLANT

Stem

Rose geranium is a shrubby perennial plant growing to a height of 1 m if left unpruned. In the tropical areas of India it is grown as an annual.

Leaves

It has lobed leaves.

Flower

The plant has typical small, pink flowers. It is morphologically similar to "Graveolens" with which it is often confused.

Essential part

Leaves and stalks are the essential parts of this plant. The essential oil is extracted from fresh plant material mainly using steam distillation.



Pelargonium cv. rosé
(Photo: W.G. Alberts)



6. CULTIVARS/VARIETIES

Several rose scented cultivars exist. *Pelargonium* cv. *rosé* which yields Bourbon type oil has been the most preferred type. Some others cultivated, are *P. capitatum*, *P. graveolens*, and *P. graveolens* hybrids such as the rose scented Chinese and Algerian varieties. India has developed rose scented cultivars of which K 99 and Kelkar (Egyptian) are best known. Other rose scented cultivars have been developed in Russia.

In Morocco, the Algerian or Tunisian type is the most planted cultivar. Some other cultivar hybrids were made as well in which *P. graveolens* was used. Egyptian, Chinese, Moroccan and Indian stock has much of this type. The essential oil chemo-types produced by these countries are, however, not close to the preferred Bourbon type. (Note that there is great confusion in the taxonomy between different countries, and hybrids were grown while other varieties are still studied. Linn, 'Herit'.) Several countries are experimenting and developing new strains.

7. CLIMATIC REQUIREMENTS

Temperature

Rose geranium prefers warm temperate to subtropical climates with a long growing season without extreme weather conditions. It grows well at a temperature range of 10 to 33 °C, and it needs enough sunshine for the development of oil in the plant. The plant is sensitive to cold weather and cannot withstand frost.

The following are required temperatures for the crop:

- ◆ Daytime optimum 20 to 25 °C.
- ◆ 5 °C above and below is acceptable.
- ◆ Below 6 °C inhibits growth.
- ◆ Below 3 °C is fatal, but then grown as an annual or covered with 'frost guard', a cover that is pulled over the crop and removed after winter.

Rainfall

The favourable rainfall for dryland growing of rose geranium should range from 700 to 1 500 mm per year, uniformly distributed throughout the season. In areas where rainfall is less, it can be grown with supplementary irrigation.



Pelargonium cv. rosé
(Photo: W.G. Alberts)

8. SOIL REQUIREMENTS

Rose geranium can be grown on a wide variety of soils. It prefers well-drained sandy to loam soils with a pH range of 5,8 to 8,5 and sunny, hot, frost-free conditions. Ideal soil types should be rich in organic matter and have a clay content of not more than 40 %. *Pelargoniums* grow well in the sandy soils of the coastal belt. It can tolerate high alkaline soils as well. Good drainage is required to prevent waterlogging and reduce the incidence of root diseases. Soils with waterlogging can be ridged.

Rose geranium is influenced by the pH of the growing medium. It is believed that many hybrid geraniums will not flower well at a pH below 5,5, and that leaves will develop brown spots. A greater effort should be made to maintain the pH in the range of 5,8 to 6,2.

Part II: Cultivation practices

1. PROPAGATION

Organic production principles are recommended because organically grown oil is selling at a premium price. As rose geranium is a hybrid; there is no viable

seed being produced, and propagation is done by cuttings from mother-plant material or by means of tissue culture. There are some off-types being propagated in South Africa that do not produce enough or good-quality oil. Care should be taken to obtain correct plant material from reputable producers.

Cuttings should be made from strong and healthy plants grown outdoors. Organic natural rooting hormones can be used to encourage rooting. Conventional rooting hormones do not give the desired effects. Cuttings of 10 to 15 cm in length are made from young top shoots and propagated in trays or seedbeds. A mixture of 30 % fine compost and 70 % sand works well. A liquid organic feed can be given on a weekly basis. After the onset of roots as from 2 to 6 weeks, the plants can be replanted in the prepared land. Winter cuttings should have more leaf material than summer cuttings.

When too many leaves are left on a cutting, the plants do not root quickly

Cuttings can also be made successfully from older wood. Cuttings of 15 to 30 cm in length can be planted directly in the rows if these are strong and healthy. The fields should have enough moisture to ensure survival or irrigation must be supplied. Cuttings are susceptible to fungus attack such as damping off and have to be treated with a suitable fungicide.



Cuttings being made
(Photo: W.G. Alberts)



Healthy rooted cutting
(Photo: W.G. Alberts)



Propagation of cuttings in nurseries
(Photos: K.M. Swanepoel)

- ◆ Cuttings can be made successfully if the weather permits.
- ◆ Avoid making cuttings during the hotter, humid months as fungus attack and heat can affect success rate.

2. SOIL PREPARATION

Herbal and essential oil crops grown on natural soils yield products that are of high quality and in demand globally.

- ◆ Have the soil analysed at a laboratory that will be able to check for mineral deficiencies and excesses, organic status and carbon ratios.
- ◆ A soil analysis will guide the producer in correcting the nutritional status of the soil in order to provide the crop with optimum growing conditions such as a balanced mineral status and correct pH.
- ◆ Soil fertility levels have to be within acceptable ranges before a soil-building programme is started.
- ◆ Correct the soil pH according to analysis and soil type.
- ◆ Fertiliser use has to be planned according to whether the crop will be grown inorganically or organically.

- ◆ Soil preparation has to be done according to good cultivation practices.
- ◆ Apply suitable soil preparation practices according to the farming operation. (Rip, plough, disc, harrow, contour, etc.)
- ◆ If mechanical harvesting and weed control is envisaged, prepare row widths adapted to the machinery to be used.

Producers who treat their soil correctly will have the benefit of producing crops of high value with less input in terms of weed, pest and disease control.



Farmers taking soil samples for analysis
(Photo: W.S. Mokgobu)

3. PLANTING

Plant density/spacing

Plant spacing should be adapted for mechanisation. Generally, a row spacing of 40 cm, with a row width of 50 cm that will give a total of 50 000 plants per ha when growing in a high-rainfall area or under irrigation, is recommended. With such spacing, 60 000 to 80 000 plants per ha can be achieved. In areas with lower rainfall, density can be 20 000 to 30 000 plants per ha. A lower plant density will leave too many open spaces, which will result in more weeds.

Planting season

Planting of cuttings can be done as soon as the active growing season commences, i.e. in spring, and during most times of the year when soil moisture is sufficient. Avoid planting during very hot times of the year and close to and during winter time when plants are usually dormant.



(Photo: W.G. Alberts)

4. FERTILISATION

Contrary to what was published a few years ago *Pelargonium* performs well with correct fertiliser practices. Calcium and potassium are important for successful growth. Phosphorus uptake is enhanced by mycorrhizal fungi association present in the soil. There is a close correlation between phosphorus and essential oil production. High nitrogen levels can increase herbage yield, however, it could result in lower oil yield per mass.

Recent trials undertaken at the University of Pretoria with organic and inorganic nitrogenous fertilisers showed that the crop responded very well to organic nitrogen supplied at rates of 100 to 300 kg/ha, and that the organic fertiliser was superior to an inorganic one at the same rates (SAEOPA, database).

Organic fertilisers are well supplied on the market and further trials are currently done in South Africa.

5. IRRIGATION

Overhead, flood and drip irrigation can be used. Overhead irrigation should be used with care as it may cause loss of oil at certain stages before harvesting.

6. WEED CONTROL

Hand-weeding and hoeing are very important as weeds affect the yield and quality of oil. Generally, 2 to 3 weed sessions are necessary during the year. Inter-row cultivation can be done by a tractor-drawn cultivator or hand hoe. Care should be taken not to damage roots.

Exclusion of sunlight is one of the best weeding practices. Therefore, rose geranium should be planted so that it forms a canopy quickly. Cover cropping practices with plants that inhibit weed growth are advised. Mulching with compost or grass will inhibit weed growth.

Pre-emergence application of pendimethalin (0,75 to 1,00 kg AI per ha) or oxyfluorfen (0,25 kg AI per ha) were effective in trials (Kothari *et al.*, 2002). Use the publication* *A guide to the use of herbicides – 2004*, compiled by Hermien Grobler, J.B. Vermeulen & Kathy van Zyl.

7. PEST CONTROL

Rose geranium is attacked by many different species of pests belonging mainly to the *Hemiptera*, *Coleoptera* and *Lepidoptera* families. Among the most important pests are the white grubs, cutworms, cockchafers, whiteflies, aphids, mites, termites and white peach scale.

According to Rajeswara Rao, (2002), from the research done in India, there are several species of nematodes that can damage the crop and inflict yield losses up to 75,8 %. Chemical control seems possible as well as biological control with a nematophagous fungus and/or companion cropping with nematicidal plants (periwinkle, marigold).

* Obtainable from the Resource Centre, Directorate Communication Services, Private Bag X144, Pretoria, 0001. Tel: 012 319 7141/7085. Fax: 012 319 7260

Chewing type damage

- ◆ Beetles, slugs, leafminers, caterpillars, grasshoppers.

Sucking type damage

- ◆ Leafhoppers, thrips, whitefly species, aphids.

For prospective producers of herbal and essential oil crops, the following pest control guidelines are recommended.

Pest control guidelines

- ◆ Natural pest control measures should be used as first choice.
- ◆ Follow a pest management programme.
- ◆ Regular scouting of the crop is needed.
- ◆ Early detection and management of pest problems can prevent major problems.
- ◆ Correct identification of pests and naturally beneficial predators is essential.

Extension officers from the Department of Agriculture and researchers from agricultural institutes should be contacted for further information on the identification of insects and for recommended control measures.

Use the publication* *A guide for the control of plant pests – 2002*, compiled by Annette Nel, Mareli Krause, Neervana Ramautar & Kathy van Zyl.

Insect pests

Cutworms can be troublesome when young plants are transplanted into the land. They can be eradicated by using biological means and poisoned bait.

Thrips are often the most serious insect pest in greenhouses. They are very difficult to control once a population becomes well established. They feed on leaves

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and flowers of a wide variety of host plants. The feeding by thrips can transmit viruses to a susceptible host plant.

Whiteflies are a very frequent pest in greenhouse production. During development, whiteflies are usually found on the underside of leaves. The adult and immature stages of whiteflies use their piercing/sucking mouthparts to extract fluid from the plant tissue. Whiteflies also produce sticky honeydew that can be a growth medium for black sooty moulds.

Spider mites are very small arthropods that develop mostly on the undersides of leaves. Spider mites cause damage/injury to plants while feeding. Using their piercing/sucking mouthparts, they extract plant sap. Feeding injury often gives the upper leaf surface a characteristic mottled or speckled appearance. Large numbers of spider mites produce a web that can completely cover the leaves and flowers.

Aphids have small, soft bodies with piercing/sucking mouthparts that they insert into the phloem tissue of plants and remove sap. Aphids cause injury by feeding, the transmission of viruses, and further damage by spreading sticky honeydew over the surface of the leaves and flowers. Encourage beneficial predators such as ladybirds and syrphid flies.

Mites can cause a scorched appearance on young leaves, which then curl up and drop off. Control with sprays of insecticidal soap, horticultural oils and currently recommended insecticides.

Subterranean termites may attack rose geranium as they tunnel through the stems and cause the plants to wilt, turn yellow and die. Clean out infested planting beds, destroy any visible termite tunnels, and treat the soil with a recommended insecticide to kill the termites. Tobacco dust is effective when placed at infection sites and tunnels.

Snails and slugs may be a problem. They can be trapped by placing out saucers of stale beer or using dichotomous earth.

8. DISEASE CONTROL

Rose geranium in cultivation is subject to numerous and very virulent fungal and bacterial diseases. Considerable literature is available on these subjects.

Several lists were established by different plant pathologists who have studied and referenced the pathogens in the producing countries (Rajeswara Rao, 2002).

Wilt, dieback, leaf blight, leafspot, root and stem rot, anthracnose, are frequent and can be ascribed to several species of fungus (*Botrytis*, *Septoria*, *Cercospora*, *Armillaria*, *Rosellinia*, *Phomopsis*, *Pythium*, *Fusarium*) and bacteria (*Pseudomonas solanacearum*). Some of these pathogens cause severe damage, sometimes leading to total destruction of the crop and the impossibility of growing rose geranium again on the same plot (e.g. wilt caused by *Pseudomonas solanacearum*).

Generally, the suggested control measures for these pathogens are only partially satisfactory, even if anthracnose and botrytis can be controlled by spraying specific fungicides. Despite the need for resistant varieties, a genetic improvement programme does not seem reasonable or economically viable regarding the economic importance of the crop in the individual oil-producing countries, (Demarne, 2002).

Botrytis grey mould or mildew, leafspot and blossom blight

It is caused by the fungus *Botrytis cinerea* that penetrates the plant tissue through the wounds and reproduces itself in humid atmospheres, causing dark-grey stains. It is very frequent during cool and moist weather. Water-soaked lesions occur first, which later dry out and are covered with a greyish-brown mass of fungal growth. When the petals are infected they become discolored, wilt and fall off.

Control: Ensure good air circulation and full sunlight, and keep the plants on the dry side. Use fungicidal sprays if the disease is severe.

Rust

It produces stains of a yellowish-brown colour in the inferior part of the leaves, causing die-off at a later stage. It is produced in plants subjected to high temperatures and humidity. Powdery, golden-brown pustules appear on the leaves, petioles and stems. The leaves turn yellow and drop prematurely.

Control: Avoid purchasing infected plants. Spray with fungicides if the disease is found in the land.



Scouting for pests and diseases on a regular basis is a recipe for success as done on this farm in Mpumalanga (Photo: W.G. Alberts)

Bacterial blight (*Xanthomonas campestris* pv. *pelargonii*)

Takes place by the action of *Xanthomonas campestris* pv. *pelargonii* that produces stains in the leaves and dark necrosis in the stems. It results from a too humid and hot atmosphere, and as a consequence of wetting the leaves. It can sometimes be treated with fungicides. The disease is favoured by warm, humid weather, crowding of plants and planting infected stock. Sometimes rose geranium begin to rot in the stem, just in the area that it is in contact with the soil and the disease advances to the entire stem until reaching the leaves.

Control: Copper fungicides are effective.

Alternaria leafspot (*Alternaria tenuis*)

It is a fungal leafspot resembling bacterial leafspot.

Control: Copper fungicides are effective.

Black leg (*Fusarium* sp.) and black stem rot (*Pythium splendens*)

These rots occur on cuttings and occasionally on fully grown plants and are most frequent in hot, humid conditions. The rots start at the base of the cutting and progress upward, blackening the stem and defoliating the plant.

Control: Take cuttings from healthy plants only which have been kept dry. Sanitise cuttings before rooting and root the cuttings in a sterilised rooting medium. Sanitation to sterilise cutting tools is by using a bleach solution. Fungicidal sprays are useful.

Virus diseases

Can be transmitted from infected mother plants to cuttings made from these stock plants. Although at one time of commercial importance, virus indexing has removed viruses from stock plants and viruses no longer occur so frequently.

Control: Discard any plants with virus-like symptoms such as mosaic, distortion or leafspots, and practise sanitation when propagating cuttings.

Root-knot nematodes

These may cause galls and swellings on the roots, and can lead to stunted plant growth and death.

Control: Destroy infested plants, rotate planting areas and never replant in known infested areas unless cleared from infection. Soil solarisation will kill nematodes and plants of the *Tagetes* family will keep these out.

Solarisation (heat stress)

It is caused by high leaf temperatures, usually in plastic tunnel greenhouses, resulting in chlorosis. Solarisation is more likely to occur when air temperatures are higher than 29 °C. Seedling of rose geranium are more heat tolerant, however, these can show symptoms when temperatures exceed 32 °C.

Control: Control greenhouse temperatures through shading.

Geranium yellowing disease

It is a condition that is occurring in most parts of South Africa. It is carried from the edges of the land moving to the middle by a vector such as leafhoppers. Investigation into identifying the cause and vectors is currently underway.



Mulching prevents weed growth and soil moisture loss

(Photo: W.G. Alberts)

Control: Prevention methods include spraying with insecticide as soon as insects appear. Harvesting the crop immediately is advised. Control insects at land edges and road verges.

Use the publication* *A guide for the control of plant diseases – 2003*, compiled by Annette Nel, Mareli Krause, Neervana Ramautar & Kathy van Zyl.

9. OTHER CULTIVATION PRACTICES

Mulching

Distillation waste of this crop applied as organic mulch is found effective in controlling weeds in the crop. A better option is to utilise the distillation waste in making organic compost, and to apply the compost as mulch.

* Obtainable from the Resource Centre, Directorate Communication Services, Private Bag X144, Pretoria, 0001. Tel: 012 319 7141/7085. Fax: 012 319 7260



The time of harvesting affects the yield and quality of the oil
(Photo: W.G. Alberts)

10. HARVESTING

Maturing time and methods

The first harvest can be obtained after 3 to 6 months, depending on cutting size and locality in South Africa as well as nutrition and moisture. Harvesting is done 3 to 4 times per year, beginning 3 to 6 months after planting. The time of harvesting is determined by a large presence of new growth. The scent of the leaves should turn from a lemony to a rose scent. Only leaves and young shoots should be harvested as this is where the most oil is located and it must be done on a dry day only. Harvesting wet plants will cause poor oil recovery during distillation.

To ensure good oil yield, it is better to wait a few days after rain and having at least 3 days of hot sunshine before harvesting. It has been shown in trials that oil yields increase with stress factors such as moisture and heat. It is therefore a good practice to stop irrigation in time before harvesting to induce this kind of stress.

Factors influencing harvesting time

Altitude

There is a relation with herbage yield and altitude, the higher the altitude, the lower the yield. Therefore the lower the altitude, the higher the yield. Indications are that at higher altitudes better quality oil can be expected. Further trials will have to confirm this.

Season

The seasonal effect shows that more oil can be expected in midsummer over warmer periods.

Humidity and rainfall

Before harvesting, at least 2 days of full sunshine are needed. Humidity at harvesting times can result in lower oil yield. Prolonged wet periods will result in lower oil yields.

Stage of plant

Mature plants should be harvested. At flowering stage the quality of oil obtained is the best.

Frost

Severe frost can kill a plant, but the stress of a little frost can cause higher oil yields.

Irrigation

Irrigation tends to increase herbage, but to reduce oil content in leaves. Irrigation should be stopped well in advance of harvesting to put plants under stress to produce oil.

Recent research in India and South Africa suggests frequent harvesting of the tops of plants will increase oil yield per hectare.



Hand harvesting of rose geranium on research trials in the Eastern Cape

Machine harvesting

Harvest the top two thirds of plant and make sure that cutting is done as cleanly as possible. Cutting too low will leave less plant material to produce new shoots and could sometimes result in plant death. Machinery must be suited to harvest the crop efficiently with minimum damage to plants.

Hand harvesting

Harvesting can be done by hand if the operation is small. The entire canopy except for one branch should be harvested. This allows for faster regrowth. When there are enough new branches, the remaining branch may be cut and distilled or left for the following harvest when another shoot is chosen to remain. Ideally the plant is cut frequently as soon as enough new growth is available.

Part III: Post-harvest handling

1. SORTING AND DISTILLATION

Distillation is done by steam at 96 to 100 °C for 30 to 60 minutes, depending on oil recovery.

For operations of 10 to 20 ha under cultivation, the most appropriate size for a distilling unit would be a pot of 1 000 ℓ capacity. This size would have the capacity to handle about 300 to 500 kg of foliage at a time and can process 1,2 to 2 tons per day (4 x 300 to 500 kg). The actual mass depends on the degree of wilting.

Distillation of fresh plant cuttings should be done within a day or two of cutting. The cuttings may be left to wilt in the field for 24 to 48 hours for better vaporisation of oil during distillation and greater packing of biomass in the still vessel. The still should be packed tightly to the top of the vessel as loosely packed stills will result in poor oil recovery.

The harvested crop can be distilled fresh or stored under shade for up to 3 days without too adverse effects on the yield or quality of oil. Wilting reduces the moisture content and allows a larger quantity of material to be packed into the still, thereby economising the fuel use. Ensure that stored material does not heat and ferment. The material should be packed firmly as this prevents the formation of steam channels. If the material is too long, it can be cut into smaller pieces to ensure firm packaging.

The mixture of vapours of water and geranium oil passes into the condenser. As the distillation proceeds, the distillate collects in the separator. The oil being insoluble and lighter than water, floats on the top of the separator and is continuously drawn off. The oil is then poured out and filtered manually or using chemicals.

2. GRADING

Characteristics of the oil

Bourbon oil is a greenish-olive liquid with a rosy-sweet minty scent, preferred in perfumery work. It blends well with lavender, patchouli, clove, rose, orange blossom, sandalwood, jasmine, juniper, bergamot and other citrus oils.

Principal constituents

Citronella, geraniol, linalool, isomenthone, menthone, phellandrene, sabinene and limonene.

3. PACKAGING AND STORAGE

Essential oils are volatile and as such have to be handled with care. Keep these in dark, air-tight glass bottles, and do not expose to heat or heavy metals. Deterioration begins if the liquid is much darker or more viscous than normal.

The oil should be stored in a cool, dry area until it is used. Once opened, refrigeration and tightly closing the cap will prolong its shelf-life. Essential oils remain potent for 6 months to 2 years, with proper care.

4. MARKETING

The market of essential oils in South Africa is divided into local buyers and international buyers. The local buyers include marketing agents and companies from chemical and pharmaceutical, as well as food and flavouring industries. The international buyers are divided into flavour and fragrance houses, cosmetics and personal health care, aromatherapy and food manufacturers who buy in large quantities.

The major market in the world for essential oils is the United States, followed by Japan and Europe. However, production continues to be concentrated in Europe, with seven of the world's largest essential oil processing firms. In the United States, the major users of essential oils are the soft drink companies. Japan accounts for 10 % of the world demand. The Canadian market is dominated by the United States perfume and flavouring industry.

France is dominating the world perfumery market, and Switzerland is one of the leaders in the pharmaceutical field. Britain and India are known to feature strongly in the flavouring sector.

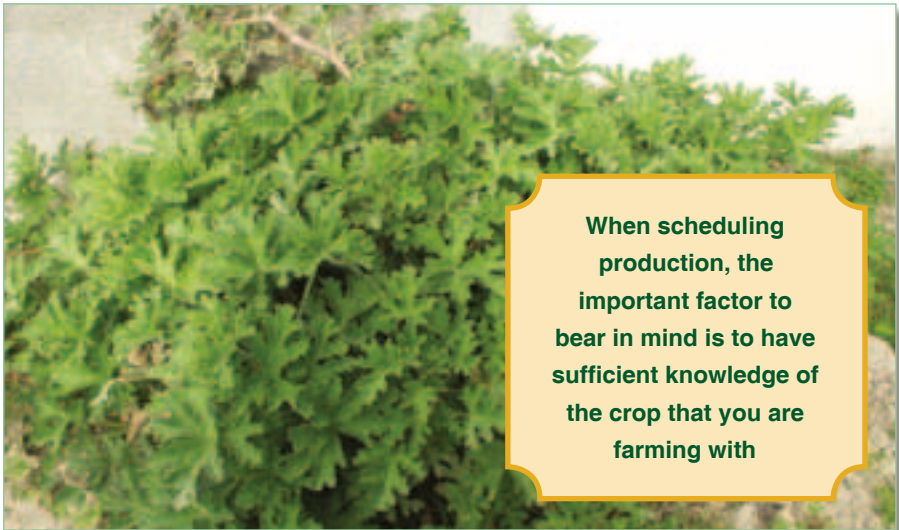
The essential oil industry is characterised by a number of difficulties, including lack of stable quality, inconsistent supplies, and variability of active ingredients owing to environmental effects. This has encouraged many of the end users to depend on synthetic oils in an effort to eliminate the above problems. The result is

a weaker market for naturally produced essential oils. With the increased interest in “natural” products and new health consciousness of the public, plus the fact that a natural product is perceived to have a superior quality, there is an opportunity to effectively market natural grown essential oils, should the above problems be addressed.

Part IV: Production schedules

As farming enterprises are so diverse, a very basic schedule is proposed. Producers have to adapt the schedule to their own needs.

Production schedules may differ considerably according to climate, region, topography, slope, rainfall and availability of irrigation. Producers should take into consideration the fact that there are other soil preparation practices such as no till or minimum tilling. Weed, pest and disease control will also be influenced by climate, rainfall and region. There is consequently no “typical schedule” for any of these crops; it should be adapted depending on the region and existing agricultural conditions, practices, equipment and infrastructure.



When scheduling production, the important factor to bear in mind is to have sufficient knowledge of the crop that you are farming with

General crop schedule – rose geranium												
Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Field preparation												
Rip and plough												
Disking												
Prepare seedbed												
Planting, cultivation and harvesting												
Plant and transplant												
Weed control												
Pest control												
Disease control												
Irrigate												
Harvest												

Part V: Utilisation

1. ACTIONS

Potpourri, used as a fragrance component in all kinds of cosmetic products: soaps, creams, perfumes, mosquito and insect repellents.

The actions include analgesic, antihæmorrhagic, antidepressant, antiseptic, astringent, anticancer, cicatrisant, cytophylactic, stimulant (adrenal cortex), deodorant, diuretic, insecticide, fungicidal, styptic, tonic, vermifuge, vulnerary.

2. COSMETIC

Acne, bruises, broken capillaries, burns, cuts, poor circulation, dermatitis, eczema, lice, oily complexion, ringworm, ulcers, wounds. On the skin, rose geranium oil helps to balance the secretion of sebum and clears sluggish and oily skins, while the antiseptic and cicatrisant properties make this oil an effective aid to help with burns, wounds, ulcers and other skin problems.

3. PHARMACEUTICAL AND THERAPEUTIC

On the physiological level rose geranium has anti-inflammatory and hæmostatic properties relieving menstrual irregularities, assisting in menopause, enlargement of the breasts, poor circulation and is good to relieve fluid retention (oedema). It assists in combating cellulite. It can be applied as wound, burn and ulcer-healing treatment. It is applied for eczema, hemorrhoids, shingles, bruises, ringworm, repelling insects and head lice. Rose geranium oil has a balancing effect on the nervous system and relieves depression and anxiety.

Rose geranium oil is now indispensable in aromatherapy and is considered, on an emotional level, to be a balancing oil for the mind and body. Its strength lies in the ability to regenerate tissue and nerves and to assist in balancing hormonal problems. It is excellent for the skin of expectant mothers, and its aromatic

influence helps release negative memories. Psychologically, rose geranium has sedative and uplifting properties, which is why its use is often considered in times of depression, confusion, panic and anxiety. It can also be useful in boosting concentration.

Traditionally, rose geranium was used to stop bleeding, ear ache, heal wounds, ulcers and skin disorders, as well as treat diarrhoea, dysentery and colic. Anti-bacterial properties and insecticidal actions were found when rose geranium was screened for medicinal usage in a joint project of the laboratories of the Royal Botanic Gardens, Kew and the Society of Applied Science, in Great Britain.

4. FOOD AND FLAVOURING

Employed as a flavouring agent in most major categories, alcoholic, soft drinks and especially with pink-coloured products.

5. FRESH MARKET

There is a fresh produce market on a limited scale within the cut flower industry where long, fresh stems are used as background filler for flower arrangements and providing a rose scent.

6. LANDSCAPING USES

In terracotta (mud) pots of all shapes and sizes or lining an entrance way, scented geraniums are stunning features.

7. SAFETY DATA

Rose geranium oil is not indicated to cause any side-effects because it is non-toxic, non-irritant and generally nonsensitising, yet can cause sensitivity in some people. Always use diluted up to 3 % with good carrier oil. Owing to the fact that it balances the hormonal system, it might not be used during pregnancy. Essential oils can be harmful if swallowed and should be kept out of children's reach.

It could cause skin irritation in people with sensitive skin. It can lead to insomnia and restlessness.

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