



Jasmine

Reinventing the “king of perfumes”

Pierre-Jean Hellivan, Charabot

“Whilst the rose is the queen of flowers, jasmine is the king of perfumes. It has been a symbol in Grasse of the perfume industry of the whole world. ... It is the natural product par excellence,” wrote Edmond Roudnitska, mentor to many of today’s great perfumers and creator of Christian Dior’s *Diorella* (1972), a quintessential jasmine perfume.¹ The jasmine flower is tattooed on the history of the fragrance industry and the city of Grasse, France. Over the course of three centuries, it crept over the hills and valleys surrounding the fragrant city, elevating the small town to world-renowned cradle of the French perfumery industry. Perfumery eventually employed thousands of Grassois devoted to serving the world’s growing appetite

for jasmine. Testimony to the thirst for its liquid extract can be found in the old saying, “No perfume without jasmine.”

Today, jasmine fields have migrated to more exotic shores. All that remains in Grasse are a few fragmented acres of jasmine fields clinging to yesteryear’s heritage, delivering high-priced flowers for the exclusive needs of luxury fragrances. What is set in stone is jasmine’s foremost position in a perfumers’ floral palette: Every day, new accords are formulated with its extract. The intensely floral, warm, rich, indolic scent of *Jasminum grandiflorum* L. boasts a highly diffusive odor with herbaceous fatty fruity tobacco and tealike undertones. Apprentice perfumers are often amazed by how little jasmine is required

Jasmine: The Flower of Flowers

A perfumer’s look at this intimate and secretive ingredient

When Pierre-Jean Hellivan asked me to collaborate with him in writing this article about jasmine, I was completely delighted, as jasmine is not only my favorite floral note, but it also seemed a really rich, interesting and history-filled subject. I saw myself getting to the task wholeheartedly—in theory.

In reality, when I sat in front of my computer, my hands froze at the keyboard. How could that be? Suddenly, the ideas I had drafted for this piece appeared to be too technical, too matter-of-fact-ish: in other words, too unemotional. I had been *thinking* about jasmine, not *feeling* through it. At first, I had said to myself, “Let’s analyze jasmine, decorticate its olfactive profile and, somehow, tell something about its history and quirks.” I was thinking about the usual suspects: Arab culture, the Grasse fields and enfleurage, the development of synthetic benzyl esters and methyl dihydrojasmonate, the chemistry of indole and other nitrogenous compounds occurring in floral physiology, etc.

An article about jasmine thoroughly *exposing* it: wrong approach. And why did this approach seem

inappropriate? Because jasmine is—to my eyes and nose—one of the very few intimate and secretive ingredients on the perfumer’s palette. There will always be something completely idiosyncratic and mysterious hidden within it.



Rodrigo Flores-Roux, Givaudan

The scent of jasmine is a highly personal one, mostly because it touches people in uncannily different ways. Jasmine makes emotion, perception and thought react differently. Thus, it conjures deeply private images, evokes the most secret memories and sparks the wildest impulses that otherwise could be prudishly held back. By this, I am not saying that the olfactive entity that perfumers call jasmine is discreet (it can be very loud), or balanced (it can be ferocious and crazily violent) or always pleasant (horse-like aspects, overripe fruit accents and fecal nuances are all present in jasmine). What I’m saying is that it is always rich and opulent, and thus, extremely desirable, despite its apparent shortcomings. Think about luxuries and delicacies like sewer-smelling white truffles, an over-salty spoonful of caviar, the unwashed whiff of agarwood, or some expensive silk taffeta so stiff it creates a rash. All of these strangely attractive things flirt with one’s imagination and somehow arouse the senses.

My first experience with jasmine occurred when I was 13, a *tête-à-tête* meeting with a century-old jasmine vine climbing up a wall in Tepoztlán, a temperate spot south of Mexico City surrounded by lower, warmer weather valleys. The plant was a glorious *Jasminum grandiflorum* in full bloom. A white and pink carpet of fallen flowers sprawled beneath the twisted branches. I remember picking up the flowers in handfuls and inhaling the dizzying, sweet scent: fruity, spicy, fresh and warm. I had just become interested in aromatic plants and this was the ultimate discovery.

Many years went by before I was able to put my hands on a small sample bottle labeled “Jasmin Absolu Egypte Extra Pur” at the facilities of Lautier Florasynth on Rue Sidi Brahim, in Grasse. Unbeknownst to the kind man who gave that bottle to me—which I still keep—an enormous and ongoing love affair was born that day. It was upon diligently studying this absolute as a first year student at ISIPCA (Institut Supérieur International du Parfum) that many things started making sense. Finally, I was able to trace back to jasmine absolute that profound, voracious scent I loved and that was prominently present in the many perfumes that had marked my life. Perfume history lessons at school happily confirmed my suspicions about jasmine being, if not omnipresent, certainly a praiseworthy supporting actor in each one of these compositions.

Firstly, on my “greatest hits” list, there was *Jean Patou Joy* (1930), my mother’s most revered perfume. I could confirm that the obvious, almost gritty rose notes featured in *Joy* concealed behind them a jasminic tempest, creating a marvelous anamorphosis. To this day, when I smell *Joy*, I ask myself, “Which one do you perceive first, the rose or the jasmine?” Henri Almeras’ creation always appears to be a flawless olfactive trompe l’oeil, an awe-inspiring balancing act of two flowers melting together.

Then there’s *Diorissimo* by Christian Dior (1956), in which I would find the heady, unctuous smell of pink amaryllis lilies blooming in Mexican late spring. After becoming more familiar with jasmine absolute, that particular floral harmony within this magnificent perfume revealed itself as a compelling indole backdrop, working in tandem with the most perfect hexenol-green opening. Lily-of-the-valley, or muguet, is not known in Mexico, and even if I had been told at school that the words “soliflore muguet” described *Diorissimo*, it became apparent that thanks to the presence of jasmine, illusion and magic could happen in this wonderful craft called perfume making: You think you smell muguet, but what you are really reacting to is, yet again, *Monsieur Jasmin* and his art of seduction, playing a dusky bass under the sparkling scherzo of lilies. In my personal Pantheon of perfect perfumes, *Diorissimo* holds court as indisputable king.

Thirdly: What about that mouthwatering fruitiness one finds in jasmine absolute? Analyzing it allowed me to understand *Diorella*, again by Dior (1972), and its unexpected encounter of fresh peaches and sunbathed lemons. This ultra-modern scent reminds me of the impossibly slick scent of magnolias. And—*quelle surprise*—its central core revolves around an abstraction of jasmine, this time paired with a diaphanous chypre accord infused with fruit, underneath a refreshing citrus burst. This is a monumental creation by Edmond Roudnitska, just like its elder sister, *Diorissimo*.

On the other side of the fruity spectrum, my old bottle of *Le Jasmin* by Le Galion—created by Paul Vacher in 1937—was redolent of raspberry jam and dried apricots, a sweetness that was hard to resist due to the velvety fruit notes of “benzol” quality jasmine absolute. This same tantalizing nuance of sugary fruit preserve is apparent in such beauties as the explosive *Gianfranco Ferre* from 1984 (which is also all about jasmine), the intricate *Ivoire de Balmain* (1979) and the sadly departed *Casaque* (Jean d’Albret, 1957).

I don’t want to sound like a preachy, dust-covered historian talking solely about the past. A new menagerie of jasmine perfumes is surely lurking and will run rampant very soon. Just recently, jasmine has been prominently featured in Estée Lauder’s *Beyond Paradise* and Ralph Lauren’s *Blue* (both launched in 2003), and the sensational but sadly overlooked *Matthew Williamson* (2005), all of them seamless constructions that, timidly or not, tiptoe around the calyx of the jasmine flower. Why not just dive in?

I personally like *Monsieur Jasmin* shaking it up a bit and storming into a men’s concoction, as I intended in *John Varvatos Vintage* (2006), where it teams up with labdanum resins, quince fruit paste and moss. Let’s see who dares toying with a frankly floral *Jasmin pour homme*.

And let’s keep an eye on new developments when it comes to extraction techniques. I’m intrigued by the bud, or “sepale,” quality, discussed in this article. Although the thought of nimble hands picking the yet-to-open floral buttons of *J. sambac* saddens me—because this will never allow them to deliver all their splendor—this exquisite but potent extract is exhilarating and fresh, and not at all beastlike. It’s almost as if other tropical flowers, maybe nocturnal, visited the jasmine fields. It will certainly prove to be a great asset within a modern perfumery palette.

I am also interested in playing new games with jasmine concretes. Jasmine will always reveal its beauty, create magic and play tricks on us. In the realm of perfume, jasmine is the flower of all flowers, and to quote William Shakespeare’s *The Tempest*, it is “such stuff/As dreams are made on.” ■

to yield that unmistakable floral note to any formula. No wonder jasmine's scent became the signature ingredient to a legendary perfumer, Ernest Beaux, and his historic creation, *Chanel N°5*. It is also unsurprising that jasmine is a keystone in *Jean Patou Joy*—the eponymously titled “most expensive fragrance in the world.” And it is certainly no wonder that jasmine made history when formulated into Coty's *Chypre*, the fragrance whose name became a benchmark fragrance family descriptor.

While the city of Grasse still grieves jasmine's exodus with an annual festival and museum expos, some Grasse extraction companies continue to carry the torch, remaining at the forefront of the jasmine trade via offshore sourcing, secondary extraction, research and innovation. This new generation in Grasse still holds jasmine close to its heart, an indelible devotion to a fragrant white flower. The love story continues, in new ways.

Botanical Origins

There are two main species of jasmine flowers extracted for the perfumery industry. First is *Jasminum grandiflorum* (L.) Aiton, so named for its larger flower. It is sometimes known as Spanish jasmine, and originates from Nepal. It was introduced into Europe in the 17th century. Today, *J. grandiflorum* flourishes in Egypt and India, thanks to mild winter weather. When grown in the Grasse area, it requires grafting onto *Jasminum officinale* L. for survival. *Jasminum sambac* L., on the other hand, is a more delicate jasmine flower that opens only at night and is picked in the morning when the tiny petals are tightly closed. Harvested buds are taken to auction markets and then stored in a cool place until dark. Between 6:00 PM and 8:00 PM, as the temperature cools, the petals begin to open, releasing their glorious scent, characterized by a rich indole content.

Jasmine's Migration

Flashback to the 17th century, when the bishop of Grasse wrote, “Oh fields! Oh fields of Grasse! Oh fertile hills, Oh cultivated crags, oh silvery sources, oh myrtles, oh jasmines, oh forests of Orangeflower.” At that time, an estimated 30 acres of Grasse gardens would produce jasmine to serve the needs of the fragranced glove and leather industry and luxury perfumes. In 1860, the construction

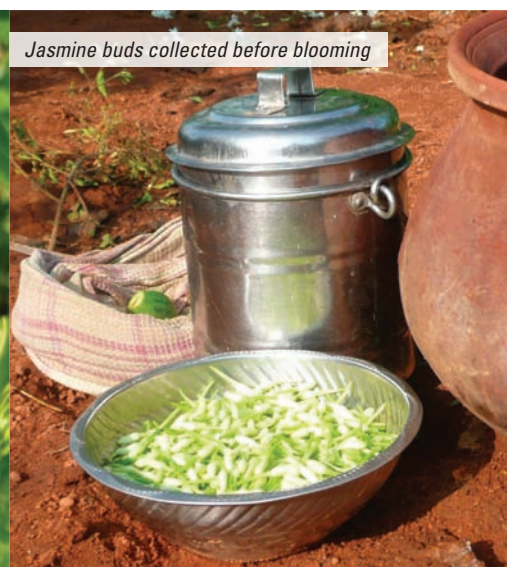
of the Siagne Canal marked the transition of the region's jasmine production into a fast growth mode, powered by more reliable field irrigation. This in turn led to a quick expansion beyond the city walls. For nearly 100 years, Grasse arose as the sole producer of jasmine extracts.

Peaking in 1931, the lives of thousands of Grassois were punctuated with the April crop of orange flower, the May crop of rose, and the jasmine crop from Bastille Day (July 14) through early fall. Famous houses still operating today, such as Robertet, Mane, Charabot, Argeville and Payan Bertrand, were processing jasmine flowers alongside other legendary names like Chiris, Roure, Chauvet, Lautier and CAL—names that did not survive the industry's tsunami of consolidations in the late 20th century.

The 1930 Grasse harvest yielded a record 1,800 metric tons of flowers and more than 5 metric tons of jasmine concrete. Women and children worked in fields seven days a week, men on Sundays, and students would not return to school until the crop ended in early October, totting excuse notes signed by the mayor of Grasse himself.¹

The decline of the production of jasmine in Grasse started with the economic crisis of the early 1930's, further spurred by the emergence of competition in Italy and Morocco. It was eventually brought to its knees by the hegemonic coup de grace of India and Egypt.

Two ambassadors of this seemingly far-gone era, Hubert Biancalana and his daughter Carole, maintain a jasmine plantation in Plascassier, near Grasse. Still farming a few acres of *J. grandiflorum*, the Biancalanas know how labor intensive this crop is in Southern France. There, *J. grandiflorum* requires well-drained sunny fields, ideally at 300–400 m elevation. As the plant is particularly sensitive to frost, Grasse farmers have always resorted to grafting. In late winter, they would plant sturdier frost-resistant stems of *Jasminum officinale* (L.) Aiton, and only in the following spring would they graft *J. grandiflorum* onto the *J. officinale* stem. Grafting was a tedious back-breaking endeavor, sometimes carried out in tag teams of four who would graft up to 2,000 plants in a day. The first year, flowering would start in August, and then subsequent harvests would kick off in early July and carry on through early October. For the Biancalanas today, just as for the thousands of pickers of a century ago, when jasmine fields stretched as far as the eye could see, jasmine



Snapshot from the Jasmine Field: Madurai, India

harvest begins every summer day at the break of dawn. The small white flowers are carefully picked by hand, as they are very fragile. Pickers fill a woven basket belted around their waist, which can sustain about 100 g of flowers. Once full, the basket will be emptied in the shade, and the flowers covered with a damp cloth. Experienced pickers can harvest 6–8 kg per day. At the end of the day, the producer will weigh each picker's yield, pay them accordingly, and rush the fresh flowers to extraction facilities. In 1856, Grasse processed 80 metric tons of jasmine flowers; in 1930 it peaked at more than 1,800 metric tons (yielding over 5,000 kg of jasmine concrete), before declining steadily and deeply. Today, processed totals have stabilized below 25 metric tons (< 70 kg of concrete).

Jasmine Extraction

Surprisingly, jasmine does not produce a steam-distilled essential oil. For centuries, various crude processes were developed to infuse its scent into starch, talcum powder or various vegetable oils. These methods were eventually refined into a cold saturation method called *enfleurage*. *Enfleurage* became widely used at the beginning of the 19th century due to its ability to extract the original scent of the fresh flower. As Madelein Masson's *Dictionnaire des Parfums de France* put it:

[E]nfleurage works in a manner closest, relatively speaking, to the olfactory tract itself of the mucous membranes of our noses, where the sweet-smelling fragrances given off by the flower one is smelling for a very short period of time. Our olfactory tract does not suddenly make contact with all the main aromas of the flower by breaking open fragrant cells, and the fat used in the saturation process also works like the mucous membranes by taking in their sweet-smelling fragrances, almost without being in contact with the flowers, up to the point where the fragrances are no longer given off.”³

The method consisted of placing 50–100 g of jasmine flowers on a bed of animal fat set on a 2-sq-ft wooden tray (called a chassis) and allowing the botanical's scent to infuse the crude lipid for up to 30 days. Trays would be stacked on top of one another, and maintained and turned over daily to optimize the surface contact between the fat and flowers. The scented fat, known as pomade, was then washed with alcohol, which was then chilled to solidify residual fats for removal. Eventually, the alcohol was distilled off to concentrate the fragrant molecules into a “jasmine absolute from pomade.” It is worth noting that, in the 20th century, the waste flowers of *enfleurage*, which still contained some odorous matter, would also be further processed with a hydrocarbon solvent (petroleum ether) to yield a “jasmine absolute from chassis”—a material that has now disappeared. The *enfleurage* method began its slow decline in the early 1900s, and became extinct in the early 1960s to the benefit of volatile solvent extraction.

As jasmine was transitioning from Grasse to Egypt and India, volatile solvent extraction became recognized as the

A powerful hand grabs my shoulder and stops my momentum. Raja Palaniswamy, director of Jasmine CE, yells, “Step back! These anthills always have cobras!” As we enter a jasmine field, this is a staunch reminder of India's exotic and dangerous reality. It is early April, the peak of the jasmine *sambac* crop. The sourcing team is visiting yet another plantation, overseeing the first production of *Jasminum sambac* bud, or “sepale,” absolute, derived from an early morning extraction of the *sambac* flower, boasting low indole levels and a much greener note.



The author in a jasmine field.

The rising sun slowly burns away the morning mist, promising another scorcher of a day. In typical Indian fashion, the local farmer grows intercrop, i.e. two crops in the same field: *J. sambac* and *J. grandiflorum* share acreage with *J. auriculatum* Vahl—a species grown mostly for the needs of the Indian decorative flower trade. Indeed, religious and marriage celebrations in India are huge consumers of fresh flowers, with jasmine being most sought after. A contingent of pickers has been hard at work since daybreak, delicately picking each *sambac* bud at a pace of < 5 kg per day.

By midmorning, buds are taken to the local flower auction market: A romantic place in theory, but quite the opposite in reality. The streets are laden with filthy rotten flowers and a constant flow of mud. Swarms of farmers and buyers—many of them barefoot—come in and out, carrying their colorful precious cargo. Filth and madness are quickly forgotten when stepping up to a vendor's stall, displaying the days' fresh pick on a clean concrete patio. The palette of colors and scent is simply incredible: white piles of fragrant jasmine *sambac* and tuberose, pink and red roses, red and orange marigolds, and green davana are in season. While men are busy handling business matters, women are involved in the value-added process, making necklaces out of flowers—yet another reminder that only a small fraction of the Indian flower crop is routed toward the fragrance industry.

Truckers are revving their engines as canvas bags of fresh flowers are submerged under water one last time before transport. Within minutes, flowers will be loaded onto cargo planes at Madurai Airport, or into extractors at Jasmine CE's facility, just miles away. ■

most efficient and safe method for processing. It remains the standard today. Volatile solvent extraction is a two-step process. The first must be conducted within hours of harvest of the fresh flowers. The primary extraction requires the placement of fresh flowers in extractors using hexane as a solvent. The volatile aromatic compounds are captured by the solvent, which is eventually distilled off under vacuum, thereby producing the concrete, a material that is insoluble in alcohol due to its wax content of up to 50%. While a concrete can be used as-is in soaps or other fat-based products, its lack of solubility requires further processing for use in fine fragrance. The secondary extraction involves mixing the concrete with alcohol, chilling it to precipitate waxes, filtering out the waxes and evaporating the residual alcohol. This is the absolute.

Modern Production Data

The market price of jasmine absolute has increased sharply in the last few seasons. Beyond the obvious impact of the oil crisis on solvent and energy costs, the price of flowers also inflated significantly as farmers increasingly walked away from jasmine agriculture due to unsustainable prices—yet another lesson in business sustainability and the paramount importance of a sourcing strategy starting at the farm level.

While today's *J. grandiflorum* farmers in Grasse harvest enough flowers to manufacture no more than a few dozen kilos of concrete, Egypt and India's production consistently flirts with the 10-metric-ton mark. In 2008, Egypt's output reached more than 4 metric tons, nearly 20% below normal; acreage has decreased, as Egyptian farmers switched to more beneficial crops (reportedly corn and wheat), forcing jasmine producers to pay up to a 50% premium to secure their needed quantities of raw material. Prices of Egyptian concrete are reported to have increased 18% in 2008.⁴

India processed just over 3 metric tons of *J. grandiflorum* concrete that same year—a normal crop. Much like their Egyptian competitors, major Indian jasmine players engaged in bidding wars while securing exclusive sourcing agreements with farmers, who were becoming increasingly concerned about unsustainable prices. Flower prices nearly doubled in two years: from 27 rupees in 2005, to 31 rupees in 2006, to 45 rupees in 2007 and 2008. Similarly, Indian jasmine concrete prices have also increased by 18%.

As for *J. sambac*, its core production lies in the Madurai area of southern India. The 2008 crop was plentiful, yielding 2,550 kg of *sambac* concrete. This was the same as 2007, but a 25% increase over 2006. As some key users had taken strong positions in 2006, concerns of overproduction grew in light of the 2008 bumper crop; still, market dynamics lead prices on a slight upward trend.

Extraction yields of jasmine (*J. grandiflorum*) differ depending on growing regions, annual crop conditions and efficiency of extraction equipment. In Egypt, a local manufacturer claims the

following as typical yields: 7,500–8,000 individual flowers, weighing 1 kg; 1,000 kg of jasmine blossoms will yield 2.5 kg of jasmine concrete; and 1 kg of jasmine concrete yields 530–600 g of jasmine absolute.

In India, Charabot's partner, Jasmine CE reports the following: 8,000–10,000 individual flowers weigh 1 kg; 1,000 kg of jasmine blossoms will yield 2.7–2.9 kg of jasmine concrete; and 1 kg of jasmine concrete yields 500–540 g of jasmine absolute.

Basic Jasmine Components

Analytical tools and science evolved throughout the 20th century, slowly lifting the veil on the composition of jasmine volatile compounds. Sticking to the basics, Maryline Vallette, Charabot quality control, routinely monitors 15 basic components when analyzing *J. grandiflorum* and *J. sambac* of Indian and Egyptian origin, keeping in mind that variances occur from crop to crop (T-1).

However, jasmine's signature scent lies beyond the basic main components: benzyl acetate, benzyl alcohol, benzyl benzoate, linalool, indole, methyl anthranilate, etc. Over the years, laboratories have discovered hundreds of other components. Some of those boasting the most potent effects were found in minute concentrations. This led Steffen Arctander to declare jasmine as "one of the most striking examples of nature's ability to round off and conceal—or unsurpassably utilize—the odor-effect of very simple odorants (benzyl acetate and linalool), the main constituents of jasmine."² Amongst the many components

Comparative percentage composition of the major volatile components of jasmine and sambac absolute

T-1

Compound	Jasmin absolute		Sambac absolute	
	1	2	3	4
<i>cis</i> -3-hexenyl acetate	ni	ni	2.8	1.8
benzyl alcohol	0.8	1.3	14.2	6.2
p-cresol	0.1	1.5	-	-
methyl benzoate	ni	ni	0.7	0.5
linalool + 2-phenethyl alcohol	4.0	4.3	21.6	8.1
benzyl acetate	14.4	18.1	9.2	13.8
indole	1.9	3.2	ni	2.5
eugenol	1.1	1.4	ni	ni
<i>cis</i> -jasmone	2.5	3.7	ni	ni
methyl anthranilate	-	-	2.5	8.1
α -farnesene*	1.7	1.8	8.2	13.8
<i>cis</i> -3-hexenyl benzoate	1.2	0.9	3.1	6.8
methyl jasmonate	1.2	0.8	0.1	ni
germacra-1,6-dien-5-ol**	-	-	3.8	2.2
benzyl benzoate	9.6	11.1	0.4	0.6
isophytol	7.4	6.4	-	-
ethyl linoleate	2.6	2.4	1.0	4.4
phytyl acetate	6.2	4.1	-	-
tricosene*	-	-	6.9	4.3

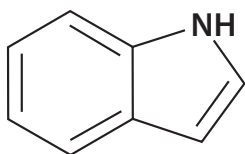
1 = Egyptian jasmin absolute; 2 = Indian jasmin absolute; 3 = Indian sambac bud ("sepale") absolute; 4 = Indian sambac absolute; ni = not integrated; *correct isomer not identified; **identification based on: BM Lawrence, Progress in Essential Oils. *Perfume Flavor*, 19(4), 64–69 (1994); source of data: Charabot (see Acknowledgements)

that contribute to delivering that true jasmine note, some have been synthesized into fragrance aroma chemicals. There are several classics that should be mentioned.

Jasmones are known for their rich, fruity, spicy, celery-like notes. Methyl jasmonate, which is called “the high pitched beating heart of jasmine” by some perfumers, constitutes < 5% of the volatile absolute. Interestingly enough, it is while researching the chemistry of methyl jasmonate and other components of jasmine absolute, that Firmenich synthesized methyl dihydrojasmonate (**F-1**). Better known as Hedione,^{*} it is a key ingredient in countless fragrances, debuting in the 1960s when Edmond Roudnitska used it in Christian Dior’s *Eau Sauvage*, and when Guerlain laced *Chamade* with a gorgeous dose.

Methyl dihydrojasmonate, first synthesized commercially as Hedione

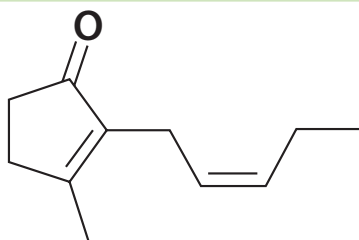
F-1



Indole, known for its animalic character, is naturally occurring in jasmine at < 5% (**F-2**). Indole builds up during the night in the cells of the petal tissue, and is released when the flower opens during the day.

Indole

F-2



Years of analytical findings, breakthroughs in aroma chemical synthesis and the talent of perfumers spurred a spike in jasminelike compounds—what Chanel perfumer Jacques Polges called “the poor cousins compared to the most mediocre of the natural jasmines.”¹ Meanwhile, every fragrance house developed its own jasmine bases. Indole, amyl cinnamic aldehyde, jasmones, the fatty-animalic notes of the high-boiling esters of para cresol (isobutyrate, salicylate, caprylate, etc.), the tobacco leaflike notes of esters of nicotinic acid, and the sweet derivatives of raspberry flavorings (such as frambinone) were all called to duty. Still, only natural ingredients could deliver that final twist: the tea and tobacco notes of maté, the waxy body of beeswax, the grassy fattiness of ginger oil, the warm herbaceous notes of chamomile oil, the spicy floral edge of a farnesene-rich ylang-ylang fraction, etc.²

New Century, New Business Challenges

Clinging to the extraction of jasmine in the 21st century brings a whole new set of challenges to Grasse. In the case of Charabot, a strategic decision was made to focus strictly on India, setting up all floral extraction operations near Madurai. The sourcing department was commissioned to grow a supplier relationship into a broader scale partnership. An agreement was made with Jasmine CE, a longtime supplier, in 2002. Its director, Raja Palaniswamy notes, “Our collaboration fostered synergies such as development of new materials for mutual benefit, improvement of processes and manufacturing practices, enhancement of efficiencies through guaranteed volume purchases, and more accurate tracking of market conditions both upstream with farmers and downstream with end-users. The partnership provided the old Grasse company a much stronger foothold in the key growing region of Indian florals (jasmine, sambac, tuberose, rose): Coimbatore (State of Tamil Nadu, southern India) and Dindigul (Tamil Nadu State, southern India). Yannick Lavenu, Charabot’s sourcing and technical manager, recalls, “Our partnership in India challenged every area of the ingredient business unit. Colleagues from finance, operations, quality assurance, quality control, research and development, regulatory, worker and environment protection, purchasing, and sales all contributed to turning a mere supplier into a

^{*}Hedione is a trademark of Firmenich.

Sambac at flower market



Jasmine flowers



full-fledged partner whose business and manufacturing practices were elevated to the highest standard in the industry.” Our partner’s sales grew significantly and minimum volumes were guaranteed, operations and manufacturing processes were upgraded, yields and cost prices were optimized as Charabot disclosed a century’s worth of experience in extracting jasmine. The quality of extracts was brought in line with market demands, as odor and specs were fine-tuned to match the unique needs of clients. Regulatory-driven projects were tackled, such as phthalate control, or sourcing a naturally occurring methyl eugenol-free rose. Sustainability principles were brought to the table, and infused upstream in the supply chain: Beyond mere price con-

cessions given to farmers, the company’s partner now has the ability to pre-finance the farming of jasmine flowers (50–60% of the flowers’ value is paid to farmers before the crop). Capitalizing on accurate forecasted needs, minimum guaranteed prices and required volumes of flowers are contracted with farmers ahead of the crop. If excess flowers are purchased, they are rushed to auction for fast resell on local flower markets. A direct relationship with farmers has become key, and more than 100 farmers are now involved in the program. Environmental protection was also enhanced. For instance, a water retention unit and recycling pools were built, and water was recycled to irrigate the local banana tree plantation. Seals and traps were installed all along the industrial

process in order to minimize the release of volatile solvents. Worker safety issues were also addressed: One project aimed at reducing operator exposure to extraction solvents. The jasmine concrete manufactured by our partner is then shipped to Grasse, where the secondary extraction into absolute takes place. Indeed, a century later, the keystone to Grasse’s modern jasmine trade is advanced sourcing management.

Grasse and Organic Jasmine Research

Consumer trends of the early 21st century are marked by a return to nature and increased demand for natural and organic products in every category. Unfortunately, jasmine absolute cannot be certified organic, as the extraction process involves hexane, a petroleum derivative. As demand for organic fragrance materials is booming, the organic perfumer’s palette has quickly filled with various spice and floral essential oils. Yet, the palette is void of any organic white flower notes. How to reconcile jasmine—the material Arctander called “one of the most important, if

not the most important perfume raw material”—with a lack of organic certification?

Several suppliers have attempted to fill the niche of organic jasmine extracts. Technological breakthroughs involving the use of natural ethyl acetate as a solvent were quickly derailed when the US Food & Drug Administration's National Organic Program (NOP) took ethyl acetate off its positive list, thereby rendering its extract non-certifiable. Since then, a French manufacturer has marketed an organic jasmine extract, which, in its current iteration, reportedly yields a much weaker odor than a standard absolute, in addition to solubility issues.

Sophie Lavoine, Charabot's R&D manager, says "As we tackle the hot subject of organic absolutes, and the

particular case of jasmine, my team is actively exploring five avenues: (1) Lipids. Animal fat was the key to the enfleurage process, so we are toying with natural and organic fats as key solvents. (2) Fermented sugars have showed success, but we have encountered regulatory barriers in the United States with NOP. Such solvents would include ethyl acetate, ethyl lactate or even pricier rum distillates. (3) Terpenes, such as limonene or pinene, are also strong candidates. The key hurdle here is the removal of residual solvent. (4) CO₂ is probably the closest and truest alternative to hexane. Much remains to be validated in the lab before tackling the major logistical challenge of placing a CO₂ facility near flower fields. (5) Other natural isolates are also being evaluated."

New Pure Jasmine Ingredients

"Jasmine comes with its very own set of challenges," says Charabot raw material perfumer Laure Jacquet. "Our team strives to source and select lots from the heart of the crop (i.e. the most floral) and avoid those early or late season extractions. We are also involved in development of new jasmine twists." The company relies strictly on flowers grown overseas to populate its portfolio of 28 jasmine ingredients—pure grades of a single-origin; pure standardized *communelles*; new bases; and colorless versions.

Perhaps of most interest in this group was co-developed with India-based Jasmine CE: *Jasmine sambac* bud (or "sepal") absolute #050330. It is a pure and natural absolute made from buds of Indian *Jasminum sambac* L. This is not a new botanical as it is the same flower as the classic *sambac*. What is different here is that the extraction is rushed in the morning, within hours of harvest, before the buds have a chance to bloom and build up heavy indole levels. Basic analytical data supplied by Charabot's R&D Christine Perichet shows drastic differences compared to a classic *J. sambac*: higher benzylic alcohol, higher linalool, lower benzyl acetate, lower α -farnesene, and no indole. The resulting raw material is much greener than a classic *J. sambac*,

obviously a lot less indolic, with more of an orange flower pittosporumlike character, and fruitier with jonquil and narcissus facets. (**See T-1.**)

Jasmine benzol type absolute #050084, meanwhile, is a pure absolute made from Indian *J. grandiflorum* via a proprietary extraction process that relies on innovative solvent blends, as opposed to straight hexane. Its note reproduces the quality that was manufactured in Grasse until the 1950s when benzene was used as a solvent. This quality is sweet and fruity, very preservelike.

Conclusion

Whereas market dynamics have forced its little white flower to leave the hills and valleys surrounding Grasse, jasmine still holds a strong position in Grasse's business landscape. Expertise in farming and crude extraction was traded for new skills in offshore sourcing, technology transfer, process improvements, quality, safety and sustainability, and research and innovation. With yesterday's jasmine fragrances still selling strong, and today's perfumers liberally formulating jasmine in new launches, the world's appetite for this classic flower is still strong. Grasse is still listening.

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