

## GC/MS BATCH NUMBER: BH0102

**ESSENTIAL OIL:** BLUE TANSY ORGANIC  
**BOTANICAL NAME:** TANACETUM ANNUUM  
**ORIGIN:** MOROCCO

KEY CONSTITUENTS PRESENT IN THIS BATCH OF BLUE TANSY ORGANIC OIL	%
SABINENE	19.3
1,9-DIHYDROCHAMAZULENE	11.8
CHAMAZULENE	12.1
CAMPHOR	7.3
$\alpha$ -PHELLANDRENE	4.1
MYRCENE	4.0
p-CYMENE	3.0
$\beta$ -PINENE	2.9
4,10-DIHYDROCHAMAZULENE	2.8
5,6-DIHYDROCHAMAZULENE	2.0
$\beta$ -CARYOPHYLLENE	1.9
BORNEOL	1.8
$\alpha$ -PINENE	1.7
7,8-DIHYDROCHAMAZULENE	1.6
LIMONENE	1.5
1,8-CINEOLE	1.3
TERPINEN-4-OL	1.1
$\gamma$ -TERPINENE	1.0

Comments from Robert Tisserand: The 12% of chamazulene is a good indicator of quality.

**Date :** September 23, 2016

*SAMPLE IDENTIFICATION*

**Internal code :** 16I16-PTH14-1-DM

**Customer identification :** Organic Blue Tansy - BH010266R

**Type :** Essential oil

**Source :** *Tanacetum annuum*

**Customer :** Plant Therapy

*ANALYSIS*

**Method :** PC-PA-001-15E06, "Analysis of the composition of a liquid essential oil by GC-FID" (in French).

**Analyst :** Sylvain Mercier, M. Sc., chimiste

**Analysis date :** 2016-09-20

Checked and approved by :

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Alexis St-Gelais, M. Sc., chimiste 2013-174

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IDENTIFIED COMPOUNDS

Identification	Column: BP5			Column: WAX			Molecular Class
	R.T.	R.I.	%	%	R.I.	R.T.	
Ethyl 2-methylbutyrate	2.21	843	0.01	0.01	983	1.02	Aliphatic ester
Tricyclene	3.16	913	0.04	0.04	925	0.78	Monoterpene
$\alpha$ -Thujene	3.25	918	0.27	0.45	952	0.88	Monoterpene
$\alpha$ -Pinene	3.35	924	1.66	1.52	944	0.85	Monoterpene
$\alpha$ -Fenchene	3.64*	941	0.67	0.65	995	1.07	Monoterpene
Camphene	3.64*	941	[0.67]	0.02	1012	1.15	Monoterpene
Sabinene	4.11	970	19.31	20.08	1060	1.53	Monoterpene
$\beta$ -Pinene	4.16	973	2.94	2.85	1039	1.36	Monoterpene
Myrcene	4.43	989	4.03	4.32	1116	1.99	Monoterpene
Octen-3-ol	4.46	991	0.03	0.02	1413	5.96	Aliphatic alcohol
6-Methyl-5-hepten-2-one	4.50	994	0.03	0.02	1272	3.94	Aliphatic ketone
$\alpha$ -Phellandrene	4.70*	1005	4.45	4.11	1109	1.92	Monoterpene
$\Delta$ 3-Carene	4.70*	1005	[4.45]	0.04	1087	1.74	Monoterpene
Octanal	4.81	1011	0.04	0.02	1230	3.36	Aliphatic aldehyde
$\alpha$ -Terpinene	4.87	1015	0.56	0.84	1121	2.05	Monoterpene
para-Cymene	5.08	1026	2.98	2.97	1206	3.04	Monoterpene
Limonene	5.11	1028	1.45	1.28	1138	2.26	Monoterpene
$\beta$ -Phellandrene	5.13	1029	0.26	1.78	1143	2.31*	Monoterpene
1,8-Cineole	5.16	1031	1.29	[1.78]	1143	2.31*	Monoterp. ether
<i>cis</i> - $\beta$ -Ocimene	5.28	1037	0.03	1.01	1186	2.80*	Monoterpene
<i>trans</i> - $\beta$ -Ocimene	5.46	1047	0.02	0.01	1200	2.97	Monoterpene
$\gamma$ -Terpinene	5.65	1057	1.02	[1.01]	1186	2.80*	Monoterpene
<i>cis</i> -Sabinene hydrate	6.00	1076	0.15	0.25	1406	5.85*	Monoterp. alcohol
Terpinolene	6.11	1082	0.36	0.33	1222	3.24	Monoterpene
Artemisia alcohol	6.18	1086	0.05	0.04	1452	6.64	Monoterp. alcohol
para-Cymenene	6.33	1095	0.01	0.01	1372	5.36	Monoterpene
6,7-Epoxyterpinene	6.35	1096	0.21	0.21	1347	5.00	Monoterp. ether
Linalool	6.64	1107	0.16	0.13	1490	7.36	Monoterp. alcohol
Nonanal	6.73	1110	0.02	0.01	1344	4.95	Aliphatic aldehyde
Unknown (m/z = 71, 43 (86), 81 (86), 79 (69), 67 (67), 41 (56), 53 (38)... 152 (7))	6.91	1117	0.09				Oxygenated monoterpene
<i>cis</i> -para-Menth-2-en-1-ol	7.17	1126	0.10	0.06	1499	7.54	Monoterp. alcohol
Limonone	7.33	1132	0.17	0.18	1463	6.86	Monoterp. ketone
<i>trans</i> -Pinocarveol	7.58	1142	0.02	0.02	1566	9.26	Monoterp. alcohol
Camphor	7.69	1146	7.27	7.51	1423	6.10	Monoterp. ketone
Isoborneol	8.08	1160	0.07	0.07	1598	10.24	Monoterp. alcohol
Umbellulone	8.32	1169	0.04	0.04	1553	8.91	Monoterp. ketone
Borneol	8.60	1180	1.78	2.04	1616	10.77	Monoterp. alcohol
Terpinen-4-ol	8.70	1183	1.06	1.83	1528	8.16*	Monoterp. alcohol

$\alpha$ -Terpineol	9.35	1203	0.27	0.36	1625	11.05*	Monoterp. alcohol
$\alpha$ -Phellandrene epoxide	9.66	1210	0.09	0.06	1716	15.04	Monoterpene
Decanal	9.87	1215	0.09	0.04	1438	6.40	Aliphatic aldehyde
Bornyl formate	10.19	1222	0.08	0.06	1456	6.72	Monoterp. ester
(Z)-Hex-3-en-1-yl isovalerate	10.43	1227	0.03	0.04	1447	6.56	Aliphatic ester
Pulegone	10.79	1236	0.56	0.57	1548	8.74	Monoterp. ketone
Cuminal	11.36	1248	0.13	0.07	1675	13.25	Monoterp. aldehyde
Thymol	15.49	1326	0.65	0.73	2111	37.29	Monoterp. alcohol
$\alpha$ -Cubebene	15.89	1332	0.11	[0.25]	1406	5.85*	Sesquiterpene
Carvacrol	16.15	1336	0.05	0.04	2145	38.44	Monoterp. alcohol
$\alpha$ -Copaene	17.36	1355	0.05	0.03	1433	6.30	Sesquiterpene
$\beta$ -Elemene	18.60	1374	0.18	[1.83]	1528	8.16*	Sesquiterpene
$\beta$ -Caryophyllene	20.26	1398	1.90	1.33	1525	8.08	Sesquiterpene
Aromadendrene	21.72	1416	0.23	[1.83]	1528	8.16*	Sesquiterpene
cis- $\beta$ -Farnesene	22.56	1426	0.49	0.54	1578	9.66	Sesquiterpene
$\alpha$ -Humulene	22.99	1431	0.17	0.22	1584	9.81	Sesquiterpene
allo-Aromadendrene	23.22	1434	0.03	0.03	1563	9.19	Sesquiterpene
trans- $\beta$ -Farnesene	24.16	1446	0.10	[0.36]	1625	11.05*	Sesquiterpene
Germacrene D	25.19	1458	0.60	0.52	1627	11.14	Sesquiterpene
$\beta$ -Selinene	25.80	1465	0.45	0.45	1631	11.30	Sesquiterpene
Bicyclgermacrene	26.41*	1472	0.29	0.21	1645	11.91	Sesquiterpene
$\alpha$ -Selinene	26.41*	1472	[0.29]	0.02	1642	11.74	Sesquiterpene
Valencene	27.33	1483	0.17	0.10	1666	12.83	Sesquiterpene
$\gamma$ -Cadinene	28.30	1495	0.03	0.07	1669	12.96	Sesquiterpene
1,9-Dihydrochamazulene	29.01*	1504	11.79	11.90	1811	20.31	Azulene
$\delta$ -Cadinene	29.01*	1504	[11.79]	0.08	1670	13.01	Sesquiterpene
$\beta$ -Sesquiphellandrene	29.83	1516	0.68	0.70	1697	14.19	Sesquiterpene
3,6-Dihydrochamazulene	30.24	1521	0.11				Azulene
Spathulenol	33.48*	1566	0.33	0.08	2022	33.65	Sesquiterp. alcohol
Caryophyllene oxide	33.48*	1566	[0.33]	0.24	1851	22.78	Sesquiterp. ether
4,10-Dihydrochamazulene	35.91	1603	2.80	2.93	2015	33.26	Azulene
5,6-Dihydrochamazulene	36.35	1613	1.96	1.85	1972	30.75	Azulene
$\gamma$ -Eudesmol	36.59	1619	0.18	0.17	2071	35.92	Sesquiterp. alcohol
7,8-Dihydrochamazulene	37.47	1640	1.56	1.29	2011	33.02	Azulene
$\beta$ -Eudesmol	37.68	1645	0.51	0.51	2118	37.48	Sesquiterp. alcohol
$\alpha$ -Cadinol	37.88	1650	0.04	0.02	2130	37.94	Sesquiterp. alcohol
$\alpha$ -Bisabolol	39.28	1683	0.05	0.05	2140	38.25	Sesquiterp. alcohol
Chamazulene	40.55	1720	12.12	12.49	2241	40.96	Azulene
Unknown (m/z = 119, 121 (70), 105 (49), 93 (48), 91 (45), 109 (44), 41 (42)... 366?(4))	47.96	1986	0.18	0.21	2180	39.38	Diterpene

Unknown (m/z = 119, 121 (78), 132 (68), 93 (56)... 366? (2))	48.16	1994	1.12	0.92	2197	39.84	Diterpene
Unknown (m/z = 119, 132 (89), 109 (58), 145 (37), 105 (37)... 366?(4))	48.28	1999	0.23				Diterpene
<b>Total identified</b>			<b>91.44%</b>	<b>92.57%</b>			

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

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

Note: no correction factor was applied

#### OTHER DATA

**Physical aspect :** Dark blue liquid

**Refractive index :** N/A (too dark)

#### CONCLUSION

No adulterant, contaminant or diluent were detected using this method.



