



## Geranium oil

### Marketing

#### 1

#### Markets

The major markets for geranium oil are the United States, France, Germany, the United Kingdom, other European countries, and Japan. France is a major reexporter of geranium oil, often further distilled and rebled there to client specifications.

#### 2

#### Customers

Geranium oil is primarily used by fragrance companies. On the international market, very little trade in essential oils is conducted directly between a producer/exporter and an end-user. The market is characterised by a heavy dependence on dealer/brokers based in the major markets. These intermediaries provide a valued service in sourcing and arranging the supply of materials and obviate the need for end-users to maintain a large and costly in-house purchasing unit. For new suppliers who have no established reputation or intimate knowledge of the market, dealers and brokers are particularly important since they know where best to target sales and some are very supportive during the difficult early years of a new venture.

A brief survey of US buyers of geranium oil was conducted in March 1998. Findings are summarized in Table 1.

**Table 1: Findings of Brief Survey of Geranium Oil Buyers in US, March 1998**

Company	Price	Competition	Volumes	Perceived Market Trends	Comments
John D. Walsh	\$50/kilo, \$22.67/lb	China		Steady market	
Citrus & Allied Essences	Current - \$55/kilo 1995- \$105/kilo 1996-\$68/kilo 1997-\$53/kilo	Buys only China	Very little, in 1997 about 700 to 1,000 kg	Market is decreasing a little	Redistills before selling
Centflor	China-\$52/kilo Egypt-\$56/kilo	Egypt & China	Very little activity	Sees increased demand	Odor profiles are important

**Table 1: Findings of Brief Survey of Geranium Oil Buyers in US, March 1998**

Company	Price	Competition	Volumes	Perceived Market Trends	Comments
Classic Flavor & Fragrance	\$42-\$48/lb	Buys only Egypt, but competitors also buying from Indonesia & China	Few hundred kilograms per year	Not big market	Egypt bad crop year; believes that African suppliers are not dependable
Ungerer	China-\$35-\$37/kg Egypt-\$55-\$60/kg	China & Egypt	Large quantities - "tons"	Sees a steady demand	

Source: Fintrac Inc., March 1998

### 3

#### Volumes

World demand is difficult to assess as import statistics are not always reliable. Various industry members estimate world demand at around 200 tons. Import statistics from the EU and the US, however, show that actual world trade fluctuates widely and may sometimes exceed this level (see Tables 2 and 3). Re-exports from major importing countries (France and the US, in particular) are common. Annual Japanese imports are estimated at around 15 MTs.

**Table 2: US Imports of Essential Oils of Geranium, 1992-1996 (MTs)**

Supplier	1992	1993	1994	1995	1996
France	23	34	34	54	14
China	12	10	27	14	6
Egypt	12	13	15	29	3
Other	6	7	6	9	4
Total	53	64	82	106	27

Source: U.S. Department of Commerce

**Table 3: EU Imports of Essential Oils of Geranium, 1996 (MTs)**

Supplier	France	Germany	UK	Other EU	Total
France		16	22	11	49

**Table 3: EU Imports of Essential Oils of Geranium, 1996 (MTs)**

Supplier	France	Germany	UK	Other EU	Total
Germany			16	1	17
UK	3			2	5
Spain			2	14	16
Other EU	1			3	4
Egypt	18	2	10	1	31
Reunion	6				6
USA	3	14	2	4	23
China	28	4	5	15	52
Other non-EU	7		1	2	10
<b>Total</b>	<b>66</b>	<b>36</b>	<b>59</b>	<b>52</b>	<b>213</b>

Source: EUROSTAT

#### 4

#### Prices

Geranium prices vary widely. Chinese product was listed at US\$65/kg in June 1994, increasing to US\$75/kg in April 1995, before falling to US\$72/kg in December 1995 and to US\$32/kg in May 1996. The price recovered somewhat to US\$50/kg in October 1996. Reunion Bourbon oil earns a premium over other oils (around US\$150/kg CIF). In a telephone survey conducted in the United States in March 1998, prices ranged from US\$35/kg to US\$60/kg. Chinese product mostly received prices in the lower range, while Egyptian product (considered higher quality) was in the higher range.

The market for essential oils can display a considerable price volatility, both between and within years. This is largely influenced by assessments of global supply levels and the pricing policy of key suppliers.

Ugandan exporters should expect to receive US\$40 to US\$50 per kilogram of product (CIF). Prices may actually be higher depending on the production situations in China and Egypt, and on the final quality and odor characteristics of Ugandan product.

#### 5

#### Competition

China is the primary producer, with most other product sourced from Egypt, Algeria, Morocco, and Reunion. Egyptian product is considered of a better quality than product from China, while Reunion product is considered superior to both. Egyptian production averages 50 to 55 MTs per year, although in 1994 production rose to 150 MTs in response to a poor harvest in China. Production was down in Egypt in 1997 as stocks are still available. Product from Algeria and Morocco is available only in small volumes and irregularly. Production in Reunion has

dropped substantially, from 20 to 50 MTs per year in the 1980s to just 5 MTs per year in the mid 1990s.

## Production

### 6

#### Method

With a central processing line, smallholders can grow geranium on 0.5 hectares, harvest the foliage which can be distilled by a trader for export. An individual producer would need to devote a minimum 7 hectares to producing geranium in order to meet minimum volume requirements for export sales.

**Soil Types and Site Preparation.** Prospective production areas in Uganda are widespread (including upland areas) as geranium can be grown in a wide variety of soils. Ideal soil types should be rich in organic matter and have a pH of between 5.5 and 6.5. Good drainage is required to prevent waterlogging and reduce the incidence of root diseases.

Before planting, plow the site, allowing weeds to develop before spraying with glyphosate. After weeds are killed, apply farmyard manure (20 to 50 tons per hectare) and basal inorganic fertilisers. Replow the site and prepare beds.

**Planting.** Geraniums should be planted in raised beds in the field at 30 cm spacing with 70 to 80 cms between rows. At these spacings, farmers will require approximately 50 thousand plants per hectare.

For the first planting, high quality cutting of the Bourbon type should be obtained from Reunion. For subsequent plantings, use cuttings from existing strong and healthy plants. Cuttings can be directly planted in the field if they are large (30 cm in length), are taken from well established plants, and they are planted in fields with high moisture content to ensure survival. A sloping cut should be made just below the node and all leaves should be removed from the bottom half of the cutting. Alternatively, smaller cuttings (10-15 cm in length) can be made from a young shoot with 3 or 4 nodes and a terminal bud and placed with spacings of 10 cm by 10 cm in nursery beds that have been fertilised with NPK. Once the roots have begun to form, the shade can be gradually reduced. After 21 days, a weak liquid feed can be applied on a weekly basis. Once the plants have developed good root system and obvious leaf growth (after about 40 days), the plants can be transplanted to the fields.

During the life of the crop (3 to 4 years), gaps in plantings should be filled in with new plants. If the gap was caused by removal of diseased plants, the soil should be treated with 0.5% Bordeaux mixture (5 g/l).

**Harvesting.** Harvesting is done 3 to 4 times per year (beginning 4 to 6 months after the first planting). Actual time of harvesting is dependent on the stage of plant growth (there is a large amount of new growth but not too many old stems) and the scent of crushed leaves (should turn from a lemony to a rose scent). Only leaves and young shoots should be harvested as this is where most oil is located; older stems should be cut off and left in the field.

Harvesting is done by hand and should only be done on a dry day. Harvesting wet plants will cause poor oil recovery during distillation. The entire canopy except for one complete branch. When there is enough new plant, the one remaining branch may be cut.

**Distillation.** Small stills are more convenient even for relatively large farms (where they can be strategically located) because of the cost of moving large amounts of geranium foliage around. In Uganda, the most appropriate size still would be 1,000 litres in size. This size still would have the capacity to handle about 300 kgs

of foliage (actual amount depends on degree of wilting) and can process 1.2 tons per day (4 x 300 kgs). One still of this type is needed for each 2 hectares (167 days of processing).

Distillation of fresh plant cuttings must be done within a day or two of cutting. The cuttings may be left to wilt in the field for 24 to 48 hours to allow for better vapourisation 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. Loosely or partially packed stills will result in poor oil recovery.

## 7

### Varieties

A true Bourbon type available from Reunion is considered the best and oil derived from it receives a premium price in the market. Other varieties, such as those from Egypt and China, have different aromatic and chemical properties and receive lower prices. A French buyer of geranium oil recently analysed samples of a Ugandan bourbon variety and found it to have excellent quality.

## 8

### Yield

The maximum oil yield is generally achieved in the second year. Geranium oil yield under Ugandan conditions should be 30-50 kilograms per hectare per year. This yield would be from three annual harvests producing a total vegetative yield of 25 tons per hectare. This is equivalent to a 0.2 percent recovery rates.

## 9

### Time to First Harvest/Seasonality

The first harvest is normally 4 to 6 months after planting. Subsequent harvesting intervals are every 3 to 4 months (3 or 4 annual crops). However, it might be possible in Uganda's climate to harvest geranium almost continuously over 10 months on a block rotation system and, thereby, achieve a high rate of distillery capacity utilization.

## 10

### Pests and Disease Prevention

Fusarium root rot and anthracnose leaf blight are the most widespread diseases in geranium. Root rot is caused by waterlogged soils, which should therefore be prevented. Plants with root rot will wilt; they should be removed from the field and the soil should be treated with a drench of 0.5% Bordeaux mixture (5 g/l). Anthracnose leaf blight generally occurs during the rainy season and mostly affects full grown plants. Spray with captan (0.2-0.5% ai) on a monthly basis during the rainy season as a preventive measure.

Insect pests are not generally a major problem. If insects become a problem, spray dimethoate (845 ml in 500 litres of water per ha) at two weekly intervals. However, do not use dimethoate if harvest is within 6 weeks; instead use a contact insecticide.

## 11

### Fertilizer Requirements

In addition to an initial application of manure and a basal inorganic fertilizer before planting, fertiliser should be

applied after each harvest. Plant residues from the distillery can be reapplied to the field as a mulch. Annually, a standard basal dressing of N (30 kg/ha), P (35 kg/ha), K (25 kg/ha) should be applied. Additionally, eight equally split top dressing of 25 kg/ha N should also be applied annually with recommended timing as follows:

before the 1st cut	two doses
immediately after the 1st cut	one dose
two weeks after 1st cut	one dose
immediately after the 2nd cut	one dose
two weeks after the 2nd cut	one dose
immediately after the 3rd cut	one dose
two weeks after the 3rd cut	one dose

## 12

### Water Requirements

Plant cuttings, whether long ones planted directly to the field or short ones reared in a nursery, will require moist soils in order to encourage root formation. Once plants are established, however, waterlogging should be avoided to prevent incidence of root disease. The plant requires reasonable amounts of moisture to maintain the thick leaves.

## 13

### Product Specifications

Normal shipment sizes are 1 to 5 tons. Possible, short-term minimum size shipments for a new produce with an interested buyer are 0.25 to 0.50 tons. The species of the geranium is very important to the quality of the product. A different species is like introducing a completely new product, which would take a lot of time. The product is differentiated by its odor profile and chemical composition. The chemical make-up is determined by soil, rainfall, fertilizer, distillation techniques, etc. There are published specifications that would need to be followed for the production of geranium oil.

## 14

### Packaging

Geranium oil is typically packed in 200 litre/180 kilogram steel (preferably galvanised) drums. Also, occasionally packed in 40-90 kg aluminum drums. The drum should be labeled with the name of the product, the country of origin, and the weight of the contents.

### Investment

## 15

### Cost of Production

The major costs of production are shown in Table 4. These include: ploughing, labor (nursery management, slashing, planting, clearing field ditches, spraying, fertiliser application, irrigation, weeding, and harvesting), fertilizers, chemicals, processing, and miscellaneous charges.

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### Profitability

A Ugandan producer of geranium oil can expect a gross margin of Ushs 877,500 per acre. See Table 4.

**Table 4: Projected Gross Margins for Ugandan Producer of Geranium Oil**  
(Ushs/acre)

<b>Revenue</b>		
Yield <sup>1</sup> (kgs/acre)	40	
Sales Price (Ushs/kg)	45,000	
Total Revenue		1,800,000
<b>Expenses</b>		
Seed/Plants <sup>2</sup>	0	
Land Cultivation <sup>3</sup>	69,500	
Fertiliser <sup>4</sup>	250,000	
Chemicals <sup>5</sup>	120,000	
Labour <sup>6</sup>	273,000	
Processing <sup>7</sup>	<u>210,000</u>	
Total Expenses		<u>922,500</u>
<b>GROSS MARGIN</b>		<b>877,500</b>

<sup>1</sup> The yield is a conservative estimate for irrigated production using good seed and basic level of inputs and weed control.

<sup>2</sup> Select own cuttings.

<sup>3</sup> Two times tractor ploughing plus bed making.

<sup>4</sup> 10 bags of NPK

<sup>5</sup> 5 kgs of captan + 5 litres of dimethoate

<sup>6</sup> Nursery management (Ushs 75,000, 50 man days @ Ushs 1,500/day); slashing (Ushs 10,000/acre); planting (Ushs 15,000, 10 man days @ Ushs 1,500/day); clearing field ditches (Ushs 15,000, 5 times @ Ushs 3,000); spraying (Ushs 30,000, 20 man days @ Ushs 1,500/day); fertiliser application (Ushs 30,000, 20 man days @ Ushs 1,500/day); irrigation (Ushs 12,000, monitoring irrigation per acre for perennials); weeding (Ushs 36,000, 24 man days @ Ushs 1,500/day); harvesting (Ushs 22,500, 15 man days @ Ushs 1,500/day)

<sup>7</sup> Withering and distillation @ Ushs 120,000/acre. Miscellaneous 5 percent of revenue (Ushs 100,000).

## 17

### Investment Requirements

**Smaller Stills.** The 1,000 litre still is most appropriate for Uganda. A stainless steel still can be bought from Reunion for around \$10,000. Copper stills give better quality oil than stainless steel but are more expensive.

**Larger Stills.** A well designed, direct steam injection distillation unit (minimum of ca. 0.5 ton charge capacity, 2,000 litre vessel capacity) is required. This possibly could be built to supplied designs by an engineering firm in Kenya, however it is recommended that it be procured from a specialist manufacturer in Europe since there

would be no risk of errors in construction. The FOB cost of a new European manufactured unit (exclusive of steam boiler) would be around US\$16,000 for a single vessel unit.

A more economically feasible size would be a 5,000 litre unit (comprised of two vessels of 2,500 litres), a European manufacturer would charge about US\$24,000 (fob) for the vessels, condenser and oil collector. A new steam boiler would cost around US\$20,000 fob (alternatively a second hand boiler can possibly be purchased in Kenya). Additional costs in order to complete the installation of a distillation facility include: buildings, water supply system, hoists for unloading charges, tanks to settle out water from oil, storage drums, etc. Because of the strict requirements by buyers of "clean" geranium oil, stainless steel construction is recommended in the distiller lid, condenser, and oil collector.

A relatively small number of European companies have experience in manufacturing steam distillation equipment for the essential oils industry. The majority of these are based in France and the largest and best known internationally is Tournaire S.A. (Equipment Division, P.O. Box 4, Le Plan de Grasse 06338, France, Fax: 33-93-09-3400). This company is also the world's leading manufacturer of aluminum containers for essential oils (50 ml size upwards). The only UK company which has manufactured essential oil stills on a regular basis in recent years is Shern Plant Services (Unit 8 Charfleets Close, Charfleets Industrial Estate, Canvey Island, Essex SS8 0PW, Tel: 44-1268-698-765, Fax: 44-1268-511-164, Contact: Mr. C.H. Bryant).

### **More Information**

More information on geranium and other essential oils is available from the ADC, including:

Proposals for Commercialisation of Essential Oil Production in Uganda. ADC, Kampala. 1996. 109 pages.

The Culture of Geranium Rosat in Reunion. 105 pages. 1992. *Various articles on production and processing of geranium oil in Reunion. All articles are in French.*

Proceedings of the International Seminar on Yunnan's Trade Development. China-EU Centre for Agricultural Technology, Beijing. 1997. 216 pages. *Production, processing, and marketing information on spices, shellac, natural flavours, essential oils, aroma chemicals, and gum naval stores.*



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