Immortelle's Sustainable Resurgence

New research into the chemistry and application of this "everlasting" natural

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Perhaps falling under the spell of immortelle's evocative name, perfumers' and flavorists' creativity is breathing new life into a small fragrant shrub from the Mediterranean. Its scent is nature's own cocktail of red fruit, nuttiness, heavy honey and tobaccolike notes, and a reminiscence of thick, sweet liqueurs. Immortelle's name roughly translates as "always there for you," or "everlasting," and its botanical name is the equally poetic "golden sun"—*Helichrysum italicum* (Roth) G. Don.

Helichrysum italicum exists in three subspecies:

1. *H. italicum* subsp. *microphyllum* (Willd.) Nyman, found in the Balearic Islands in Spain, the French *collectivité territoriale* Corsica, and Sardinia in Italy.
2. *H. italicum* subsp. *italicum*, found in countries around the Mediterranean, including the Balkans.
3. *H. italicum* subsp. *serotinum* (Boiss.) Fourn., found throughout Spain and Portugal.

Commercially available materials are obtained from subspecies 1 and 2.

Immortelle's Sustainable Resurgence

Immortelle is making a rather glamorous comeback on F&F creators' palettes—and consumers are apparently loving it. However, businesswise, few industry professionals can boast a deep understanding of immortelle's supply chain. The material continues to hold plenty of secrets, yet yields endless opportunities for new research and beautiful olfactive stories. These stories begin with a hardy wildflower in the Mediterranean—which is now coping with a surge in demand—and two Corsican brothers who have pioneered its sustainable harvest.

Immortelle, which grows in inhospitable, nutrient-starved soil, is often harvested from Corsican roadsides

Fine fragrance: Immortelle's charm has long been known for complementing chypre, floral and amber compositions. Unlike other more mainstream naturals, immortelle plays a backstage role both in formulation and consumer marketing. Yet, the return of woody or spicy fragrances and the comeback of darker notes are challenging perfumers to use lesser known naturals and formulate them in innovative ways. The success of decisively provocative men's fragrances such as Diesel's *Fuel for Life*, and women's fragrances such as Estée Lauder's *Sensuous* or Calvin Klein's *Secret Obsession* further drive perfumers to seek warmer, woodier, spicier or more tobacco/tea or liqueuresque notes, thereby pushing immortelle from the backstage to the spotlight.

Most recently, Givaudan perfumer Yann Vasnier explored immortelle's unique character in Divine's specialty fragrances, *L'ètre aimé Homme* and *L'ètre aimé Femme*. Meanwhile, in the personal care arena, immortelle lent its pleasant scent and therapeutic virtues as a keystone of L'Occitane's product line.

Immortelle's Origins

Some say immortelle received its deathless name because it never rots, retaining its signature scent in perpetuity even as a dry flower. In bloom throughout the summer, and bearing a scent as mysterious as its name, immortelle survives in some of the most nutrient-deprived Mediterranean terrain, from sea level to 4,500 feet—sandy coastlines, abandoned vineyards, mountain wilderness, cliffs, slopes and roadside ditches. Despite this, immortelle displays higher distillation yields when grown in lower altitudes. For instance, processors report that yields start dropping in harvests from elevations above 1,500 feet.

This hardy shrub grows no more than 2 feet tall, with long sage-green stems topped by bouquets of tiny, bushy yellow flowers. The entire plant is loaded with fragrant volatile compounds. Therefore, unlike rose for instance, harvest is not only limited to picking the flower. While harvesting can take place anytime in the summer, properly timing a harvest is an age-old art that can triple the baseline essential oil yield. While immortelle has traditionally been harvested in Corsica around late June's summer solstice—around the feast of Saint John—harvest starts in the coastal south as soon as early June, and ends in late July in the central mountains.

As noted, three regions produce immortelle for the flavor and fragrance industry, with Charabot's sourcing team

estimating the following volumes of essential oils: Corsica, 300 kg; Balkans, 350–400 kg; and Spain, 50–60 kg. It is worth noting that the Italian island of Sardinia is reported to have started collecting immortelle in minimal amounts recently—a new source to keep an eye on.

From the Field to the Still

In Corsica, the "maquis" (or mountain bush country) is immortelle's primary home. The stony, harsh mountainous terrain is dotted with dense shrubs and trees, and filled with aromatic plants including genet, cistus, rosemary and laurel. Guy de Maupassant paints the scene perfectly in *La Vie Errante* (1890): "I drowned in a warm breeze and perfumed with wild aromas spreading like a bounteous flow of violent scents of myrtles, mints, citronellas, immortelles, lentisques, lavenders and thymes."

The harvest of wild immortelle here begins only after a handful of workers have driven three hours along endless winding roads and dirt trails to reach this area, an ancestral growing ground. Fifty canvas bags, translating to more than 1,000 kg of immortelle, must be collected by noon for proper processing. With the expert swing of their sickle, the harvesters methodically cull the top foot of the bushes—the most aromatic part. Just enough of the plant will be left above ground to survive the winter for next years' crop. A sloppy swing of the sickle is a death sentence for wild immortelle. Soon, canvas bags line the dirt trail awaiting delivery for further processing.

Flowers selected for essential oil processing are rushed down the mountains to the nearby still within hours of harvest. The boiler is already at operating temperature when the flowers arrive at the facility; steam distillation will start immediately. In Corsica, stills are relatively small, but quite modern, their boilers powered by petro fuel. Steel or copper kettles are then carefully filled with flowers to ensure a uniform load and to avoid any path of least resistance to the flow of steam. Flowers reserved for solvent extraction will be sun-dried for one month in a greenhouse. Most shipments of these flowers are bound for southern France for primary extraction into a concrete and secondary extraction into absolute.

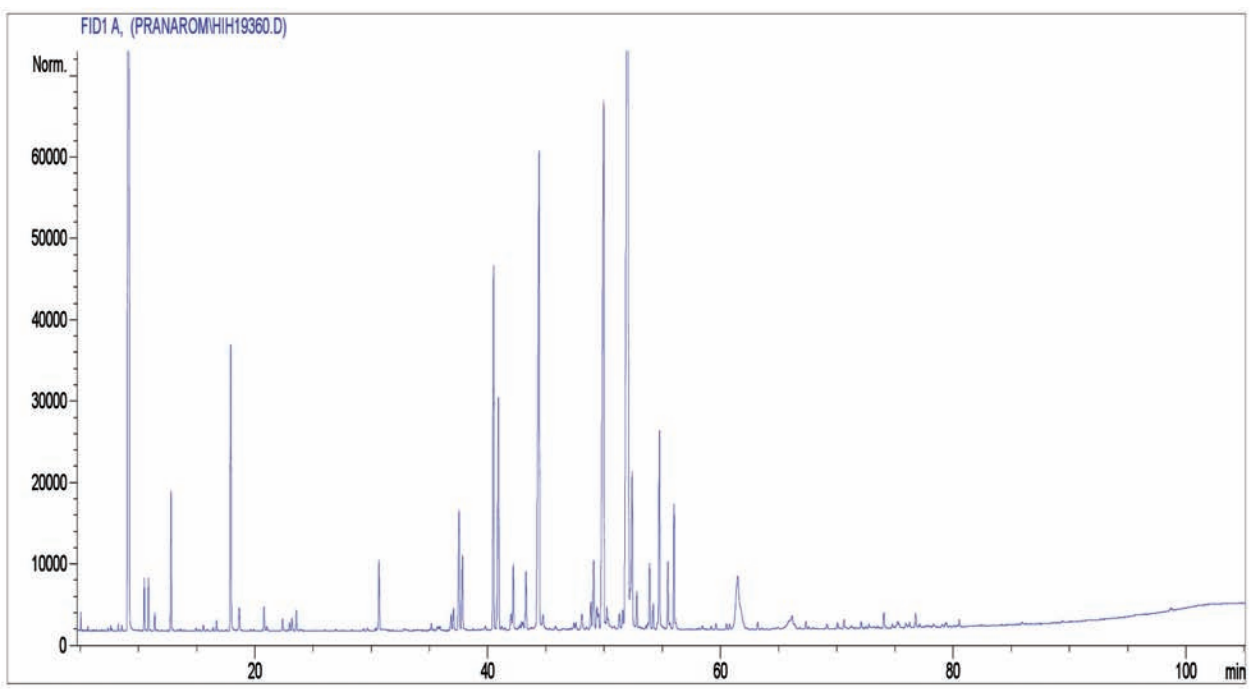
Steam distillation batches process as much as 1,000 kg of flowers. All told, distillation time is spread over 3–4 hrs, with yields subject to various factors, including weather conditions, altitude, time of harvest, and time span between collection and processing. Producers report distillation yields ranging from a poor 500 g per 1,000 kg load (0.05%) to a very satisfactory 1,500 kg (1.5%).

Immortelle Ingredients, Evaluation and Composition

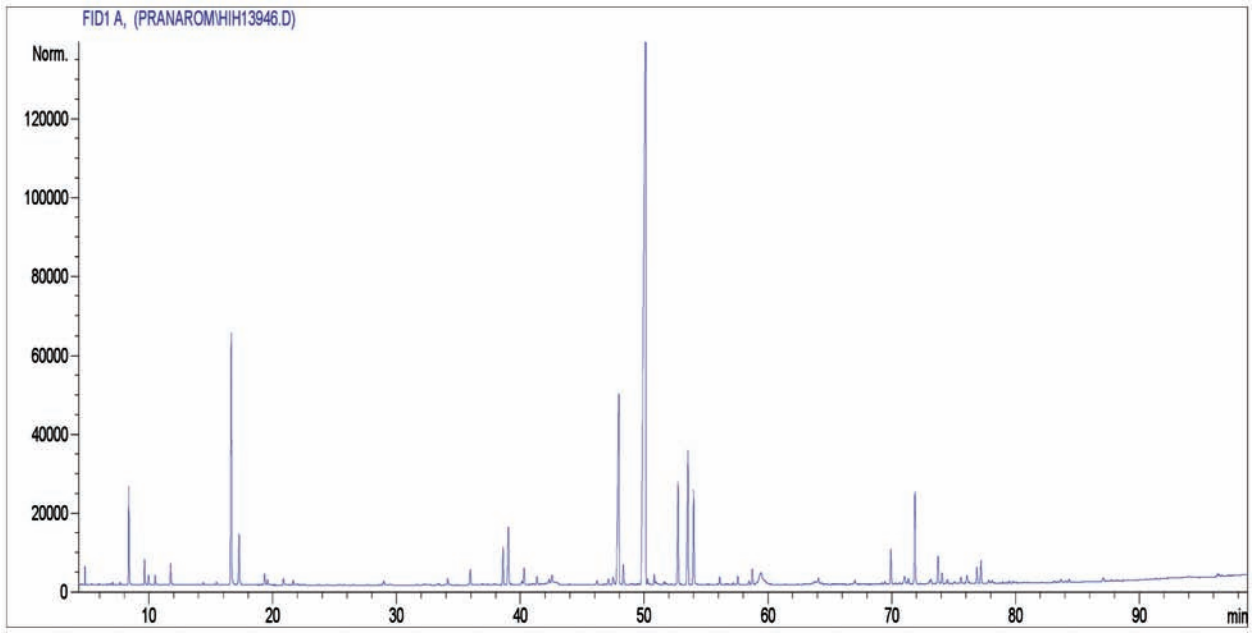
Immortelle ingredients are marketed to the industry in two forms, essential oil and absolute. The essential oil is a basic product of the steam distillation of fresh flowers. Traditionally distilled at the source, as described above, the oil possesses a fresher, fruiter, greener character than the absolute. A quick glance at GC profiles from the Balkan and Corsican oils (**F-1** and **F-2**, respectively) highlights major differences:

- The Corsican oil boasts significant levels of neryl acetate (43.09%), along with elevated amounts of nerol (2.9%) and limonene (7.16%).
- The Balkan oil is much lower in neryl acetate, but 10 times richer in α-pinene (27.52%).

GC Profile of *Helichrysum italicum* from the Balkans **F-1**



GC Profile of *Helichrysum italicum* from Corisca **F-2**



A detailed GC analysis of immortelle oil from the Balkans and Corsica can be seen in **T-1**.

Meanwhile, immortelle absolute is manufactured in a two-step process, beginning with a primary extraction into concrete. The flowers are dried as described above and processed with hexane to yield a very waxy, pasty substance that is not alcohol-soluble. This concrete requires further processing to become a useful tool to flavorists and perfumers. A secondary extraction into an absolute mixes the concrete with alcohol before being chilled, decanted and filtered to remove waxes and fixed oil. Residual alcohol is then removed by vacuum distillation to yield the absolute. Its character is commonly described as more tobaccolike than the essential oil, with celery, curry, nutty and dry fruit notes. The absolute is also slightly cistuslike, reminiscent of spirits such as Armagnac or cognac.

The Perfumer Perspective

Of immortelle absolute, Dorothee Piot, perfumer at Charabot, offers these thoughts: "Immortelle absolute's tobacco character has often encouraged me to formulate it in men's fragrances. It marries well with woody accords, oriental, fougère or leather notes. Its spicy saffron character is well complemented by its curry, nutty and celery facets. However, finding its correct usage level can be a challenge: immortelle warms a fragrance and makes it more vibrant, but should not take a compound into foodlike territory. In women's fragrances, I formulate immortelle with floral fruity accords, for example with magnolia or tagete. I much prefer the softness of the absolute. It is an exceptionally complex material that remains to be tamed."

Ingredient perfumer Laure Jacquet notes some of the reasons that immortelle sourced from Corsica has grown to be a market favorite. "For essential oils, the Corsican shines for being a lot fruitier, spicier, more ambery and warmer. The Balkan is fruity, almost aldehydic, with tobacco and hay, amber and leather notes. For absolutes, the Balkan variety is ambery, liqueurish, dried fruit and nutty, spicy and aromatic. The Spanish type is more animalic, retaining the classic herbal hay, tobacco character. There again, the Corsican quality stands above the rest for being richer, denser, more diffusive, a lot more powerful with honey aromatic notes and a floral facet that rounds up its character."

Sourcing Corsican Immortelle

Wild Corsican immortelle has experienced booming demand from the flavor and fragrance and aromatherapy industries due to its elevated levels of neryl acetate and italidiones. This market favorite has paid the price. Since early 2000, the accessible supply of wild flowers hasn't come close to meeting demand. Furthermore, unfavorable climatic conditions have hindered limited crop outputs by up to half, according to some reports. In addition, wild fires and real estate development wiped out some growing grounds, while other traditional wild fields became recklessly and hastily overharvested or insufficiently rotated, contributing to poor plant survival and tensions among competitors.

For any sourcing team, the sociopolitical environment in Corsica presents yet another hurdle to building a reliable network of immortelle supply. The island is currently governed almost as any other *région* of France,

Comparative percentage composition of Balkan and Corsican immortelle oil **T-1**

Constituent	Balkan oil	Corsican oil
3-methyl-cyclohexanone	0.06	0.20
2-methylfuran	0.02	-
ethanol	-	0.03
unsaturated ester	0.02	0.03
unknown	0.03	0.05
2-methyl-3-pentanone	0.04	0.05
tricyclene	0.03	0.01
α-pinene	27.52	2.13
α-thujene	-	0.10
α-fenchene	0.35	0.62
camphene	0.37	0.24
4-methyl-3-hexanone	0.12	0.24
β-pinene	1.04	0.58
sabinene	0.02	-
monoterpene hydrocarbon	0.02	-
δ-3-carene	0.02	-
unknown	0.01	-
myrcene	0.05	0.07
α-phellandrene	0.02	0.02
2-methyl isobutyrate	0.02	-
α-terpinene	0.09	0.09
limonene	2.31	7.16
β-phellandrene	0.03	0.05
1,8-cineole	0.17	1.48
2-pentylfuran	0.01	0.01
(Z)-β-ocimene	0.01	0.02
trans-arbuscalone	-	0.02
unsaturated compound	0.01	-
γ-terpinene	0.21	0.36
(E)-β-ocimene	0.04	0.18
p-cymene	0.10	0.21
2-methylbutyl 2-methylbutyrate	0.07	0.02
terpinolene	0.11	0.15
isobutyl angelate	0.17	0.03
6-methyl-5-hepten-2-one	0.01	0.02
aliphatic ester	0.02	-
alkyl angelate	0.03	0.02
2-nonanone	0.02	0.05
isoamyl angelate	0.62	0.12
nonanal	-	0.02
hexyl 2-methylbutyrate	0.02	-
α-p-dimethylstyrene	-	0.02
methyl p-cresol	-	0.02
hexyl angelate	0.07	0.05
aliphatic compound	0.03	0.02
artemis ketone	0.04	0.23
α-ylangene	0.17	0.01
sesquiterpene hydrocarbon	0.24	-
α-copaene	1.32	0.02
isoitalicene	0.76	0.54
2-nonanol	0.01	0.04
camphor	0.01	0.02
aliphatic dione (MW 156)[d]	-	0.09
sesquiterpene hydrocarbon	0.04	-

Constituent	Balkan oil	Corsican oil
linalool	3.25	1.04[a]
italicene	2.70	2.06
sesquiterpene hydrocarbon	0.04	0.04
sesquiterpene hydrocarbon	0.02	-
sesquiterpene hydrocarbon	0.20	0.14
cis-α-bergamotene	0.67	0.58
aliphatic dione[d]	0.03	0.03
α-cedrene + δ-cadinene	0.05	0.04
α-fenchol	0.07	0.03
bornyl acetate	0.06	-
trans-α-bergamotene	0.62	0.28
2-undecanone	0.02	0.10
4,6-dimethyloctane-3,5-dione[d]	0.03	0.55
β-caryophyllene	7.23	0.12
terpinen-4-ol	-	0.27
guaia-6,9-diene	0.25	-
aromadendrene	0.02	-
sesquiterpene hydrocarbon	0.02	-
β-maaliene	0.07	-
β-santalene	0.03	-
allo-aromadendrene	0.10	-
monoterpene ester	-	0.06
trans-pinocarveol	0.08	-
(E)-β-farnesene + zonarene	0.25	0.16
sesquiterpene hydrocarbon	0.04	-
α-humulene	0.30	0.02
selina-4,7-diene	0.93	-
sesquiterpene hydrocarbon	0.28	0.21
sesquiterpene hydrocarbon (and) (Z)-β-farnesene	0.18	0.35
γ-curcumene	8.81	8.92
sesquiterpene hydrocarbon	0.07	0.04
α-terpineol	0.23	0.63
α-terpinyl acetate	0.13	-
borneol	0.08	0.05
unknown angelate	0.06	0.04
germacrene D	0.21	0.02
sesquiterpene hydrocarbon	0.22	0.07
neryl acetate	22.36	43.09
β-bisabolene	-	0.14
β-selinene	1.02	-
α-muurolene	0.40	-
α-selinene	1.79	-
7-epi-α-selinene	0.10	-
β-curcumene	0.37	0.31
oxygenated monoterpene	0.04	0.16
geranyl acetate	0.05	0.09
α-farnesene*	0.06	0.09
δ-cadinene	0.65	0.03
γ-cadinene	0.23	0.04
α-bisabolene*	0.06	0.10
ar-curcumene	1.95	3.08
neryl propionate	0.60	4.62
cadina-1,4-diene	0.07	-

Comparative percentage composition of Balkan and Corsican immortelle oil **T-1 (cont.)**

Constituent	Balkan oil	Corsican oil
nerol	1.11	2.90
α-amorphene	0.06	-
2-phenethyl acetate	0.01	0.03
trans-carveol	0.02	0.24[b]
cis-calamenene	0.02	0.04
geraniol	0.04	0.03
unknown (MW 220)	0.03	0.06
neryl butyrate	0.06	-
neryl 2-methylbutyrate	0.05	0.27
aromatic compound	0.06	0.13
neryl isovalerate (and) unknown (MW 220)	-	0.51
italidione I (MW 210)[d]	1.69	1.26
italidione II	0.53	0.63
α-calacorene	0.07	-
italidione*[d]	0.05	-
italidione III (MW 238)[d]	0.58	0.24
neryl valerate	0.10	0.31
caryophyllene oxide	0.09	0.03
aliphatic ester	0.02	0.03
sesquiterpene alcohol	0.01	0.02
(E)-nerolidol	0.05	0.24
neryl hexanoate	0.06	-
sesquiterpene alcohol	0.10	-
subenol	0.05	0.04
sesquiterpene alcohol	-	0.09
guaiol	0.07	1.08
aromatic compound	0.02	0.03
2-phenethyl ester	0.04	0.05
aromatic ester	0.02	-
aliphatic dione[d]	-	0.30
eudesmol*	-	0.13
trimethylpentadecanone*	0.02	0.21
eudesm-5-en-11α-ol	0.17	3.06
sesquiterpene acetate	0.04	0.02
sesquiterpene alcohol	0.10	0.10
methoxy-aromatic compound	0.06	0.14
eudesmol*	-	0.93
γ-eudesmol	0.06	0.37
eudesmol*	0.07	-
cadinol*	0.16c	0.16
oxygenated compound	0.04	-
sesquiterpene alcohol	0.02	0.11
bulnesol	-	0.37
sesquiterpene alcohol	0.04	0.05
α-bisabolol	0.05	-
α-eudesmol	0.04	0.11
cadalene (and) α-cadinol	0.08	0.05
β-eudesmol	0.03	0.71
aliphatic ester	-	0.11
eudesm-7(11)-en-4-ol	0.07	0.12
aromatic compound	-	0.06
aliphatic dione[d]	-	0.13
aromatic compound	-	0.05
aromatic compound	-	0.15
aliphatic methyl ester	0.03	-
aliphatic dione	-	0.15
aromatic compound	-	0.02
aliphatic dione[d]	-	0.02
aliphatic dione[d]	0.04	0.08
aliphatic dione[d]	0.04	0.09

[a]plus an unknown angelate; [b]plus an unknown monoterpene ester; [c]plus an unknown methoxy-aromatic compound; [d]aliphatic diones are also known as italidiones; *correct isomer not identified

though many Corsicans are quick to say "Pays, pas region!" or "*Country*, not territory." The island's history has been deeply marked by political and clan rivalries. Today, powerful movements keep calling for some degree of Corsican autonomy from France, with the more extreme autonomists seeking full independence. Corsicans fearlessly shield their unique culture from the influence of the continent—and globalization. This awe-inspiring love for heritage translates into a unique lifestyle, vibrant with the extensive usage of the local Corsican language and the promotion of all things Corsican, from spring water to food to music. Unfortunately, the more radical independence elements are known to resort to intimidation tactics to further their agenda.

As any casual observer can see, Corsica is a surprisingly complex and volatile environment for reliable sourcing of a wild raw material in such short and fragile supply. While there is little concern about the mere survival of immortelle in Corsica, easy access to bountiful supply is becoming very scarce—a serious challenge to the industry. Thus, the pillars for a successful sourcing strategy must embrace the genuine love Corsicans have for their *terroir* and culture while also shielding and promoting its tradition and rich culture through sound business practices. There must be one keystone: sustainability.

The Faces of Sustainability in Corsica

Brothers Jean-Pierre and Paul Caux, true Corsicans at heart, have become pioneers in the region's modern immortelle sustainability. They endured criticism and sometimes mockery in their quest to apply their two-pronged strategy for sustainability: enforcing sustainable harvest practices for wild immortelle and researching the sustainable farming of immortelle.

The Caux brothers lobbied officials and competitors, friends and foes, to implement a *charte de cueillette*, loosely translated as "picking regulations," providing strict harvest guidelines for themselves and the five other major collectors of the island. This regulatory frame was eventually endorsed by the Office de l'Environnement. This plan protects the wild botanical and ensures a safer supply for global demand, thereby diminishing the risk of alternate sourcing from other countries.

The economics of immortelle oil production in Corsica **T-2**

Time, yield and costs	Wild	Cultivated
Hourly labor (euros/hr)	11.0	11.0
Freight (hours/day)	2.0	-
Work time (hours/day)	8.0	10.0
Volume harvested (kg/h)	40.0	80.0
Cost of crop (euros/t)	344.0	138.0
Yield of oil (kg/t)	1.8	2.4
Cost of 1 kg of oil (euros)	191.0	57.0
Yield (t/ha)	-	3.3
Yield (kg/ha)	-	8.0
Time amortized over eight years	-	79.0
Turnover (euros/kg)	1,000	1,000
Gross profit (euros/kg)	809	782

Study on the conditions of development of perfume, aromatic and medicinal plants in Corsica, July 2005.

The brothers spent years researching the sustainable farming of immortelle, eventually finding success by taming a wild flower into just another crop. Farming immortelle not only protects wild resources, but also provides a clear business advantage. Paul Caux notes, "With farming immortelle, we solved major business challenges. The first one is proximity and accessibility, our fields now being a short drive away from the plant. We do not have to drive two or four hours anymore to reach traditional wild growing grounds. The second challenge is crop monitoring, as we can easily keep a close eye on our fields and accurately time the harvest for peak extraction yields. The third is cost control, achieving savings in man hours, freight and fuel."

Does immortelle sustainability deliver savings, or does it come at an additional cost? A 2005 study, shown in **T-2**, suggests that the savings in wild harvest cost are offset by the cost of amortization and maintenance of new farmland. Therefore, a case can be made that protecting Corsica's natural resource comes at no additional cost to the industry.

For the first time, immortelle is being successfully cultivated to maturity on a farm, an agricultural breakthrough that will surely spread throughout Corsica. And mechanical harvesting of immortelle is just around the corner. "We'll harvest immortelle with a combine harvester just like lavender in Provence," says Paul Caux. "Can you believe it?"

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