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STUDIES ON PAKISTANI ROSE OIL

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The rose oil obtained from the flowers of "Red rose" (*Rosa indica*, N.O. Roszacea) cultivated in the lower part of Sind (Pakistan) has been investigated for the first time in Pakistan with respect to its physico-chemical values and chemical composition. The percentage of its main constituents has been recorded as; rhodinol – 36.3 %, geraniol – 24.4 %, phenylethyl alcohol – 12.1 % and nerol – 7.6 % through G.C./M.S. The physico-chemical constants were found as : d_{15}^{30} – 0.8627, n^{25} – 1.4640, congealing point – 17.3°, m.p. – 18.7°, ester no. – 8.5, sap. no. – 16.2, total alcohols – 83.3 %, stearoptene 8.22 %.

Key words: Rose, Rosaceae, Rhodinol. *Rosa indica,* Rose otto.

INTRODUCTION

Various species of rose, locally known as "Gulab" are cultivated in Pakistan, of which the principal are *Rosa indica, R. damascena, R. alba, R. gallica* and *R. centifolia.*

In indigenous medicine, fresh rose flowers are used for preparation of rose water and rose oil, also called "otto of rose". The former is mainly employed in lotions and collyria [1], while the latter is largely used in the perfuming of toilet soaps, cosmetics, soft drinks and alcoholic liquours.

The rose oil is mainly produced in Bulgaria, Morocco and France. It is also produced in China, India, USSR, Turkey and Syria in minor quantities [2].

No work on the composition of rose oil in Pakistan has been reported as far. It was, therefore, thought worthwhile to carry out the present studies with the objective of evaluation of its utility in the flavour and perfume industries.

MATERIALS AND METHODS

The flowers of "Red rose" Rosa indica (N.O. Rosaceae) were collected before sunrise from the gardens near Thatta, lower part of Sind in the months of December/ January and processed as under:

4 kg. of fresh flowers were distilled with ten litres of water in a 20 litres flask and about 2.5 litres of the distillate (rose water) was collected during 3-4 hours. The distillate was cohobated to provide one litre of rose water. The rose oil was separated, dried over anhydride sodium sulphate and weighed (0.88 g, 0.022 %).

The physico-chemical properties and percentage of some of the constituents i.e. rhodinol, total alcohols and stearoptene were determined by standard methods [3] (Table 1).

GC and GC/MS analysis of rose oil. The rose oil was resolved into individual components by Dani 6800 GC fitted with FID. The parameters were:

Nitrogen as carrier gas, glass capillary column SP 2310 (2m, i.d. 1/8", O.V. – 101, 10 %), Inj. temp. 120°, FID at 260°, instrument temp. programmed at 50° (min.) to 300° (max.) at the rate of 5°/minute.

The GC/MS analyses were performed using a Finnigan MAT 1125 mass spectrometer with MAT 188 data system, attached with Varian 3400 gas chromatograph. Other parameters are helium as carrier gas, flow rate 0.1 ml/ minute, glass capillary column Sp – 2100 (O.V. – 101), temp. programmed at 60° (initial) to 260° (final) at the rate of 8°/minute.

RESULTS AND DISCUSSIONS

The major components of rose oil, as determined by GC/MS (Fig. 1), are recorded in Table 1. They were identi-

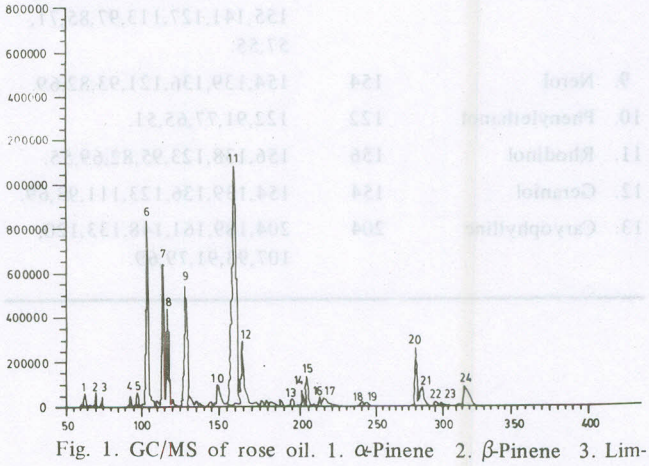

Fig. 1. GC/MS of rose oil. 1. α-Pinene 2. β-Pinene 3. Limdnene 4. Myrcene 6. Geraniol 7. Prenyl ethanol 9. Nerol 10. Linalool 11. Rhodinol 12. Citral 14. Caryophyllene 15. Cadinene 20. Nonadecene 24-Hene iocosane.

fied through their mass ions, fragmentation pattern of the individual component in the M.S. (Table 2). Their percentage was determined by GC and other standard method [3].

Table 1. Physico-chemical constants and major components for rose oil.

1. d^{30}	0.8627
2. n^{25}	1.4640
3. Congealing point	17.3°
4. Melting point	18.7°
5. Ester No.	8.5
6. Sap. No.	16.2
7. Total alcohols %	83.3
8. Stearoptene %	8.22
9. Rhodinol %	36.3
10. Geraniol %	24.4
11. Phenyl ethyl alcohol %	12.1
12. Nerol %	7.6

Table 2. Mass spectral data of individual components of rose oil.

Sr. No.	Component	Mass ion (M^+)	Mass Spectrum peaks (m/e)
1.	α-Pinene	136	136,121, 105, 93, 77, 53.
2.	β-Pinene	136	136, 121, 107, 93, 79,69, 53.
3.	Limonene	136	136,121,107,93,79,68,53.
4.	Myrcene	136	136,121,107,93,69,53.
5.	Linalool	154	139,136,121,93,80,71,67,55.
6.	Citral	152	152,123,93,84,69,55,53.
7.	Nonadecene	266	266,181,168,153,139,125, 111,97,83,69,55.
8.	Heneiocosane	296	296,239,211,197,183,169, 155,141,127,113,97,85,71, 57,55.
9.	Nerol	154	154,139,136,121,93,82,69.
10.	Phenylethanol	122	122,91,77,65,51.
11.	Rhodinol	156	156,138,123,95,82,69,55.
12.	Geraniol	154	154,139,136,123,111,93,69.
13.	Caryophylline	204	204,189,161,148,133,120, 107,93,91,79,69.

The rose oil obtained by hydrodistillation contains 83.3 % of total alcohols and only 8.2 % of stearoptene (Table 1) while the Bulgarian rose oil [4] is reported to compose of a maximum of 78.2 % of total alchols and 18.2-21.3 % of stearoptene. This is also corroborated by its low freezing and melting points i.e. 17.3° and 18.7° respectively.

It is surprising to note that phenylethyl alcohol constitutes 12.1 % of the rose oil, although no solvent was used in the process for isolation of the oil. But it is understandable, since the rose water left after separation of the oil was used in the subsequent batches which get saturated with phenylethyl alcohol.

In addition to rhodinol, geraniol, phenylethanol and nerol (Table 1), small amounts of α-pinene, β-pinene, limonene, citral, linalool, caryophylline, nonadecene, myrcene and heneiocosane were also identified.

The present studies indicate that the rose oil of "Red rose" is comparable with the rose oil of Bulgaria [4], Turkey [5] and India [6] and can be commercially exploited for use in flavour and perfume industries.

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