

Herbs Make Scents

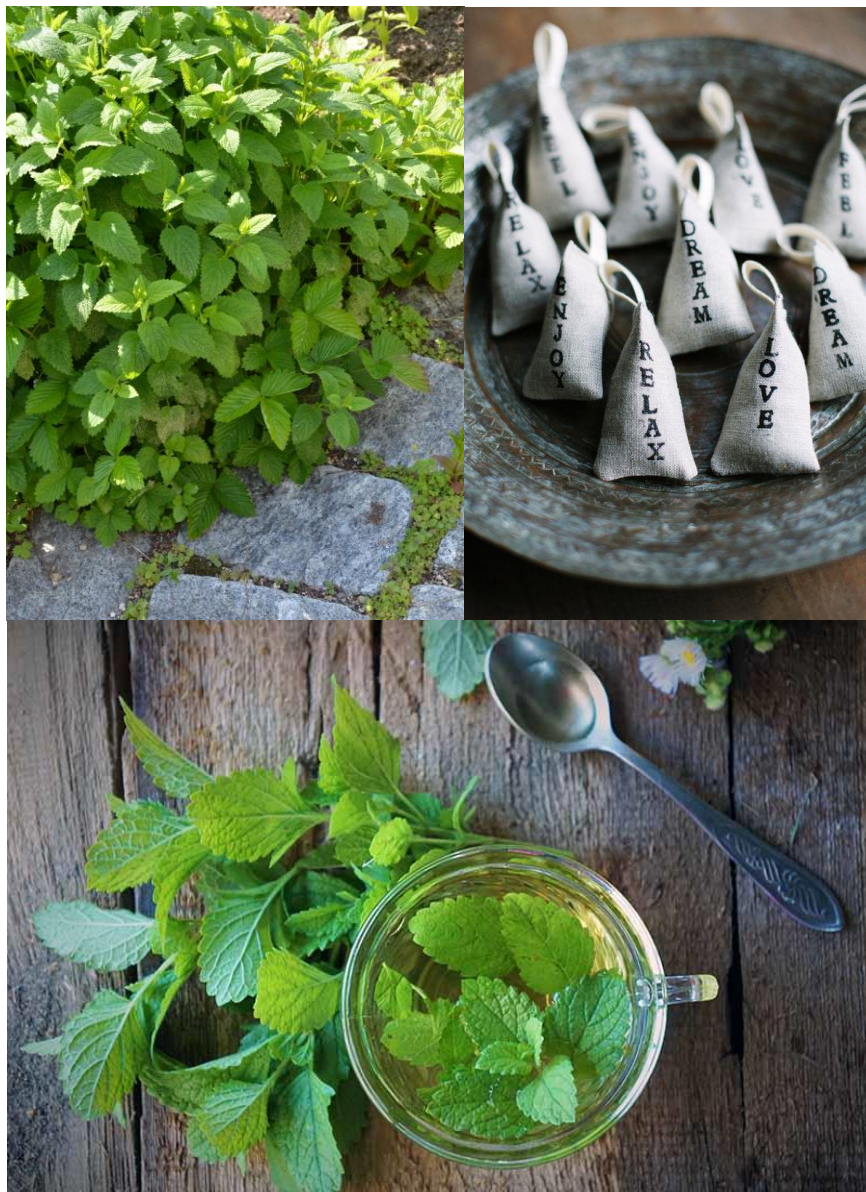


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KEEPING CALM WITH LEMON BALM (*Melissa officinalis*) Karen Cottingham



According to English botanist and barber-surgeon **John Gerard** (1545 -1612), lemon balm “comforteth the hart and driveth away all sadnesse.”



Has this crazy world got you down? Feeling anxious, unsettled, or overwhelmed? Thankfully, there's a fragrant and uplifting herb that's been soothing frazzled nerves and sagging spirits for centuries - and it might even be growing in your own herb garden. It's *Melissa officinalis* - also known as lemon balm, honey balm, "bee queen", "heart's delight" and the "gladdening herb." The common names of this treasured herb refer to its uplifting lemony fragrance, its attractiveness to bees, and its ability to bring joy and peace to our troubled hearts.

Just pick a leaf or two, and gently rub - you'll be rewarded by a rush of sweet lemony fragrance that will lift your spirits in an instant.

Melissa officinalis is a perennial herbaceous plant in the mint family (Lamiaceae) that originated in the scrublands of south-central Europe, the Mediterranean Basin, and western and central Asia. By the 14th century lemon balm had naturalized throughout Europe; American colonists brought its seeds to the New World in the early 1600's.

This wild lemony herb was first noticed about 3000 years ago because of its irresistible attractiveness to bees. Honeybees were considered divine messengers in many ancient religions. By traveling between the spiritual and the natural worlds, bees were thought to bring all forms of life, including each human soul, to earth. The bee-worshipping priests and priestesses of ancient Ephesus, now known as Turkey, naturally took note of the favorite nectar source of their sacred bees.

Honeybees were so important to daily life, religion and mythology that almost all deities were associated with bees in some way. *Zeus* himself was said to have been raised on wild honey and goat's milk. The Minoan Earth Mother *Potnia* was known as "The Pure Mother Bee," and *Aphrodite*, the goddess of love, beauty, and procreation, was called "Melissa, the Queen Bee." Even the *Delphic Oracle* was called "The Delphic Bee," and the complex at Delphi was said to be based on a beehive.

Goddesses were sometimes even depicted as half-human, half-bee deities:



Gold plaque embossed with winged bee goddesses found at Camiros, Rhodes, and dated to the 7th century BCE (British Museum)



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Melissa, one of the Greek nymphs of mythology, sent the soul of each newborn baby - in the form of a honeybee - to join its body. She also discovered honey and taught humans how to mix honey with water for a nourishing (and sometimes intoxicating!) beverage. *Melissa's* great contribution of honey was said to have civilized mankind, and in gratitude, the honeybee, or *mélissa* in Greek, was named in her honor.

Priestesses of important goddesses were also called "*Melissae*" and were believed to be human embodiments of these divine insects. Only those who had lived a righteous life were chosen as *Melissae*, and after death, they returned to heaven, just as bees returned to the hive.

Caring for these divine honeybees was obviously of great religious importance. The observant beekeepers of Ephesus, who had noticed their honeybees flocking about the flowers of an otherwise ordinary weed, started planting it all around the sacred beehives. This "bee-friendly" weed ensured that the bees return every night to the sacred hive every and supplied them with all the nectar they needed to produce the divine honey. Eventually, what was once a wild lemony weed achieved its sacred status as a carefully tended temple herb.

The Latin name of lemon balm, *Melissa officinalis*, comes from this ancient association with bees.



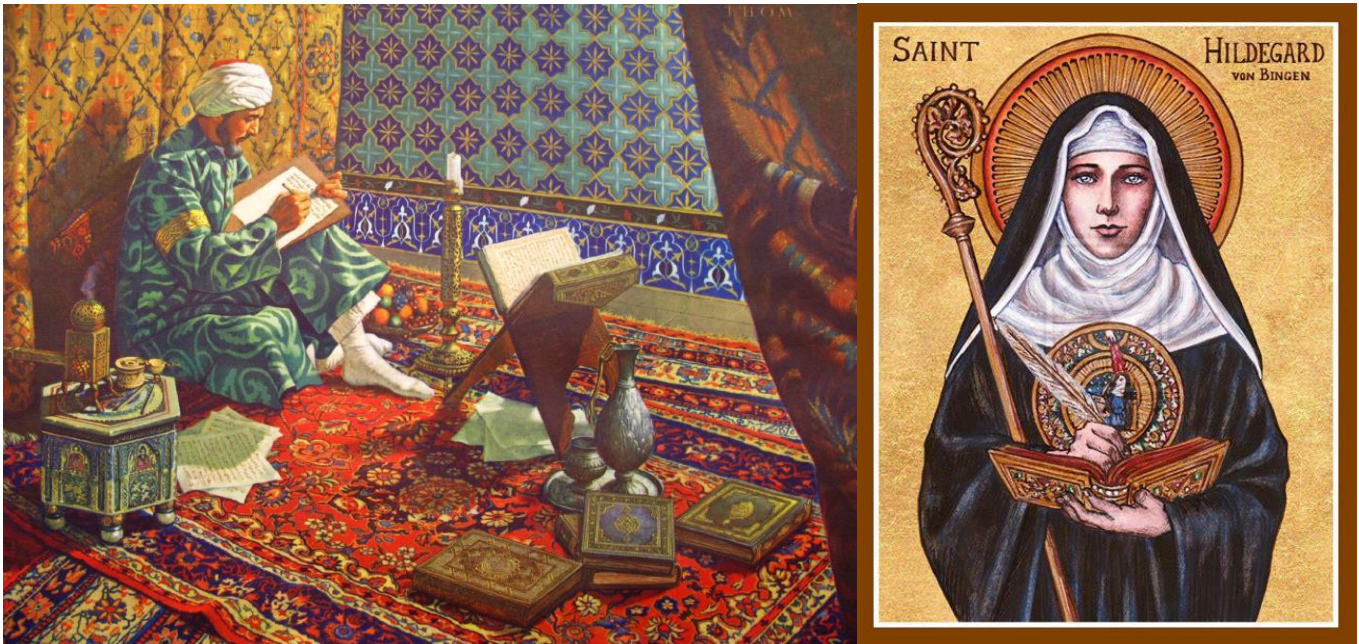
An acrobatic bee extracting nectar from a lemon balm flower

Since lemon balm was now appreciated, cultivated, and readily accessible, its medicinal properties and other uses soon became apparent. Over the ensuing centuries, *Melissa officinalis* was used to treat so many health conditions that it became known as "cure-all." It is best known, however, for its relaxing effects, and is still used to relieve anxiety and insomnia.

Physicians, herbalists, and naturalists from Greek and Roman antiquity, ancient Persia, the monasteries and convents of medieval Europe, the emerging scientific world of Renaissance England, and the newly settled American colonies all extolled the virtues of *M. officinalis* as a remedy for emotional distress. Lemon balm's beneficial properties were first recorded as early as 300 BCE in **Theophrastus's** *Historia Plantarum*. The Greek physician **Dioscorides** wrote of lemon balm's ability to "sweeten the spirit" in *De Materia Medica* (50-80 BCE).



Avicenna, the great eleventh century Persian physician (980-1037), claimed that "balm makes the heart merry and joyful, and strengthens the vital spirits."



Avicenna and Hildegard von Bingen both believed that lemon balm makes the heart joyful.

A century later, **Saint Hildegard von Bingen** (1098-1179) wrote that "lemon balm contains within it the virtues of a dozen other plants." She recommended a tea of lemon balm and fennel fronds, saying that "Lemon balm reduces the effects of harmful humours and prevents them from gaining the upper hand."

Knowledge of lemon balm's virtues came to Hildegard in one of her extraordinary visions. She saw that this plant had seven different "faces" or personalities, with the center of them at the heart. Perhaps this visionary experience led to her conclusion that lemon balm "makes the heart joyful."

The 16th-century Swiss alchemist and physician **Paracelsus** (1493-1541) was so confident in the medicinal properties of lemon balm that he prescribed it for "all complaints supposed to proceed from a disordered state of the nervous system."

His potent "Elixir of Life," a miraculous concoction said to revive patients close to death, prevent senility, and cure impotence, depended on lemon balm for its miraculous healing effects.

Based on its reputation of strengthening the heart and lifting the spirits, lemon balm was an important ingredient in the medieval cordials generally known as "elixirs of youth." Convents and monasteries were the medical centers of the time, and most had their own closely-guarded secret recipes for healing elixirs. Herbal remedies made by people dedicated to prayer and service to God were thought to be especially effective.



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The most famous of these elixirs was Carmelite Water, first prepared about 1380 by the nuns of the Carmelite Abbey of Saint Juste. The original formula is shrouded in mystery, having been passed down in secrecy from nun to nun, but was most likely a combination of lemon balm, angelica, nutmeg, and lemon peel infused into wine or brandy.

The ingredient list for this elixir was quite remarkably expanded to include orange flower water, Lily of the Valley, thyme, rosemary, marjoram, sage, mugwort, lavender, Roman chamomile, elecampane, savory, fennel, sandalwood, great yellow gentian, galangal, bitter orange, green anise, ginger, pepper, cinnamon, coriander, and/or clove. The one constant, though, was lemon balm; with its reputation for calming a nervous disposition, the heart-shaped lemony leaf was always the featured ingredient.



For a gloomy mood or a broken heart that needs soothing, Carmelite water can still be purchased, or better yet, made at home. On the left is the product of a recipe found at

<https://picnicinakeldama.wordpress.com/2016/07/20/carmelite-water-a-herbal-tonic-for-mind-body-and-soul/>.

Mountain Rose Herbs also offers a recipe as well as all the ingredients needed at <https://blog.mountainroseherbs.com/herbal-carmelite-water-recipe>. The image on the right is from the *Tacuinum Sanitatis*, a series of lavishly illustrated manuscripts first commissioned by Northern Italian nobility during the last decades of the 14th century and continuing during the course of the 15th century.

The marvelous reputations of lemon balm and Carmelite Water spread throughout Europe during the Renaissance, and the healing herb and its elixir were particularly admired by the great English herbalists.

John Gerard (c.1545-1612), the English botanist, herbalist, and barber-surgeon, wrote the massive 1,484-page illustrated *Herball, or Generall Historie of Plantes* published in 1597. His assessment of lemon balm echoes his herbal predecessors - "...drunk in wine, it (lemon balm) is good against the bitings of venomous beast, comforts the heart, and drives away melancholy..."

Another admirer of Carmelite Water was **Nicholas Culpeper** (1616-1654), the English botanist, herbalist, physician, and astrologer. In his 1563 book, *The English Physitian* (later re-titled *The Complete Herbal*) he wrote that Carmelite Water "causeth the Mind and Heart to becom merry ... and driveth away al troublesome cares and thought..."



Culpeper also added that lemon balm could be used to “...open obstructions of the Brain; and hath so much purging quality in it...as to expel those melancolly vapors from the Spirits.”

A similar assessment comes from the English author, architect, and landscape gardener **John Evelyn** (1620-1706), who described lemon balm as "sovereign for the brain, strengthening the memory, and powerfully chasing away melancholy.”

Specially designed herbal elixirs were available for every ailment imaginable, including infections. Starting in the 14th century, waves of deadly pandemics spread all over Europe, eventually reaching London as the Great Plague of 1665-1666. Desperate to control these mysterious and devastating outbreaks, physicians, herbalists, apothecaries, and interestingly, housewives, devised their own complex versions of medicinal “Plague Waters.”

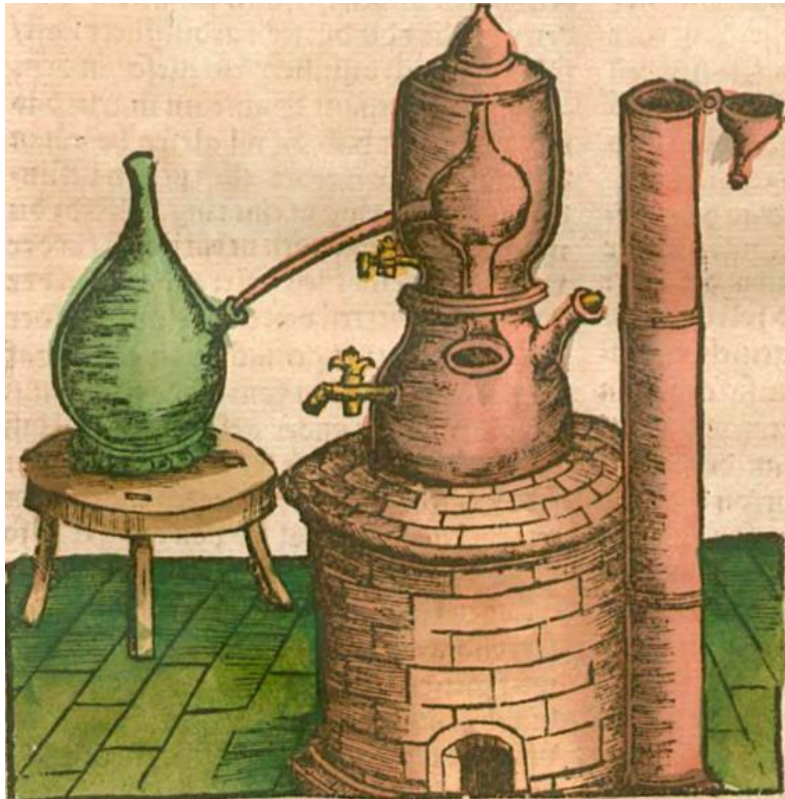


Herbal “Plague Waters,” prescribed during the Great Plague of London, often included lemon balm. You can see “balm” listed in the recipe in the center.

The 1677 Plague Water recipe in the above image is from *The Closet Of the Eminently Learned Sir Kenelme Digby*. For those interested, here are the complete instructions for what is essentially a cordial:

Take a pound of Rue, of Rosemary, Sage, Sorrel, Celandine, Mugwort, of the tops of red Brambles, of Pimpernel, Wild-draggons, Arimony, Balm, Angelica, of each a pound. Put these Compounds in a pot, fill it with White-wine above the herbs, so let it stand four days. Then still it for your use in a Limbeck.

“Agua epidemica” was another popular Plague Water that included lemon balm, along with masterwort, angelica, peony, butterbur, viper-grass, Virginia snakeroot, rue, and rosemary. All the herbs were infused in spirit of wine and then distilled.



A distilling apparatus as may have been found in a 17th century Apothecary.
The *Alembic* is seated inside a large copper vessel of water called a "*Moor's Head*."

The Compleat Housewife, or, Accomplish'd Gentlewoman's Companion is **Eliza Smith's** massive 1727 cookery book. Mrs. Smith included her own version of Plague Water, which also contains lemon balm:

Take rosa folis, agrimony, betony, scabious, century tops, scordium, balm, rue, wormwood, mugwort, celandine, rosemary, marigold leaves, brown sage, burnet, carduus, and dragons, of each a large handful; and angelica-roots, piony-roots, tormentil-roots, elecampane-roots and licorice, of each one ounce; cut the herbs, and slice the roots, and put them all in an earthen pot, and put to them a gallon of white wine and a quart of brandy, and let them steep two days close cover'd; then distill it in an ordinary still with a gentle fire; you may sweeten it, but not much...

You have to admire a housewife, "Accomplish'd Gentlewoman" or not, who had the skills to put this recipe together! And by the way, "dragons" in these Plague Water recipes probably denotes tarragon. To the medieval eye, the roots of tarragon apparently looked like the tail of a dragon, giving rise to its common name "little dragon" as well as its official name *Artemesia dracunculus*.

Continuing with the virtues of lemon balm, the author of the *Pharmacopoeia Londinensis or, The new London dispensatory* of 1696 assured its readers that "an essence of Balm given in Canary wine every morning will renew youth, strengthen the brain, relieve languishing nature, and prevent baldness."

The claim that lemon balm prevented baldness may have been a bit of an exaggeration. But then again, an herb that was commonly believed to prevent plague, "revive patients close to death" and "expel those melancolly vapors from the Spirits" could probably handle a little problem like baldness!



But what is it about lemon balm that is so uplifting to “languishing” spirits?

Rub a leaf and try to describe the fragrance - intensely lemony, for sure; but what other fragrances can you detect? A hint of rose, perhaps? That would be due to the geraniol, an essential oil that lemon balm shares with geranium leaves. There might be a scent that’s a bit like the smell of grass, or maybe you would call it woody or spicy. You may even detect a scent that reminds you of lavender - that would be due to the linolool, an essential oil shared by both of the aromatic herbs. Perfume experts can detect all of these scents, and even more, in the leaves and flowers of lemon balm.



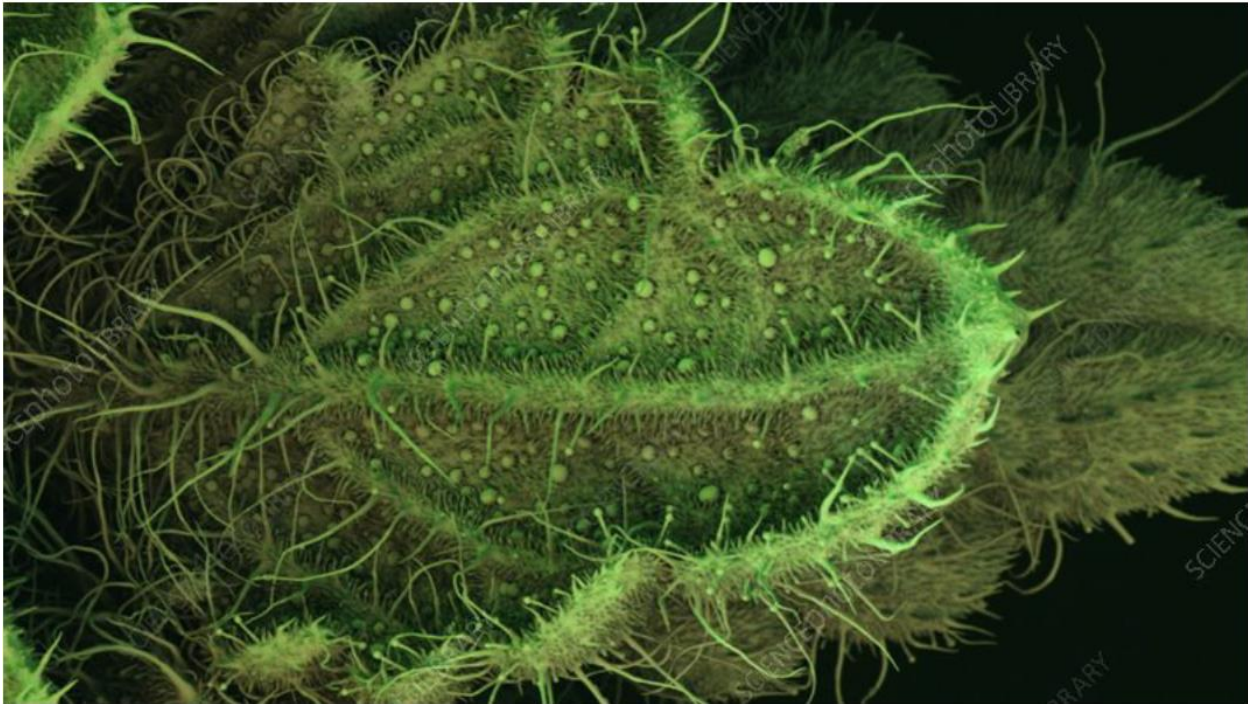
Over 100 chemicals have been identified in the leaves of *M. officinalis*.
How many different odors can you identify?

It might be easier to describe lemon balm’s fragrance as green or clean; or perhaps it seems sweet to you, or even sharp or tangy.

Each individual has a slightly different sensory experience of lemon balm, and uses different words to describe it. But just about everyone experiences the fragrance of lemon balm as energizing, uplifting, and overwhelmingly pleasant. It’s one of the most delightful and refreshing fragrances ever created by nature.



What actually happens when we gently rub a lemon balm leaf? With just the lightest touch, the vibrantly aromatic chemicals burst out of their bubble-like storage units and vaporize into the air that we inhale.



The aromatic essential oils of lemon balm are produced and stored in these spherical structures called glandular trichomes. Other members of the mint family, such as rosemary, thyme, oregano, marjoram, basil, savory, lavender, sage, mint, and shiso, synthesize their own essential oil blends in similar glandular trichomes. The long, hair-like trichomes protect the leaves from herbivores and regulate temperature by deflecting excess solar radiation.

These delightful volatiles quickly find their way into our nasal passages where they interact with myriads of super-sensitive scent receptors. Olfactory nerves are unique in their design - they're the only sensory nerves that connect directly and immediately to our brain. The aromatic molecules just released from the injured leaf go straight to the part of our brain where emotions are processed and emotional memories are stored.

And we instantly feel soothed, comforted, and calm.

How on earth does this work? There are actually several ways that the phytochemicals of lemon balm interact with our neurological system.

On an individual level, any fragrance associated with a specific pleasurable memory will trigger strongly positive emotions. The lemony aroma of *M. officinalis* might reawaken a pleasant memory of a long-ago lemonade on a lazy summer day, of grandmother's lemon meringue pie, or even of the fresh, lemony scent of a clean home. Sometimes the memory itself doesn't reach consciousness, but the associated positive emotions will always come forth.

In addition to these highly personal emotional associations, many volatile aromatics produced by plants have a direct and universal effect on the human brain. This is the basis of aromatherapy, the therapeutic



use of essential oils extracted from plants. Research is still limited, but scientists are actively looking into how and why certain fragrances make us feel the way they do.

What is clear, though, is that the essential oils most consistently found to relieve anxiety consist of various combinations of the same chemicals that impart a lemony fragrance to plants.

To be specific, in *Essential Oils and Anxiolytic Aromatherapy* (2009), William N. Setzer states that the “popular anxiolytic essential oils generally seem to be dominated either by terpenoid alcohols (linalool, geraniol, and/or citronellol), the monoterpene limonene, or citral.”

Compare this statement to the remarkably similar list of the phytochemicals responsible for lemony scents in plants - “Lemon scent and flavor primarily comes from a few terpenoid essential oils: citral (also called geranial, neral, or lemonal), linalool, limonene, geraniol, and citronellal.” (See <https://botanistinthekitchen.blog/2013/09/02/evolution-of-lemon-flavor/>)

What an intriguing coincidence! It seems that the phytochemicals that we perceive as lemony are the same ones that relieve anxiety and agitation!

Not only that, but they are the same chemicals released when we gently rub that lemon balm leaf - “the main components of the essential oil are citral (neral and geranial), citronellal, linalool, geraniol and β -caryophyllene-oxide.” (<https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/lemon-balm>)



Science is beginning to support the traditional use of lemon balm for relaxation

What about the other lemony herbs? The relative proportions of the lemony terpenoids vary for each plant, but those rich in the aromatic oils listed above, such as lemongrass, lemon verbena, lemon catnip, and lemon myrtle are all known to improve mood and promote relaxation. Ethnobotanical studies of traditional cultures show widespread use of these herbs for anxiety; in addition, there is a surprising amount of scientific verification of their benefits.



Irresistible! Lemon myrtle (*Backhousia citriodora*) and lemon catnip (*Nepeta cataria* 'citriodora')
Try them both in soothing herbal teas (if you can keep Kitty away from the catnip!)

Research on the therapeutic properties of lemon balm has been hindered by the very low oil yield from the plant, making therapeutic grade lemon balm essential oil one of the most expensive oils used in aromatherapy. In one study in England, though, researchers found that applying lemon balm oil to the face and arms of patients with severe dementia reduced their agitation significantly. (J Clin Psychiatry 2002 Jul;63(7):553-8)

Lemongrass essential oil, which consists of the same aromatic components as in lemon balm but in somewhat different ratios, is much easier to study. Research published in the *Journal of Alternative and Complementary Medicine* in 2015 found that participants exposed to lemongrass essential oil had an immediate reduction in anxiety and tension. Those who inhaled the lemongrass essential oil also recovered more quickly from a stressful situation compared to those who inhaled a control aroma.

According to **Barbara Thomley**, lead coordinator for the Complementary and Integrative Medicine Program at the Mayo Clinic, citrusy aromas in general can alleviate physiological symptoms of stress. See <https://www.prevention.com/life/a20448271/scent-of-citrus-shown-to-reduce-stress/>

Let's look next at the therapeutic use of geranium essential oil. It might seem like a huge jump from lemon balm to geranium, but actually, the two herbs share several of the same psychoactive essential oils. Rub a geranium leaf and you'll smell its citrus notes; rub a lemon balm leaf, and if you can detect a rose scent, it's from geraniol. And both leaves contain large amounts of citronellol.

To mention just a couple of studies on geranium oil aromatherapy, researchers have found that inhaling geranium essential oil helps patients cope with pain and anxiety during labor (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4484988/#>) and after suffering a heart attack (<https://www.ncbi.nlm.nih.gov/pubmed/29122262>). The effectiveness of geranium oil for anxiety is generally attributed to the same essential oils that geranium shares with lemon balm - citronellol, geraniol, and linolool. It all makes sense.

What's so special about the sweet, relaxing scent of linolool? Found most famously in lavender, linolool is also present in significant amounts in lemon balm, lemon myrtle, and lemon catnip, and in lesser amounts



in lemon verbena, and lemongrass. Research has repeatedly confirmed the beneficial effects of linolool for anxiety, insomnia, and panic attacks. While there are too many studies to discuss, it's beginning to look like linolool affects anxiety levels by altering the function of the GABA system in the brain. To simplify a very complex subject, GABA (gamma-aminobutyric acid) is the body's most important inhibitory neurotransmitter; it slows down the neural circuits that are active during emotional stress and over-active in anxiety states. Many of our most frequently prescribed medications, including benzodiazepines, antidepressants, barbiturates, and sleep medications, work by interacting with the GABA system.

Just like the benzodiazepines, linolool activates the GABA receptor sites in the brain. And, again, just like the benzodiazepines, this brings about a state of relaxation, a more balanced mood, and improved sleep.



Linolool, the volatile oil responsible for lavender's signature scent, is also present in large amounts in lemon balm, lemongrass, lemon verbena, and lemon catnip. Linolool is one of the best-studied essential oils for anxiety and insomnia.

In a particularly interesting study from Japan, researchers showed that, in mice, inhaling linolool reduced the activity of more than 100 genes that go into overdrive in stressful situations.

[\(https://pubmed.ncbi.nlm.nih.gov/19456160/\)](https://pubmed.ncbi.nlm.nih.gov/19456160/)

So far, we've only been discussing the volatile, or inhaled, chemicals produced by lemon balm and the other lemony herbs. But herbs are also consumed as part of a normal diet, and can be administered therapeutically in the form of teas, encapsulated dried leaves, extracts added to foods and drinks, topical preparations, or tinctures.

Numerous clinical studies have shown that lemon balm taken in a wide variety of ingested forms relieves chronic anxiety, reduces laboratory-induced psychological stress, and improves sleep quality.

[\(http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3230760/\)](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3230760/)



Homemade lemon balm tincture is easy to make. See <https://www.growforagecookferment.com/lemon-balm-tincture/> for instructions

Lemon balm relieves agitation in people with dementia, (<https://pubmed.ncbi.nlm.nih.gov/12143909/>) and improves alertness, computational accuracy, and short-term memory in healthy subjects (<https://doi.org/10.3390/nu6114805>). Many other studies have similarly confirmed the traditional wisdom of using lemon balm as a calming agent.

When lemon balm is inhaled - whether it's in the garden or in the laboratory - only the volatile, or air-borne, essential oils enter our bodies. But when we ingest lemon balm as an herb, tea, or tincture, a vast array of additional phytochemicals are absorbed into our bloodstream. Scientists are actively investigating which of the many ingested chemicals might be contributing to lemon balm's calming effects.

Research designed to answer this question consistently points to rosmarinic acid, a phytochemical present in large amounts in lemon balm extracts as well as in the fresh plants.

Rosmarinic acid is produced by several plants of the *Lamiaceae* family, including rosemary (*Rosmarinus officinalis*), from which it was originally isolated, sage (*Salvia officinalis*), basil (*Ocimum tenuiflorum*), perilla (*Perilla frutescens*), oregano (*Origanum vulgare*), marjoram (*Origanum Majorcan*), and lemon balm (*Melissa officinalis*). It's also present in catnip (*Nepeta cataria*) and comfrey (*Symphytum officinale*). All of these herbs are known to have potent physiological effects.

Rosmarinic acid protects plants from viral and bacterial infections, and prevents damage from free radicals and ultraviolet radiation. But what does it do in animals, including humans? There are several potential applications being studied, including treatment of infections, immunological diseases, cancer, and a variety of neurologic and mood disorders.

How is it that rosmarinic acid, a protective chemical produced by plants for their own use, could possibly work to calm anxiety in humans?



We are back to the all-important GABA system in the brain. Just like linolool, rosmarinic acid reinforces the emotionally balancing GABA system in the brain. But it does it in a completely different way! Instead of sneaking in and stimulating the GABA receptor like linolool does, rosmarinic acid prolongs the lifespan of each GABA molecule. There's an enzyme that normally dismantles GABA, and rosmarinic acid prevents it from doing its job. Whether the GABA receptor is activated, or the break-down of GABA is prevented, the net result is that the GABA system is enhanced. And an enhanced GABA system translates into a calm, peaceful state of mind. Amazing, isn't it?

Here's a final thought for all of you who love the scent of lemon balm. If you think lemony herbs such as lemon balm go the trouble of making these delightful scents just to please us and make us calm, think again! In the plant world, the actual purpose of lemon-scented essential oils is to keep them safe from leaf-eating insects. The fresh scent that humans love is a repulsive, noxious repellent for insect marauders. And for plants, their relationship with insects is far more important than their relationship with humans will ever be!

I hope that some day someone will explain how these diverse plant and animal systems managed to evolve in such a strangely overlapping way.

For more on the fascinating world of lemony herbs, join us on Zoom for **Pearls for the Pandemic Episode II**. We'll be gathering virtually on September 16 at 7pm for *What Could be More Lemon-y than Lemon? Lemon-Scented Herbs!* See you then!



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