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Extraction and Analysis of Essential Oil of *Rosa species*

M. ASLAM KHAN AND SHOAIB-UR-REHMAN
Institute of Horticultural Sciences, University of Agriculture, Faisalabad–38040, Pakistan

ABSTRACT

Rosa species were evaluated for oil yield, colour and other physical and chemical properties. Recovery of concrete oil from petals of *Rosa demascena* was higher (0.24%) than *Rosa centifolia* (0.22%) on fresh weight basis. Oil color of *Rosa centifolia* was yellowish brown while the color of absolute oil of *Rosa demascena* was yellowish. Refractive index of *Rosa centifolia* oil was higher (1.45) at 25°C than *Rosa demascena* (1.42). *Rosa centifolia* was *found higher* for all the chemical constituents studied except phenyl ethyl alcohol which was greater in case of *Rosa demascena* than *Rosa centifolia.* The study indicates that there is qualitative and quantitative difference in chemical composition, aroma constituents of essential oil of *Rosa centifolia* and *Rosa demascena* produced locally or elsewhere in the world.

Key Words: *Rosa centifolia; Rosa damascene;* Essential oil

INTRODUCTION

Roses are cultivated for ornamental purposes and essential oil extraction. These are highly appreciated for fragrance and production of perfumes and cosmetic. By adopting different techniques like distillation and extraction of rose petals yield very low quantities of highly scented essential oil. Rose essential oil has a wide range of application (Naryanand & Kumar, 2003) in many industries for the scenting and flavouring purpose. It is used as perfumer in soap and cosmetics and as a flavour in tea and liquire. Locally grown *Rosa centifolia* and *Rosa damascena* are commonly used for rose water production (urq-e-ghulab) and extraction of essential oil (Naryan *et al*., 2003). The essential oil, locally known as "Attar" is highly appreciated among people as a perfume. This rose essential oil comprises of a number of different type of complex constituents. These constituents can be analysed by adopting extraction techniques like, using solvent hexane (Reverchon, 1997) and steam distillation. Commonly extraction by using solvent (hexane) is used to study the minute quantity of essential oil of *Rosa centifolia* and *Rosa demascena*.

Gas chromatographic analysis (Sood *et al*., 1994) is most advanced, fast and relatively simple technique for separation of different aroma constituents by the perfumer. Moreover, the chances of interaction between the components are greatly reduced.

This comparative study reveals that how much and what kind of volatile scented compounds are present in *Rosa centifolia* and *Rosa demascena*.

MATERIALS AND METHODS

Rose flowers were collected from Postgraduate Agriculture Research Station (PARS) Jhang road Faisalabad. Healthy looking flowers of each species were collected in the morning. Unwanted material like sepals, pollens and anthers were removed, petals were weighed, spread in trays and kept under shade at room temperature to remove extra moisture in the petals.

The apparatus used for the recovery of rose oil was Soxhlet extraction apparatus, petals were filled in thimble which was placed within the cylinder. The apparatus is fitted into flask containing 95% pure N-hexane as a solvent, (Moates & Reynolds, 1991). 20 kg of rose petals of each species were used for extraction of oil. The flask containing N-hexane was heated to boil. Hexane vaporized and condensed into thimble. It dissolves the volatile compounds of the petals. In this way, the organic components came into the flask along with hexane.

Distillation of recovered solvent. When the entire aroma was taken out by the solvent then the process of distillation was carried out. Dissolved organic residue in the hexane was collected in a flask and dried over by adding anhydrous $NaSo_4$. The last traces of hexane were removed by bubbling nitrogen gas through the oil. In this method concrete oil is recovered.

In absolute oil recovery, concrete oil was dissolved in minimum volume of absolute alcohol to remove the natural waxes present in the essential oil. It was filtered through a filter paper. Alcohol was removed by distillation and traces of alcohol were removed by passing nitrogen gas through the oil.

Recovery of Rosa Oil

a) Concrete oil percentage and b) Absolute oil percentage

Physiochemical properties of absolute oil

i) Colour, ii) Refractive index, iii) Specific gravity, and iv) Acid number

Liquid gas chromatographic analysis The chromatograms obtained were compared with the chromatogram of the standard compounds.

RESULTS AND DISCUSSION

Recovery of rosa oil (Table I). Recovery of concrete oil from petals of *Rosa demascena* was higher (0.24%) than *Rosa centifolia* (0.22%) on fresh weight basis. Similarly absolute oil recovered from concrete oil of *Rosa demascena* was higher (10.17%) and 0.03% on the petal weight basis than *Rosa centifolia* (9.83% and 0.02%, respectively).

Though the absolute oil recovered from *Rosa demascena* was greater than *Rosa centifolia* but oil yield was much lower compared to yield (0.015%) obtained from petals of *Rosa rugosa* (Greagiev *et al*., 1981).

Physiochemical properties of absolute oil (Table II). Oil color of *Rosa centifolia* was yellowish brown against the findings of Iqbal (1987) who found it pale yellow while the color of absolute oil of *Rosa demascena* was yellowish. Refractive index of *Rosa centifolia* oil was higher (1.45) at 25°C than *Rosa demascena* (1.42). These findings are in agreement with the results of Iqbal (1987) and Javed (1989). Similarly, the absolute oil specific gravity of *Rosa centifolia was* greater than *Rosa demascena* (0.89 and 0.87, respectively) at 20°C. Javed (1989) also observed similar trend for the specific gravity in these two species. Acid number of absolute oil of *Rosa centifolia* and *Rosa demascena* was 12.04 and 15.10, respectively. The results obtained are variable to the findings of Poucher (1974) and Javed (1989).

Liquid gas chromatographic (LGC) analysis (Table III). LGC analysis revealed *Rosa centifolia* higher for all the chemical constituents studied except phenyl ethyl alcohol which was higher in case of *Rosa demascena* than *Rosa centifolia.* as reported by Chen *et al*. (1985).

In Rosa demascena, our findings were much higher for the percentage oil constituents like Citronellal, Citronellal acetate phenyl ethyl alcohol, rhodinyl acetate, rhodinol and linalool than the reports of Chen et al. (1985), Randha (1980), Hayat (1990) and Javed (1989), respectively. Our findings were lower for geraniol than the findings of Hayat (1990).

CONCLUSION

Rosa demascena has more oil yield than *Rosa centifolia*. The colour of Rosa oil of *Rosa centifolia* is yellowish brown while the colour of *Rosa demascena* is yellow. Refractive index and specific gravity of rosa oil of both the species were nearly same. The aroma constituents of Rosa oil; Geraniol, Eugenol, Rhodinol, Citronellol, Linolool, Phenyl Ethyl Alcohol, Rhodinyl acetate are present in essential oil of *Rosa centifolia* and *Rosa damascena* with variable percentage.

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Table I. Rose essential oil yield

	Rosa centifolia	*Rosa damascena*
Total flower used	20 kg	20 kg
Concrete oil yield	40.5 gm	44.8 gm
(%age on fresh wt. basis)	0.22%	0.24%
Absolute oil yield	3.98 gm	4.56 gm
(%age on concrete oil basis)	9.83%	10.78%
(%age on petal wt. basis)	0.02%	0.03%

Table II. Physiochemical properties

	Rosa centifolia	*Rosa damascena*
Colour	Yellowish brown	Yellowish
Refractive index (25°C)	1.45	1.42
Specific gravity (20 °C)	0.89	0.87
Acid number	12.00	15.10

Table III. Some chemical constituents of essential oil of *Rosa centifolia* and *Rosa damascena*

Sr. No.	*Components*	*Rosa centifolia (%age Constituents)*	*Rosa damascene (%age Constituents)*
1	Geraniol	2.98	1.53
2	Eugenol	3.99	1.68
3	Rhodinol	4.05	2.69
4	Citronellol	12.09	3.72
5	Linalool	1.68	1.02
6	Citranellyl acetate	4.09	2.46
7	Phenyl ethyl alcohol	56.68	70.86
8	Rhodinyl acetate	1.94	0.42

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