

REVIEW ARTICLE

Review paper on genetic diversity of damask rose (*Rosa damascena* Mill.) and economic importance of its oil

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The genus *Rosa* consists of more than 200 species. Among these *Rosa damascena* Mill belongs to the Damask group of roses which are known for their strong fragrance. *R. damascena* has been cultivated as garden rose in some west European collections but it is mainly grown for production of rose oil and rose water obtained after steam distillation of the rose flowers. It is considered that the oil rose originates from ancient Persia (today Iran) and has been later spread to Europe and Northern Africa. By the 14th century the Damask roses were already grown in West European rose collections as garden roses. Rose oil is mainly used in the perfumery and cosmetics industry as a base component of many of the modern perfumes but it also finds application in the food industry as a flavor additive. The main producers of rose oil are Bulgaria, Turkey, Iran and India. Smaller amounts of rose oil and mainly rose water are produced in the countries of Northern Africa. The price of the rose oil has been growing during the last years. The rose oil and rose flower extracts have been studied for a number of health-beneficial effects including antibacterial activity, antioxidant activity, anti-infective and anti-inflammatory properties, relaxant effects on tracheal chains and anti-HIV activity.

Keywords: *Rosa damascena* Mill, Perfume, Essential oil content, Fragrance, Composition, Distillation.

Introduction

Rosa L. as a major genus belongs to the family Rosaceae and comprises 200 species and up to 18000 cultivars (Gudin, 2000). They are mostly deciduous shrubs (Carins, 2003) distributed in the temperate zones of the northern hemisphere with showy and colorful flowers (Horn, 1992). One of the most important *Rosa* species is *R. damascena* Mill. of which some cultivars are used for oil production and others are cultivated throughout the world as garden roses (Guenther, 1952). It is called as Damask rose because, in the beginning, this species was introduced from Damascus to the Europe (Gault and Syngé, 1987). *Rosa damascena* primarily grew in their natural habitat and still this plant is wild in some countries like Caucasus, Syria, Morocco and Andalusia (Chevallier, 2001).

Rose oil (*Rosa damascena* Mill.) which is known as pink rose oil, rose oil or damascus rose is one of the important agricultural products. The Damask rose is cultivated to obtain rose oil, which is the main raw material of perfume industry. The most important world rose oil producers are Bulgaria and Turkey. Both "Turkish Oil Rose" and "Bulgarian Oil Rose" are distilled from fresh rose oil flowers.

Roses have gained the title of the king of flowers (Peter Bealis, 1990) and it is the most popular ornamental plant that has been cultivated systematically (Wylie, 1995). Genus *Rosa* consists of approximately 200 species and up to 18,000 cultivars (Gudin, 2000). Roses are mainly used for showy purposes and oil extraction but they are also used for straight utilization or creation of a variety of food stuff like tea, jam and confectionary. They are a rich source of Vitamin C and used in the making of medicinal stuff. The

utilization of Damask rose dates back to 1500 years ago. The Iranian people call it the flower of Prophet Muhammad (SAW) due to its nice fragrance (Nikbakht and Kafi, 2008).

The species mainly used for oil production is *R. damascene* Mill. Rose oil is the most exclusive essential oil in the world due to its low content and unique scent. About 3000 kg of rose petals can produce only one kg of rose oil (Baydar and Baydar, 2005; Baser, 1992). It is true that there is no alternate of rose oil present in nature nor has it been prepared synthetically (Baydar and Baydar, 2005). Other than rose oil, a number of significant raw stuff for the perfume and cosmetics industry is attained which includes rose concrete, rose absolute and rose water (Nilgun, et al., 2004). The oil content and constituents of the rose oil differ among species used for the production of rose oil. Therefore, the aim of this review is to assess the genetic diversity of Damask rose and Economic importance of its oil.

Literature Review

Origin and description of damask rose

The eastern Mediterranean region is the centre of production and a postulated centre of origin of Damask rose. Till date, the origin of *R. damascena* is a bone of contention among the researchers throughout the world. It is generally believed that *R. damascena* originated in the Neo-lithic period, in South Anatolia, as a hybridization of *R. gallica* and *R. phoenicea*. Both of these have grown wild in Anatolia for centuries (Dayrok, A., et al., 1994, Baytop, T., 1990; Kazaz, S., Kelen, M., 1999, Mandenova, et al., 1970). Iran has also been nominated as one of its origins (Chevllier, A., 1996).

Rosa damascena is a temperate plant indigenous to Europe and Middle East countries of Iran and Turkey. It is believed that the Damask rose has originated from Damascus and introduced in European countries.

Bulgaria, Turkey, France, Italy, Morocco, Russia and India are the main countries where it is cultivated in large-scale for the production of oil. Bulgaria, Turkey and Morocco are the largest producers of rose, oil in the world producing together 10 tons of oil per year. Over the last 300 years the largest integrated growing area for roses has been developed in Central Bulgaria at the foot of Balkan Mountains.

Description of damask rose

The Damask rose is a deciduous shrub growing to 2.2 metres (7 ft 3 in) tall, the stems densely armed with stout, curved prickles and stiff bristles. The leaves are pinnate, with five (rarely seven) leaflets. The roses are a light to moderate pink to light red. The relatively small flowers grow in groups. The bush has an informal shape. It is considered an important type of old rose, and also important for its prominent place in the pedigree of many other types.

Rose is a common name given to the thorny shrubs and climbing vines of the genus *Rosa* in the Rosaceae family. More than 100 *Rosa* species have been recorded throughout the world. Because rose is a popular garden plant, it is virtually impossible to determine the number of currently existing cultivars.

Distribution of damask rose

It is also reported that a Bulgarian (ottoman) merchant introduced rose cultivation to Rumeli in the mid fifteen century A.D. (Baytop, I., 1990). After that, cultivation and processing of *Rosa damascena* were introduced into the Europe and Africa from Turkey (Buttner, R., 2001). Now it is distributed in South France, South Italy, Morocco, Libya, Turkey, Ukraine, Crimea, Caucasus, Syria, India, China and North Korea (Buttner, R., 2001). However, there are only two locations which are ideal for growing-the Isparta province of Turkey and area around the Kazanlak town of Bulgaria. These two regions are the main centres for both rose oil and rose water production in the world. *Rosa damascena* is also planted in Iran and India for production of rose petals and rose water (Staikov, V., and Kalaijie, I., 1980), alongside rose oil, absolute and rose concrete. In India, the distribution of rose is restricted to the mountains with an exception of *R. clinophylla* Thory (*R. involucrate*), which is probably single topical rose spices of the world.

Economic importance of damask rose oil

Rose oils constitute different ingredients like 2-phenylethanol, citronellol, ingredient geraniol, nerol, stearopten waxes etc. Rose oil is used as perfume in the production of soap and cosmetics and as flavor in liquors and tea. Being mildly antimicrobial and rich in fragrance, it is used in lotions, soaps and creams. It is also used in the traditional treatment of exhaustion and fatigue, anemia, asthma, liver dysfunctions and some gastrointestinal problems and due to positive impact on the nervous system activity; it is also used as a relaxing, toning and cooling agent.

Trade and marketing of essential oil

It is well known that the true essence of the plant can be found in the essential oils. There is a consistently growing demand on and increase in prices of essential oils at national and international markets. Hence, essential oils imply a noteworthy upstream business opportunity for the world agricultural sector. Based on Bloor, et al., the entire world annual turnover of cosmetic, perfumery, and flavor industry exceeds US \$6 billion comprising more than 100 essential oils (Bloor, et al., 2000). In 2008, the top exporters of essential oils were the France, UK, Germany, Switzerland, USA, Brazil, China, India, Indonesia, and Argentina (Pal, 2013).

In these days, the most expensive essential oils in the world market is rose oil owing to low oil content and lack of natural and synthetic substances (Baydar and Baydar, 2007). Annually, the world production of rose oil and rose concrete is 15-20 tons (Baydar, 2006). The major producers and suppliers of the rose oil in the world market are Bulgaria and Turkey their share is 80-90% of the world production (Gunes, 2005). The rest of the world production supply comes from France, Italy, Lebanon, Iran, Russia, India, China, Morocco, and Mexico (Gunes, 2005). Even though, there are some other Middle Eastern countries that have historically produced rose oil, yet their modern contribution is minimal (Gunes, 2005).

Challenges and opportunities of damask oil production

Besides, *Rosa damascena* historical and cultural importance, its cultivation is a significant commercial dynamism includes all its agricultural activities being it planting the garden, harvesting and processing. Nevertheless, this traditional activity is facing chief problems in all countries that produce it.

In fact, Damask rose growers are facing many constraints such as:

1. Roses are frost sensitive and have irregular flowering behavior (Pal, 2013).
2. A key obstacle is the available spaces, since the existing gardens are small and fragmented due to the division of land into pieces by inheritance (Rusanov et al., 2011).
3. Farmers are replacing the rose gardens by alternative agriculture products or even economic activities thus they can bring in more money and reduce the risk due to the international and national market alternation (Rusanov et al., 2011).
4. Roses cultivation is highly labor intensive particularly for picking of flowers (Pal, 2013).
5. During harvest temperature affects the oil content of the flower, high temperature cause loss of essential oil from the trichomes of the petals (Baydar and Baydar, 2007).
6. Roses have low flower yield and low oil content (Sharma and Farooqi, 1990).
7. Roses have very low oil recovery from prevailing oil distillation methods (Pal, 2013).
8. The majority of rose's growers are not aware of recent production technologies (Pal, 2013).
9. Instead of being a source of income *Rosa damascena* is considered merely an economical support to the framers (Rusanov et al., 2011).

Over decades, the cosmetics and perfumery industries were quiet conformist to produce constant quality of rose oil (Pal, 2013). On the other hand, farmers are not able to do so mainly since there are no definite market and support price from the governments (Pal, 2013). Therefore, big processing unit holders exploit the farmers (Pal, 2013).

Conclusion

Rosa damascena Mill. is a plant from the Rosaceae family in the form of an erect shrub of 1-2.2 m in height and is primarily cultivated in Turkey, Bulgaria, Iran, India, Morocco, South France, China, South Italy, Libya and South Russia. In addition, the most important production centers are Turkey (Isparta) and Bulgaria (Kazanlik). The most important products obtained from oil rose are rose oil, rose water, rose concrete and rose absolute. These products obtained by distillation and extraction are used in food, medicine and perfume industries as well as make-up and health products.


The plant of oil rose is flowered only once annually and its flowering period in Turkey lasts for almost 35 to 45 days (from the second half of May to the end of June).

References

- Libster, M. (2002). Delmar's integrative herb guide for nurses. Delmar/Thomson Learning.
- Rechinger, K. (1982). Flora Iranica. Graz, Austria.
- Baydar, H. (2006). Oil-bearing rose (*Rosa damascena* Mill.) cultivation and rose oil industry in Turkey. *Euro Cosmetics*, 14:13.
- Baydar, H., Baydar, N.G. (2005). The effects of harvest date, fermentation duration and Tween 20 treatment on essential oil content and composition of industrial oil rose (*Rosa damascena* Mill.). *Industrial Crops and Products*, 21:251-255.
- Bayrak, A., Akgul, A., Dogan, A., Tekin, A. (1994). A study on the chemical composition of rose oil obtained from different sources. *Standart*, 389:51-59.
- Baytop, T. (1990). The cultivation of oil-bearing rose (*Rosa damascena*) and the production of rose oil (Oleum Rosaea) in Anatolia during the Ottoman era. In *Proceedings of the International Conference on Essential Oils, Antalya, Turkey*, pp: 26-30.
- Gunes, E. (2005). Turkey rose oil production and marketing: a review on problem and opportunities. *Journal of Applied Sciences*, 5:1871-1875.
- Kazaz, S., Kelen, M. (1999). A research on the effects of the harvest hours and waiting times in *Rosa damascena* Mill. on the quantity of rose oil. In *Turkish National Horticulture Congress in Turkey, Ankara University, Turkey*.
- Mandenova, I.P. (1970). A revision of rosta in Turkey. *Notes from the Royal Botanic Garden Edinburgh*, 30:327-40.
- Chevallier, A. (1996). *The encyclopaedia of medicinal plants*. Dorling Kindersely, London.
- Buttner, R. (2001). Rosa. In: Hanelt, P., Institute of Plant Genetics and Crop Plant Researches (eds), *Mansfelds Encyclopaedia of Agricultural and Horticultural Crops*, pp: 439-445.
- Stai'kov, V., Kalaïdzhiev, I. (1980). Study of essential oil roses (*Rosa damascena* Mill.) from India, Morocco, Iran and Bulgaria. *Rasteniiev" dni Nauki*, 17:58-69.
- Rusanov, K., Kovacheva, N., Rusanova, M., Atanassov, I. (2011). Traditional *Rosa damascena* flower harvesting practices evaluated through GC/MS metabolite profiling of flower volatiles. *Food Chemistry*, 129:1851-1859.
- Singh, K., Singh, V. (2001). Economics of cultivation and distillation of damask rose: A case study in Palampur (Himachal Pradesh). *Indian Journal of Agricultural Economics*, 56:696-707.
- Pal, P.K., Singh, R.D. (2013). Understanding crop-ecology and agronomy of *Rosa damascena* Mill. for higher productivity. *Australian Journal of Crop Science*, 7:196-205.

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