

# Essential Oil of *Heterotheca Latifolia*

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Several weeds growing widespread in west-central Argentina have potential utility as sources of essential oils. We made a preliminary screening in order to select the most interesting species not analyzed previously. *Heterotheca latifolia* Buck. (*Compositae*), one of them, is a foreign (North American) species that was brought to Argentina as contaminant of commercial samples of seeds. It was first detected in 1972 and currently covers extensive regions of both unworked or cultivated lots in all the central area of San Luis Province, Argentina. Evidently, it has found a suitable climate, and it is one of the dominant species in this habitat. Named "alcáfor" (camphor) obviously for its fragrance, it has no known medicinal or economical use; on the contrary, it is considered a weed and is readily destroyed.

Although there are several papers in the bibliography about this genus,<sup>1</sup> no one has studied or described its aroma. We have identified in a previous work<sup>2</sup> the main constituents of the essential oil from its aerial parts and showed an olfactive evaluation that was further confirmed by the assistance of the Symposium of Natural Aromatic and Medicinal Resources, held in Necochea, Argentina in 1984. The confirmation of those compounds and identification of some others present in minor quantities are given

in this paper. Furthermore, we present a critical analysis of the potential economic value of this essence for the fragrance industry.

## Experimental

The plant material (batches of 250, 550 and 750 Kg) was collected in three different areas of the central region of San Luis Province, Argentina. A voucher specimen was deposited in the Faculty of Pharmacy and Biochemistry Herbaria at the University of Buenos Aires. The plants were in an advanced flowering stage, with incipient fructification. The plants were harvested by hand, except for those areas of uncontaminated vegetations where mechanical harvest was possible.

The plant material was air-dried for one day "in situ" and then transferred to the stills, where a classical steam distillation was performed during 4 hours to obtain the essential oil. The yield was 0.1% in all the batches. An aliquot was dried and analyzed by GLC and GLC-MS (RI at 20°C: 1.4805; density (20°C): 0.920). The percentages were those obtained by the GLC-capillary column analysis (SE-30), using split injection (1:100), FID and olfactive detection.

A sample of 1 g of the essential oil was esterified with tetramethyl ammonium hydroxide, and

the product analyzed by GLC. Only one new peak appeared (0.2% of the volatiles) that was not identified.

## Results

The chemical composition of the essential oil from the aerial parts of *Heterotheca latifolia* Buck was found to be:

tricyclene (0.1%)	linalyl acetate (0.3%)
alpha pinene (3.7%)	bornyl acetate (2.2%)
camphene (5.5%)	alpha bergamoptene (0.2%)
sabinene (0.1%)	terpinen-4-ol (2.0%)
beta pinene (6.0%)	beta caryophyllene (1.5%)
myrcene (0.5%)	methyl chavicol (0.5%)
alpha phelandrene (0.1%)	borneol (21.4%)
alpha terpinene (0.7%)	germacrene D (6.4%)
limonene (15.0%)	delta cadinene (1.1%)
1,8 cineol + beta phelandrene (0.7%)	gamma cadinene (0.3%)
gamma terpinene (1.8%)	caryophyllene epoxide ? (0.7%)
trans beta ocimene (1.4%)	nerolidol ? (0.5%)
para cymene (0.9%)	beta elemene ? (0.1%)
terpinolene (0.3%)	
trans sabinene hydrate (0.3%)	

We have studied the variation in composition through two harvests (1982/83 and 1983/84), and we have seen that the compositions are comparable. We observed only some minor modifications that could probably have originated in climatological disturbances.

## Discussion

Analyzing *H. subaxillaris* from U.S.A., Lincoln et al. suggest that this species may be chemically polymorphic, due to the different data for two samples of the same essential oil.<sup>3</sup> Regarding our results it must be taken into account that we have considered only the phylogenic variations, so we worked with a large population: 200-700 Kg of fresh material. This was done as a first step of our study because of our need to know the charac-

teristic of the essential oil produced on the industrial scale and its potential economic value. In a future work we must analyze the probable ontogenic variations through isolated individuals.

Although the qualitative composition of both *Heterotheca* spp. are very similar, differences are noticeable in the quantities. For example, *H. latifolia* contains much more limonene, borneol and camphor; while *H. subaxillaris* accumulates caryophyllene and myrcene. This fact suggests a modified biosynthetic pathway between them corroborating the morphological classification. It should be very interesting to analyze both species growing together, in order to discriminate any possible modification related to climate or edaphical conditions. Nevertheless, it is important to point out the absence in both species of sesquiterpenes lactones, characteristic for this genus.

The essential oil of *H. latifolia* may be described as wild-spicy and with a camphoraceous odour. It is as intense as armoise oil, and as fresh and herbaceous as cardamom oil. Because of this intense freshness small amounts of it could be used both in masculine and feminine fragrances.

Due to the oil's strength the low yield of the plant is not a detriment. Again, it must be taken into account the possibility of polymorphic<sup>3</sup> or chemical races in order to select or improve the fragrance and the yield of this material.

All of the material that we used was collected from the wild. However we think there will be no problem to farm it. Then considering the market demand it shall be possible to determine the cost for this essential oil.

As a general rule, we think it is very important to encourage our fellow essential oil scientists to report the olfactive characteristic of any new substance or biological extract with which they are working. This could be a very useful source of information for our industries.

## Acknowledgment

We are indebted to Prof. Dr. A. Cabrera (Instituto Darwinio, San Isidro, Argentina) for the taxonomical identification of the plant material. Also, we are indebted to Dr. W. Bühn (Holtzminden, Germany) whose experimental advice made this work possible.

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