

Essential oil yield and composition of three *Helichrysum* species occurring in the Eastern Cape Province of South Africa



Province of the
EASTERN CAPE
DEPT OF RURAL DEVELOPMENT
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INTRODUCTION

Of the 245 species of *Helichrysum*, three are widely used in South Africa for medicinal purposes, namely, *H. odoratissimum*, *H. cymosum* and *H. petiolare*, also commonly known as Imphepho (Xhosa, Zulu) (Van Wyk *et al.*, 1997). Inhaling the smoke is believed to assist with pain relief. It can also be used as a tea for coughs and colds, and by making wound dressings from the leaves. The active ingredients include essential oil which has been shown to have anti-microbial properties (Bougatsos *et al.* 2004), anti-inflammatory and anti fungal properties (François *et al.*, 2010). *H. italicum* (native to the Mediterranean region) essential oil is available commercially and used in the perfume industry and for aroma therapy.

AIM OF THE STUDY

The aim of the study was to compare and describe the essential oil composition of three *Helichrysum* species that commonly occurs in the Eastern Cape Province.

MATERIALS AND METHODS

- Essential oil was extracted from fresh plant material from the three *Helichrysum* species harvested at the Kareedouw and Woodlands area of the Eastern Cape (figure 1), using steam distillation. *H. odoratisimum* oil samples from Hogsback was provided by Essential Amathole.
- Fresh plant material and extracted oil masses were measured to determine yield.
- Oil composition was determined using Gas chromatography coupled with mass spectrometry and Flame Ionization Detector for quantification

GC conditions:

- Carrier gas: Helium (1ml / min)
- Temperature program: 60°C to 246°C at 3°C/minute

Component identification:

- NIST mass spectra library
- Confirmation of ID based on retention index using the essential oil dictionary of Adams (2007)

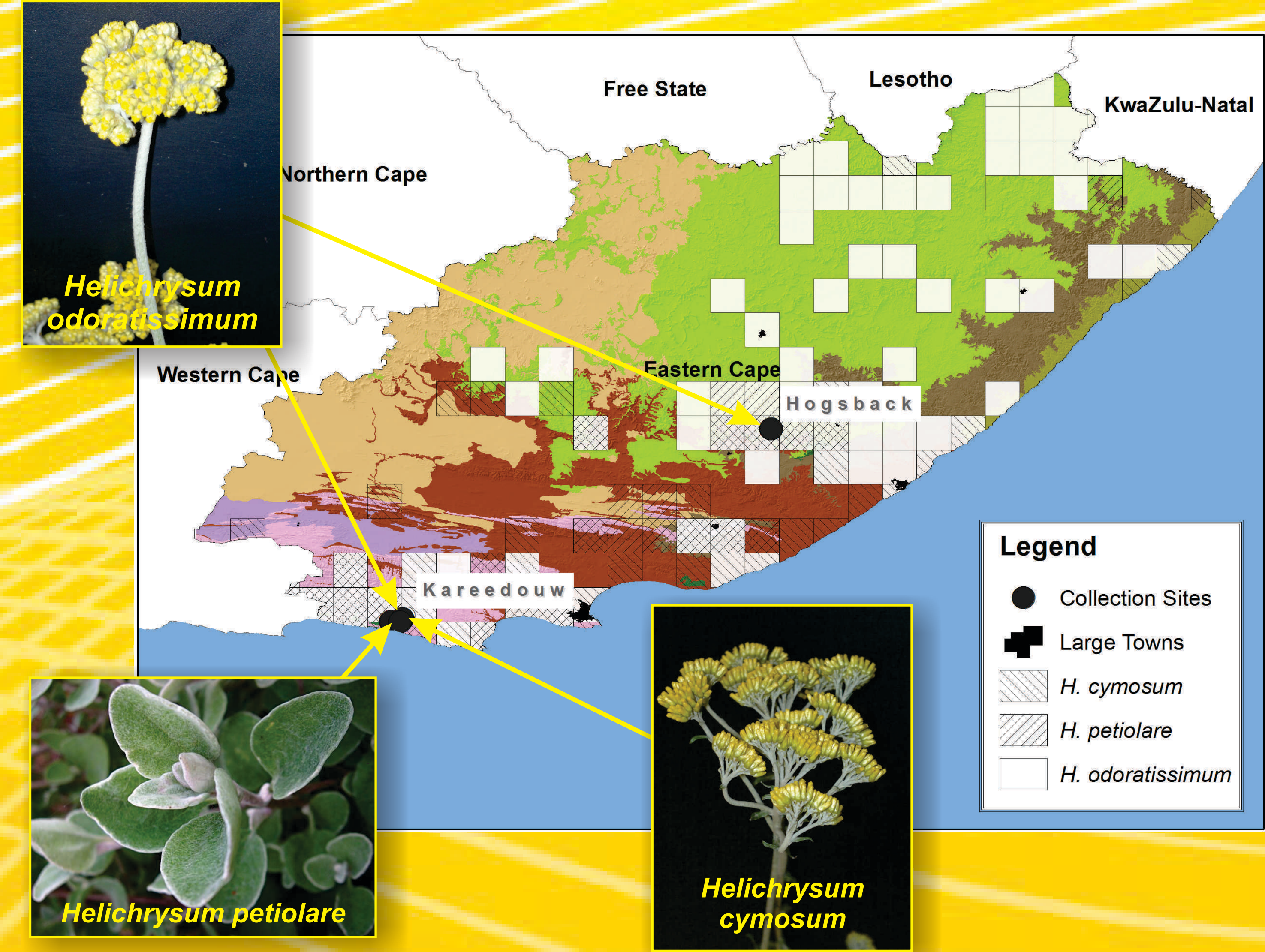


Figure 1 Distribution and sampling sites of three species of *Helichrysum* occurring in the Eastern Cape. (Distribution data provided by National Biodiversity Institute)

RESULTS

A Oil yield

- H. odoratissimum* had the highest oil yield with an average of 0.21% (Figure 2)
- The oil yield of *H. petiolare* harvested in Autumn was 67% lower than that of the late winter harvest
- Oil of *H. odoratissimum* was transparent while those of *H. cymosum* and *H. petiolare* was a yellow to orange colour

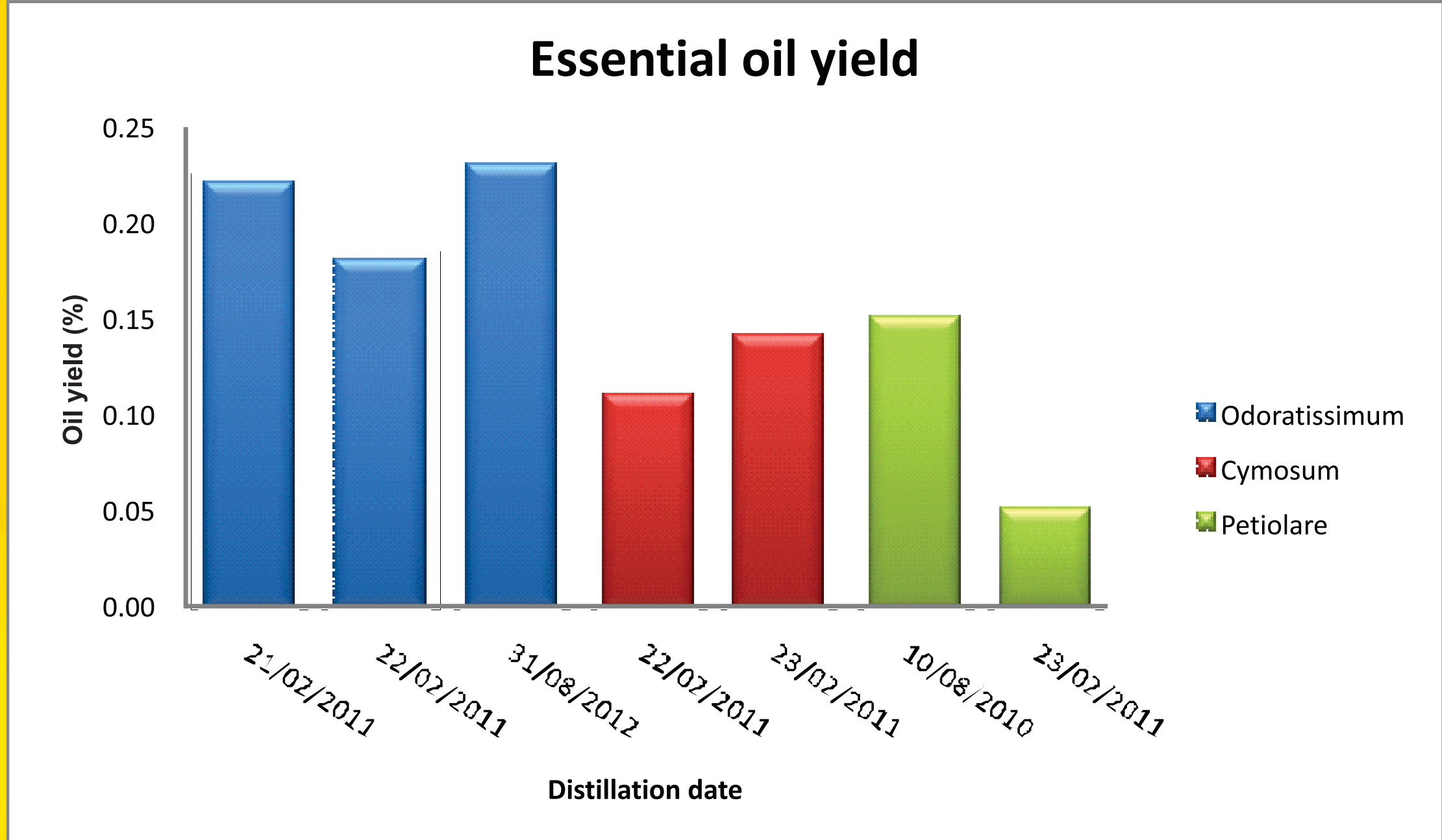


Figure 2 The essential oil yields of three species of *Helichrysum*

B Oil composition

- GC analysis showed about 70 components of which 19 were confidently identified as shown in Table 1.
- Major oil components: α -pinene, limonene, 1,8-cineole (eucalyptol), β -caryophyllene and α -humulene.
- 1,8-Cineole concentration could not be determined due to co-elution with an unknown compound
- The β -Caryophyllene of *H. petiolare* was considerably lower than that of *H. odoratissimum* and *H. cymosum* but contained the highest concentration of α -Humulene
- Large differences in the concentrations of α -pinene, Limonene, β -caryophyllene, and caryophyllene oxide was observed between the *H. odoratissimum* from Kareedouw and Hogsback

Table 1 The average oil composition of three species of *Helichrysum* (%) (n=number of samples analysed)

Oil component	<i>H. Odoratissimum</i> (Kareedouw) (n=3)	<i>H. Cymosum</i> (Kareedouw) (n=2)	<i>H. Petiolare</i> (Kareedouw) (n=2)	<i>H. odoratissimum</i> (Hogsback) (n=4)
Monoterpenes				
α -Thujene	0.2	0.2	0.2	0.1
α -Pinene	23.1	8.4	13.8	9.3
Camphene	0.3	0.5	0.3	0.3
β -Pinene	0.0	0.1	0.1	0.0
<i>p</i> -Cymene	0.7	1.5	0.3	0.6
Limonene	5.8	5.0	1.3	13.1
γ -Terpinene	1.7	1.5	0.2	0.8
Terpinolene	0.5	0.6	0.1	0.3
Monoterpenol				
Terpinen-4-ol	0.3	1.0	0.3	0.1
Oxides				
Unknown + 1,8-Cineole	12.3	25.8	5.3	7.9
Caryophyllene oxide	0.2	0.3	0.2	1.6
Sesquiterpenes				
α -Copaene	0.4	0.7	1.3	4.1
β -Caryophyllene	15.0	17.8	1.1	22.7
α -Humulene	7.6	3.7	10.9	6.6
γ -Cadinene	0.7	0.2	0.2	0.5
σ -Cadinene	1.4	0.5	3.2	1.7
Calamenene	0.3	0.2	0.9	0.5
Spathulenol	0.0	0.1	0.2	0.0
Murolene	0.4	0.1	0.2	1.3

CONCLUSIONS

- Further investigation of the factors effecting oil yield and composition is needed including seasonal and geographic variation.
- The large variation in oil composition of the three species may indicate that they may not have the same medicinal effectiveness.
- H. odoratissimum* will have the greatest potential for commercial production due to the high oil yield.

ACKNOWLEDGEMENTS

Mr Sam van der Merwe of Joubertina for supplying the plant material from Kareedouw
Mr Ian Weir of Essential Amathole for supplying the oil samples from Hogsback



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