

## Extraction and Characterization of Essential Oil of *Rosa gruss-an-teplitz*

WASEEM MUMTAZ<sup>†</sup>, HAMID MUKHTAR\*, FAROOQ ANWAR<sup>†</sup> and RAZYIA NADEEM<sup>†</sup>  
*Institute of Industrial Biotechnology, Government University College  
Lahore-54000, Pakistan  
E-mail: hamidmukhtar@gcu.edu.pk*

In present studies, the authors characterize the essential oil of *Rosa gruss-an-teplitz*. For this purpose, flower petals of *Rosa gruss-an-teplitz* (surkha gulab) were collected. The physico-chemical properties and gas chromatographic analysis was also conducted. Data regarding the yield indicates that *Rosa gruss-an-teplitz* showed a yield of concrete oil and absolute oil 0.6851 and 0.3425 %, respectively. Various physico-chemical properties of yellowish, brown oil have been reported. Gas chromatogram of essential oil of *Rosa gruss-an-teplitz* detected some major compounds such as geraniol, linalool, phenethyl alcohol, benzaldehyde, citronellyl acetate, benzyl alcohol, geranyl acetate, etc. with different percentages.

**Key Words:** Extraction, Characterization, Essential oil, *Rosa gruss-an-teplitz*.

### INTRODUCTION

Rose is rightly called "Queen of flowers" because of its beauty and fragrance. The rose cultivar used in this research for extraction of its essential oil was *Rosa gruss-an-teplitz*, which belongs to botanical group Chinese; parentages are Sir Joseph Paxton, Fellenberg, Papa Gontier and Gloire des. It is famous as Surkha (red rose) and its origin is Asia and Middle East. This rose cultivar has medium size flowers having 25 petals, colours red, rich in fragrance, 1.5 m high, leaves are light green. It flowers throughout the year and is a vigorous plant. Rose oil extracted from *Rosa gruss-an-teplitz* is antiseptic, balancing, antidepressant, astringent, anti-inflammatory, aphrodisiac and digestive<sup>1</sup>. Because of high cost of production, rose essential oil is one of the most expensive scents. Rose essential oil has a wide range of applications<sup>2</sup> in many industries for the scenting and flavoring purposes. Rose oil is a pleasant and safe oil to use in aromatherapy. Rose oil relax strengthens, imparting a feeling of calm and wellbeing. It is beneficial to use in times of stress and will relief too many

---

<sup>†</sup>Department of Chemistry, University of Agriculture, Faisalabad, Pakistan.

stress-related conditions, soothing frustration and irritability and lifting the spirits<sup>3</sup>.

At present different extraction techniques like distillation, effleurage, CO<sub>2</sub> extraction, expression and solvent extraction are applied for oil extraction from rose. But commonly steam distillation and solvent extraction methods are used to study the minute quantity of essential oil of *Rosa gruss-an-teplitz*. Present studies were aimed at extraction of essential oil (*Rosa gruss-an-teplitz*) by solvent extraction method, its physical and chemical analysis and gas chromatographic separation of complex constituents of essential oil of *Rosa Gruss-an-teplitz*. Rose essential oil comprises a number of different types of complex constituents. Their separation and analysis is performed by gas chromatography.

### EXPERIMENTAL

*Rosa Gruss-an-teplitz* from the experimental floriculture area University of Agriculture, Faisalabad has been collected in paper boxes. The flowers were weighed before and after the removal of unwanted material (sepals, pollens and anthers) and petals were kept under shade at room temperature for removal of extra moisture. For the extraction of essential oil from *Rosa gruss-an-teplitz* solvent extraction was used and concrete oil was obtained.

Absolute oil was recovered by dissolving concrete oil in minimum volume of absolute alcohol to remove the natural waxes present in essential oil and then filtered.

Gas chromatographic analysis of absolute oil of *Rosa gruss-an-teplitz* was carried out using Shimadzu gas chromatograph model 17A equipped with FID. The other analysis conditions were as, column SP2330 (30 m × 0.32 mm), initial oven temperature 50°C, ramp rate 5°C/min, final oven temperature 150°C, initial holdup time was 3 min while final holdup time was 9 min. The initial injector and detector temperature were 175° and 200°C, respectively. Moisture free pure N at a flow rate of 5mL/min was used as carrier gas. The identification of contents of essential oil of *Rosa gruss-an-teplitz* was done by comparison with the chromatogram of mixture of standards, while quantitative analysis was carried out by using CS32 software in the form of percentage composition.

### RESULTS AND DISCUSSION

In the present studies, the extraction and analysis of a rose cultivar (*Rosa gruss-an-teplitz*) was carried out. The yellowish brown oil was analyzed for its various physical (Table-1) and chemical parameters. The analysis<sup>4</sup> was carried out in triplicate and the data was statistically analyzed and results are reported as mean ± SD.

Concrete oil recovered from 24 kg petals of *Rosa gruss-an-teplitz* was 164.44 g. This showed oil content of 0.6851 % on petal weight basis. This yield showed that *Rosa gruss-an-teplitz* had more concrete oil yield than *Rosa centifolia* (0.2065 %) as reported by Naves and Mazuyer<sup>5</sup> and *Rosa gallica* 0.29 % as reported by Nofal *et al.*<sup>6</sup>

Absolute oil recovered from concrete oil for *Rosa gruss-an-teplitz* was 0.3425 % on the petal weight basis. This yield was greater than *Rosa gruss-an-teplitz*, which was 0.0199% as reported by Ullah<sup>7</sup>.

These results indicate that *Rosa gruss-an-teplitz* is suitable for the extraction of essential oil or "Attar" on commercial scale, these findings indicate that locally grown *Rosa gruss-an-teplitz* (Surkha Gulab) is highly appreciated among the people for the extraction of Attar and making of rose water.

The refractive index of yellowish brown oil of *Rosa-gruss-an-teplitz* is found to be 1.451 at 34°C and the congealing point was 15.7°C. The optical rotation was found to be - 32.50 to + 45.25 while the specific gravity at 20°C was  $0.8146 \pm 0.041$  (Table-1).

TABLE-1  
PHYSICAL CONSTANTS OF ESSENTIAL OIL OF  
*ROSA GRUSS-AN-TEPLITZ*

Parameters	Mean $\pm$ SD value
Refractive index at 34°C	1.451 $\pm$ 0.45
Congeaing point (°C)	15.7 $\pm$ 0.6
Optical rotation	-32.50 $\pm$ 0.76 + 45.25 $\pm$ 0.93
Specific gravity at 20°C	0.8146 $\pm$ 0.041

Acid number of the oil of *Rosa gruss-an-teplitz* was 11.594 which was greater than that of 1.5 to 3.8 as reported by Poucher<sup>8</sup>, while much lesser than 24.004278 of Javed<sup>9</sup>. Ester number of *Rosa gruss-an-teplitz* was 29.92 which was greater than that of 3.7 to 17.5 as reported by Poucher<sup>8</sup> and less than 54.15299 of Javed<sup>9</sup>.

Gas chromatographic analysis was performed under some specific conditions and results thus obtained (Table-2) were compared with previously reported data.

The compounds are listed along with corresponding peak No. and their % constituents (Fig. 1). Geraniol (peak 8) was 3.6 %. Its quantity was lower then that of 12.7 % in *Rosa bourboniana*<sup>10</sup>, 3.615 % and of *Rosa centifolia* 62.697% by Ullah<sup>7</sup>. Linalool (peak 9) was 2.1 %, which showed that its quantity was lesser than 0.222 % as reported by Javed<sup>9</sup> and *Rosa centifolia* with 12.682 % by Ullah<sup>7</sup>. Another important constituent of 46.2 % of phenyl ethyl alcohol (peak 10) was also found in the oil. This amount was much greater than 4.23 % found in *Rosa rugosa*<sup>11</sup>. Benzaldehyde

TABLE-2  
CHEMICAL CONSTITUENTS OF ESSENTIAL OIL OF  
*ROSA GRUSS-AN-TEPLITZ*

Retention time (min)	Constituents	Percentage composition (%) (Mean $\pm$ SD)
4.130	Unidentified	2.30 $\pm$ 0.100
4.470	Unidentified	10.60 $\pm$ 0.390
5.590	Unidentified	3.30 $\pm$ 0.150
6.430	Unidentified	4.70 $\pm$ 0.200
8.230	Unidentified	3.90 $\pm$ 0.180
8.380	Unidentified	6.60 $\pm$ 0.270
10.300	Unidentified	3.20 $\pm$ 0.140
21.640	Geraniol	3.60 $\pm$ 0.110
22.540	Linalool	2.10 $\pm$ 0.100
24.140	Phenyl ethyl alcohol	46.20 $\pm$ 0.980
24.830	Benzaldehyde	1.30 $\pm$ 0.065
25.900	Citronellyl acetate	0.40 $\pm$ 0.018
26.710	Benzyl alcohol	2.30 $\pm$ 0.110
28.360	Geranyl acetate	9.50 $\pm$ 0.450

(peak 11) 1.3 % was also found to be present in the oil, which had not been reported by any worker in past. Citronellyl acetate (peak 12) 0.4 % was another important constituent of the oil, whose concentration was smaller<sup>12</sup> than 0.627. Benzyl alcohol (peak 13) 2.3 % was also present in low amount and has not been reported by any scientist. Another important constituent 9.5% of geranyl acetate (peak 14) was also found in the oil<sup>10</sup>. It was also present in *Rosa bourboniana* rose oil. Peaks from 1 to 7 remain unidentified due to the unavailability of pure standards.

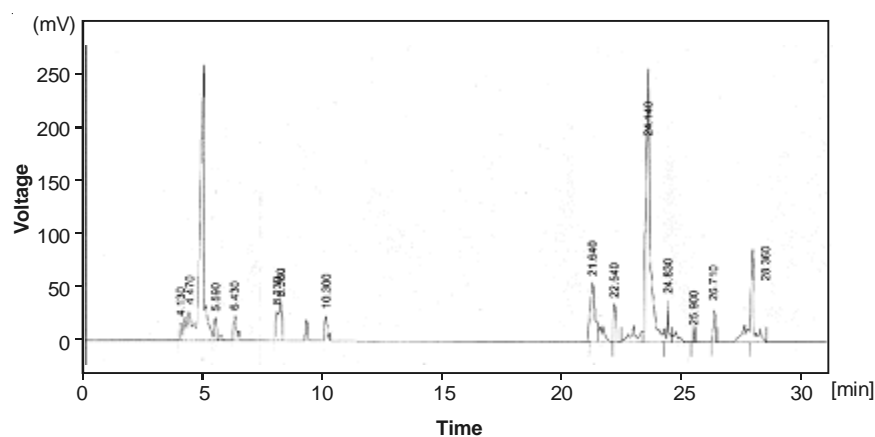


Fig.1. Gas chromatogram of essential oil of *Rosa gruss-an-teplitz*.

**REFERENCES**

1. P. Allardice, *The Art of Aromatherapy*, Random House value publishing, New York, pp. 65-67 (1994).
2. C. Chandra, *Roses and Essential oils*, Good Will publishing House, New Delhi, India (1998).
3. L. Michael, *An Examination of Bulgarian Rose Oil by Chromatographic and Spectroscopic Techniques*, Faberge Inc. Ridgefield, NJ 07657 USA (1990); *Chem. Abstr.*, **92**, 169027z (1990).
4. R.G.D. Steel, J.H. Torrie and D.A. Dickey, *Principals and Procedure of Statistics*, McGraw Hill Book Co., Inc, New York (1997).
5. Naves and Mazuyer, *Essential Oils of the Plant Family, Rosaceae*, p. 268 (1983); E. Guenther, *The Essential Oil*, D Van Nanstrand Co, Inc. London, New York, Vol. 5 (1983).
6. M.A. Nofal, C.T. Ho and S.S. Chang, *Perfume Flavor*, **7**, 23 (1982); *Chem. Abstr.*, **98**, 8081w (1983).
7. A. Ullah, *Extraction and Gas Chromatographic Analysis of Essential Oil of Two Rose Cultivars, Rosa Centifolia and Rosa gruss-an-teplitz*, M. Sc. Thesis, Department of Horticulture, University of Agriculture, Faisalabad (2002).
8. K.W.A. Poucher, *The Production of Natural Perfumes, Perfumes, Cosmetics and Soaps*, Chamman & Hall, London, edn. 8, Vol. 2, pp. 16-40 (1974).
9. M. Javed, *Gas Chromatographic Analysis of Essential Oil of Rosa bourbonica or Edward Rose*, M. Sc. Thesis, Submitted to U.A.F. Horticulture (1989) (Unpublished).
10. M.C. Nigam, G.N. Gupta and D.R. Dhingra, *Indian Perfume*, **3**, 76 (1959); *Hort. Abstr.*, **32**, 1292 (1962).
11. C. Wu, Y. Wang, D. Zhao, S. Sun, Y. Ma and J. Chen, *Zhiwu Xuebao*, **27**, 510 (1985); *Chem. Abstr.*, **104**, 1035v (1986).
12. L.L. Knapp and P.W. Halter, *J. Essential Oil Res.*, **12**, 392 (2000).

(Received: 27 July 2005; Accepted: 19 July 2006)

AJC-5037

**1st UK-US CONFERENCE ON CHEMICAL AND BIOLOGICAL  
SENSORS AND DETECTORS**

**22 - 24 APRIL 2007**

**HOLIDAY INN, LONDON, UNITED KINGDOM**

*Contact:*

Francesca Chapman

Conference Administrator

Royal Society of Chemistry, Thomas Graham House,

Science Park, Milton Road, Cambridge, CB4 0WF

Tel: (44)(1223)432380; Fax: (44)(1223)423623

E-mail: Francesca\_Chapman@rsc.org