

Geranium Oil from Yunnan, China

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Geranium oil is obtained by steam distillation of the partially dried green herbage of *Pelargonium* sp. It is one of the most important oils used in perfumery formulation, and rarely is used as a flavoring. It possesses a characteristic rosy odor which is primarily due to citronellol and geraniol, often known as the "rose alcohols." These terpene alcohols are often known, collectively, as the "rhodinol" or "rhodinol fraction." Because of the characteristic rosy floral odor, the oil is suitable as a component of a wide range of high-grade perfumery products.

History

It seems that the geranium (*Pelargonium* sp.) that is being grown in the Yunnan province (China) was introduced by European missionaries in the 1940s. Since the 1960s, the cultivation has been developed by the Academic Institute of Botany Kunming.

When it first appeared on the market, Yunnan geranium oil was considered to be of mediocre quality. Over the past ten years, the quality has steadily improved and, until recently, it had the advantage of being low priced. Although recent climatic setbacks have caused a general rise in the price of the oil, it remains highly competitive, especially with Egyptian and Réunion oils. In recent years, oil production in Réunion, an island in the Indian Ocean, east of Madagascar, has fallen steadily, and the limited quantity produced is high priced. Similarly, oil production in Egypt continues to face domestic problems such as disease and falling yield. As a result, China is likely to play a more dominant role in the geranium market in the foreseeable future.

Production

To produce a good quality geranium oil requires ideal climate and soil characteristics, both of which can be found in certain areas of Yunnan province. In the past, the total production of geranium oil from Yunnan reached nearly 300 tons annually, and it was localized in three main areas.¹ Today, the only place in China where geranium oil is still produced in commercial quantities is the region of Binchuan, 450 km from Kunming. In 1989, Fang et al.² incorrectly reported that geranium oil was produced around Chendu

and Beijing; in fact, it is produced only in Yunnan. The oils used in the study by Fang et al. were probably lab productions from Botanic Garden material.

Geranium cuttings are planted in a nursery bed during the rainy season. Replanting into the field takes place approximately eight weeks later, when the cuttings are strong enough to survive the plantation environment. Geranium can be harvested for the first time nine months after it has been set out in the field. Once cut, it is left out in the field in a wind row for about half a day to allow the herbage to partially dry, after which it is collected and taken to the still. The reduced moisture content of the geranium allows the distillers to put more herbage into the still because the plant material has wilted and lost a lot of its turgidity. In addition, the reduced moisture affords a more rapid and efficient steam and water distillation. Because the oil glands on geranium are glandular hairs, rainfall can damage them, causing a temporary reduction in oil content. To ensure that the maximum oil yield is obtained, the farmers harvest the plant material only during a long dry period.

An average still charge is 250 kg. It can be distilled in two hours with an average yield of 1.7% (1.3% at the beginning of the season, rising to >2.0% as the season progresses). There are two geranium harvests per year, one in the winter between December and March (1-2 cuttings) and the other in the summer between May and October (4-5 cuttings). The quantity of oil produced in the winter crop is quite small (20% of total production); in the summer the major amount (80% of total production) is produced. During the first full year of geranium cultivation the oil production reaches 20 kg/ha, while during the second and third year of growth the oil production is approximately 40-50 kg/ha and 70-80 kg/ha, respectively.

Many farmers believe that after three years of production the geranium plants are too old to produce good quality oil in amounts that are cost effective. As a result, the plantation is cleared and replanted again during the fourth year. Most farmers own their own stills. Those who do not, can get their geranium custom-distilled for Rmb 12.0 per distillation (\$1.00 = Rmb 8.3). In 1994 in Yunnan, it is estimated that there were approximately 2,000 distillers supporting 1,600 hectares of geranium.

The quality of the "winter oil" is considerably less than that of the "summer oil." For example, the geraniol content of winter oil is only 2-4%, whereas the summer oil has 6-9% geraniol. It is believed that the quality of summer oil that is produced during the middle of the season is comparable to Bourbon geranium oil.

A comparison between the chemical composition of Bourbon and Yunnan geranium oils can be seen in Table I. If the summer oil is compared with Bourbon oil, it can be seen that there are many similarities between them. However, the amount of the important cis- and trans-rose oxides is higher in Yunnan oil than in Bourbon oil, while the amounts of linalool, isomenthone, α -terpineol and geraniol are lower. Also, it can be seen that Yunnan and Bourbon oils have comparable guai-6,9-diene contents, but Yunnan oil is richer in citronellol and citronellyl formate.

In conclusion, it can be seen that Yunnan geranium oils (summer and winter types) are different from Bourbon oil; however, because of its odor quality, Yunnan summer oil has been widely accepted on the international market as a substitute for Bourbon oil. Generally, summer and winter oils are sold separately. However, some collectors mix the oils, either 1:1 or 1:2 winter to summer oil, to improve the poorer quality winter oil.

Until approximately two years ago, the major exporters of geranium oil from China were the Yunnan Native Product Export/Import Co. and some of the national native product companies from other provinces who were buying geranium oil from a few collectors.

In terms of quality, for the last 20 years, Yunnan Native Product has developed their "E Brand" label. This product has been recognized as a stable quality accepted by the worldwide perfumery industry. Nevertheless, E Brand is not a determinant of whether the lot is a summer harvest oil or winter harvest oil or a mixture of the two. As a result, it is recommended that users always obtain a representative

Table I. Comparison of major components of Bourbon and Yunnan geranium oil

Component	Percentage		
	Bourbon	Yunnan (summer oil)	Yunnan (winter oil)
α -pinene	0.90	0.48	0.54
β -pinene	0.27	0.17	0.16
linalool	8.90	3.01	2.59
trans-rose oxide	1.09	1.66	1.05
cis-rose oxide	0.39	0.64	0.26
menthone	0.71	0.43	0.53
isomenthone	9.29	6.60	6.29
α -terpineol	0.71	0.23	0.19
citronellol	23.21	39.60	44.43
geraniol	13.90	7.05	4.03
citronellyl formate	11.38	12.84	15.58
geranyl formate	5.46	2.10	1.48
guai-6,9-diene	6.38	6.39	2.79

sample of an oil lot for evaluation before purchasing the material.

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