



Natural Stories: Ylang-ylang

Exploring nature and emotion: from seed to formulation

Pierre-Jean Hellivan, Charabot

In the first of a continuing series of guest columns, Pierre-Jean Hellivan will share his knowledge and passion for naturals, exploring key materials from source to refinement to formulation. Future editions will reach across the globe, including India, Morocco, China, the Mediterranean basin, and France. —Ed.

While consumers and flavor and fragrance professionals know and use many of nature's ingredients, very few truly grasp the magical stories that hide behind naturals—from a bottle of vanilla extract, to a drum of ylang-ylang oil. For too many of our industry colleagues, naturals are little more than a code number, a price or a bad crop report. Yet, it all starts with a farmer putting a seed in the ground and passionate teams dedicated to bringing nature's bounty to the world. Their stories are indeed nothing short of magical, the scents they deliver striking the very core of our emotions.

Through years of experience selling botanical ingredients, I have witnessed countless perfumers, flavorists, chefs and buyers craving to further connect with the “Gardens of Eden” where the botanicals we formulate with and consume every day are grown. Quenching their thirst with stories of nature and its craftsmen hardly ever fails to trigger this unmistakable spark in their eyes: the satisfaction of novel knowledge, the thrill of discovery and adventure, the inspiration of unleashed creativity. Is it not time to make it real? Is it not time to bring nature back in naturals?



“It is my job to tame ylang!” says ingredient perfumer Laure Jacquet; all photos courtesy of Charabot.

Ylang-ylang (*Cananga odorata*) is one of the great classics. Yet, a victim of collapsing quality, its future in our industry is endangered. This pale yellow essential oil, with an intensely sensual-sweet, soft floral, balsamic and slightly spicy scent, is a deep and rich material—a fragrance in itself. Ylang-ylang is a star ingredient of perfumers' natural palettes, immortalized in such timeless fragrances as *Chanel No. 5* and Guerlain's *Samsara*. A recent trend for white flower scents has drawn perfumers to reinterpret tuberose, neroli and jasmine, thereby shedding new light on ylang-ylang's uncanny ability to reveal the true beauty of floral notes.

Charabot perfumer Dorothee Piot bears witness to perfumers' fascination for ylang-ylang: “I cherish its spicy, sunny edge, its exhilarating charm. Ylang-ylang makes me travel. I use it to impart volume, wealth, subtleness, texture, character and mystery. It is a rich raw material that is lively; it perfectly complements floral notes. I love to marry it with woody notes, or formulate it to tame aldehydes.” But, she adds, quality is essential to ylang-ylang's effectiveness.

Beginning in the Fields

Ylang-ylang is a fragrant yellow tree flower planted in orchards alongside banana and coconut trees. It is often used as a “tutor” for vanilla vines. Ylang-ylang trees are constantly pruned to keep the trunk and branches from growing too tall, ensuring that flowers will be within easy reach of harvesters. This harvesting is conducted by hand in the morning; flowers are then taken either to collecting sites or directly to the stills for immediate processing. Distillation occurs over a wood fire using traditional equipment. While ylang-ylang trees can produce flowers year-round, the core of essential oil production occurs during the cooler and drier winter months of April through October. Blooming typically peaks July through September.



Ylang-ylang from Nosy Be.

While the ylang-ylang tree originated in the Philippines, today the flower is cultivated and distilled for its essential oil in just a tiny corner of the Indian Ocean. The Comoros Archipelago—four islands located between the northern tip of Madagascar and Tanzania—alone contributes nearly three-quarters of global ylang-ylang production: Anjouan, Grande Comore (Ngazidja), Mohéli and Mayotte. (Meanwhile, Madagascar, which only produces one-quarter of the world supply, derives its ylang-ylang crop from its northwest corner, particularly its sister island of Nosy Be.) The total ylang-ylang output from the Indian Ocean is estimated at approximately 75 tonnes per year. Among the top sources are:

- Anjouan, 45–50 T
- Grande Comore, < 2 T
- Mohéli, 3 T
- Mayotte, 3–4T
- Nosy Be, 17–20 T
- Ambanja (Madagascar), 3.5 T

Ylang-ylang and its Traditional Fractions

As many readers may know, ylang-ylang oil is typically distilled and marketed in four or five grades: “superior extra,” “extra,” (see F-1) “first,” “second” and “third”—the combination of which is known as “complete.” (For quantitative ylang-ylang oil figures, see Brian Lawrence’s “Essential Oils, Volume 6.”) These terms refer to the portion, or “fraction,” of the oil as it drips off the still. Still operators separate the oils by time of distillation, whereas collectors and traders sort it by density or “specific gravity” at 27°C:

- Ylang-ylang extra superior flows during the first half-hour of distillation. Its specific gravity is > 0.965.
- Ylang-ylang extra comes during the next hour of distillation. Its specific gravity is 0.955–0.965.
- Ylang-ylang 1 (first) is obtained during the third hour, with a reading of 0.945–0.955.
- Ylang-ylang 2 (second) comes next, within the 0.932–0.940 bracket.
- Ylang-ylang 3 (third) is collected after the sixth hour of distillation, and will come dripping in until the following day. (See F-2.) This is why this last fraction often has a burned note. To avoid such off notes, distillation should be stopped after the sixteenth hour. Best qualities should have a specific gravity of 0.905–0.910.

Such traditional fractionation processes yield one-third of high fractions (extra superior, extra, first) and two-thirds of low fractions (second and third). Oils are sorted in the field, right at the mouth of the still’s gooseneck. Specific gravity is then verified by a simple manual glass density meter. Until recently, specific gravity dictated price—there was a price per degree for the highest fractions! Indeed, a high-density, high-fraction ylang-ylang extra would always fetch top dollar as it was preferred by perfumers despite its limited supply. Accordingly, the low-density ylang-ylang 3 was sold at a discount (per kilo) as it was in much lower demand and boasted a greater supply. All of this was proof that ylang-ylang extra was the industry’s Holy Grail.

The Industry’s Ylang-ylang Crisis

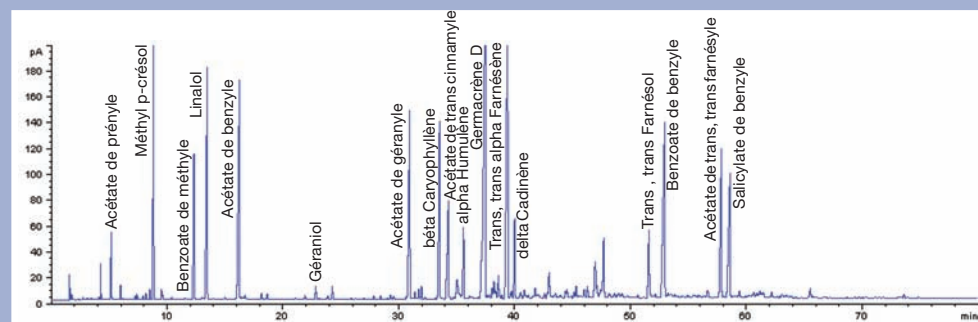
In the last few years, the three largest traders of Comoros ylang-ylang went out of business. Over the course of just a couple of seasons, they abandoned their stronghold on Anjouan’s ylang-ylang production, leaving the market at the mercy of newcomers. Many industry players tried to fill the void, wrestling for supply and market share and meanwhile dismissing quality considerations.

Soon enough, the word spread amongst the ylang-ylang community in the Comoros Islands that heating ylang-ylang 3 would increase its density from the low 0.900’s to the mid-0.950’s—essentially turning ylang-ylang 3 into ylang-ylang extra, on paper. Oblivious to the consequences of such adulteration (odor, GC and solubility), and without strong supervision or enforcement by these newcomers, large volumes of Anjouan’s ylang-ylang 3 (essentially 60% of the world supply) was adulterated.

Ylang-ylang 3 was routinely heated and eventually recombined with genuine ylang-ylang extra. Proof is found in export statistics, which show an unbalanced ratio of high vs. low fractions of 60/40, whereas the distillation process only produces a ratio of 33/66. This adulteration and related misrepresentations have plagued the industry and endanger the future of ylang-ylang itself. We are now facing a major shortage of ylang-ylang 3; high quality ylang-ylang extra is hard to come by—not to mention prices that have risen dramatically.

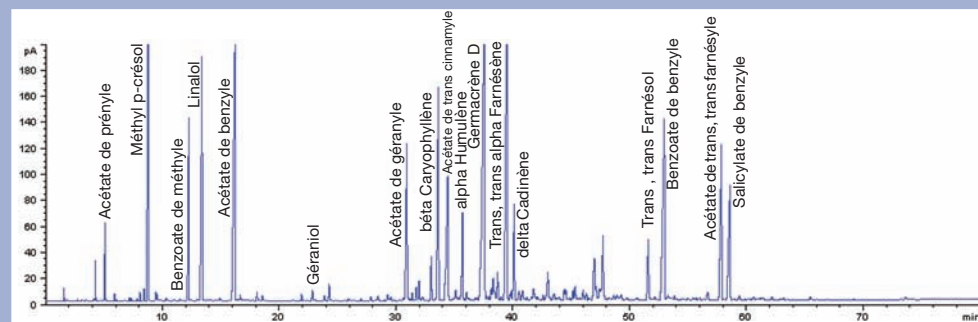
Ylang-ylang extra (Comoros) GC/FID

F-1



Ylang-ylang 3 (Comoros) GC/FID

F-2



Snapshots from the Land of Ylang-ylang in Turmoil

Yannick Lavenu, Charabot’s technical and sourcing manager, is in the midst of yet another trip to the

Comoros Islands. As his four-seater airplane awkwardly lands in Anjouan Airport, he does not fail to notice the control tower has been peppered with machine gun fire since his last visit to this politically unstable and impoverished island. Still, tackling recurring quality issues and securing and stabilizing the ylang-ylang oil supply is well worth landing in what was a battlefield just weeks ago.

Anjouan is indeed the heart of ylang-ylang production, supplying over half of the world's output. French colonists imported ylang-ylang from Reunion Island to the Comoros Archipelago, where its agriculture grew significantly. Exports of its essential oil have ever after been a vital source of foreign currency to the local economy, representing a pivotal source of income for local farmers. Unlike Madagascar, where ylang-ylang is found in a just a few large commercial farms and distilleries, the Comoros Islands are dotted with countless family plots growing and distilling ylang-ylang with rudimentary stills. Anjouan alone boasts some 450 operating stills, according to collector estimates and aerial reconnaissance.

Lavenu's 4x4 truck progresses at a snail's pace along the poorly maintained colonial roads hugging the Caribbean-blue waters. Obstacles are everywhere: potholes, goats, stray dogs and old beat up drums marking police roadblocks manned by machine gun-toting African Union soldiers. Having seen combat just weeks ago when they landed on the island, these Tanzanian and Somali soldiers have one clear mission now: prevent further unrest following the latest of numerous political upheavals. Speaking neither English nor French, they waste no time in suspecting the unfortunate Lavenu for a foreign agent. Lavenu is questioned, searched and eventually persuaded to pull out his digital camera and show the soldiers his photos of ylang-ylang. Ah, the number-one export of the country! Satisfied with their interrogation, the soldiers reluctantly release their suspect.

Soon, along the winding road at the base of a steep volcanic mountain, Lavenu passes women carrying on their heads woven palm baskets filled with a few pounds of fresh ylang-ylang enroute to the local still. "Our still



Stills are sheltered in shacks made of palm leaves, hidden in the steep jungle.

is right off the road along the beach," they say. A short three-mile walk.

The ylang-ylang orchard is in its prime during Lavenu's visit. On this lush mountainside parcel, trees that were planted here five years ago are just now ready for their first harvest. The farmer can now count on harvesting 5 kg



Ylang-ylang trees are constantly pruned to keep the trunk and branches from growing too tall, ensuring that flowers will be within easy reach of harvesters.

of ripe flowers per tree this season. Flowers are blooming, the scent of ylang-ylang drifts through the whole plantation. Like hummingbirds following a sweet scent trail, pickers glide from tree to tree in the poorly maintained farm, expertly collecting flowers. They have been trained to only pick the ripe yellow flowers not the greenish ones, so as to optimize distillation yields.

The wood fire is burning hot under the old still—a classic sight in Anjouan. The still is sheltered in a shack made of palm leaves, hidden deep in the steep jungle. Its roof does shade from the scorching sun, but it also keeps the heat in. Sweating from every pore, men are busy feeding the fire, weighing baskets of fresh ylang-ylang, and carefully laying flowers in the still in loads of 60–100 kg. Decades of experience have taught these workers to collect every drop of oil flowing off the gooseneck and properly segregate each fraction. The process is comprised of novel precision: here, the 33-cl Coke glass bottle rules as a standardized unit of measurement. The first 30 minutes of distillation will fill exactly two such bottles with ylang-ylang extra superior. The next hour will fill three more with extra quality, and so on.

Sample bottle in hand, Lavenu stands ready to capture the very first drops of essential oil, the quintessential top note of ylang-ylang extra superior. Dizzy from the heat, his cerebral cortex captures forever the three-layered scent of an ylang-ylang still: smoky wood fire, animalic human sweat and the exhilarating ylang-ylang. Soon enough, the first drop of essence comes through: a fascinating floral note, slightly spicy, with an unmistakable banana edge.

As the distillation continues, and for the next 20 hours, he will systematically collect samples of every fraction, to be used as quality benchmarks for ylang-ylang of this region of Anjouan. Being able to "fingerprint" ylang-ylang oil



The wood fire burning hot under the old beat-up still is a classic sight in Anjouan.

and thus pinpoint precise origins is key, indeed. Lavenu scans the old notebook, and notices that extraction yields here are in line with averages 2% to 2.25%. He knows, however, that yields could be boosted to 2.75% with a minor equipment upgrade and processing of mature flowers only. Something to work on, he notes.

Rebuilding Ylang-ylang's Supply Chain at Source

After days of touring both the Pomoni and Moya areas of Anjouan, and having met with all of the company's collectors and suppliers, it became clear to Lavenu that the market and its network had perilously destabilized. Scavenging attempts by various market newcomers have failed, either for lack of financial backing or strategic commitment. Local suppliers are nervous, are not sure of whom to trust and with whom to ally themselves. These locals are longing to rebuild a strong partnership with a new partner, able to deliver quick cash and long-term commitment.



Soon enough, the first drop of ylang-ylang oil will come through: a fascinating floral note, slightly spicy, with an unmistakable banana edge.

The pillars for stewarding Anjouan's ylang-ylang back on the road to recovery were set in stone with Lavenu's network of collectors and traders: quality support to recover olfactory and analytical standards, improvement of distillation equipment, operational support to help further enhance yields, commitment to purchase significant volumes, plant new orchards and improve maintenance of existing plantations, assure sustainable prices to the dealers as well as the farmers, along with pre-financing. Two ecological concerns were also addressed: firewood harvested for open fire distillation and related dangers of deforestation, and proper monitoring of water consumption and waste water disposal.

Having completed an exhausting week in Anjouan, Lavenu boards his Cessna under the bullet-hole-peppered control tower. The compass will soon mark 310°, heading northwest to Grande Comore. There, Lavenu plans on capitalizing on a wholesome network of farmers and collectors. Quality has never been an issue in Grande Comore, yet its annual output of barely two tonnes is well below capacity and bears much potential.

Ylang-ylang and Basic Added Value

"Every lot of ylang-ylang is different," says Charabot ingredient perfumer Laure Jacquet, who works hand in hand with the QC department on quality management.

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Yannick Lavenu, technical and sourcing manager, inspects ylang-ylang on Nosy Be.

"Yet, on paper, they all meet the same basic standard specifications. Analytically and olfactively, we have developed the ability to discern Madagascan oil from one from Nosy Be from Anjouan or Grande Comore, for example." The trick for Jacquet and her colleagues is to level the natural peaks and valleys among the six different origins and key collectors, by carefully selecting lots and formulating consistent blends. As the ingredient perfumer puts it, "It is my job to tame ylang!"

Once screened, every lot of ylang-ylang will be blended according to Jacquet's formulas, then filtered before undergoing a final QC check. Only then will ylang-ylang oils be made available to the market. In addition to managing the supply of high-priced pure oils, Jacquet's responsibilities also involve formulating natural and artificial grades to serve every technical regulatory and budget need of the industry.

Ylang-ylang and High-tech Added Value

Distillation fractionation and molecular distillation equipment are now increasingly put to the task to further add value to ylang-ylang materials. For instance, Charabot isolates the "heart" of ylang-ylang 3 from Comoros (internally referred to as "ylang fraction G"), which is characterized by germacrene D and cinnamyl acetate's floral character. (See F-3.) This heart mixes well with mild vanilla, clove and woody notes. This low-allergen fraction is a carnationlike fragrance in and of itself.

A narrow fraction of Comoros ylang-ylang 3 (internally referred to as "ylang fraction F") boasts high concentrations of farnesene and cadinene, twisting its aroma into sweet green, slightly floral-metallic, and spicy notes. (See F-4.) This molecular distillate is low in isoeugenol and benzyl alcohol.

Employing a flash-distilled extraction process, Charabot also removes heavy, insoluble and colorant components to resolve solubility issues (this ingredient is referred to internally as "ylang extra-soluble"). (See F-5.) This new material can be an asset to perfumers working for clients

that require “water white” fine fragrance formulations. Furthermore, the process adds a slightly creamy facet to the classic ylang-ylang profile.

The Sourcer's Perspective

Reflecting on the ylang-ylang crisis and Charabot's sourcing strategy, Lavenu shares his thoughts: “As a company, we cannot solve the ylang-ylang crisis on our own. Yet, we are determined to play a key role in a long-term solution. Learning from the turmoil of the past, we are implementing a deep, comprehensive, boots-on-the-ground approach and are building stronger partnerships throughout the Indian Ocean. In Anjouan, the epicenter of it all, it will take the dedication of every member of our ingredient business unit to turn the tide. Extensive support trips by our experts in farming, extraction and quality management will bear fruit.”

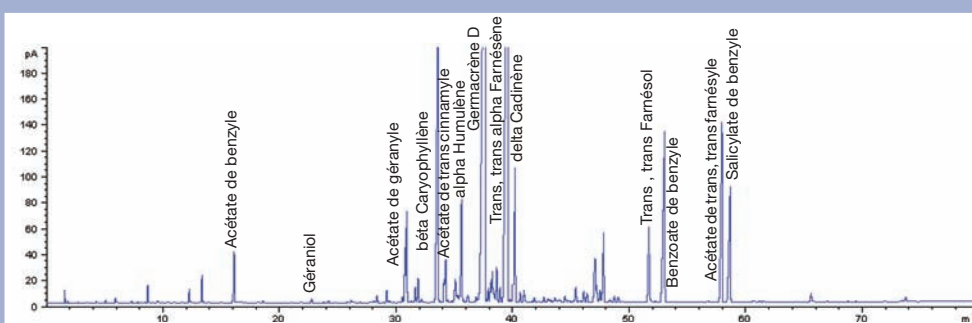
The Perfumer's Perspective

Charabot perfumer Emilie Bouge says she recently rediscovered ylang-ylang when she smelled a fresh flower for the first time. “For me, ylang-ylang was just another oil with that jasminey floral penetrating note, sometimes hitting you too hard, unbalanced between animalic and anise characters. Many modern perfumers call ylang-ylang ‘the jasmine of the poor’ and consider it as vintage, or déjà-vu, along the same lines as patchouli. It all changed for me when I smelled a fresh flower of ylang-ylang, making it real, making it magic. While I immediately picked up the character of the oil, the scent of the fresh flower was magnified, beautified, enchanted, a lot more sensual, more refined. Ylang-ylang oil has become for me a diamond in the rough.”

So, make it real. Bring a blotter of ylang-ylang to your senses. Hopefully now, more than just another floral note, its essence will make you revisit snapshots and stories of

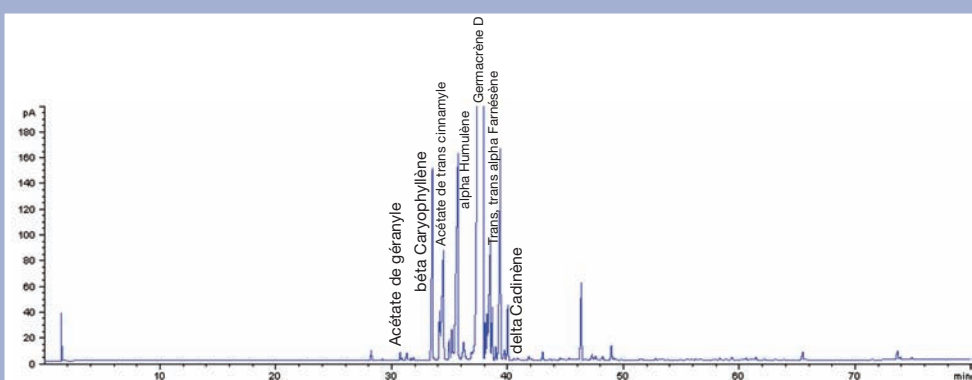
Ylang-ylang fraction G GC/FID

F-3



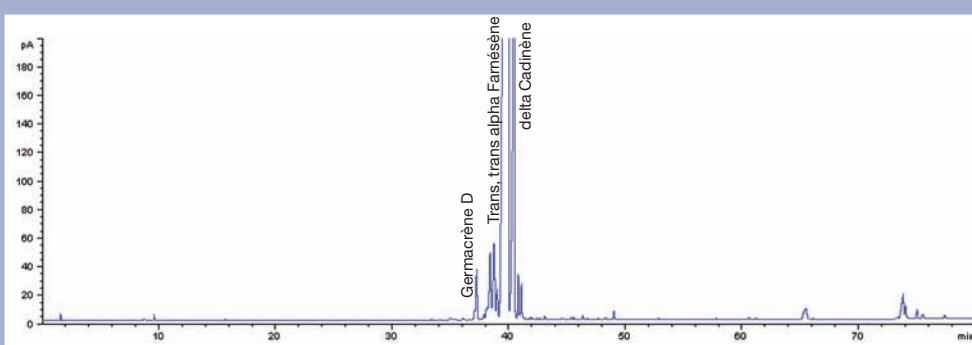
Ylang-ylang fraction F GC/FID

F-4



Ylang-ylang (Comoros) extra soluble GC/FID

F-5



a magical flower and the people dedicated to bringing to our industry its scent and all its emotions.

Address correspondence to Pierre-Jean Hellivan, Charabot, 30 Corporate Drive, Orangeburg, NY 10962; p.hellivan@charabot.com.

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