

Turkey: Rose and other essential oils

Turkey has a long history of the production of a diverse range of medicinal and aromatic plants, and is particularly known for its production of rose oil – one of the most valuable of the essential oils used in top end ('haute gamme') perfumery. The diversity of Turkey's production stems from its position in the NE Mediterranean region and its range of environmental niches from coastal to high mountains and inland plains.

Rose oil

Two major species of rose are cultivated for the production of rose oil: *Rosa damascena*, the red damask rose (including *Rosa alba*, the white flowered form), which is the basis for the industry in Bulgaria, Turkey and Russia (and Syria where there is a very small industry but might be where the type originated, 'the Damascus rose'); and *Rosa centrifolia*, the cabbage rose which is the basis of the industry in Morocco and Egypt (and France).

Rose oil (also termed rose attar, rose otto) is the essential oil distilled from the petals of freshly harvested rose flowers. An important commercial by-product of distillation is 'rose water' – the water used in distillation that contains some aroma compounds that did not separate out with the oil at the condensation stage of distillation. Commercially produced rose water may be diluted with additional pure water (in a 1:1 ratio for example). Alternatively rose water can be produced by adding a small amount of rose oil to pure water – up to 1% oil being used (which gives a surprisingly strongly perfumed rose water).

Rose flowers can also be solvent extracted (with a solvent such as hexane) to yield a *concrete*, that is then re-extracted with alcohol to yield an *absolute*.

Typical physical and chemical parameters for Turkish rose oil are:

| | |
|--------------------|--------------------------------------|
| Odour description: | strong and sweet rosaceous character |
| Appearance: | liquid |
| Colour: | light yellow to green |
| Specific gravity: | 0.844 – 0.868 (@ 25°C) |
| Refractive index: | 1.4520 – 1.4630 (@ 25°C) |
| Optical rotation: | - 3.3 to – 5.9 (@ 25°C) |
| Solubility: | in 90% alcohol |

Distillation

Yields of oil vary widely, at the extreme in the range 1,500 to 10,000 kgs of flowers to 1 kg oil. Yield is a major determinant of commercial viability, and at a minimum yields should be above 1 kg oil per 5,000 kgs flowers, with a target in the range 3-3,500 kgs flowers per 1 kg oil. With such a valuable oil strict technical control of the process of distillation is essential.

Rose production areas in Turkey

Rose cultivation for rose oil is centered in Isparta, in the SW of Turkey, just back from the coast, and has spread into Afyon, Denizli and Burdur. The total estimated production area is around 2,300 ha – of which an estimated 1,600 ha is in Isparta, 380 ha in Burdur, 280 ha in Afyon, and a small amount,



Rose Damascena Planting



New large Rosa damascena with drip irrigation

around 30 ha, in Denizli. Total production is estimated at around 1.5 tonnes of rose oil, and 7 tonnes of concrete (by comparison, Bulgaria is estimated to produce around 1.5 to 1.8 tonnes of rose oil annually).

The main producer of rose oil is Gulbirlık – a union of 6 cooperatives, with 8,000 members, 4 rose oil distilleries, and 2 extraction units for production of concrete, and a daily total processing capacity of around 3 tonnes of flowers. Basmakci cooperative in Afyon has 3,000 members, and there are another 8 medium and small sized companies active in the sector.

Other Turkish essential oils

Turkey produces a wide range of other essential oils, including citrus (orange, lemon) oils. The major essential oils produced in addition to citrus oils are laural leaf oil, origanum, lavender and mint oils. Other oils produced include: myrtle, fennel, anise, cumin, sage, juniper, rosemary, melissa, styrax and vitex oils. The styrax oil is from *Liquidamber orientalis* (as distinct from American styrax oil from *L. styraciflua* from SE USA, Mexico and Central America).

Turkish essential oil exports

The value of rose oil exports from Turkey over the last 10 years is shown in the Table below. Export value fluctuate in the range US\$8 to US\$12 million/year, and are currently at a peak of US\$12.6 million (2012, most recent available data). Total export value for all essential oils are currently around US\$25 million. France is the dominant market, taking around 70% of all production, with other EU countries (including Switzerland) and the US taking around 22% and accounting for the bulk of the balance.

Turkish Rose Oil Exports, 2002 to 2012, US\$ '000's

| Year | US\$ '000's |
|------|-------------|
| 2002 | 8,068 |
| 2003 | 9,784 |
| 2004 | 7,393 |
| 2005 | 7,174 |
| 2006 | 7,594 |
| 2007 | 9,383 |
| 2008 | 11,210 |
| 2009 | 8,492 |
| 2010 | 9,157 |
| 2011 | 10,301 |
| 2012 | 12,613 |

Turkish Essential Oil Exports, 2008 to 2012, US\$ '000's

| HS Code | Product | 2008 | 2009 | 2010 | 2011 | 2012 |
|--------------|----------------------|---------------|---------------|---------------|---------------|---------------|
| 330112 | Orange oil | 30 | 10 | 34 | n/a | 5 |
| 330113 | Lemon oil | 11 | 44 | 98 | 97 | 150 |
| 330119 | Other citrus oils | 30 | 15 | 29 | 167 | 237 |
| 330124 | Peppermint oil | 1 | | 25 | | 42 |
| 330129 | Other essential oils | 23,087 | 19,941 | 15,264 | 19,721 | 21,382 |
| 330130 | Resinoids | 258 | 1 | 24 | 8 | 25 |
| 330190 | Terpenic by-products | 1,222 | 1,198 | 2,016 | 2,182 | 2,787 |
| TOTAL | | 24,638 | 21,209 | 17,491 | 22,175 | 24,628 |