

Material review

Woody Notes in Perfumery

Vetiver, derivatives and aroma chemicals. Part II

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A number of popular fragrances contain vetiver or its derivatives, including Chanel No. 5 (Chanel)



In the first part of this article (*Perfumer & Flavorist*, May 2004),* I discussed various vetiver types, the composition of vetiver oils of different origin, showed a few early vetiver imitations and illustrated a number of traditional perfume compounds. In this article, I shall exemplify additional types of traditional perfume compounds containing vetiver or its derivatives.

Traditional Fragrance Compounds

Fougerè No. 6

140	geranium Bourbon
100	vetiver
100	lavender
50	amyl salicylate
50	coumarin
40	cananga
10	patchouly
<u>10</u>	solvent
500	

Lavender Water¹

500	lavender oil French
50	lavender absolute
150	bergamot
30	musk Tonkin infusion 3%
20	civet infusion 3%
10	neroli bigarade
20	orange flower absolute
20	petitgrain Grasse
30	orange oil sweet
50	vetiveryl acetate
5	Tonka resinoid
5	hydroxycitronellal
5	clary sage
5	estragon oil
5	cloves
10	styrax resinoid
20	benzoin resinoid
10	labdanum resinoid
30	vanilla extract 10%
<u>15</u>	methylionone
1000	

Mimosa No. 541²

300	ylang synthetic
375	bergamot synthetic
65	sandalwood E.I.

60	heliotropin
60	vetiver Réunion
50	orris resinoid
45	neroli synthetic
<u>45</u>	rose synthetic
1000	

Opoponax No. 3

200	bergamot
80	benzoin resinoid
50	vanillin
40	vetiver
32	coumarin
35	musk ambrette
25	lemon c.p.
16	castoreum resinoid
<u>8</u>	patchouly
486	

Origan Base No. 290³

200	Raldeine D Giv.
100	cassie synthetic No. 133
100	vetiver Java
80	carnation synthetic No. 117
45	rose synthetic No. 163
40	ylang Bourbon
70	jasmin synthetic No. 51
97	amyl salicylate
40	neroli synthetic No. 75
20	rhodinol
40	opoponax resinoid
23	musk ketone
10	musk ambrette
10	coumarin
50	heliotropin
65	vanillin
6	patchouly
2	aldehyde C-12 (L)
<u>2</u>	mousse de chène absolute
1000	

*The heading of T-1 (p.32) was a printing error. It should be: "Modifiers of vetiver odor"

Peau d'Espagne⁴

4	birch tar oil rectified
45	castoreum infusion 5%
270	civet absolute 10%
55	sandalwood E.I.
70	bergamot
35	neroli bigarade
7	fleurs d'oranger absolute
55	rose oil Bulgare
50	musk ambrette
35	musk ketone
55	musk Tonkin
10	Tonka absolute
13	coumarin
2	patchouly
14	jasmin absolute
2	cassie absolute
45	tolu resinoid
25	styrax resinoid
20	ylang ylang oil
100	vetiverol
17	cloves
25	lemon c.p.
45	petitgrain Grasse
1000	

Rose V⁵

phenyl ethyl alcohol	425 cm ³
rhodinol	400 cm ³
jasmin synthetic	50 cm ³
nerol	25 cm ³
vetiver	15 cm ³
sandalwood	10 cm ³
neroli oil	10 cm ³
tuberose oil	10 cm ³
rose oil	10 cm ³

Vetiver Compound⁶

vetiver Java	140 g
vetiver Bourbon	200 g
sandalwood	100 g
hydroxycitronellal	120 g
cinnamic alcohol	60 g
jasmin synthetic	90 g
heliotropin	80 g
coumarin	50 g
musk ketone	50 g
musk ambrette	10 g

And a more recent vetiver compound is:

Vetiver Bouquet for Men

400	vetiver Bourbon
150	cedryl acetate
120	methyl ionone
120	Grisambrol 10% (Firmenich)

80	patchouly
30	sandalwood E.I.
20	oakmoss resinoid 50%
10	geraniol
20	musk ketone
950	

Dermatological Consideration

Most of the illustrated traditional perfume compounds were developed before the advent of dermatological considerations. Today, some components in these formulas would (1) be prohibited, (2) have to be

specially processed or (3) be limited in percentage used, in accordance with IFRA's (International Fragrance Association) recommendations. For example, use of musk ambrette is prohibited.

In the second category are:

- **Citral**: can be used in conjunction with perfume materials preventing sensitization, such as pinene
- **Styrax**: only vacuum distillation or extraction with ethanol should be used
- **Opoponax**: only obtained by extraction of solvents or steam distillation

In the third category are:

- **Bergamot**: because of its phototoxicity, the level in consumer products used on skin exposed to sunshine should not exceed 0.4 percent
- **Cinnamic alcohol**: limited to 8 percent in consumer products
- **Hydroxycitronellal**: limited to 5 percent in fragrance compounds
- **Lemon oil c.p.**: limited to 2 percent in consumer products
- **Oakmoss absolute**: limited to 0.6 percent in consumer products

If older fragrances have to be adapted to today's dermatological requirements, future fragrances are facing even more stringent regulations.

Meschede and Duclos described the changing situations in current and future European legislation:

1. Essential oils and related products in Europe and shipped to Europe will be facing new restrictions. Apparently, the European Parliament will be making most regulating decisions in Brussels. 2. The new legislation requires, among other things, the labeling of 26 substances alleged to be allergens identified by the Scientific Committee for Cosmetics and Non-Food Products (SCCNFP) for all skin products. 3. The new legislation requires among other things a labeling of 26 substances alleged to be allergens identified by the Scientific Committee for Cosmetics and non-Food Products (SCCNFP) for all skin contact products. No differentiation as to the origin of these substances (coming from essential oils or synthetics) was made. The authors listed 59 essential oils illustrating their total percentage of allergens from 0-90. Even vetiver oil would be a "culprit," listed in the 0-5 percent category.⁷

Aroma Chemicals and Specialties

Let us take a look at different aroma chemicals with woody vetiver and multifaceted odors:

- Guaiyl acetate (guai-l(5)-en-ll-ol:acetate) (IFF): woody, vetiver, balsamic
- Isobutyliionone (Bedoukian): woody, vetiver
- α -Isomethyl ionol (Bedoukian): woody, vetiver
- Methyl cedryl ketone (Vertofix Coeur - IFF): woody, vetiver, leather with musky undertones
- Methyl tetrahydroionol acetate (Bedoukian):

vetiver, vetiver acetate-like

- Khusimone (7,7-dimethyl-6-methylene tricyclo [6,2.1.0^{1,5}] undecan-2-one): has been found to be mainly responsible for the characteristic odor of vetiver⁸
- 2-Heptanol, 3,4,5,6,6-pentamethyl (Kohinol - IFF): woody, ambery, vetiver
- Rootanol 100 (BASF): minty, earthy, reminiscent of vetiver roots
- 2,5,10-Trimethyl 1,2,5,9-cyclododecatrien-1-yl methyl ketone and isomers (Trimofix - IFF): amber, woody note with vetiver and tobacco nuances
- Vetyal extra (Givaudan): caryophyllene acetate main component, woody, used as extender of vetiver notes
- Vethymine (2,4-diethoxy-5-methylpyrimidine): earthy, dusty, woody and rooty with strong vetiver, patchouli and agarwood nuances⁹
- Vetyval, vetyvertone (4-cyclohexyl-2-methyl-2-pentanone)¹⁰
- Vetylbois (1,4 dimethoxy-2-terbutyl benzene): woody with vetiver and patchouli nuances¹¹

Vetiver oil and derivatives are valuable perfume materials used in many women's and men's fragrances and in various cosmetic and soap perfumes.

One patent covers isolongifolene esters.¹² These esters "have valuable perfumery properties, particularly as replacements for vetiverol derivatives."

The second patent describes a genus of substituted hexahydro acetone derivatives having a structure containing a carbon-carbon double bond and carbon-carbon single bonds, possessing multifaceted aromas of sweet, woody, citrusy, vetiver-like, musky, leathery, peppery, hay and green fragrance notes.¹³ They are useful fragrance ingredients for perfumes, colognes, cosmetic powders, soaps and detergents.

An example of a hexahydro acetone derivative used to impart a rich, green, woody note of vetiver is given:

Vetiver Fragrance

10 labdanum resinoid

- 50 hexahydro acetonaphthone derivative
- 25 cedrol
- 5 cedryl acetate
- 1 isobutyl quinoline
- 2 α -ionone
- 15 caryophyllene
- 2 eugenol

The above fragrance compound may be used in a cologne at a concentration of 2.5 percent in 85 percent aqueous alcohol, and into a handkerchief perfume at a concentration of 20 percent in 95 percent aqueous alcohol. Used in a powder detergent at a concentration of 0.7 percent, it will produce a vetiver aroma with deep green and woody notes.

A third patent describes cyclohexene-3-nitriles, which can be readily synthesized.¹⁴ These nitriles have a good stability in acid and basic conditions; they do not oxidize easily, can withstand higher temperatures, and are suitable in soap, detergents and personal care products.

In the preparation of mixed 3,5-dimethyl- and 2,4-dimethyl-3-cyclohexene nitriles, the odor of combined fractions eight to 18 had a strong green, cuminic note with herbal, cinnamic and woody

background. The 24-h dry-out odor was strong, warm, woody.

Application

Vetiver oil and derivatives are valuable perfume materials used in many women's and men's fragrances and in various cosmetic and soap perfumes. Vetiver root has been employed in the Orient since antiquity. The dried root is used to scent clothes lines, by itself or in a form of sachet.

Vetiver and its derivatives are natural fixatives and are also modifiers of musky odors. Vetiverol is especially suitable as a background note in floral bouquets. Vetiver was used in old-fashioned violet pomade as fixative.

Vetiver gives a covering power and persistence in talcum powder perfumes. Vetiver also finds applications in various types of potpourri, combined with spicy, floral, citrus or lavender notes. In addition, it is a component of perfumes used to impart a pleasant scent to cigar boxes.

It is interesting to note that vetiver is considered an insect repellent, probably due to khusimone, a minor but essential component of vetiver oil with insect repellent power.

Here is an illustrative list of a number of earlier and later fragrances containing vetiver or its derivatives: Arpège (Lanvin), Chanel No. 5 (Chanel), Femme (Ro-

chas), Miss Dior (Dior), Shalimar (Guerlain), Cravache (Piguet), L'O (Lancôme), Mystère de Rochas, Bales-tra (ICR), Anais Anais (Cacherel), Silences (Jacomo), Sheherazade (J. Deprez), Bois des Iles de Chanel (1920s, reappeared in 1993), Paradox (Jacomo), Tiffany (Tiffany & Co.), Paco Energy (Paco Rabanne), Must (Cartier), Eau de Vetiver (Guerlain), L'Eau Cheap et Chic (Moschino), Coriolan (Guerlain), Tiffany for Men Sport Cologne, and the 2004 fragrance Le Baiser du Dragon (Cartier).

Conclusion

Vetiver and its derivatives are likely to remain important woody note components in a broad spectrum of men's and women's fragrances in the foreseeable future. In spite of the pessimistic prognosis of G. and F. Robert, who include vetiver oil among the vanishing raw materials because of its popularity and huge world consumption of natural products, vetiver oil is still available and used in fragrances released in 2004.¹⁵ Vetiver will continue to remain an important ingredient because it is difficult to replace/substitute. The newer vetiver specialties approximate the initial vetiver odor, but leave much to be desired in comparison to vetiver oil's lasting fixative power.

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