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Essential Oil of *Achillea ligustica* (Asteraceae) as an Antifungal Agent against Phytopathogenic Fungi

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Supplementary data

Table S1

The chemical constituents of *Achillea ligustica* flower essential oil.

Compounds ^a	RI ^b	Area %	ID ^c
α -thujene	927	Tr	MS,RI
α -pinene	933	0.6 \pm 0.2	MS,RI,std
camphene	948	Tr	MS,RI,std
benzaldehyde	968	Tr	MS,RI,std
sabinene	974	1.3 \pm 0.3	MS,RI,std
β -pinene	976	6.4 \pm 1.1	MS,RI,std
yomogi alcohol	1004	0.5 \pm 0.1	MS,RI
α -terpinene	1018	1.0 \pm 0.2	MS,RI,std
<i>p</i> -cymene	1028	0.8 \pm 0.2	MS,RI,std
β -phellandrene	1031	0.2 \pm 0.0	MS,RI
1,8-cineole	1033	5.8 \pm 1.2	MS,RI,std
γ -terpinene	1062	2.2 \pm 0.4	MS,RI,std
artemisia ketone	1068	1.3 \pm 0.3	MS,RI
<i>cis</i> -sabinene hydrate	1071	0.3 \pm 0.1	MS,RI
terpinolene	1089	0.6 \pm 0.2	MS,RI
<i>trans</i> -sabinene hydrate	1098	0.3 \pm 0.1	MS,RI
linalool	1105	24.8 \pm 4.1	MS,RI,std
hotrienol	1110	0.6 \pm 0.2	MS,RI
2-methyl butyl isovalerate	1114	0.3 \pm 0.1	MS,RI
<i>cis-p</i> -menth-2-en-1-ol	1125	0.3 \pm 0.0	MS,RI
α -campholenal	1130	Tr	MS,RI
veratrole	1137	0.4 \pm 0.1	MS,RI
<i>trans</i> -pinocarveol	1141	1.3 \pm 0.2	MS,RI
<i>trans-p</i> -menth-2-en-1-ol	1145	Tr	MS,RI
camphor	1146	0.4 \pm 0.1	MS,RI,std
pinocarvone	1164	1.6 \pm 0.3	MS,RI
borneol	1168	0.6 \pm 0.2	MS,RI,std
δ -terpineol	1172	0.2 \pm 0.0	MS,RI
terpinen-4-ol	1179	5.3 \pm 1.0	MS,RI,std
artemisyl acetate	1181	0.1 \pm 0.0	MS,RI
α -terpineol	1192	1.9 \pm 0.3	MS,RI,std
myrtenal	1195	0.2 \pm 0.0	MS,RI,std
myrtenol	1197	0.5 \pm 0.1	MS,RI,std
<i>trans</i> -piperitol	1210	0.1 \pm 0.0	MS,RI
<i>trans</i> -myrtenol	1256	0.1 \pm 0.0	MS,RI,std
<i>cis</i> -chrysanthenyl acetate	1265	0.4 \pm 0.1	MS,RI
bornyl acetate	1287	0.8 \pm 0.2	MS,RI
geranyl formate	1296	Tr	MS,RI
<i>trans</i> -pinocarvyl acetate	1300	0.5 \pm 0.1	MS,RI
myrtenyl acetate	1329	0.1 \pm 0.0	MS,RI
<i>trans</i> -carvyl acetate	1343	Tr	MS,RI
cyclosativene	1363	0.5 \pm 0.1	MS,RI

<i>cis</i> -carvyl acetate	1367	0.3±0.0	MS,RI
α -copaene	1373	0.3±0.1	MS,RI,std
<i>trans</i> -myrtaanol acetate	1386	0.5±0.1	MS,RI
β -elemene	1390	0.1±0.0	MS,RI
α -gurjunene	1405	0.1±0.0	MS,RI,std
(<i>E</i>)-caryophyllene	1415	1.0±0.2	MS,RI,std
α -humulene	1450	0.2±0.0	MS,RI,std
9- <i>epi</i> -(<i>E</i>)-caryophyllene	1458	0.8±0.1	MS,RI
(<i>E</i>)- β -farnesene	1465	Tr	MS,RI
<i>trans</i> -cadinane-1(6),4-diene	1475	0.2±0.1	MS,RI
germacrene D	1478	Tr	MS,RI
\square -curcumene	1480	0.7±0.1	MS,RI
<i>ar</i> -curcumene	1483	0.5±0.1	MS,RI
viridiflorene	1492	0.2±0.0	MS,RI
α -zingiberene	1495	0.3±0.1	MS,RI
α -muurolene	1498	Tr	MS,RI
β -curcumene	1512	0.1±0.0	MS,RI
δ -cadinene	1523	1.5±0.3	MS,RI
β -sesquifellandrene	1526	0.2±0.0	MS,RI
α -calacorene	1542	0.1±0.0	MS,RI
<i>cis</i> -dracunculifoliol	1545	0.2±0.0	MS,RI
Compounds^a	RI^b	Area %	ID^c
spathulenol	1577	0.2±0.0	MS,RI
caryophyllene oxide	1580	1.0±0.2	MS,RI,std
<i>ar</i> -turmerol	1583	0.2±0.0	MS,RI
viridiflorol	1591	9.6±2.0	MS,RI
globulol	1600	0.8±0.2	MS,RI,std
guaiol	1601	0.7±0.1	MS,RI,std
humulene epoxide II	1604	Tr	MS,RI
isolongifolan-7- α -ol	1614	1.8±0.4	MS,RI
10- <i>epi</i> - γ -eudesmol	1625	0.9±0.2	MS,RI
1- <i>epi</i> -cubenol	1629	0.9±0.2	MS,RI
zingiberenol	1635	1.5±0.3	MS,RI
3-thujopsanone	1656	0.6±0.2	MS,RI
helifolenol A	1664	Tr	MS,RI
α -bisabolol	1685	0.5±0.1	MS,RI,std
11- α H-himachal-4-en-1-beta-ol	1691	2.4±0.4	MS,RI
(2 <i>Z</i> ,6 <i>Z</i>)-farnesol	1697	0.4±0.1	MS,RI
chamazulene	1727	0.2±0.0	MS,RI
(6 <i>S</i> ,7 <i>R</i>)-bisabolone	1748	0.2±0.0	MS,RI
<i>n</i> -tricosane	2300	0.1±0.0	MS,RI,std
<i>n</i> -pentacosane	2500	Tr	MS,RI,std
Total identified (%)		92.8	
Grouped compounds			
Monoterpenes hydrocarbons		13.3	
Oxygenated monoterpenes		49.2	
Alcohols		42.6	
Ketones		3.3	
Oxides		5.8	
Esters		3.0	
Aldehydes		0.3	
Sesquiterpenes hydrocarbons		7.1	
Oxygenated sesquiterpenes		22.3	
Alcohols		20.5	
Ketones		0.8	
Oxides		1.0	
Others		0.9	

^a Compounds are listed in order of their elution from a HP-5 column. ^b Linear retention index as determined on HP-5 column using homologous series of C8-C26 alkanes. ^c Identification methods: MS, by comparison of the mass spectrum with those of the computer mass libraries and Adams [24]; RI, by comparison of RI with those reported from Adams [24]; std, by injection of an authentic sample. -, not detected. Tr, trace (<0.1%).