Cascarilla Bark Essential Oil of El Salvador: New Source and Standard

by Rachael Shapiro, A Woman of Uncommon Scents Inc., Roxbury, PA; and Javier Frances, Nibs Hidrodifusion, El Salvador

Photos: Dave Ferris

The Bahama's "Out-Islands"—Samana Cay, Acklins, and Crooked Island—have been the traditional source of cascarilla bark oil, dating back to the 18th Century. In 1492, Christopher Columbus, tempted by the wafting fragrance of Crooked Island's native herbs, dropped anchor and named it "Fragrant Island." Columbus eventually introduced cascarilla bark to Europe. The Europeans used the material for the manufacture of incense, sachets, potpourris, liquor and tobacco flavorings, and employed it as a therapeutic aromatic bitter tonic for the treatment of various stomach ailments. The oil is relatively new to the modern commercial perfume and flavor marketplace. Today, the highly desired and sought after cascarilla bark essential oil is used for flavoring aperitifs, liquors, beverages, confections and fine perfumery.

For decades, the Bahamian government considered cascarilla bark (not the essential oil) one of its top exports, alongside rum, salt, crawfish, and fishery products. Exports of the cascarilla bark material declined in 1998. This was the result of unfavorable severe weather conditions, in addition to the almost nonexistent infrastructure logistics of the sparsely populated collecting areas. El Salvador, on the other hand, possesses sound infrastructure logistics and communications, talented industrial engineers and agronomists, accomplished world-class distillers, a tradition of unremittingly hard working collectors, and abundant cascarilla trees. Thus, the production center for cascarilla bark oil has shifted from the Out-Islands to El Salvador. Since 1998, El Salvador's annual production has increased twofold. The country's 2000 delivered production was 50 kilos, establishing El Salvador as the new principal and standard provider of this material. Expected 2001 production capacity is 100 kilos. Nobs Hidrodifusion SA is the biggest player and distiller in this emerging market.

> "Nature creates ability, luck provides it with opportunity."
>
> *Francois de La Rochefoucauld*

Author, Rachel Shapiro, with the flowers of El Salvador cascarilla.

Collection and Distillation of El Salvador Cascarilla Bark Oil

The Bahamian cascarilla is a *Croton eluteria*, in the family of *Euphorbiaceae*.[3] El Salvador's cascarilla is a *Croton reflexifolius*, also in the family of *Euphorbiaceae*. In El Salvador, cascarilla is known by many common names, including copalchi, aromatic quinquina and sweetwood bark. Normally, a small tree, the El Salvador cascarilla tree can reach heights of up to 25 feet. It is often covered with grayish-green lichen. The bark is hard, compact, pale to yellowish-brown and fissured. In El Salvador, unlike the Bahamas, there is plentiful renewable material growth because cascarilla trees are planted in windbreak hedgerows on mountain coffee plantations. In the Bahamas, cascarilla was never grown for a practical purpose other than for bark collection. As the cascarilla hedges grow tall and widen, they take up valuable space for the coffee plants. The full-grown trees are then cut down and new ones replanted, insuring future available material.

After harvest, the bark is separated from the trees by

0272-2666/01/0006-0022$04.00/0—

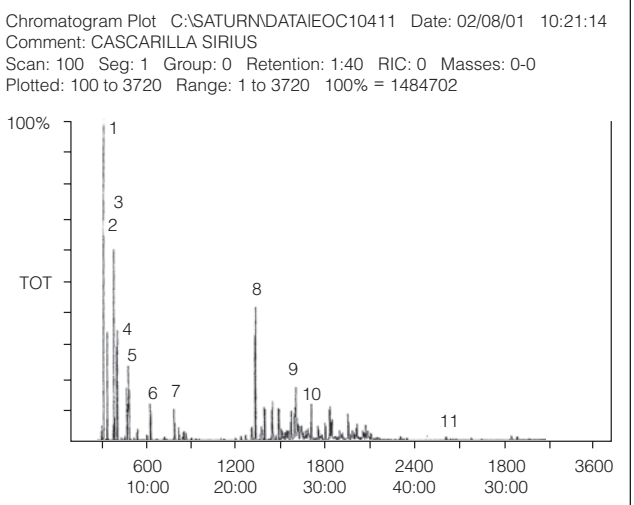
Table 1. Percentage composition of Salvadoran cascarilla oil (density at 20°C, 0.8976; refraction indices at 20°C, 1.484)

Material	Percentage
Tricyclene	0.32
α-thujene	0.58
α-pinene	14.75
camphene	4.5
sabinene	0.6
β-pinene	9.5
mycrene	4.65
α-phellandrene	0.09
α-terpinene	0.16
p-cymene	2.45
1,8-cineole	2.9
β-phellandrene	1.0
limonene	2.0
(Z)-β-ocimene	0.05
(E)-β-ocimene	0.08
γ-terpinene	0.47
terpinolene	0.23
linalool	1.8
borneol	1.55
terpinene-1, ol-4	0.62
α-terpineol	0.65
eugenol	0.15
α-copaene	6.25
β-elemene	1.05
cascarillone	1.55
cascarilladiene	1.6
β-caryophyllene	1.15
α-humulene	0.9
germacrene D	2.4
β-selinene	3.05
α-selinene	0.95
δ-cadinene	0.68
γ-cadinene	1.7
spathulenol	1.65
β-caryophyllene oxide	1.05

a special machete. Once a collector gains the skills necessary, harvesting becomes surprisingly efficient, though extremely strenuous. Collectors work on slope grades of 11-25 percent, making it difficult to stand up straight. The collection of material is possible year-round, but the coffee plantation owners prefer harvesting when coffee picking is not in season.

Trees that are 10 years old or more yield the best quality essential oil. Approximately 60 trees surrender one ton of bark, yielding 1 kilo of distilled essential oil. To achieve the best quality and highest yield of essential oil, the bark is dried to a specific level of humidity and then immediately distilled. The Bahamian cascarilla material is not distilled locally, but is air shipped overseas for processing. However, excessive time between harvest and distillation reduces oil yield and degrades the chemical components of the final product.

Figure 1. Gas Chromatograph Analysis of El Salvador Cascarilla Oil



The Nobs Hidrodifusion method of distillation for the cascarilla bark essential oil is, appropriately, hidrodifusion. In this process, small bit-sized cascarilla bark is loaded into a 1,500-liter capacity stainless steel still. From the boiler, steam is piped into the top of the loaded still, which diffuses down and thru the plant charge condensing at the bottom on a stainless steel condenser. The condensed water separates into oil and water via a series of Florentine flasks. The final separation, refining and filtration are a laboratory procedure. The distillation time is approximately 3 h.

It is possible that the chemical components of cascarilla bark essential oil differ according to the method of distillation. Hidrodifusion, compared to water and/or steam distillation, produces a distinct end product. Regardless of the chosen distillation method, cascarilla essential oil is a very complex chemical material. Its gas chromatograph analysis profile (Figure 1 and Table 1) was once described to me as having "more peaks than the Himalayas."

The low-percentage yield in the distillation process dictates a high price per kilo. The cascarilla collection process further adds to the final cost of the product because it is highly demanding of human resources and is reliant upon costly nursery plantation programs that insure future ecologically renewable material.

The distilled oil is pale greenish to yellowish. The odor profile is spicy, with cool notes of eucalyptus and nutmeg and warm touches of musk, sandalwood, frankincense and pepper, in addition to a development of lasting creamy notes. It is important to note that cascarilla oil's sensory profile ages desirably for at least 10 years.

Harvesting the bark from El Salvador cascarilla.

Applications

The material is applied in perfumes as trace notes. It is also desired for its remarkable diffusive power. Suggested use is at a level of 0.20-0.50 mg/percent.[2] The oil's minimum perceptible level is 0.02-0.04 /percent. The "Perfume Handbook" by Nigel Groom lists cascarilla bark essential oil in the ingredient list of first-class perfumes, including Coco and Oscar de la Renta.[5]

The taste profile was featured in a past edition of Gerard Mosciano's column, "Organoleptic Characteristics of Flavor

Cascarilla plantation in El Salvador—note the steep incline.

The harvested bark of El Salvador cascarilla.

Materials."[1] Mosciano described the taste as spicy, woody, peppery, cola-like, with cinnamon, ginger, nutmeg and clove notes, and a smoky nuance.

In terms of medicinal usage, El Salvador's natives have traditionally used cascarilla bark as a stomach tonic for dyspepsia, intermittent and low fevers, diarrhea, dysentery, and as an expectorant.[6] Aromatherapy rarely makes use of this material because only very small quantities find their way to this specialized market. "L'aromatherapie exactement," by P. Franchomme and D. Penoel, suggests the application of cascarilla oil in anti-viral treatments and for relief of headaches.[4]

References

Address correspondence to Rachel Shapiro, A Woman of Uncommon Scents Inc., PO Box 103, 14613 Timmons Road, Roxbury, PA 17251.

1. Perfumer & Flavorist, Volume 26, Number 3, 2001, Allured Publishing Corp. Gerard Mosciano, Organoleptic Characteristics of Flavor Materials.
2. Perfume and Flavor Materials of Natural Origin, Steffen Arctander, 1994, Allured Publishing Corp.
3. The Essential Oils, Ernest Guenther, 1972, Robert Krieger Publishing Co. Inc.
4. L'aromatherapie exactement, P. Franchomme, D. Penoel, 1990, Roger Jollois Editeur.
5. The Perfume Handbook, Nigel Groom, 1994, Chapman & Hall.
6. A Modern Herbal, Mrs. M. Grieve, 1982. Dover Publications Inc.

■