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Essential Oil Origins

Where Do Essential Oils Come From?

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Introduction: The Power of Plants

Hundreds of thousands of kinds of plants cover the earth, playing a vital role in animal and human life. Plants produce oxygen, provide food, regulate water, create habitats, and more.

Despite a seemingly endless amount of plant types, species, and families, each plant has unique characteristics. On the 196,900,000 square miles of the earth's surface, scientists estimate there are 390,000 plants, and new species are being discovered frequently.

Nearly 400,000 natural options give us a lot to choose from. It's no wonder people have been using plants to help solve problems since ancient times. While extracting essential oils from plant parts and using them for cooking, health, and cleaning might seem strange, such practices have actually been around for thousands of years. People in several ancient civilizations discovered how useful plants and plant parts could be for everyday tasks and used them for everything from health solutions and beauty treatments to religious ceremonies and burials.

While we know much more today about the benefits and uses of plant parts and essential oils thanks to technology and modern research, the people of these ancient civilizations had the right idea—we have nigh countless ways we can use plants in everyday life.

In this eBook, you'll learn all about where essential oils come from and how they're made. If you've ever wondered how an essential oil goes from a plant in a remote region of the world to a bottle sitting on your kitchen counter, this eBook will walk you through each stage of the process. By the end, you'll see how important it is to know where your essential oils come from, how they're made, and what's inside every bottle you bring home.

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Where Do Essential Oils Come From?

Essential oils are invisible to the naked eye—hidden in the seeds, bark, stems, flowers, roots, wood, needles, and fruits of plants all over the world. If you've ever wondered where essential oils come from, now you know. They're all around us!

What Role Do Essential Oils Play in Plant Life?

Essential oils may be found in different parts of a living plant, depending on the type and its structure. For example, in some plants, essential oil can be found in the flowers, while other plants contain essential oils in the leaves or bark. Regardless of where essential oils are found within plants, they play an important role in plant life.

Not all plants produce essential oils. If a plant does create an oil, it typically does so in microscopic, specialized glands. After the plant produces the oil, it's either excreted or stored within the glands for future use. The amount of essential oil a plant makes varies, depending on the time of day, the time of year, climate and environmental conditions, and predatory threats.

In many cases, essential oils give plants their aroma. Along with giving a plant its distinct smell, some

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Where Do Essential Oils Come From? (Cont.)

essential oils have defensive properties, protecting the plant by keeping insects and herbivores away. Essential oils can also assist with plant pollination and reproduction.

Not all oils found in plant parts will be beneficial or particularly potent. However, with such a wide range of plants and plant parts to choose from, we have plenty of sources that produce useful, pure essential oils with significant benefits.

Volatile Aromatic Compounds

From a scientific perspective, essential oils are often referred to as "volatile aromatic compounds." Volatile aromatic compounds are small organic molecules that change quickly from a solid or liquid state to a gas when left at room temperature.

The word volatile refers to how fast these molecules change states. Because of their volatility, essential oils are potent and aromatic, even from a distance. When you first open a bottle, you can smell the scent right away because the physical and chemical makeup of volatile aromatic compounds allow them to move quickly through the air and interact with receptors in your nose. The type of volatile aromatic compounds found in an essential oil determines what kind of aroma and benefits it has.

Today, more than 3,000 volatile aromatic compounds have been discovered and identified. Essential oils vary from plant to plant or species to species. They can even differ within botanical families. Each plant has a special ratio of aromatic constituents that give it specific benefits and make it unique among other plants.

With your more complete understanding of where essential oils come from, you might be wondering, "How does an essential oil get from inside a plant to inside a bottle?" Knowing where to find essential oils in nature is relatively easy, but growing and caring for the plant, extracting the essential oil, and processing it properly requires a delicate scientific process.

Volatile Aromatic Compound

Volatile: A volatile compound changes quickly from one state to another. The organic molecules that make up essential oils are known to rapidly change from a liquid to a gas at room temperature.

Aromatic: Typically, aromatic compounds have distinct aromas and similar chemical structures.

Compound: A compound is two or more chemical elements bonded together.

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How Are Essential Oils Made?

Several methods for successfully extracting essential oil from a plant and preparing it for use exist, but each one has something in common—they all require extreme caution and care. Because plants are so delicate, careful planning and precision are necessary to extract high-quality essential oils. The process of taking essential oils from plant parts and preparing them for your use can be considered both an art form and a scientific process because it requires attention to detail and exactness.

Producing quality essential oils also requires a thorough knowledge of plants and proper distillation methods and substantial care at every stage. Cutting corners at any stage will result in a low-quality product, and quality is everything when it comes to essential oils.

Not All Essential Oils Are Created Equal

Because of variations in the production process, not all essential oils are created equal. Every part of the process can impact the quality of the final product—from planting and growing methods to how the essential oil is extracted and distilled. Some companies may add synthetic fillers or take shortcuts to save time and money; however, such practices lower the quality of their products.

When essential oils are produced with extreme care, the natural benefits of the plants are preserved, making these gifts of the earth more beneficial and useful. High-quality essential oils also provide peace of mind when you use them regularly with your family and incorporate them into your daily life. Before using essential oils, cultivate an understanding about their history and ingredients.

As volatile aromatic compounds, essential oils are delicate and easily alterable. Composition may be influenced by environmental factors like weather conditions, rainfall, and temperature. While these are considered uncontrollable factors, we can do a lot to preserve the potent aromatic compounds extracted from plant parts.

For example, carefully choosing geographic locations and specific climates for planting, growing, and harvesting can improve the essential oil quality. Other factors ranging from distillation methods to extraction time frames can also influence potency and benefits.

Factors that influence essential oil composition include:

- Weather conditions, rainfall, and temperature
- Geographic location and climate
- Distillation method and duration
- Amount of time between extraction and distillation
- Harvest time (year, season, and even time of day)

Planting and Growing

Producing quality essential oils is a detail-oriented process that starts with choosing high-quality land, soil, and seeds. Growers must consider these factors, along with the climate of the location, the time of year to plant, and more.

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How Are Essential Oils Made? (Cont.)

For example, the region of Reggio di Calabria, Italy, has long been a sanctuary for growing bergamot because of its unique climate and soil. This area is so optimal for growing the fruit that most of the world's bergamot comes from this area. The rich soil and ideal climate allow the trees to thrive and produce the highest-quality fruit.

Regardless of the geographic location, plant type, or essential oil being produced, the trees need to be carefully planted, cared for, and watched by knowledgeable growers and farmers. The best methods for planting, growing, and sustaining healthy plants contribute to a higher quality of essential oil.

Harvesting

Peak Harvesting

After plants have been carefully planted and sustained, they must be harvested at optimal times to preserve the delicate chemistry of their essential oil.

Just as fruits and vegetables taste best when picked at peak ripeness, plants must be harvested at just the right time to optimize the chemical profile and produce as much essential oil as possible. Preserving chemical composition during the harvesting process helps the essential oil retain potency and power.

Peak harvest time varies with the plant, and harvesters can take years to determine the perfect moment for essential oil harvesting. After enough research, harvesters can narrow this window to the optimal season and even the preferred time of day!

For example, the flowers of the jasmine plant produce the lovely Jasmine essential oil. Once the flowers blossom, they lose their volatile aromatic compounds quickly, so harvesting at the right time is crucial to preserve the chemical profile. The flowers must be gathered early in the morning before the buds have fully opened—even waiting an hour too long will cause important chemical content to be lost.

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How Are Essential Oils Made? (Cont.)

Achieving Optimal Chemical Profile

The season in which a plant is harvested for essential oil is influenced by the precipitation, the presence of insects, the condition of the soil, the amount of sunlight, and more. An essential oil's chemical profile within a plant is seriously impacted by the season and time of day, as plants go through several stages of blossoming, ripening, and maturing.

A good example of this is Spikenard essential oil. Harvesters must hike—sometimes for days—into the high mountains of Nepal to access the spikenard plant and harvest it by digging the roots out of the ground, cleaning them off, and replanting a small percentage so the plant can continue growing. Spikenard can only be collected a few weeks out of the year, so harvesters must labor quickly to get it done within the peak harvest time.

Proper Harvesting Methods

Once the ideal harvest time has been determined, gathering plant parts in preparation for essential oil production is a careful, labor-intensive process. Plant parts can be removed by hand or with tools. Careful harvesting allows the plant to maintain good health afterward and regrow effectively so it can be harvested again in the future.

For many essential oils, hand harvesting is still done, but mechanical harvesting methods have helped many harvesters gather plant parts quickly while only causing the plant minor damage.

Once harvested, some plants are wilted or dried to preserve their chemical components. The chemical makeup of an essential oil varies between the living plant and harvested parts. In some cases, beginning the distillation process for harvested parts as quickly as possible allows the chemical profile to stay similar to the live plant material. After proper harvesting, plant parts are transported to a distillery where the essential oil is extracted. Like the harvest process, the distillation process must be completed with extreme care and attention to detail to retain the benefits and properties of the essential oil.

Juniper: Several essential oils can be derived from the wood, leaves, and berries of the Juniperus phoenicea tree. Researchers and harvesters have found Juniper essential oil offers a higher percentage of alpha-Pinene (a chemical constituent that gives the essential oil specific benefits) when harvested and distilled during the summer and autumn months.

Wintergreen: Grown in the mountains of Nepal where it can be "wild-harvested," wintergreen requires a labor-intensive process to separate the leaves from the rest of the plant and prepare it for distillation. Nepalese harvesters climb steep mountainsides in muddy, rainy conditions to remove the leaves from the wintergreen shrubs. After removing the leaves, they place them in large baskets, full to the brim, and carry them down the mountainside.

How Are Essential Oils Made? (Cont.)

Distillation

Once plant parts have been harvested, starting the distillation process at the right time ensures the proper aromatic compounds and potency are captured. In some cases, the distillation process must take place immediately after harvesting, while for other essential oils—such as Spikenard or Frankincense—the plant materials can be dried for distillation.

It's crucial for distillers to use the correct part of a plant to get the desired essential oil. For example, Coriandrum sativum produces two kinds of essential oils: Cilantro and Coriander. Cilantro is derived from the leaves of the plant, while Coriander is taken from the seeds. Cilantro and Coriander essential oils have completely different chemical makeups, properties, and benefits. With some essential oils, it may require distilling the entire plant, while others simply come from a smaller section of the plant, like the leaves, roots, bark, or flowers.

Essential Oil	Plant Name	Plant Part Used for Essential Oil
Basil	*Ocimum basilicum*	Leaf
Bergamot	*Citrus bergamia*	Peel
Cinnamon Bark	*Cinnamomum zeylanicum*	Bark
Frankincense	*Boswellia*	Resin
Ginger	*Zingiber officinale*	Root
Peppermint	*Mentha piperita*	Whole Plant
Ylang Ylang	*Cananga odorata*	Flower

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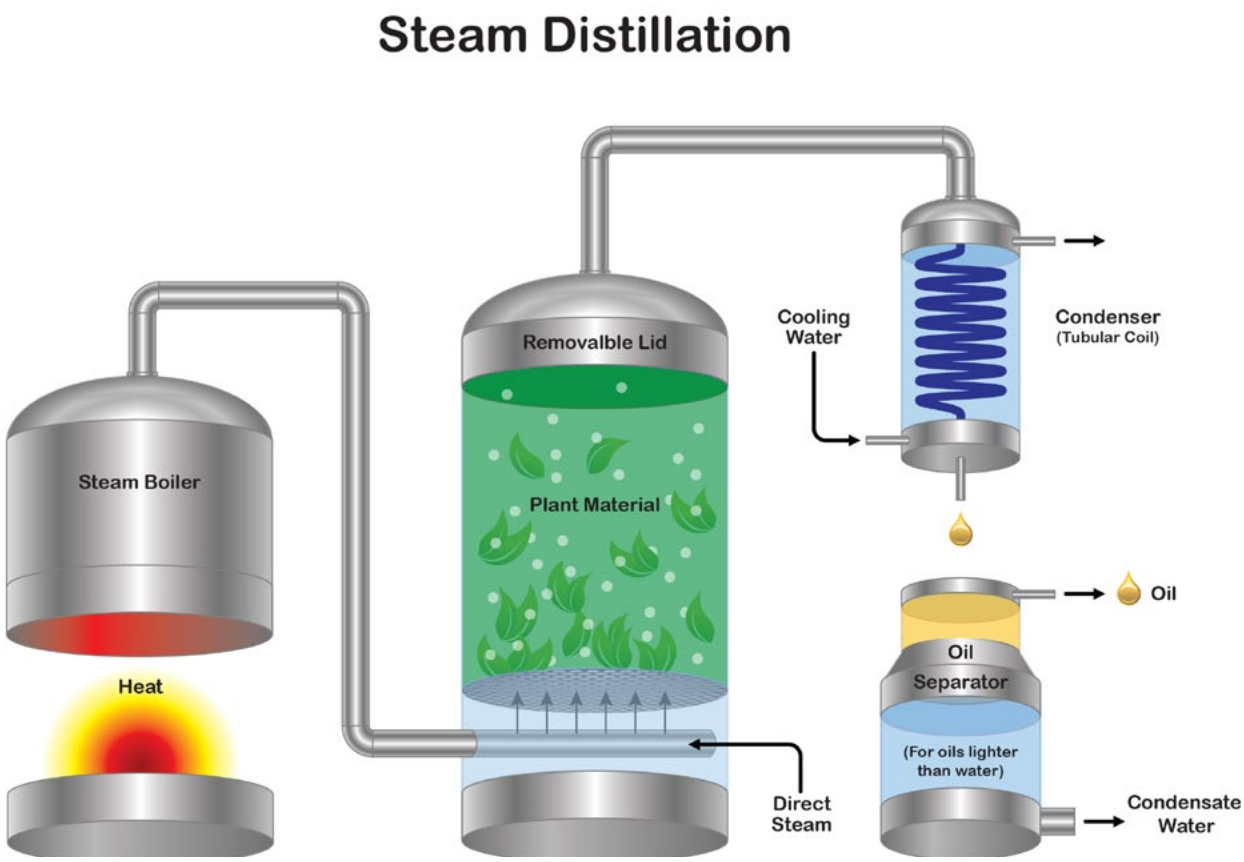
How Are Essential Oils Made? (Cont.)



Distillation Methods

The objective of the distillation process is to separate the essential oil from the plant and turn it into a usable natural solution. The most common types are steam distillation and expression. These organic processes allow aromatic compounds to be gently separated from the rest of the plant, while still preserving the essential oil's potent, delicate chemical components.

Steam Distillation

As the name suggests, steam distillation uses heated steam and pressure to separate essential oils from plants. With this method, pressurized steam is circulated through the plant materials, pulling out the essential oil and carrying it away. Once the steam settles and cools, the essential oil naturally separates from the water, making it simple to collect.

Distillation Process:

1. Steam passes through the plant materials.
2. Heated steam and light pressure help release the essential oil from the plant's microscopic protective sacs.
3. The vapor mixture flows through a condenser and cools, creating two separate layers of essential oil and water.
4. The essential oil rises to the top and is ready for extraction.

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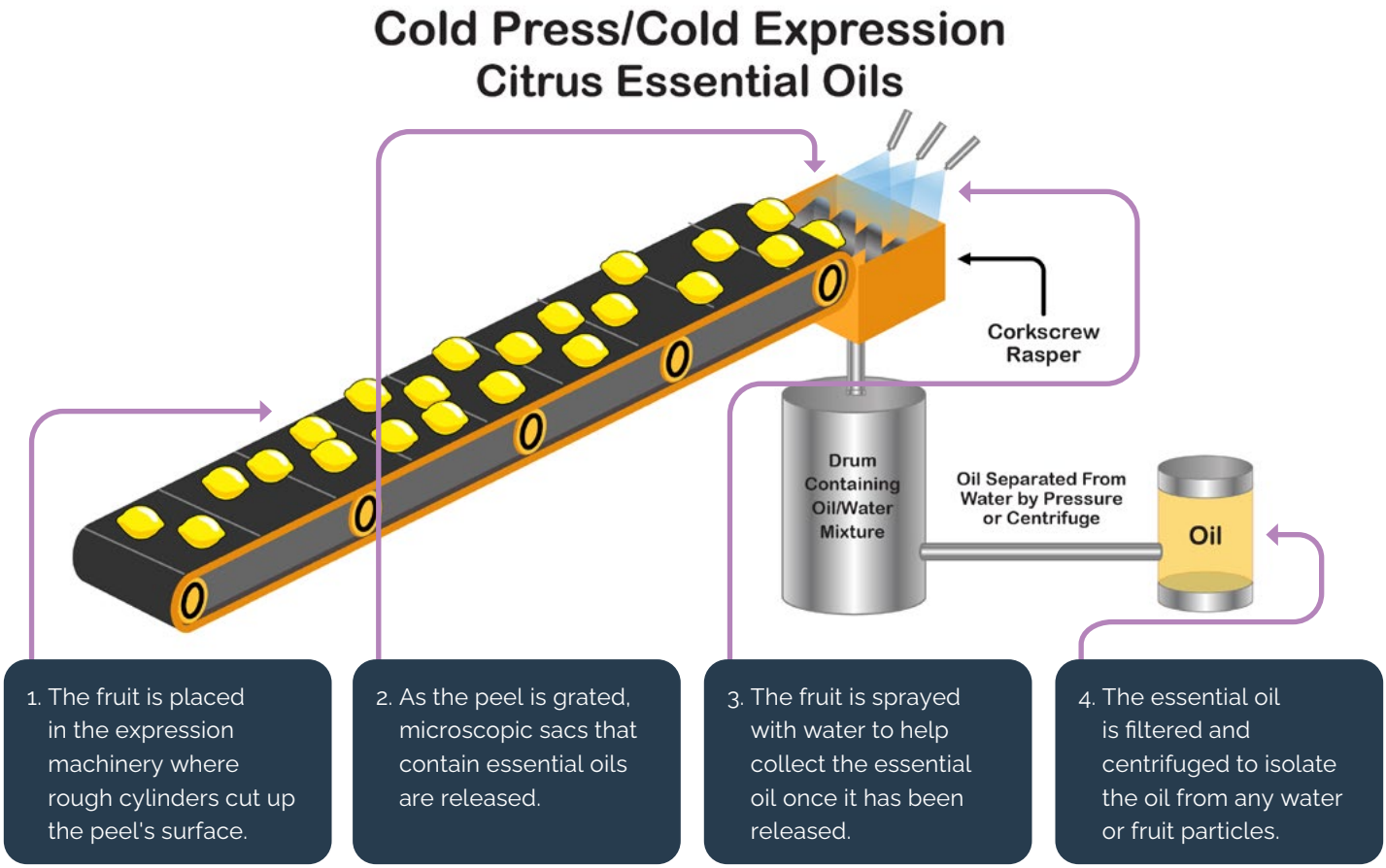
How Are Essential Oils Made? (Cont.)



With pressure and heat, the intricate chemical profile of an essential oil can be preserved and protected, because the process allows the essential oil to be distilled well below the normal boiling point. Maintaining the proper temperature with steam distillation process, as an incorrect temperature could alter the purity of the chemical compounds. The optimal steam distillation temperature is typically between 140 and 212˚F, but certain plants require different pressure levels, distillation times, and temperatures for proper distillation.

Hawaiian Sandalwood: To retrieve essential oil from Santalum paniculatum (also known as a Hawaiian sandalwood), the wood outer layers must be stripped from the heartwood—the wood in the center. The heartwood is chipped into fine pieces, filtered, and chipped even further to create super fine pieces. This wood then undergoes a 36-hour steam distillation process, with high heat and pressure separating the essential oil.

Expression or Cold-Pressing

Expression is another common distillation method for producing essential oils. However, unlike steam distillation, expression doesn't use heat for extraction, instead relying on precise mechanical pressure to release the essential oil. Expression is often referred to as "cold-pressed" because it doesn't use heat or steam like other distillation methods.

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How Are Essential Oils Made? (Cont.)

Expression is typically used to produce citrus oils, as it's useful for extracting them from the rinds and peels of citrus fruits.

During the expression process, fruits are placed in the machinery, where they're first grated with rough cylinders that cut up the peels. As the peel of a fruit is grated, microscopic sacs of essential oil are released, and water is sprayed over the fruit to collect the essential oil that's escaped. Through filtering and centrifuge, we separate the pure essential oil from any water or other particles that came loose during the grating part of the process.

Once an essential oil has been extracted and separated from its plant part, it must be tested to ensure safety and quality. The testing process helps remove any impurities and contaminants and prepares the product for safe, effective use in the homes of millions of people worldwide.

Grapefruit: Grapefruit—also known as Citrus X paradisi—was named because the fruit grows in clusters, just like grapes. Grapefruit essential oil is distilled through expression, and it takes roughly 50 grapefruit peels to create a 15 mL bottle of Grapefruit essential oil, depending on the season, region, year, and other variables.

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Testing

Essential oils require significant testing to confirm they meet specific standards. In fact, testing has to begin long before a seed is even planted. An essential oil producer must determine the best plant species to use and ensure the proper plant parts are harvested. This type of botanical assessment is critical, because it creates quality parameters against which scientists and chemists can measure when evaluating plant parts prior to distillation.

While testing takes place before planting and growing, this chapter will discuss the testing that occurs after distillation phase. This part of the process uses advanced methods to verify the essential oil has the correct chemical and physical makeup, based on the botanical testing described above.

Quality testing measures ensure the pure volatile compounds found in essential oils are preserved during the packaging process and appear in the proper amounts for maximum efficacy. Essential oils must undergo several quality control tests, with the goal being verification of potency and purity.

Avoiding adulteration: The addition of any synthetic or natural component designed to lower the price of an essential oil also lowers the quality and safety of the oil as it has the potential to alter both the physical and chemical properties of the oil.

Testing and Quality Assurance Varies

No regulatory body oversees the safety and efficacy of essential oils. This lack of oversight means companies or essential oil producers must take it upon themselves to verify potency and ensure purity before consumer use. Several tests exist that allow essential oil producers to guarantee potency and purity.

Common essential oil quality tests:

- Organoleptic testing
- Microbial testing
- Gas chromatography
- Mass spectrometry
- Fourier-transform infrared spectroscopy (FTIR)
- Chirality testing
- Isotopic analysis
- Heavy metal testing

Verifying potency: This helps identify the chemical composition of an essential oil and determines its potency and properties.

Ensuring purity: A quality, safe essential oil is free of harmful contaminants or synthetic components. Contaminants and synthetic fillers alter both the chemical and physical elements of an essential oil, decreasing its efficacy or potentially giving it dangerous effects.

Avoiding adulteration: The addition of any synthetic or natural component designed to lower the price of an essential oil also lowers the quality and safety of the oil as it has the potential to alter both the physical and chemical properties of the oil.

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Testing (Cont.)

These tests include organoleptic testing, microbial testing, gas chromatography, mass spectrometry, Fourier-transform infrared spectroscopy (FTIR), chirality testing, isotopic analysis, and heavy metal testing.

Organoleptic Testing

The word organoleptic refers to using four human senses: sight, smell, taste, and touch. Organoleptic testing requires distillers to use their senses to determine whether an essential oil looks, smells, and feels as it should to determine if there's something wrong.

For example, if an essential oil has an odd smell, unusual color, or uneven consistency, the distiller will know right away that something might be wrong off. This type of testing is typically the first stage of quality control, since experienced and professional distillers, chemists, and technicians can typically tell if there's something wrong with an essential oil batch.

Gas Chromatography–Mass Spectrometry (GC-MS) Analysis

Gas chromatography–mass spectrometry allows an essential oil producer to analyze the composition and chemical constituents in a particular product to ensure it matches the expected chemical profile.

Gas Chromatography

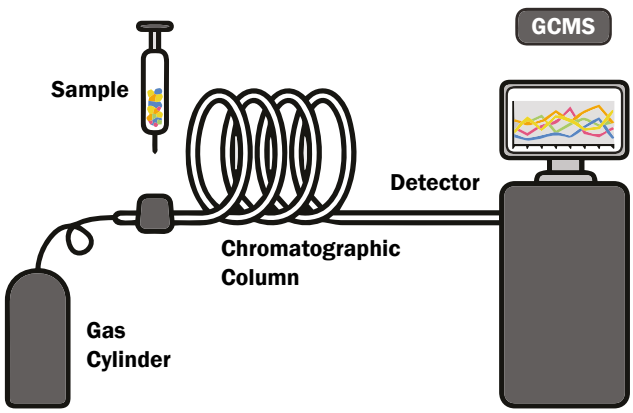
A gas chromatograph machine vaporizes essential oil with a carrier gas (like helium) and sends the vapor through a tube lined with chemical components holding specific properties. Because each essential oil comprises several different aromatic constituents, the constituents will interact with the chemical compounds on the tube in different ways. This setup means each constituent moving through the tube at a different speed.

The speed at which each constituent passes through the tube depends on how much interaction the essential oil's compounds have with the compounds found on the wall of the tube. The compound will move quickly if it has little interaction and slowly if there's a lot of interaction. At the end of the tube, a detector records how quickly or slowly a compound leaves the tube and how much of the compound makes it through.

Mass Spectrometry

Like gas chromatography, mass spectrometry analyzes the composition of an essential oil. This test uses a mass spectrometer to identify the different aromatic compounds found in a particular essential oil. After individual compounds have been separated with gas chromatography, they're ionized—a process in which a compound is struck by a stream of electrons, causing neutral molecules to break apart and become charged. The ions are then sent to magnetic fields, where they interact based on their molecular mass and charge.

The mass spectrometer reading shows the quantity, mass, and charge of each constituent. This information helps identify the different aromatic compounds that make up an essential oil.



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Testing (Cont.)

Fourier-Transform Infrared Spectroscopy (FTIR)

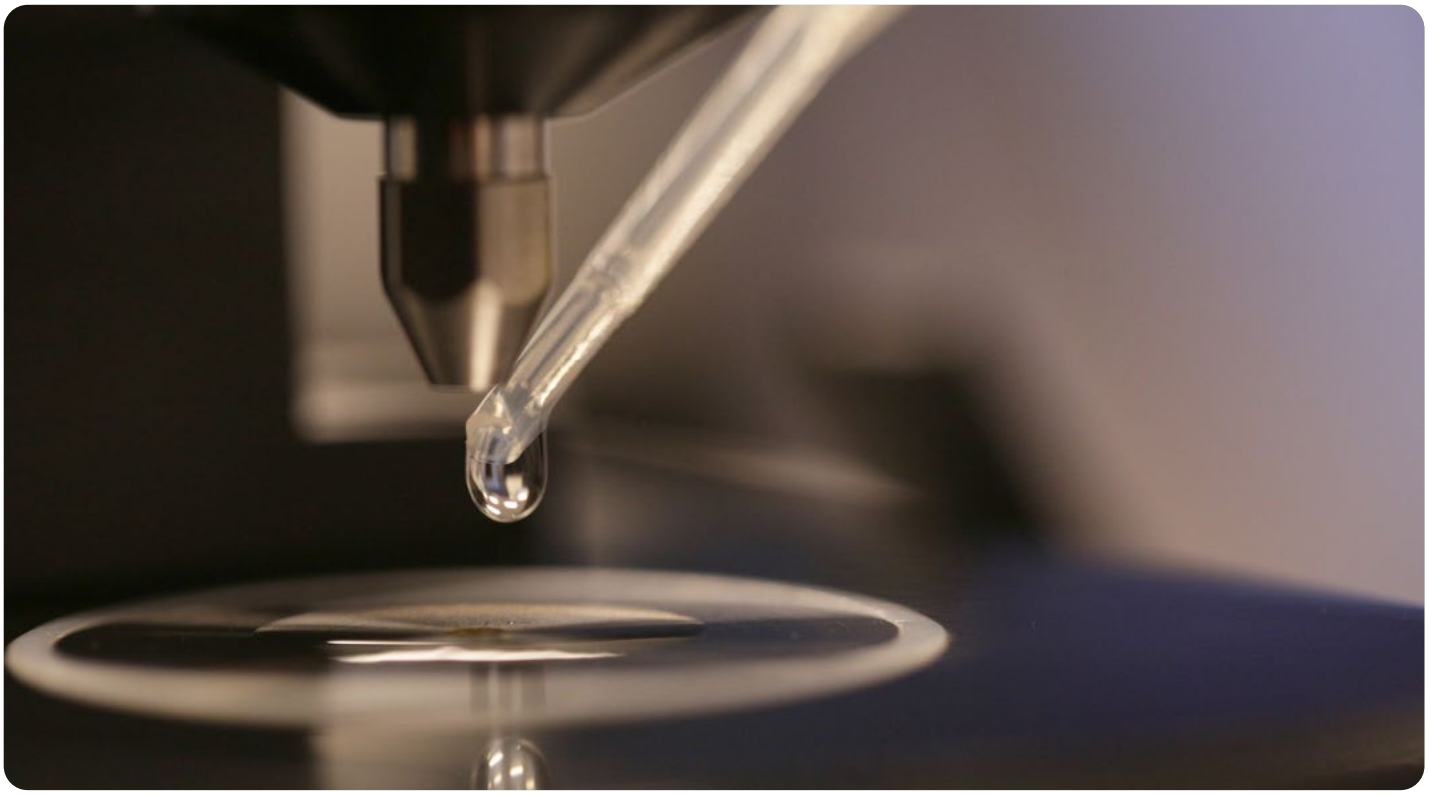
Another test that can verify potency and purity in an essential oil is Fourier-transform infrared spectroscopy (FTIR). During this test, the structural components of the essential oil are examined to figure out which compounds are present, thus determining quality.

An FTIR scan uses infrared light at different frequencies to measure the amount of light that's absorbed by an essential oil sample. When light energy passes through a molecule, the bonds that connect the atoms will varyingly move based on the frequency of the light. The amount of movement in a molecule during the FTIR scan provides a reading, which helps establish if the essential oil sample contains desirable structural components. The FTIR reading is compared to other readings in a historical database to see whether the current sample matches the expected absorption profile.

Chirality Testing

Chirality is a term used to describe the orientation of a molecule. A molecule is chiral when it has a different arrangement of bonds between molecules, so different forms would be mirror images of each other rather than identical copies. A molecule's orientation will determine how it interacts with other molecules.

If an essential oil has been altered by synthetic fillers, frequently the types or ratio of chiral molecules will be different, which shows testers the essential oil isn't pure. Testing for chirality helps scientists ensure no synthetic fillers have been used in the product, as the molecules are interacting the way they should.



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Testing (Cont.)

Heavy Metal Testing

As mentioned before, certain tests verify no contaminants can be found in an essential oil after it's been distilled. Following the distillation process, an essential oil shouldn't contain any heavy metals—or even traces of them—because these types of molecules are literally too heavy to be carried by the steam during distillation. However, it's still possible for essential oils to be contaminated with heavy metals like mercury, arsenic, or lead during handling or storage, so heavy metal testing helps us make sure an essential oil is safe for use.

Experts use inductively coupled plasma mass spectroscopy (ICP-MS) testing methods to check that a batch of essential oils hasn't been contaminated by heavy metals. The ICP-MS testing method first uses inductively coupled plasma (ICP) to ionize an essential oil sample (breaking apart and charging compounds, as stated previously). The essential oil sample then travels through a mass spectroscope machine, where elemental parts of the essential oil are separated, providing a reading on which elements are present and in what quantities. If any heavy metal elements are present, they'll show up in the reading, ensuring safety and purity before the packaging process.

Isotopic Analysis

Isotopic analysis testing allows scientists to determine whether an essential oil contains the proper chemical characteristics based on its country of origin. When an essential oil is sourced from a specific area, all chemical constituents in it will follow the same pattern.

Using a special type of mass spectroscopy, scientists can tell which carbon isotopes are present in an essential oil constituent and at what levels. If they're sourced from the same location, every essential oil constituent should have a particular ratio of carbon isotopes. If a sample has a skewed ratio of isotopes in its constituents, then scientists can know it contains an adulterant or contamination from another location.

The purpose of each testing phase:

- **Organoleptic testing:** Determines if an essential oil looks, feels, and smells as it should.
- **Microbial testing:** Ensures an essential oil is free from any biohazardous microorganisms like bacteria, viruses, fungi, or mold.
- **Gas chromatography:** Identifies which chemical compounds are in each essential oil and at what levels.
- **Mass spectrometry:** Analyzes the composition of an essential oil to identify the different aromatic compounds.
- **Fourier-transform infrared spectroscopy (FTIR):** Determines the quality of the essential oil by examining different compounds.
- **Chirality testing:** Observes how the molecules interact to determine whether the essential oil is pure and free from synthetic fillers.
- **Isotopic analysis:** Ensures an essential oil follows the proper chemical constituent pattern based on the location from which it was sourced.
- **Heavy metal testing:** Checks for heavy metals like mercury, arsenic, or lead.

Testing (Cont.)

What Happens Once Testing Is Complete?

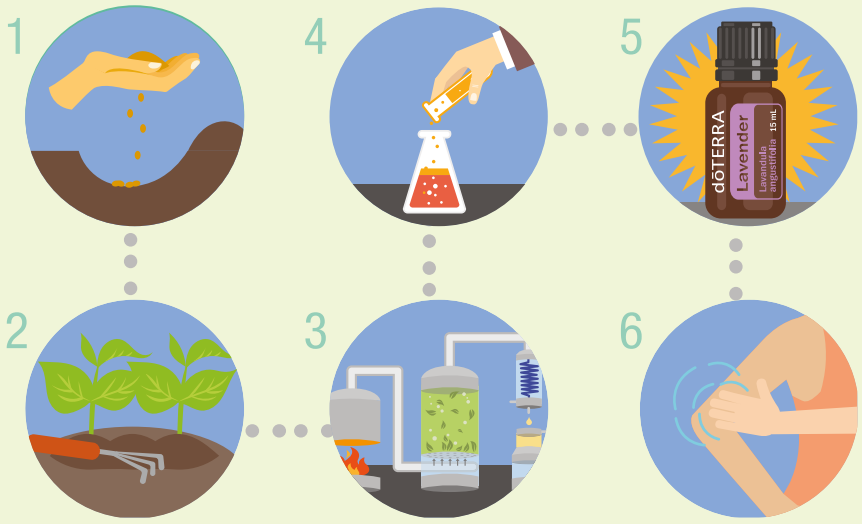
Once an essential oil batch has been thoroughly tested to guarantee it's pure, potent, and filler- and contaminant-free, it's time to package for final consumer use.

Like the other steps in the essential oil production process, packaging is important for preserving quality and purity. When an essential oil has been tested and approved for use, it's then funneled into a glass bottle and securely sealed with a cap or lid.

Typically, an essential oil bottle will have tinted glass to protect the essential oil and its chemical constituents from sunlight or other sources of UV radiation that could alter the efficacy. Any plastic elements used in packaging (lids, caps, and so on) must be made from the highest-quality materials to prevent erosion over time.

After the essential oil is funneled into the glass bottle and securely sealed, a label is applied to provide users with an expiration date and other important information about application. Once it's been tested, packaged, and properly labeled, the essential oil is ready to be used by anyone who wants to experience the potent, pure benefits that high-quality essential oils have to offer.

The Production Process



In summary:

1. **Planting:** Essential oils are found in plants and plant parts. Essential oil production begins with good seeds and soil for growth.
2. **Harvesting:** After it's had time to grow, the plant must be harvested at the right time for optimal essential oil quality.
3. **Distilling:** Plant parts are distilled, using machinery to separate the essential oil.
4. **Testing:** The distilled essential oil must be tested to verify purity and chemical composition.
5. **Packaging:** Once testing is complete, the essential oil is carefully packaged for final use.
6. **Applying:** High-quality essential oils can be used for everyday tasks like cooking, cleaning, beautifying, and promoting overall wellness.

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Responsible Sourcing and Production

As crucial as planting, growing, harvesting, distilling, and testing are for producing high-quality essential oils, the most important part of successful essential oil production is cultivating reliable, experienced partners every step of the way. Several methods exist for taking a plant and turning it into a usable natural solution. However, cutting corners or skipping steps at any point in a process will lower the final product's quality.

While each step of the process is delicate and important, a reliable network and fine-tuned system for producing the most pure and potent essential oils is crucial. The key to establishing a successful system that produces high-quality essential oils is employing responsible sourcing and production practices at every step from planting to packaging.

What Happens If Producers Cut Corners?

As discussed, each phase of the production process must be carried out with extreme care and exactness. If any of these steps are skipped or altered to save time or money, the quality of an essential oil can drop.

When essential oil producers take shortcuts, they're unable to guarantee the quality, safety, or efficacy of the final product. A low-quality essential oil can have adverse or potentially dangerous effects on individuals and won't contain the same benefits and properties as a quality essential oil that's treated with care from beginning to end.

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Responsible Sourcing and Production (Cont.)

Building a Network of Professionals

Successfully, consistently producing high-quality essential oils takes a network of professionals who effectively and responsibly care for the plants and essential oils at each step of production.

Growers

In many cases, plants that produce essential oils can only be found in certain areas of the world. Many of these plants grow best in particular places because of climate, soil, and weather patterns, allowing for better essential oil production. (Remember our example of growing bergamot fruit in Reggio di Calabria from Chapter 2?)

When we bring the knowledge and talents of local growers in these areas of the world to the table, producing high-quality essential oils becomes easier.

Some families have been growing plants used for essential oils for generations and know best how to handle planting, growing, and harvesting plant parts. Having knowledgeable growers can make all the difference when producing quality plants with pure, potent essential oils.

Distillers

Plants are often grown and distilled by the same group of people, but it's still important that the distillation process be carried out by seasoned professionals who understand the delicate nature of the process. Distillers must have a thorough knowledge of the machinery, specific plant parts, proper temperatures, best distillation times, and other crucial details to produce a batch of quality essential oils. Many plant parts must be distilled directly after harvest, so most distilleries are close by.

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Responsible Sourcing and Production (Cont.)

Scientists

Before a batch of essential oils can be given to customers, they must be tested and proven safe. With help from qualified scientists and research professionals, an essential oil producer can use cutting-edge technology to verify their products are free from contaminants; safe to apply aromatically, topically, or internally; and contain the proper chemical constituents necessary to offer maximum benefits.

Not only will skilled scientists ensure safety and enforce quality control, but they'll also provide valuable information about essential oils, their chemical profiles, and the most innovative ways to produce a high-quality product. Establishing a network of professionals who care for an essential oil from seed to bottle results in a high-quality product that's safe for everyday use.

Responsible Practices

Unfortunately, not all essential oil companies follow processes that focus on producing the highest-quality products. Instead, they prioritize cutting costs and saving time. This approach has caused several problems in the industry, including unfair treatment and payment of growers, practices that damage the environment, skipped crucial testing steps, and more.

When an essential oil company employs responsible practices, it not only ensures the fair treatment of professional growers, distillers, and scientists, but it also protects and preserves the quality of essential oils during each phase of the production process.

The dōTERRA® Global Botanical Network

To avoid common hazards that come with growing and distilling in this industry, dōTERRA has created a global botanical network that supports the constant demand for our essential oils while using safe, responsible practices. Some companies choose to buy their own plots of land where they grow the plants necessary for producing essential oils. dōTERRA, however, chooses to rely on the expertise of local growers and distillers around the world—many of whom have decades of experience with specific plants. Not only does the experience of these growers and distillers help improve the quality of our essential oils, but many plants simply grow better in certain climates and geographic locations. This approach also enables dōTERRA to support hundreds of thousands of growers and harvesters around the world.

Now that you've learned about where essential oils come from and how they're produced, here are a few examples of how dōTERRA essential oils are sourced, grown, and distilled globally.

Frankincense: Somaliland, Oman, and Ethiopia

Source: Somaliland, Oman, and Ethiopia

Plant part: Resin from Boswellia carterii, B. frereana, B. papyrifera, and B. sacra trees

Distillation method: Hydrodistillation

*These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.

Responsible Sourcing and Production (Cont.)

Frankincense essential oil is derived from the resin of Boswellia trees after a lengthy, difficult harvesting process. Frankincense has been harvested in these countries for centuries, as the sandy soil and rocky, dry climate are optimal growing conditions for several Boswellia species. Harvesting frankincense resins from these trees is an intricate process that takes over five months to complete and requires careful planning, knowledge, and experience. Frankincense harvesters must often travel far from home to retrieve resins in remote locations—after which they bring their harvest back to their communities to be cleaned, separated, and organized into different sizes and colors.

Unfortunately, in Ethiopia and Somaliland many harvesters don't receive fair payment for their yield, even after months of difficult, dedicated work. dōTERRA has established a Cō-Impact Sourcing® initiative that provides harvesters with fair, on-time payments for their time and skills. By providing fair payments—often in the form of food and cash prepayments spread throughout the year—dōTERRA has helped frankincense harvesters continually supply premium resins that eventually turn into high-quality dōTERRA Frankincense essential oil.

On top of providing fair payments, dōTERRA has also built warehouses for cleaning and sorting before hydrodistillation. These warehouses are located as close to the harvesting communities as possible to support local job opportunities, especially for women in remote areas. They also ensure harvesters don't spend too much time away from their families.

Frankincense trees and their longevity face many obstacles because of overharvesting, land conversion, and lack of regulation. Our Cō-Impact Sourcing program is proud to be a leading supporter for research and sustainability initiatives, protecting these sacred and historic trees. In all three sourcing countries, dōTERRA, our sourcing partners, and key research organizations and universities have worked together to drive propagation nurseries, data collection, and trainings to ensure the long-term viability and sustainability of these Boswellia species.

The dōTERRA Cō-Impact Sourcing initiative in these three countries is not only designed to produce the highest-quality Frankincense essential oil possible, but also to protect and nurture the precious tree species and help improve the quality of life for frankincense harvesters who are working hard to make a living and support their families.

Along with facilitating the harvesting process, dōTERRA and our sourcing partners have also supported families in Somaliland's primary frankincense harvesting region with the construction of the Sanaag Specialty Hospital—a nonprofit regional hospital in Erigavo. This hospital provides access to life-saving services for tens of thousands of people living in the heart of Somaliland's resin harvesting region.

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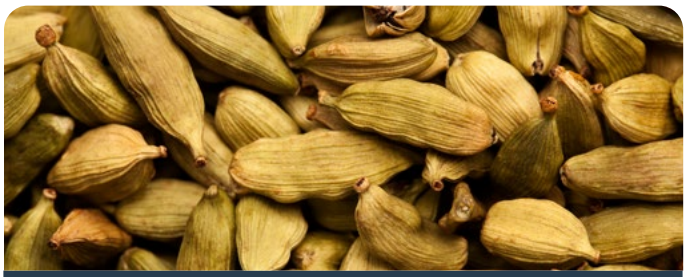
Responsible Sourcing and Production (Cont.)

Cardamom: Guatemala



Source: Alta Verapaz, Guatemala

Plant part: Seeds from the cardamom plant

Distillation method: Steam distillation

While the cardamom plant has many uses, only 1% of all cardamom plants worldwide are grown to produce cardamom oil. Most seeds are harvested and sold to the global spice market. The labor-intensive nature of the cardamom supply chain makes it an incredibly expensive spice.

Guatemala is the largest exporter of cardamom. The hot, humid climate creates the perfect environment for the cardamom plant to thrive. Alta Verapaz, Guatemala—home to experienced growers—is one of the primary sourcing locations for Cardamom essential oil. The humidity, frequent rain, and nutrient-dense clay soil of the mountains foster healthy plants that in turn make quality Cardamom essential oil.

The essential oil is taken from the seeds of the cardamom plant—a perennial and close relative to ginger. The seeds are steam-distilled, producing an essential oil with a spicy, fruity, warm, and balsamic aromatic profile.

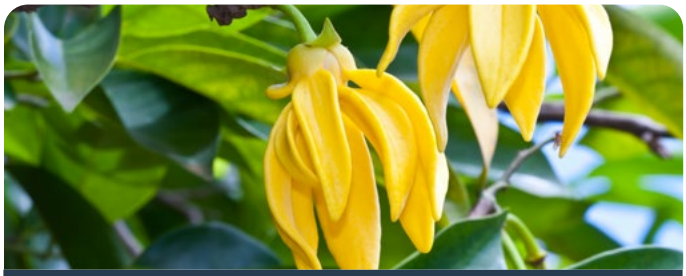
The environment of Guatemala is ideal for growing cardamom, but Alta Verapaz is quite remote. Transportation is limited, which has left producers with few options for selling their harvests. Often, middlemen will buy cardamom at a minimal price, only to resell it at a much higher rate. This system leaves producers at the unpredictable whims of middlemen, making it extremely difficult for them to plan for the future, make a profit, and support their families.

dōTERRA has established Cō-Impact Sourcing® initiatives in Guatemala to help harvesters make the most of their crops, receive fair prices, and benefit from access to helpful resources. Cō-Impact Sourcing supports training for farmers in Guatemala, which teaches best practices for growing cardamom, including seed selection, planting techniques, harvesting practices, and plant care. As a result of this training, farmers should have a higher quality and quantity of cardamom and therefore receive a higher price for their yield.

Along with supporting cardamom production, producer communities benefit from social impact initiatives funded by the dōTERRA Healing Hands Foundation®, including school renovation, community infrastructure, and healthcare.

Responsible Sourcing and Production (Cont.)

Ylang Ylang: Madagascar



Source: Nosy Be, Madagascar

Plant part: Flowers from the ylang ylang tree

Distillation method: Steam distillation

As with many essential oils, the harvesting process for Ylang Ylang is a labor of love that takes significant time and dedication to accomplish. Ylang Ylang essential oil is taken from the yellow, star-shaped flowers of the ylang ylang tree, which must grow for three to four years before the flowers are ready to be harvested during the peak months—between April through June, just after the rainy season. Ylang Ylang harvesters pick the flowers once they reach maturity, so a single tree can be harvested several times within a six-week period.

dōTERRA sources Ylang Ylang from Madagascar, which has produced some of the highest-quality oil since the late 1800s. Our Ylang Ylang essential oil comes from Nosy Be, an island off the northwest coast of Madagascar. In the early morning hours, harvesters (typically women) pick the delicate flowers by hand. They deliver their baskets to a weighing station, where the flowers are weighed and quickly delivered to a nearby distillery. The flowers must be distilled within 24 hours of collection to preserve their properties. Distillation lasts for 18 to 24 hours.

Because of the large volume of flowers needed to produce the essential oil, the whole process of growing, picking, and distilling Ylang Ylang requires a huge collective effort.

dōTERRA has forged a partnership with the distillers and harvesters of Nosy Be to ensure they're fairly compensated for their intensive labor and the attention to detail required to produce high-quality Ylang Ylang essential oil. Along with providing fair compensation, dōTERRA is also a guaranteed buyer, so the people of Nosy Be don't have to worry about dealing with middlemen or an unstable market.

With proper compensation, these growers and harvesters have expanded the capacity of their production. In return, dōTERRA knows the trees and flowers used to make Ylang Ylang are being cared for by professionals who are passionate about delivering a useful, valuable essential oil.

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Conclusion: Honoring the Gifts of the Earth

From beginning to end, producing essential oils is a delicate, meticulous process. However, with constant care, proper technology, and skilled specialists, it's possible to produce pure, high-quality essential oils that can provide individuals with countless benefits.

Though it's a difficult and enormous task to successfully take a simple plant part and turn it into a potent essential oil, having dedicated and experienced professionals at each step of the process makes it possible to sustainably take advantage of the gifts this earth has to offer.

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