Ylang Survey

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Ylang Ylang, *Cananga Odorata forma genuina* is most likely native to the Phillipines. The tree, if left alone in its natural state, would reach a height of 60 feet. Unfortunately the majestic height and natural beauty of this tree impedes the efficient and economical harvest of the delicate ylang blossoms. Consequently the tree is pruned and maintained at a height of 7-10 feet. The final result is a tree that is grossly disfigured to facilitate ease of harvest with a bonus of improved yield per acre.

The somewhat unusual name Ylang Ylang comes from the vernacular "Alang-Ilang." a term that describes the "hanging" or "fluttering" condition of the flowers which tremble in the slightest wind.[1] A relative newcomer to the fragrance industry in contrast to other florals, the history of this essential oil is well known.

Seldom can a time period, let alone a specific person, be associated with the development of an industry. But such is the case with Ylang. The Ylang industry had its beginning when a sailor named Albert Schwenger found himself stranded in Manila around 1860. Enchanted by the odor of these flowers he conceived the idea of a field still on wheelcart.[2] With this still he set out traveling the countryside distilling Ylang in small quantities.

Shortly thereafter the industry shifted to the French possessions in the Indian Ocean and by 1909 there were 200,000 Ylang trees on the island of Reunion. About that time Reverend F. Riembault introduced Ylang trees to Madagascar on the small island of Nossi-be. This small island came to be known for producing the finest quality and was dubbed Ylang "Peres Mis-

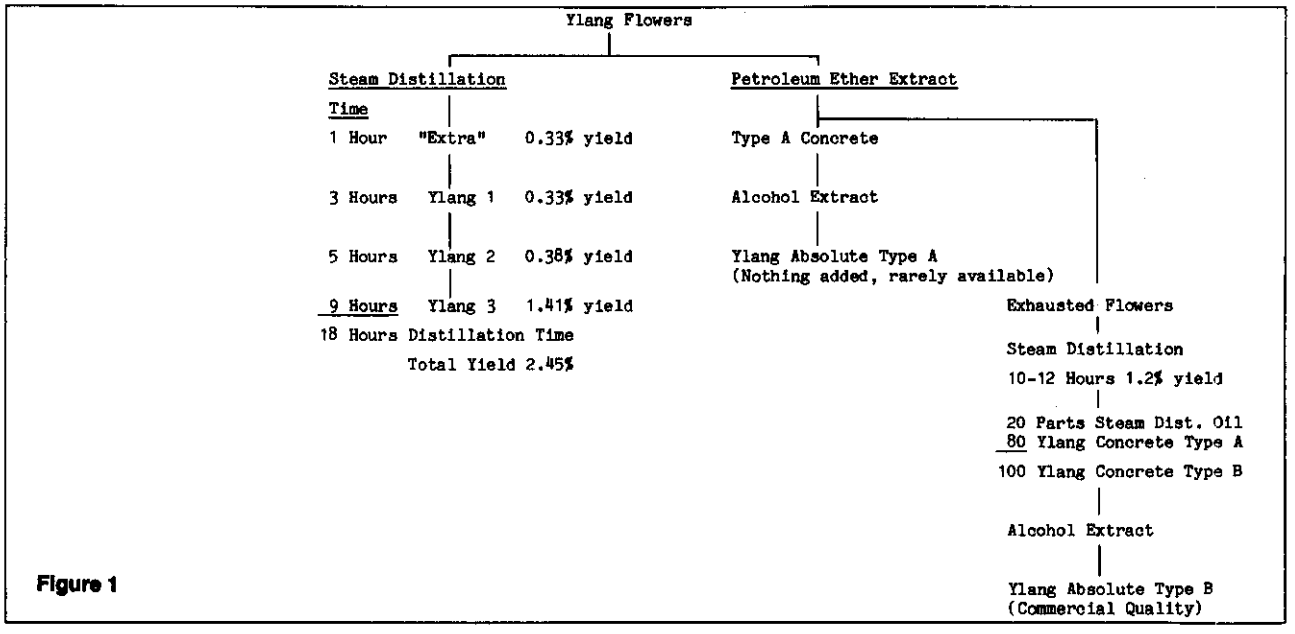

Figure 1

sionaires."[3]

The center for production of Ylang at present is on the islands of Anjoun and Mayotte. Bambao is reputedly the producer of the finest quality Ylang oils. While accurate production figures are difficult to obtain, approximately 100 tons per year are imported into the United States.

The essential oil, concrete and absolute of Ylang find many uses in perfumes such as L'Air du Temps by Nina Ricci and Wind Song by Matchabelli. They are also used in many other functional products like shampoos, creams and lotions and impart a warm floral and somewhat spicy balsamic topnote to any fragrance.

Ylang is no stranger to the flavorist and has been used as a modifier in ice cream, candy, chewing gum, and baked goods flavors.[4]

There were at one time two types of absolute in production. Type A is the concrete obtained from a petroleum ether extract, and type B is the oil from type A mixed with the oil from the steam distillation of exhausted petals. Figure 1 is a production scheme for general reference.

I have never seen type A and it is probably rarely produced or may not be economically desirable to produce. There is an easy method to distinguish type A from type B. Type A should be free from sesquiterpenes and more specifically free from caryophyllene which is probably produced as a result of the steam distillation process forming caryophyllene from epoxy dihydro caryophyllene.[5]

The odor of Ylang is quite unusual. The composition of Ylang has been fairly well researched and some early work[6] reports the following constituents:

methyl benzoate
benzyl benzoate
methyl salicylate
benzyl salicylate
benzyl acetate
linalyl acetate
linalyl benzoate
geranyl acetate
geranyl benzoate
p-cresyl methyl ether
methyl anthranilate
methyl isoeugenol
cadinene
pinene
formic acid
safrole
isosafrole
valeric acid
benzyl alcohol
nerolidol
farnesol

A literature survey shows the following additional components identified[7] through the years by various workers:

Table I

Component	Extra	1	2	3	Cananga	Absolute	Concrete
Alpha Pinene	0.3	0.1	0.1	0.1	-	0.1	-
P-Cresyl Methyl Ether	8.4	3.1	1.0	0.4	1.1	3.0	4.3
Benzyl Alcohol	0.5	0.2	-	-	-	-	0.5
P-Cresol	0.1	0.1	-	-	-	-	0.1
Methyl Benzoate	4.0	1.0	0.3	0.1	-	3.5	1.2
Linalool	10.3	5.5	3.2	2.0	1.7	13.2	11.8
Benzyl Acetate	12.6	4.2	1.2	0.5	-	2.8	2.5
Alpha Terpineol	0.1	-	-	-	-	0.8	-
Methyl Salicylate	0.1	0.1	-	-	-	0.3	0.2
Geraniol	0.2	0.2	0.2	-	0.6	1.7	2.0
Linalyl Acetate	0.2	0.2	0.2	-	-	-	-
Safrole	0.3	0.1	0.1	-	-	0.4	-
Methyl Anthranilate	0.1	-	-	-	-	0.1	0.1
Eugenol	0.2	0.2	0.4	0.3	-	0.8	0.5
Geranyl Acetate	4.0	3.0	2.2	2.0	1.8	4.0	3.5
Isoeugenol	0.2	0.4	-	-	-	-	-
Beta Caryophyllene	6.8	11.5	12.8	16.3	37.0	10.0	8.1
Alpha Caryophyllene	3.1	4.2	4.1	8.8	10.5	3.3	3.1
Farnesene *	18.0	16.8	17.0	21.0	12.2	14.9	10.0
Delta Cadinene	8.9	15.1	20.4	16.3	5.4	10.8	5.8
Gamma Cadinene	2.0	5.3	7.0	7.5	7.6	2.8	2.6
Nerolidol	0.5	0.8	0.5	1.8	1.0	0.7	0.7
(Z) (E) Farnesol	0.9	1.7	1.7	1.4	1.1	1.8	2.3
Benzyl Benzoate	4.3	8.5	9.7	5.3	2.9	11.8	16.4
Benzyl Salicylate	1.9	2.2	2.7	1.7	0.1	5.2	4.9

* The section between brackets is the sesquiterpene section of Ylang. This section is complex mixtures of various sesquiterpenes. Percentages indicated are only a rough guideline, at best.

linalool
geraniol
creosol
eugenol
isoeugenol
para cresol
para cresyl acetate
acetic acid
valeric acid
benzoic acid
salicylic acid
acetone
furfural
benzaldehyde
alpha terpineol
phenyl ethyl alcohol
nerol
1-cadinol
sesquiterpenes 33-38%

The sesquiterpene section of Ylang has been studied[8] and found to contain:

alpha cubebene
copaene
B-cubebene
B-elemene
caryophyllene
humulene
alpha cadinene
farnesene
delta cadinene
gamma cadinene

In addition various methyl butenols and their acetates have been reported.[9]

While many compounds have been identified, precious little quantitative information has ever appeared in the literature. By gas chromatography I have examined the constituents of the various products of Ylang as can be seen in Table I.

Table I shows that the Ylang Extra fraction is rich in the characteristic components of Ylang—p-cresyl methyl ether, methyl benzoate, linalool, benzyl acetate and geranyl acetate. The subsequent fractions 1, 2 and 3 show a drastic reduction in these compounds and an increase in the sesquiterpene section. Cananga shows few of these compounds that give Ylang most of its character. Ylang absolute and concrete show the characterizing compounds near the levels present in the Extra quality. It is interesting to note a marked increase in benzyl benzoate and benzyl salicylate.

The character of Ylang is complex in that it is a combination of floral, spicy, balsamic, fruity, woody and medicinal notes.

It has been my personal practice to establish in my own mind the major characters of any natural product. In Table II I have listed under their appropriate heading the chemicals which support or are responsible for the major odor characteristics of Ylang.

Chemical Classes

● Hydrocarbons ● Alpha Pinene, a minor constituent, is not a very important odor contributor but the sesquiterpene hydrocarbons comprise approximately 40% of Ylang. The sesquiterpenes as a class, specifically caryophyllene and cadinene, can generally be described as woody and more or less peppery (depending on the specific molecule in question). Farnesene on the other

Table II

Medicinal	Floral	Spicy/Balsamic	Fruity	Woody
P-Cresyl Methyl Ether	Benzyl Alcohol	Methyl Benzoate	Benzyl Acetate	B-Caryophyllene
Para Cresol	Linalool	Safrole	Linalyl Acetate	Alpha Caryophyllene
Methyl Salicylate	Alpha Terpineol	Eugenol	Methyl Anthranilate	Cadinene
	Geraniol	Isoeugenol	Geranyl Acetate	
	Farnesene			
	Nerolidol			
	Farnesol			
	Benzyl Salicylate			

hand is somewhat different in character and exhibits a floral character with a delicate green note that is fresh, leafy and somewhat vegetable in its tone. This entire sesquiterpene region provides the warm natural base on which all the other components rest. It should be kept in mind that this section is much more complex than this analysis indicates.

• Alcohols • The major alcohol in this group is linalool. The character of linalool is a compromise of citrus and floral. While there are other familiar floral alcohols reported, such as benzyl alcohol, alpha terpineol, geraniol, farnesol and nerolidol, their part in the overall odor of Ylang is minor.

• Esters • This class of chemicals is very important to the odor of Ylang. Methyl benzoate is without a doubt the most characteristic chemical and is responsible for the odor most identifiable as Ylang. Benzyl acetate and geranyl acetate provide the fruity floral body of Ylang. Methyl salicylate and benzyl salicylate are phenol esters and provide in the former a bright floral medicinal note and in the latter a long lasting floral body. Methyl anthranilate, special character donator, provides (at the level found) a fruity and floral nuance to the odor profile. While benzyl benzoate is found in significant proportions in all qualities it is not an important odor contributor to Ylang.

• Ethers • The major component in this class is para cresyl methyl ether. It is responsible for the very diffusive and penetrating medicinal character of Ylang.

• Phenols • This class of chemicals almost always plays an important part in the odor profile of any natural product. Usually present in trace quantities, their presence is felt from topnote to dryout. Ylang is a perfect example of how these phenols, p-cresol, eugenol, isoeugenol and 2-methoxy-4-methyl phenol, make their presence felt in just that way. They are responsible for the spicy, warm balsamic effect for which Ylang is so well known.

• Aldehydes • Benzaldehyde and furfural are two very potent aldehydes with very characteristic odors. They contribute to the fruity character of Ylang. Other aldehydes like n-octanal and n-decanal at very low levels contribute to the overall brightness of Ylang.

In summary it is the blend of esters, ethers, and phenols, and sesquiterpenes in significant proportions that form the basic accord of Ylang. It is indeed a unique tropical blend of fruity, floral, balsamic and medicinal notes.

Many synthetic blends adequately reproduce the Ylang effect quite economically, yet fall short of perfection when compared to the original. I feel this is due to the variety of sesquiterpenes (not to mention other unknowns) that occur naturally in Ylang. While much is known about the nature of these ubiquitous sesquiterpenes, a feasible synthesis to produce them economically or sufficiently pure is beyond current technology.

References

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