

Analysis of the Chemical Compositions of Essential Oils from Scented Leaves of *Pelargonium* Hybrids Acclimated in Yunnan Province

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Geranium oil is distilled from the tender stems and leaves of aromatic *Pelargonium* hybrids. It is a pale yellow liquid with a rosy odour and there is high demand for the oil on the international market.

Geranium oil is mainly produced in China, Réunion, Egypt and Morocco, and the world production is about 150-200 tons per year. Our institute introduced the plant and has successfully cultivated it in Kunming since 1987. We have now extended this crop to the western and southern areas of Yunnan province and small quantities of oil are now for sale on the domestic market.

To determine the quality of geranium oil produced after acclimatization in our botanical garden, we used gas chromatography (GC) to analyse oils for chemical composition at the main plant growth periods.

The oil was steam distilled in a Clevenger apparatus using green material collected from two year old plants. GC analysis was carried out on Shimadzu 9A gas chromatograph equipped with a flame ionization detector and a built in silicon peak surface integrator. The conditions were as follow: stationary phase OV 101, column length 25 m, ID 0.2 mm, carrier gas N₂, oven temperature programmed from 100 to 200°C, injector port and detector at 200°C.

From the data in Table 1, it seems that the *Pelargonium* cultivar grown in Kunming produces an essential oil with a higher percentage of geraniol and a lower percentage of citronellol than the cultivar usually grown in Bin Chuang. Over the study period, the percentage of geraniol increased while that of citronellol decreased. Compared with geranium oils usually produced abroad, the oil produced in Yunnan has a higher percentage of geraniol (+ 4% to 13%), while there is not much difference in the percentage of citronellol, or in the other components.

Generally, the percentage of geraniol and citronellol is an index to evaluate the quality of geranium oil, in addition to the presence of other ingredients such as (Z)- and (E)-rose oxides and geranyl and citronellyl formates. Therefore, we think that the geranium oil produced in our province is similar to that produced in Réunion (Bourbon type).

It has a very powerful green leafy rosy odour with a pronounced fruity minty undertone. It is suitable for use high-grade perfumes and soaps.

As our plantations expand, this plant will allow us to diversify our perfumery industry and also disrupt the current single product situation in our geraniol industry. It should be cost effective in the future.

Table 1
Comparative chemical composition of *Pelargonium graveolens* oil and *Pelargonium roseum* oil.

Compounds	Kunming					Bin Chuang	Bourbon	Morocco
	May	June	August	Sept.	Oct.			
Linalool	7.82	6.98	4.45	6.99	7.76	4.38	12.9	6.80
Isomenthone	7.04	4.58	4.38	6.02	6.96	6.92	7.20	5.20
(Z)-rose-oxide	0.22	0.06	0.15	0.20	0.32	0.40	0.64	0.97
(E)-rose-oxide	0.37	0.34	0.24	0.30	0.38	1.11	0.21	0.38
Citronellol	21.30	21.60	21.95	19.39	18.82	39.88	21.28	19.28
Geraniol	23.97	24.30	30.29	31.39	32.02	7.29	17.45	18.40
Citronellyl formate	8.04	8.79	9.18	6.18	5.67	11.78	8.37	6.02
Geranyl formate	4.68	5.06	6.47	4.39	4.51	1.83	7.55	6.55