



# Rosemary

*Rosmarinus officinalis*

by Salvatore Battaglia

The invigorating scent of rosemary has such a wonderful revitalising effect on our psyche. Holmes best describes rosemary oil when he states that it promotes motivation and self-confidence and should be used to dispel apathy, self-neglect and feelings of pessimism.

## Synonyms

*R. coronarium*

## Family

Lamiaceae (Labiatae)

## Botany and origins

Rosemary is a small evergreen shrub with thick aromatic, linear leaves, which grows up to 2m in height. It is a native to the Mediterranean region. The plant grows wild in abundance in Spain, France, Corsica, Italy, Sardinia and Tunisia. The majority of the essential oil is produced in Spain, France and Tunisia.<sup>1</sup>

There are three main chemotypes of *R. officinalis*:<sup>2</sup>

- camphor-borneol (Spain)
- 1,8-cineole (Tunisia)
- verbenone (France)

Schnaubelt explains that rosemary growing at higher altitudes will always have more camphor – as much as 20%. On the other hand, rosemary growing at sea level produces very little to no camphor.<sup>3</sup>

## Method of extraction

Rosemary oil is steam distilled from the leaves, flowers and twigs of *R. officinalis* and the numerous sub-varieties.

## Characteristics

Rosemary oil is a pale yellow to almost colourless mobile liquid with a strong, fresh, woody-herbaceous top note with a clean-woody-balsamic body note which fades into a dry herbaceous base note. This description is for a commercial rosemary oil from Tunisia and Spain.<sup>4</sup>

Arctander explains that the Tunisian oil is very uniform and of a very high quality. One reason is that the twigs are never included in the distillation.<sup>4</sup>

Mailhebiau describes the odour of the Spanish chemotype as strong and rather camphoraceous; the French chemotype as gentle and

the Tunisian chemotype as having an odour reminiscent of eucalyptus, giving it a fresher aroma.<sup>5</sup>

## Traditional uses

The generic name *Rosmarinus* is derived from the Latin *ros*, meaning dew, and *marinus*, meaning sea, referring to its habit of growing near the coast.<sup>6</sup>

Rosemary is probably one of the best known and most used of aromatic herbs. The ancient Egyptians favoured it, and traces of it have been found in the first dynasty tombs. To the Greeks and Romans, it was considered a sacred plant. They believed rosemary symbolised love and death.<sup>6</sup>

Rosemary has been used medicinally for centuries.

Theophrastus and Dioscorides recommended it as a powerful remedy for stomach and liver problems; Hippocrates, said rosemary should be cooked with vegetables to overcome liver and spleen disorders, and Galen prescribed it for jaundice.<sup>6</sup>

In place of more costly incense,

the ancients used rosemary in their religious ceremonies. It was a custom to burn rosemary with juniper berries to purify the air and prevent infections.<sup>6</sup>

Rosemary was known to have a stimulating effect on the mind and as a useful aid to the memory, consequently the herb became known as a symbol of remembrance.<sup>6</sup>

On this account, it became the emblem of fidelity for lovers. It was used at weddings, funerals, at banquets during festivals and as incense in religious ceremonies and in magical spells. It was a custom to burn rosemary in sick chambers and in French hospitals it was customary to burn rosemary with juniper berries to purify the air and prevent infection.<sup>7</sup>

A sprig of rosemary was carried in the hands at funerals, being given to the mourners before they left the house, to be cast on the coffin when it had been lowered into the grave.<sup>7</sup>

Culpeper recommended the herb for the treatment of diseases of the head and brain, as the giddiness and swimings therein, drowsiness or dullness, the dumb palsy, or loss of speech, the lethargy and the falling sickness (epilepsy).<sup>6</sup>

It was used to prepare Hungary water, which was used to restore the vitality of paralysed limbs.

Hungary water was first prepared for the Queen of Hungary and was considered very effective in the treatment of gout.<sup>7</sup>

Grieve stated that rosemary oil was highly regarded as a carminative and is considered an excellent stomachic and nervine, curing many cases of headaches. It was used topically as *spiritus Rosmarini*, in hair lotions for its

odour and effect in stimulating the hair and preventing premature baldness. The oil is used externally as a rubefacient and added to liniments as a fragrant stimulant.<sup>7</sup>

### Other uses

Rosemary oil is extensively used as fragrance component in cosmetics, soaps, detergents and perfumes.<sup>1</sup>

### Adulteration

Rosemary oil is often adulterated with turpentine oil, fractions of turpentine oil, 1,8-cineole from eucalyptus, white camphor, synthetic camphor and fractions from the production of synthetic terpineol.<sup>4</sup>

10 commercial samples of rosemary oil were analysed. The percentage of the components in the rosemary oils varied;  $\alpha$ -pinene 3.1 to 28.1%, 1,8-cineole 8.5 to 28.6% and camphor 10.3 to 27.9%. It was stated that rosemary oil is often adulterated with eucalyptus oil and camphor oil. However, it is also possible that the variation was due to different chemotype of rosemary.<sup>9</sup>

Schnaubelt states that rosemary is commonly adulterated and

diluted. He explains that it is very important to pay close attention to the source of the oil and that the best quality can only be provided by those producers who make the oil exclusively for the aromatherapy market.<sup>2</sup>

### Properties

Analgesic, antidepressant, astringent, carminative, cephalic, cholagogue, cordial, digestive, diuretic, emmenagogue, hepatic, hypertensive, nervine, rubefacient, stimulant, sudorific, tonic.<sup>10,11,12,13,14,15</sup>

### Pharmacology and clinical studies

#### Alopecia areata

A random controlled study involving 84 patients with Alopecia areata confirmed that a blend of *Thymus vulgaris*, *Lavandula angustifolia*, *Rosmarinus officinalis* and *Cedrus atlantica* in a base of jojoba and grapeseed massaged into the scalp every night and occluded with a warm towel showed significant statistical advantage to the treatment than the control group with an improvement rate of 44%. A lack of response in

### Chemistry

There are three principal chemotypes of *R. officinalis*: camphor, borneol and verbonene. Comparative major component composition of various rosemary oils is as follows:<sup>8</sup>

Compound	Tunisian	Spanish	French
$\alpha$ -pinene	10.3-11.6%	19.1-26.9%	10.40%
borneol	2.8-4.2%	2.4-3.4%	3.10%
$\beta$ -pinene	4.9-7.7%	4.3-7.7%	7.60%
camphor	9.9-12.5%	12.7-20.7%	-
bornyl acetate	1.0-1.2%	0.4-1.6%	13.20%
camphene	4.0-4.3%	7.0-9.9%	4.20%
1,8-cineole	40.1-44.45%	17.0-25.1%	49.10%
limonene	2.0-4.8%	2.9-4.9%	2.10%

the control group indicated a pharmacological activity of the essential oils as opposed to any effects arising from the scalp massage with carrier oils alone.<sup>16</sup>

A double-blind randomized controlled study using a blend of thyme, lavender and rosemary oils confirmed that the aromatherapy group was significantly more effective than the placebo for the treatment of localized Alopecia areata.<sup>17</sup>

### **Androgenetic alopecia**

A study investigated the efficacy of rosemary oil for the treatment of Androgenetic alopecia and compared its effects with minoxidil 2% for a period of 6 months. Both groups experienced a significant increase in hair count at the end of the 6 months. The findings of the trial provided evidence supporting the efficacy of rosemary oil in the treatment of Androgenetic alopecia.<sup>18</sup>

### **Antimicrobial activity**

An in vitro study confirmed that rosemary oil and clove oil when tested alone possessed significant antimicrobial effect against range of micro-organisms. The blend of both oils was tested and reported to have a synergistic improved antimicrobial effect.<sup>19</sup>

Rosemary essential oil exhibited antimicrobial activity against drug resistant mutants of Mycobacterium smegmatis, Escherichia coli and Candida albicans.<sup>20</sup>

### **Anti-colic activity**

An in vivo study investigated the effects of rosemary essential oil and rosemary hydro-alcoholic extract on experimental colitis in rats. Rosemary essential oil was administered orally and

intraperitoneally. Both rosemary essential oil and hydro-alcoholic extract were effective in reducing colon tissue lesions.<sup>21</sup>

### **Antifungal activity**

Rosemary oil is reported to having significant antifungal activity.<sup>22</sup>

At 20mg/ml rosemary oil exhibited good antifungal activity against Candida albicans, Cryptococcus and the mycobacterium.<sup>23</sup>

Rosemary oil exhibited antifungal activity by destruction of cell walls and impairment of metabolism of Candida albicans.<sup>24</sup>

### **Cognitive performance**

An in vivo study on 20 healthy human volunteers showed that the improvement of cognitive tasks was significantly related to the concentration of absorbed 1,8-cineole following exposure to rosemary essential oil aroma. Furthermore, it was also found that these effects were also similar for speed and accuracy performance. The relationship between 1,8-cineole levels and mood was less pronounced, but there was significant correlation between change of contentment and plasma 1,8-cineole levels. The findings of this study suggest that the compounds absorbed from rosemary essential oil aroma affect cognition and subjective states independently through different neurochemical pathways.<sup>25</sup>

### **Drug interaction**

The influence of Rosmarinus officinalis essential oil on pharmacodynamics effects of diazepam and pentobarbital on experimental animals was evaluated on mice. Rosemary oil significantly reduced pentobarbital-induced sleeping time, compared to the control group. The oil

also caused a significantly longer retention of mice on the rotarod, compared to the group receiving diazepam only. The results confirmed that rosemary oil had a considerable influence on diazepam and pentobarbital pharmacodynamics.<sup>26</sup>

### **Hepatoprotective activity**

The hepatoprotective effects of rosemary essential oil and the ethanolic extract were investigated in rats. Rosemary ethanolic extract (0.15 g/100g body weight) for three weeks produced the most pronounced hepatoprotective effect compared to silymarin which was used as the reference compound.<sup>27</sup>

The hepatoprotective effects of rosemary have been observed in different experimental models of liver injury. Rosemary methanol extract has been effective against carbon tetrachloride (CCl<sub>4</sub>) induced acute liver damage in rats. The methanolic extract of rosemary could also prevent hepatotoxicity in both prevention and reversion experimental models of liver cirrhosis induced by CCl<sub>4</sub>.<sup>28</sup>

The results of another study confirmed that rosemary essential oil mediates its hepatoprotective effects not only by scavenging of harmful free radicals, but also through activation of physiological defense mechanisms.<sup>28</sup>

### **Niticidal activity**

An in vitro study confirmed that rosemary oil exhibited good niticidal activity on Pediculus humanus capitus. It was noted that the alcoholic and ketonic compounds were found to be the most effective on nits.<sup>29</sup>

## Stimulating activity

Rosemary oil was also found to stimulate locomotor activity of mice when administered orally or by inhalation. 1,8-cineole, a component of rosemary oil was used as an indicator of the level of rosemary in the blood. Dose related increases in 1,8-cineole blood levels were found after oral and inhaled administration of rosemary oil. The component of rosemary causing the stimulating effect was not investigated.<sup>30</sup>

Another study was performed in 40 subjects to assess the EEG activity and the mood after 3 minutes of inhalation with rosemary and lavender. The lavender-treated group showed increased beta power, suggesting increased drowsiness. They also had less depressed mood and reported feeling more relaxed. The rosemary oil had decreased frontal alpha and beta power, suggesting increased alertness. It was also reported that they were faster but not more accurate during mathematics computations and they had lower anxiety scores and also reported feeling more relaxed and alert.<sup>31</sup>

When inhaled rosemary decreased blood flow and increased systolic blood pressure immediately after inhalation, resulting from stimulating sympathetic nerve activity.<sup>32</sup>

Another study also confirmed that rosemary oil significantly increased blood pressure, heart rate and respiratory rate after inhalation of rosemary.<sup>33</sup>

## Spasmolytic activity

In animal experiments, rosemary oil induced tonic-clonic convulsions. The oil inhibited oxygen consumption and the electrolyte gradients of sodium and

potassium.<sup>34</sup>

Rosemary oil has an inhibiting action on muscle contraction when tested on contractile electro-induced response of guinea pig ileum. The constituent borneol was found to have the greatest spasmolytic activity.<sup>35</sup>

## Aromatherapy Uses

### Cardiovascular system

Rosemary oil is considered a tonic of the heart.<sup>12</sup> It is said to benefit cardiac fatigue, palpitations, low blood pressure and circulatory problems of the extremities.<sup>36</sup>

### Digestive system

Holmes describes rosemary as a digestive and gastrointestinal stimulant. He recommends it for gastric dyspepsia with flatulence, chronic gastroenteritis and colitis.<sup>13</sup>

### Liver tonic

Rosemary is recommended as a tonic for the liver and gallbladder.<sup>12</sup> It may be used in the treatment of gallbladder infections, biliary colic and gallstones.<sup>10,11,36</sup> For this purpose Fischer-Rizzi recommends warm compresses of rosemary.<sup>36</sup>

Mailhebiau recommends R. officinalis CT bornyl acetate, verbenone for people who are very tired, with an overloaded liver, fetid breath and a grey complexion. He describes it as a 'remarkable regulator of the liver.'<sup>15</sup>

### Musculoskeletal system

It makes a good analgesic and should be used for treating rheumatism, arthritis and tired, stiff and overworked muscles.<sup>10,11,12</sup>

### Nervous system

Rosemary oil is well known for its stimulating effect on the central nervous system. It is reputed to be a brain stimulant and is used for

poor concentration and nervous debility.<sup>10,12,36</sup>

Holmes describes rosemary as a nervous and cerebral restorative and recommends it for conditions such as mental and physical fatigue, debility and memory or concentration loss.<sup>13</sup>

Mailhebiau recommends blending rosemary CT. 1,8-cineole with peppermint and lavender as an excellent treatment for alleviating headaches.<sup>5</sup>

### Psychological

Holmes states that rosemary promotes motivation and self-confidence and recommends using the oil for loss of motivation, apathy, self-neglect and feelings of pessimism.<sup>13</sup>

### Respiratory system

The 1,8-cineole chemotype rosemary oil is recommended for catarrhal conditions and respiratory ailments such as bronchitis, asthma and sinusitis.<sup>3,10,11</sup>

The verbenone chemotype rosemary oil is recommended for its mucolytic properties.<sup>3,11,12</sup>

### Skin care

Rosemary has traditionally been used in skin and hair care.<sup>12</sup> It is extensively used in hair care products as it is reputed to stimulate hair growth and prevent premature baldness. It is also used for the prevention of dandruff.<sup>7</sup>

### Personality profile

Worwood describes the rosemary personality as young at heart person who has found the elixir of youth. They are imaginative, happy, sensitive people with determination. They love security and aim to be in a secure position in love and life because it's within a secure environment that they can

express themselves fully. Rosemary has a spirit that vibrates at an astonishing level; others often find it difficult to keep up with rosemary personalities. They have the ability to perform several tasks at once. They love a challenge and set high standards for themselves.<sup>37</sup>

The rosemary personality types have high ideals of themselves and consider themselves to be better than most people around them, however not in a consciously arrogant way. They always judge with their head, rather than the heart. They are very open and trustworthy and will make good friends.<sup>37</sup>

Mailhebiau provides us with a character profile of each chemotype of rosemary. He describes *R. officinalis* CT. 1,8-cineole as a cheerful, youthful and sincere character while *R. officinalis* CT. bornyl acetate, verbenone is a super human being whose stability, strength and equilibrium have no equal in love, justice and light. On the other hand *R. officinalis* CT. camphor is an elderly man, essentially characterised by the temperament of an old moaner.<sup>5</sup>

According to the principles of Myers Briggs personality typers, the rosemary personality is likely to be an ESTP. ESTPs are confident, gregarious and exciting. They like being with people who share their interests and sense of fun and adventure is pleasurable for them. They are charming and have an infectious manner. They can be assertive. They have lots of energy and are constantly on the go. They like to live on the edge and can be oblivious to the consequences.

## Subtle aromatherapy

Davis describes rosemary as a psychic protector. She recommends using the oil first thing in the morning before exposing oneself to all the external influences.<sup>43</sup> Rosemary oil is associated with clear thought and is helpful wherever there is a need for clarity. It is therefore associated with the third eye or brow chakra.<sup>38</sup>

Keim Loughran and Bull explain that rosemary promotes mental clarity, allowing us to remember what we truly value. It strengthens our relationship with spirit and strengthens our willpower so we can walk our spiritual path with purpose and intent. It also deepens our joyful, loving connection with the sustenance of faith and the tender, powerful truth that we are always with spirit.<sup>39</sup>

Zeck states that the scent of rosemary stimulates the psyche while allowing us to tap into the enormous riches of the creative realm. It allows us to recharge our creative batteries and reconnect our creative fire and allow us to tap into the next part of our cycle to emerge.<sup>40</sup>

## Energetics

Mojay refers to rosemary as one of the most valuable and invigorating essential oils, describing it as an excellent tonic for the body's yang energy promoting the circulation of Qi and blood.<sup>14</sup>

Holmes states that rosemary oil helps to tonify the Qi and strengthen the Shen. It is recommended for conditions associated with physical and mental fatigue, poor focus and memory and depression.<sup>13</sup>

It also warms the Lungs, expels phlegm and dispels wind-cold.

It is therefore recommended for conditions associated with chronic cough, sputum expectoration, sinus congestion, aches and pains.<sup>13</sup>

According to the principles of TCM and the Five Elements I would associate rosemary oil with Wood element.

## Blending tips

### Aromatherapy

As a liver restorative and tonic consider blending rosemary oil with essential oils such as lemon and everlasting.

For the relief of upper respiratory tract infections such as sinusitis and rhinitis consider blending rosemary oil with essential oils such as cajeput, eucalyptus, fragonia, myrtle, peppermint, pine or thyme.

For the relief of muscular pains, cramps, tendinitis, sprains and strains consider blending rosemary oil with essential oils such as black pepper, cajeput, eucalyptus, ginger, kunzea, lavender or pine.

As a mental restorative consider blending rosemary oil with essential oils such as basil, black pepper, ginger, lemongrass, lemon, pine or peppermint.

As a hair restorative and tonic for seborrhoea, dandruff and alopecia consider blending rosemary oil with essential oils such as Atlas cedarwood, lavender or patchouli.

### Perfumery

Rosemary oil is extensively used in perfumery for citrus colognes, fougere style perfumes, pine needle fragrances and oriental style perfumes. It blends well with cedarwood oils, citronella, labdanum, lavender, elemi, frankincense, petitgrain and thyme oils.

## Perfect Potion classics with rosemary

It is not surprising that rosemary oil is used in many of our invigorating and more energizing blends. It is the heart and soul of Perfect Potion's **Focus** and **Wood essential oil blends**. A small amount of rosemary has been used to balance the intense spiciness of cinnamon in **Exotic Spice blend** and just a dash of rosemary oil gives a refreshing and energizing quality to **Zest blend**.

Rosemary oil helps to strengthen the third eye chakra so it is an important oil in **Insight blend** and in our exquisite **Chakra Balancing range**.

We have used the fresh, herbaceous and invigorating qualities of rosemary oil in both

our **Man Made and Wild Lime & Vetiver men's skin care range**.

Don't go travelling without our **Jet Setter Aromatic Mist** – This refreshing mist containing rosemary oil will keep you energised and revitalized on your long journey.

The warming and analgesic qualities of rosemary make it a very important ingredient in products such as **Active Balm** or **Chillout Balm**.

Rosemary blends so well with citrus oils and peppermint. You will find a small amount of rosemary in our **Heiwa Peace Perfume** which is so refreshing and uplifting. Blended with peppermint oil, rosemary oil gives **Cool It Quick Fix** and **Buzz Pulse Point** that extra boost!

It is not surprising that rosemary is the star ingredient in our **Rosemary Shampoo and Conditioner** and that we have added it to the **Hair and Scalp Elixir**, the **Hair Balm** and our **Beard Oil**.

### How to use

**Bath:** Full body bath, foot bath.

**Topical:** Compress, massage, ointment, skin care.

**Inhalation:** Direct inhalation, diffuser, oil vaporizer.

### Safety

Lawless states that rosemary oil is non-toxic, non-irritating and non-sensitising.<sup>10</sup>



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## References

1. Khan I, Abourashed E. *Leung's encyclopedia of common natural ingredients used in food, drugs and cosmetics*. 3rd edition, John Wiley & Sons Inc. New Jersey, 2010.
2. Schnaubelt K. *Advanced aromatherapy*. Healing Arts Press, Rochester, 1995.
3. Schnaubelt K. *The healing intelligence of essential oils*. Healing Arts Press, Rochester, 2011.
4. Arctander S. *Perfume and flavour materials of natural origin*. Allured Publishing, Carol Stream, 1994.
5. Mailhebiau P. *Portraits in oils*. The C.W. Daniel Company Limited, Saffron Walden, 1995.
6. Le Strange R. *A history of herbal plants*. Angus and Robertson, Great Britain, 1977.
7. Grieve M. *A modern herbal – volume 2*. Dover Publications, Inc., New York, 1971.
8. Lawrence B. *Rosemary oil*. *Perfumer and Flavorist*, 1986; 11 (2):75.
9. Svoboda KP, Deans SG. *A study of the variability of rosemary and sage and their volatile oils on the British market: their antioxidant properties*. *Flavour and Fragrance Journal*. 1990; 7(2):81-87. Cited in Quintessential Aromatics Ltd database, 2013.
10. Lawless J. *The encyclopaedia of essential oils*. Element Books Limited, Shaftesbury, 1992.
11. Lavabre M. *Aromatherapy workbook*. Healing Arts Press, Rochester, 1997.
12. Davis P. *Aromatherapy A-Z*. 2nd edn, The C.W. Daniel Company Limited, Saffron Walden, 1999.
13. Holmes P. *Aromatica – a clinical guide to essential oil therapeutics*. Volume 1: Principles and Profiles. Singing Dragon, London 2016.
14. Mojay G. *Aromatherapy for healing the spirit*. Healing Arts Press, Rochester, 1997.
15. *Assessment report on Rosmarinus officinalis L. aetheroleum and Rosmarinus officinalis L. folium*. European Medicines agency, 15 July 2010, EMA/HMPC/13631/2009.
16. Hay IC et al. *Randomized trial of aromatherapy. Successful treatment of Alopecia areata*. *Archives of Dermatology*. 1998;134(11):1349-1352. ID 666. Cited in Quintessential Aromatics Ltd database, 2013.
17. Ozmen I et al. *Efficacy of aromatherapy in the treatment of localized alopecia areata: A double-blind placebo controlled study*. *Gulhane Medical Journal*. 2015; 57:233-236. ID 6401. Cited in Quintessential Aromatics Ltd database, 2013.
18. Panashi Y et al. *Rosemary oil vs minoxidil 2% for the treatment of androgenetic alopecia: a randomized comparative trial*. *SKINmed*. 2015;13(1):15-21. ID 5767. Cited in Quintessential Aromatics Ltd database, 2013.
19. Fu YF et al. *Antimicrobial activity of clove and rosemary essential oils alone and in combination*. *Phytotherapy Research*. 2007; 21(10):989-994. ID 2753. Cited in Quintessential Aromatics Ltd database, 2013.
20. Luqman S et al. *Potential of rosemary oil to be used in drug resistant infections*. *Alternative Therapies*. 2007; 13(5):54-59. ID 2993. Cited in Quintessential Aromatics Ltd database, 2013.
21. Minaiyan M et al. *Effects of extract and essential oil of Rosmarinus officinalis L. on TNBS-induced colitis in rats*. *Research in Pharmaceutical Sciences*. 2011; 6(1):13-21. ID 4769. Cited in Quintessential Aromatics Ltd database, 2013.
22. Bozin B et al. *Antimicrobial and antioxidant properties of rosemary and sage (Rosmarinus officinalis L. and Salvia officinalis L., Lamiaceae) essential oils*. *Journal of Agricultural and Food Chemistry*. 2007; 55(19):7879-7885. ID 2141. Cited in Quintessential Aromatics Ltd database, 2013.
23. Soliman FM, et al. *Analysis and biological activity of the essential oil of Rosmarinus officinalis from Egypt*. *Flavour Fragrance Journal*, 1994,9:29-33. Cited in the Aromatherapy Database, by Bob Harris, Essential Oil Resource Consultants, UK, 2000.
24. Steimetz MD et al. *Transmission and scanning electron microscopy study of the action of sage and rosemary essential oils and eucalyptol on Candida albicans*. *Mycoses*. 1988; 31(1):40-51. ID 131, Cited in Quintessential Aromatics Ltd database, 2013.
25. Moss M, Oliver L. *Plasma 1,8-cineole correlates with cognitive performance following exposure to rosemary essential oil aroma*. *Therapeutic Advances in Psychopharmacology*. 2012; 1(1):1-11. doi: 10.1177/2045125321436573.
26. Milanovic I et al. *Interaction of Rosmarinus officinalis L. essential oil with diazepam and pentobarbital in experimental animals*. *Value in Health*. 2014; 17(3):A15. ID 5567. Cited in Quintessential Aromatics Ltd database, 2013.
27. Fahim FA et al. *Allied studies on the effect of Rosmarinus officinalis L. on experimental hepatotoxicity and mutagenesis*. *International Journal of Food Sciences and Nutrition*. 1999;50:413-427. ID 4473. Cited in Quintessential Aromatics Ltd database, 2013.
28. Raskovic A et al. *Antioxidant activity of rosemary (Rosmarinus officinalis L.) essential oil and its hepatoprotective potential*. *BMC Complementary and Alternative Medicine*. 2014 14:225.
29. Lahlou M, Berrada R. *Composition and niticidal activity of essential oils of three chemotypes of Rosmarinus officinalis L. acclimatized in Morocco*. *Flavour and Fragrance Journal*. 2003; 18(2):124-127. ID 1599. Cited in Quintessential Aromatics Ltd database, 2013.
30. Kovar K.A. et al. *Blood levels of 1,8-cineole and locomotor activity of mice after inhalation and oral administration of rosemary oil*. *Planta Medica*, 1987, 53(4):315-318. Cited in the Aromatherapy Database, by Bob Harris, Essential Oil Resource Consultants, UK, 2000.
31. Diego M et al. *Aromatherapy positively affects mood, EEG patterns of alertness and math computations*. *International Journal of Neuroscience*. 1998; 96(3-4):217-224. ID 790. Cited in Quintessential Aromatics Ltd database, 2013.
32. Saeki Y, Shiohara M. *Physiological effects of inhaling fragrances*. *International Journal of Aromatherapy*. 2001; 11(3):118-125. ID 1103. Cited in Quintessential Aromatics Ltd database, 2013.
33. Sayorwan W et. *Effects of inhaled rosemary oil on subjective feelings and activities of the nervous system*. *Scientia Pharmaceutica*. 2013;81(2):531-542. ID 5004. Cited in Quintessential Aromatics Database Pty Ltd, 2013.
34. Steinmetz MD. et al., *Actions of essential oils of rosemary and certain of its components on the cerebral cortex of the rats in vitro*. *J. Toxicology Clin Exp*, 1987, 7 (4): 259-271. Cited in the Aromatherapy Database, by Bob Harris, Essential Oil Resource Consultants, UK, 2000.
35. Taddei I et al. *Spasmolytic activity of peppermint, sage and rosemary essences and their major constituents*. *Fitoterapia*, 1988, 59(6):463-468.
36. Fischer-Rizzi S. *Complete aromatherapy handbook*. Sterling Publishing Company, New York, 1990.
37. Worwood V. *The fragrant mind*. Transworld Publishing Ltd, London, 1995.
38. Davis P. *Subtle aromatherapy*. The C.W. Daniel Company Limited, Saffron Walden, 1991.
39. Keim Loughran J, Bull R. *Aromatherapy anointing oils*. Frog Ltd, Berkeley, 2001.
40. Zeck R. *The blossoming heart – aromatherapy for healing and transformation*. Aroma Tours, East Ivanhoe, 2004.
41. Tisserand R, Young R. *Essential oil safety*. 2nd edn, Churchill Livingstone, Edinburgh, 2014.