

Rose Essential Oil: Great Demand in The Aromatic and Cosmetic Industry

Saraswati^{*1}, Namita² and M. K. Singh³

¹Ph.D. Research Scholar, Division of Floriculture and Landscaping, ICAR-Indian Agricultural Research Institute, New Delhi, India 110012

²Senior Scientist, Division of Floriculture and Landscaping, ICAR-Indian Agricultural Research Institute, New Delhi, India 110012

³Head, Division of Floriculture and Landscaping, ICAR-Indian Agricultural Research Institute, New Delhi, India 110012

*Corresponding Author: ssgorebal0107@gmail.com

The rose is part of the *Rosa* genus, which includes close to 200 species and around 1800 cultivars. This erect, perennial, hermaphroditic shrub features numerous green, prickly stems that can reach heights of up to 2 meters, and compound leaves with oval, serrated leaflets. Roses are cultivated for food, perfumes, cosmetics, and pharmaceuticals, and they hold significant potential in the ornamental plant industry. Their global importance has been on the rise due to their natural fragrances and aromas, contributing to their economic value.

For centuries, roses have stood as a significant crop in the floriculture sector, enjoying global popularity as both garden ornamentals and cut flowers. The floral scent, a key trait, not only enhances the decorative appeal of roses but also supplies vital fragrances and flavours for spices, perfumes, and cosmetics in associated industries. Moreover, rose essential oil, derived from these scent compounds, serves as an analgesic or antispasmodic. Initially celebrated for their aroma and medicinal benefits, roses eventually became prized for their beauty. The Damask rose (*Rosa damascena*), known for its petite yet intensely fragrant blossoms, was the most renowned species. To this day, it remains the epitome of fragrance and holds the record for the highest concentration of essential oils.

The Damask rose (*Rosa damascena* Mill.), a high-value aromatic plant species from the Rosaceae family, is renowned for the superior quality of its essential oil, making it a globally cultivated variety. Its flowering period begins with the summer season and lasts for 30–35 days. Native to the Asia Minor, the Damask rose holds a significant place in the extraction of essential oil. It thrives in the sub-tropical and temperate zones of the northern hemisphere. In India, its commercial cultivation can be traced back to the Mughal era. Currently, it is grown in northern areas such as Himachal Pradesh, Jammu and Kashmir, Rajasthan, Haryana, Uttar Pradesh, and Punjab, yielding an annual production of 200 kg of essential oil. Himachal Pradesh's temperate climate and

suitable soil conditions are particularly favourable for the cultivation of perfumery roses.

The rose is not only highly decorative but also possesses a light, pleasant, and invigorating fragrance. This fragrance is attributed to the essential oils present in the plant. Volatile organic compounds (VOCs) are emitted from the plant's above-ground parts into the atmosphere. Their primary roles include protecting the plant from herbivores and pathogens, attracting pollinators, aiding in seed dispersal, and facilitating plant communication. Additionally, they are utilized as flavouring agents, preservatives, and in alternative medicine.

Roses serve not just as ornamental plants in parks and gardens but also play a significant role in perfumery, cosmetics, and medicine, thanks to their essential volatile organic compounds. Beyond their popularity in fragrance and beauty products, the essential oils derived from roses exhibit numerous pharmacological properties. These include anti-aging, anti-tyrosinase, and antidepressant effects, as well as benefits for intestinal health, such as antioxidant, anticancer, anti-inflammatory, antimicrobial, antiepileptic, antimigraine, antiallergic, and various other effects.

The content of essential oils ranged from 0.030% to 0.045%. Profiling of these oils through gas chromatography-mass spectrometry showed significant variations in their compounds. The predominant components were acyclic monoterpene alcohols, specifically citronellol and geraniol, followed by the long-chain hydrocarbon nonadecane. Globally, the production of this essential oil is approximately 4.5 tons per year, with Turkey and Bulgaria accounting for up to 90% of the total production. Recent reports estimate the global market value of rose oil at around 279 million USD in 2018, with expectations of growth in the foreseeable future.

The damask rose's essential oil is widely used in the production of perfumes and cosmetics, and its by-product, rose water, is highly sought after in the flavouring industry. Due to its low oil yield and high

demand, damask rose essential oil is among the most expensive globally. Research involving GC/MS methods has been undertaken to analyse the composition of damask rose essential oil. The primary components found in the oil are acyclic monoterpene alcohols and long-chain hydrocarbons, with β -citronellol, nonadecane, geraniol, and eugenol being the predominant compounds. The quality of the essential oil is determined by the Citronellol/Geraniol ratio (C/G Ratio). Additionally, the essential oil from the damask rose is known to possess various pharmacological properties.

Four primary *Rosa* species are utilized globally in the floral industry for the production of essential oil.

- 1 *R. damascena*
- 2 *R. centifolia*
- 3 *R. moschata*, and
- 4 *R. gallica*

The primary components of rose oil are geraniol (35.4%), citronellol (31.6%), and nerol (15.3%). The main industrial product derived from oil-bearing roses is rose oil, obtained through hydro-distillation and solvent extraction processes. The volatile oil content in rose flowers is quite low (0.03-0.04%). It takes approximately 3.5 tons or 1,250,000 fresh rose flowers, handpicked in the early hours of the flowering season, to produce just 1 kg of rose oil after hydro-distillation in the factory. Despite its high cost on the global market, rose oil remains the most popular essential oil in the perfume and cosmetic industries.

Various significant products, such as concrete, water, oil, and absolute, are derived from the oil-bearing rose. With the growing demand for cosmetics and natural alternatives to synthetic perfumes, the exploration of flower scents from organically cultivated plants has become increasingly relevant today.

References

Erzurumlu, G. S., and Erzurumlu, D. Y. (2021). Evaluation of Outdoor Ornamental Plants

from the Viewpoint of Urban Biodiversity and Cultural Change in Terrestrial Climate: The Case of Nigde City. *Yuzuncu Yıl University Journal of Agricultural Sciences*, 31, 825-837.

Guney, M. (2020). Determination of fatty acid profile and antioxidant activity of Rosehip seeds from Turkey. *International Journal of Agriculture Environment and Food Sciences*, 4, 114-118.

Kovacheva, N., Rusanov, K., Atanassov, I. (2010). Industrial cultivation of oil bearing rose and rose oil production in Bulgaria during 21st century, directions and challenges. *Biotechnology and Biotechnological Equipment*, 24, 1793-1798.

Omidi, M. et al. Comparative study of phytochemical profiles and morphological properties of some Damask roses from Iran. *Chem. Biol. Technol. Agric.* 9, 51 (2022).

Shawl, A. S. & Adams, R. Rose oil in Kashmiri India. *Perfum. favorist* 34, 22-25 (2009).

Singh, S. et al. CSIR-IHBT-RD-04 (IC0635435; INGR20105), a Damask rose (*Rosa damascena*) germplasm for high flower yield registered with NBPGR New Dehli India (2022).

Singh, S. et al. Morphological and molecular characterization revealed high species level diversity among cultivated, introduced and wild roses (*Rosa sp.*) of western Himalayan region. *Genet. Resour. Crop Evol.* 64, 515-530 (2017).

Singh, V., Kaul, V. K., Singh, B. & Sood, R. P. (1997) Damask rose (*Rosa damascena* Mill.): Cultivation and processing. Supplement to *Cultivation & Utilization of Aromatic Plants*, 195

Yaghoobi, M. et al. Chemical analysis of Iranian *Rosa damascena* essential oil, concrete, and absolute oil under different bio-climatic conditions. *Ind. Crops Prod.* 187, 115266 (2022).

* * * * *