

## GC-MS Profiling Analysis Prepared for Jade Bloom, Inc

**Date:** March 6, 2018  
**Sample:** Anise Star  
**Type:** Essential Oil  
**Source:** *Illicium verum*  
**Batch:** 132597

### ANALYSIS SUMMARY

Identification	DB-5 (%)	DB-WAX (%)	Classe
2-Methyl-3-buten-2-ol	0.01	0.01	Aliphatic alcohol
Isovaleral	tr	tr	Aliphatic aldehyde
2-Methylbutyral	tr	tr	Aliphatic aldehyde
Furfural	0.01	0.01	Aliphatic alcohol
$\alpha$ -Thujene	0.01	0.01	Monoterpene
$\alpha$ -Pinene	0.45	0.45	Monoterpene
Camphene	0.01	0.01	Monoterpene
$\beta$ -Pinene	0.08	0.04	Monoterpene
Sabinene	[0.08]	0.04	Monoterpene
Myrcene	0.09	0.09	Monoterpene
$\alpha$ -Phellandrene	0.32*	0.31	Monoterpene
Pseudolimonene	[0.32]*	0.01	Monoterpene
$\Delta$ 3-Carene	0.24	0.24	Monoterpene
$\alpha$ -Terpinene	0.06	0.06	Monoterpene
para-Cymene	0.06	0.06	Monoterpene
1,8-Cineole	1.31*	0.40*	Monoterpenic ether
$\beta$ -Phellandrene	[1.31]*	[0.40]*	Monoterpene
Limonene	[1.31]*	0.94	Monoterpene
(Z)- $\beta$ -Ocimene	0.01	0.02	Monoterpene
(E)- $\beta$ -Ocimene	0.02	0.02	Monoterpene
$\gamma$ -Terpinene	0.07	0.07	Monoterpene
cis-Sabinene hydrate	0.02	0.01*	Monoterpenic alcohol
Terpinolene	0.06	0.06	Monoterpene
trans-Linalool oxide (fur.)	0.01	[0.01]*	Monoterpenic alcohol
Methyl benzoate	0.01	0.01	Phenolic ester
Linalool	0.96	0.99	Monoterpenic alcohol
trans-Pinocarveol	tr	0.01	Monoterpenic alcohol
Borneol	0.01	0.12*	Monoterpenic alcohol
Terpinen-4-ol	0.13	0.18*	Monoterpenic alcohol
$\alpha$ -Terpineol	0.09	[0.12]*	Monoterpenic alcohol
Methylchavicol	3.25	3.30*	Phenylpropanoid
(Z)-Anethole	0.48*	0.22	Phenylpropanoid
para-Anisaldehyde	[0.48]*	0.30	Simple phenolic
(E)-Anethole	88.66	88.57	Phenylpropanoid
$\alpha$ -Copaene	0.10	0.08	Sesquiterpene
para-Acetonylanisole	0.05	0.06	Phenylpropanoid
$\beta$ -Elemene	0.03	0.77*	Sesquiterpene
cis- $\alpha$ -Bergamotene	0.44*	0.09	Sesquiterpene
$\beta$ -Caryophyllene	[0.44]*	[0.77]*	Sesquiterpene
Aromadendrene	0.42*	[0.18]*	Sesquiterpene
(Z)- $\beta$ -Farnesene?	[0.42]*	0.04	Sesquiterpene
trans- $\alpha$ -Bergamotene	[0.42]*	[0.77]*	Sesquiterpene
cis- $\beta$ -Bergamotene?	0.02		Sesquiterpene
$\alpha$ -Humulene	0.04	[3.30]*	Sesquiterpene
Methyl (Z)-isoeugenol	0.04		Phenylpropanoid
Bicyclogermacrene	0.09*	0.07*	Sesquiterpene
Viridiflorene	[0.09]*	0.04	Sesquiterpene
$\alpha$ -Muurolene	0.05	[0.07]*	Sesquiterpene

$\gamma$ -Cadinene	0.07*	0.02	Sesquiterpene
$\beta$ -Bisabolene	[0.07]*	0.08	Sesquiterpene
$\delta$ -Cadinene	0.06	0.06	Sesquiterpene
$\alpha$ -Elemol	0.02	0.02	Sesquiterpenic alcohol
(E)-Nerolidol	0.08	0.08	Sesquiterpenic alcohol
1-(4-Methoxyphenyl)propane-1,2-diol isomer I	0.06		Phenylpropanoid
Globulol	0.05	0.02	Sesquiterpenic alcohol
(Z)-Foeniculin	0.04	0.04	Phenylpropanoid
Viridiflorol	0.01	0.03	Sesquiterpenic alcohol
$\tau$ -Cadinol	0.04*	0.02	Sesquiterpenic alcohol
$\tau$ -Muurolol	[0.04]*	0.01	Sesquiterpenic alcohol
$\beta$ -Eudesmol	0.01	0.01	Sesquiterpenic alcohol
$\alpha$ -Cadinol	0.05	0.04	Sesquiterpenic alcohol
(E)-Foeniculin	1.15	1.13	Phenylpropanoid
<b>Total identified</b>	<b>99.34%</b>	<b>99.29%</b>	

\*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

tr: The compound has been detected below 0.005% of total signal.

Note: no correction factor was applied

#### PHYSICOCHEMICAL DATA

**Physical aspect:** Faintly yellow liquid

**Refractive index:** 1.5525  $\pm$  0.0003 (20 °C)

#### COMPLIANCE WITH ISO 11016:1999 (ILLICIIUM VERUM - ANISE)

Compound	Min. %	Max. %	Observed %	Complies?
$\alpha$ -Pinene	0.1	1.5	0.5	Yes
$\alpha$ -Phellandrene		0.7	0.3	Yes
Limonene	0.2	6.0	0.9	Yes
Linalool	0.2	2.5	1.0	Yes
$\alpha$ -Terpineol		0.3	0.1	Yes
Methylchavicol	0.6	6	3.3	Yes
(Z)-Anethole	0.1	1.0	0.2	Yes
para-Anisaldehyde	0.1	0.5	0.3	Yes
(E)-Anethole	86	93	88.7	Yes
$\beta$ -Caryophyllene		0.8	0.4	Yes
<i>trans</i> - $\alpha$ -Bergamotene	0.06	0.6	0.4	Yes
<i>cis</i> - $\alpha$ -Bergamotene	0.04	0.09	0.09	Yes
(E)-Foeniculin	0.1	3.0	1.2	Yes
Refractive index	1.553	1.556	1.5525	No

#### CONCLUSION

No adulterant, contaminant or diluent has been detected using this method. The oil marginally does not comply with the ISO standard for star anise oil.