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SHORT COMMUNICATION

CONSTITUENTS OF THE ESSENTIAL OIL OF *THYMUS SCHIMPERI*

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Abstract. The essential oils of the aerial parts of *Thymus schimperi* growing in two different localities of Ethiopia were analysed using GC, GC-MS, ^{1}H- and ^{13}C-NMR data. *T. schimperi* oil from plant material collected in Dinshu (Bale Province) was found to contain thymol (50%), γ-terpinene (12.1%), carvacrol (10.1%) and *p*-cymene (10.0%) as the major constituents whereas carvacrol (66.2%) and γ-terpinene (13.2%) were shown to dominate in the same species obtained from Addis Ababa. Thymol (48.6%) and γ-terpinene (19.8%) were the major constituents of *T. vulgaris* oil acclimatized in Wondo Genet, Ethiopia.

INTRODUCTION

The genus *Thymus* (Labiatae) includes about 350 species world wide and is widely distributed in temperate zones [1]. Many species of *Thymus* yield the commercially important thyme oil, which exhibits high antimicrobial effect. The strong antimicrobial activity of thyme oil is ascribed mainly to the high content of phenolic constituents such as carvacrol as was observed in *T. broussonettii* oil [2]. The essential oils of various *Thymus* species have been investigated by several workers [3-5].

T. schimperi and *T. serrulatus*, both locally known as 'Tosign', are indigenous to Ethiopia. *T. vulgaris* is a species, native to southern Europe, recently introduced into Ethiopia and cultivated in Wondo Genet by the Essential Oil Research Center. The leaves of *Thymus* are used in Ethiopia as spices to flavour a wide range of food products as well as medicines. We report here results of investigations of the essential oils of aerial parts of *T. schimperi* grown in Ethiopia.

MATERIALS AND METHODS

Plant material. Fresh aerial parts of *T. schimperi* Ronniger were collected in May 1996 from Dinshu (Bale Province) and also from the Science Faculty Campus, Addis Ababa University. The species was identified by Dr. Sebsebe Demissew and voucher specimens are deposited at the National Herbarium, Addis Ababa University, under the cipher no. S913 (Dinshu) and S658 (Science Faculty Campus). *T. vulgaris* was collected in September 1995 from Wondo Genet farm site of the Essential Oil Research Center (EORC) and was identified by Dr. Tadele Worku and a voucher specimen is kept under the cipher no. S864 at the National Herbarium.

Isolation of essential oils. The plant materials were chopped and hydrodistilled for 3 h in a Clevenger type apparatus. The yield of essential oils after hydrodistillaton were 0.9% and 0.5% for *T. schimperi* from Dinshu and Addis Ababa, respectively, and 0.9% for *T. vulgaris*.

GC and GC-MS analysis. The oils were examined by GC and GC-MS according to a previously described procedure [7] and further confirmed by peak enhancement, GC retention time and in the case of thymol, carvacrol, *p*-cymene and γ-terpinene by ^{1}H and ^{13}C- NMR spectral analyses.

RESULTS AND DISCUSSION

The results from GC, GC-MS and NMR analyses are presented in Table 1. A total of twenty compounds were identified from the volatile oils of the above three specimens.

Table 1. Chemical composition (%) of the essential oils of two *Thymus* species grown in Ethiopia.

Components*	T. *schimperi*		T. *vulgaris*	Method of identification
	Dinshu	A.A.		
α-thujene	1.1	0.8	1.0	GC-MS
trans-ocimene	0.3	0.2	0.9	GC-MS
α-humulene	-	-	0.5	GC-MS
1-octen-3-ol	-	0.3	0.7	GC-MS
β-myrcene	1.6	0.2	2.2	PE, GC-MS
3-octanol	1.5	4.5	-	GC-MS
α-terpinene	1.7	3.4	5.1	GC-MS
3-octanone	1.4	-	-	GC-MS
limonene	0.3	-	-	PE, GC-MS
p-cymene	10.0	2.2	3.3	PE, GC-MS, NMR
1,8-cineole	-	0.6	1.2	PE, GC-MS
γ-terpinene	12.1	13.2	19.8	PE, GC-MS, NMR
cis-sabinene hydrate	-	0.8	0.8	GC-MS
linalool	6.5	1.3	4.6	PE, GC-MS
borneol	-	-	1.9	GC-MS
p-menth-1-en-4-ol	0.4	0.4	0.9	GC-MS
α-terpineol	0.3	0.2	-	GC-MS
thymol	50.0	3.6	48.6	PE, GC-MS, NMR
carvarcol	10.1	66.2	1.6	PE, GC-MS, NMR
trans-caryophyllene	1.3	0.5	2.1	PE, GC-MS
Total % of components identified	98.6	98.4	95.2	

*Components are arranged in order of their elution from a DB-17 capillary column; PE = peak enhancement; NMR = ^{1}H and ^{13}C-NMR.

It was found that oil obtained from *T. schimperi* grown in Addis Ababa was rich in carvacrol (66.2%) and γ-terpinene (13.2%) (figure 1) while thymol (50%), γ-terpinene (12.1%), carvacrol (10.1%) and p-cymene (10.0%) were the major constituents in the same species from Dinshu (figure 2).

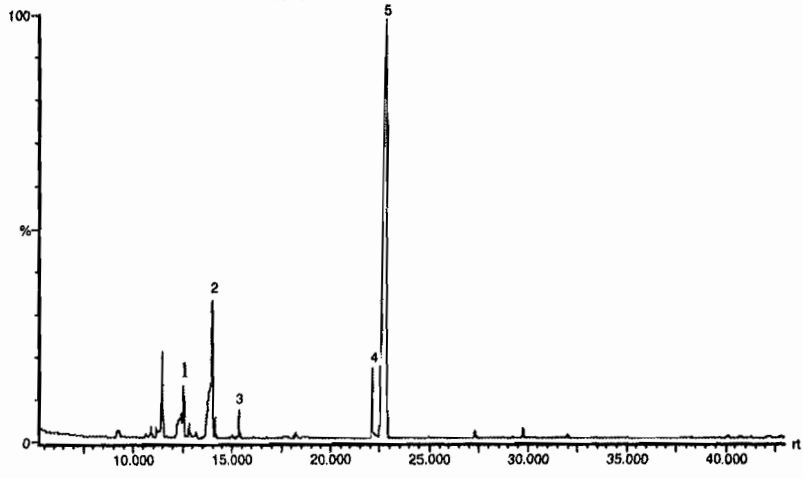

Figure 1. Gas chromatograms of steam distilled oil of *T. schimperi* (Addis Ababa)(**1**: *p*-cymene; **2**: γ-terpinene; **3**: linalool; **4**: thymol; **5**: carvacrol).

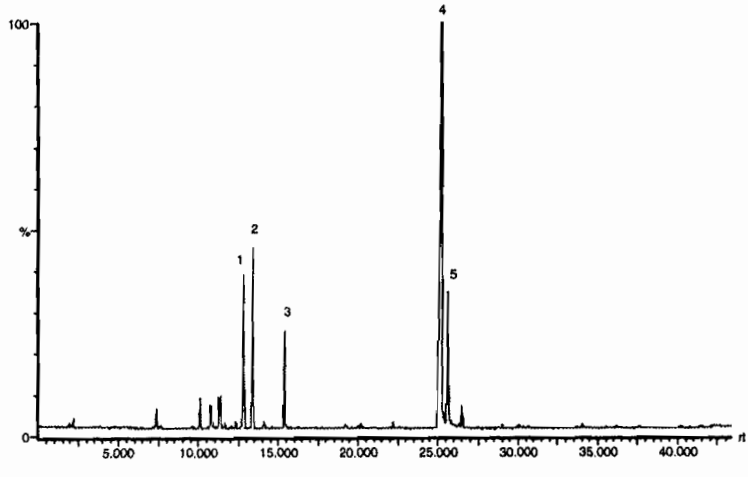

Figure 2. Gas chromatograms of steam distilled oil of *Thymus schimperi* (Dinshu); (**1**: *p*-cymene; **2**: γ-terpinene; **3**: linalool; **4**: thymol; **5**: carvacrol).

It is well known that the qualitative and quantitative composition of thyme oil is affected by various factors, including geographic origin, time of harvest, etc. [6]. The above results show that *Thymus schimperi* is rich in the medicinally important phenolic constituents, thymol and carvacrol.

The oil of *T. vulgaris* was likewise analysed in order to compare the results with the above oils. The results are summarized in Table 1. The major compound is thymol (48.6%). Other compounds present in significant amounts are γ-terpinene, *p*-cymene, linalool and carvacrol.

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