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A new natural source of Camphor from *Cinnamomum longepetiolatum* Costerm. apud Phamh. in Vietnam

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Abstract. Essential oil of Cinnamomum longepetiolatum Costerm. apud Phamh. Obtained by hydro distillation. The essential oil yield was 0.91% in fresh leaves. The chemical composition of this oil was study by GC and GC/MS. Twelve compounds were identified representing 98.8% of this oil with camphor as major constituent (87.5%). Eleven other compounds were found with lower content. The results of this study shows that Cinnamomum longepetiolatum Costerm. apud Phamh. was a new natural source of camphor in Vietnam.

Keywords: Cinnamomum longepetiolatum, Lauraceae, Essential oil, camphor.

1. Introduction

Lauraceae farmily has about 45 genera and 2000-2500 species, distributed in tropical and subtropical regions of the world, but mostly in tropical Southeastern Asia and Neotropical America.

This family was very important in the economic use, because it contains much more economic trees, such as *Cinnamomum camphora, C. parthenoxylon, C. glanduliferum etc.,* all yield camphor and essential oil which was the source for perfume and useful natural resources for terpenes which were commercially important chemicals in the flavor, fragrances and pharmaceutical industries. The fruits of *Cinnamomum, Litsea, Lindera, Syndiclis, Cryptocarya, Actinodaphne* contain abundant oil and fat which ware very useful for industry. The timber of *Cinnamomum Phoebe* and other genera was very valuable. The bark of *Cinnamomum cassia* and the root of *Lindera aggregata* were the famous drug in traditional medicine. The fruit of *Persea americana* is a kind of nutritious fresh fruit. The leaves of *Laurus nobilis, Cinnamomum subavenium* and others were the good spice for food or can [1,2].

The genus Cinnamomum comprises over 250 species and distributed in tropical areas and both hemisphere.

Cinnamomum species in general are well known aromatic plant which an oil was produced in small and large quality in many countries. It was included in the Pharmacopoeia of Vietnam [3] and other countries such as China, India etc, because of their wide use in

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perfumery, in food industry, in traditional medicine, in health care etc.

To our best knowledge, no previous phytochemical works have been recorded for the *C. longepetiolatum* Costerm. apud Phamh. found in Vietnam.

As a part of the research on the essential oils of Medicinal and Aromatic plants of the Vietnam flora, especially in the course of systematic study of Lauraceae in Vietnam, we reported herein on the chemical constituents of the essential oils obtained by hydro distillation of the leaves of *C. longepetiolatum*.

2. Experimental

1. **Source-** *Cinnamomum longepetiolatum* Costerm. apud Phamh. was a shrub tree up to 5-8^{m} high, growing in Vietnam. Leaves collected from Nghean province in December 2006. A voucher specimen (DD109) was deposited at the Herbarium of the Institute of Ecology and Biological Resources, Vietnamese Academy of Science an Technology, Hanoi, Vietnam.

Fresh leaves were shredded and their oil was obtained by steam distillation for 3h at normal pressure, according to the Vietnamese Pharmacopoeia [3]. The yield of the fresh leaf oil is 0.91%.

2. **GC-** About 15mg of essential oil, which was dried with anhydrous sodium sulfate, was dissolved in 1ml of n-hexane for spectroscopy or chromatography analysis.

GC analysis was performed on a Agilent Technologies HP 6890 Plus Gas chromatography equipped with a FID and fitted with HP-5MS column (L = 30m, ID = 0.25mm, film thickness = 0.25 μm), carrier gas H_2, injector temperature (PTV) 250^{o}C, detector temperature 260^{o}C, column temperature programmed 60^{o}C, 2 min, 4^{o}C/min, 220^{o}C, 10 min.

3. **GC/MS**- A Agilent Technologies HP 6890 N Plus Gas Chromatography equipped with a mass spectrometer HP5973 MSD was fitted with a fused silica capillary column HP-5MS column (L = 30m, ID = 0.25mm, film thickness = 0.25 μm). The analytical condition were the same as described above with He as carrier gas, and interface temperature 260^{o}C. Components identification was carried out by comparing MS data with those reported in Library Willey on Chemstation HP [4-9].

3. Results and discussion

Table 1 shows the compounds detected in the leaf oil of *Cinnamomum longepetiolatum* representing 98.8% of the total components separated.

The essential oil was dominated by camphor (87.5%), with lesser amounts of α-pinene (2.7%), camphene (2.3%), myrcene (1.2%), β-pinene (1.2%), limonene (2.3%), borneole (0.4%), α-humulene (0.3%), α-phellandrene (0.2%), α-terpinolene (0.3%), α-terpineol (0.2%), and p-cymene (0.2%).

Table1. Chemical composition of the leaf oil of *Cinnamomum longepetiolatum* Consterm. apud Phamh. in Vietnam

	Compounds	KI	Amount (%)
1	α-pinene	939	2.7
2	Camphene	953	2.3
3	β-pinene	980	1.2
4	myrcene	990	1.2
5	α-phellandrene	1006	0.2
6	p-cymene	1028	0.2
7	Limonene	1032	2.3
8	α-terpinolene	1090	0.3
9	camphor	1145	87.5
10	borneol	1167	0.4
11	α-terpineol	1191	0.2
12	α-humulene	1454	0.3

The monoterpene hydrocarbons contains about 8.0%, sesquiterpene hydrocarbon contains only 0.3%, oxygenated compounds was very high, around 88%. These compounds contribute to the camphorous odor of this oil, which was shows that this species was a new natural source of camphor.

To the best of our knowledge, this was the first report on the chemical composition of the leaf oil of *Cinnamomum longepetiolatum* Consterm. apud Phamh. in Vietnam.

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References

[1] P. Hoang Ho, *Flora in Vietnam*, Montreal Pub, 1992.

[2] Flora of China Editorial Committee, eds. In Preparation. *Flora of China.* Vol. 7 (Berberidaceae through Capparaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis.

[3] *Vietnamese Pharmacopoeia,* Medical Publishing House, Hanoi, 1997.

[4] S.R. Hell, G.W.A. Milne, *EPA/NIH Mass Spectral Data Base*, U.S. Government Printing Office, Washington D.C., 1978, 1980, 1983.

[5] E. Stenhagen, A. Abrahamsson, F.W. McLafferty, *Registry of Mass Spectral Data,* Wiley, New York, 1974.

[6] A.A. Swigar, R.M. Siverstein, *Monoterpenens,* Aldrich, Milwaukee, 1981.

[7] R.P. Adams, *Identification of Essential Oil Components bay Gas Chromatography/ Quadrupole Mass Spectrometry.* Allured Publising Corp.Carol Stream, IL., 2001.

[8] D. Joulain, W.A. Koenig, *The Atlas of Spectral Data of Sesquiterpene Hydrocarbons.* E. B. Verlag, Hamburg., 1998.

[9] N. Anh Dung, T. Dinh Thang, H. Van Luu, N. Xuan Dung, Volatile Constituents of the Leaf Oil of *Alchornea tiliifolia* (Benth.) Muell. (Family Euphorbiaceae) from Vietnam, *Journal of Essential Oil Research* (accepted), 2007.

Một nguồn Camphor tự nhiên mới từ loài *Cinnamomum longepetiolatum* Costerm. apud Phamh. ở Việt Nam

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Cây có tên khoa học là *Cinnamomum longepetiolatum* Costerm. apud Phamh. và tinh dầu của nó đã nhận được bằng kỹ thuật chưng cất lôi cuốn hơi nước. Hàm lượng tinh dầu trong lá tươi là 0,91%. Thành phần hoá học của tinh dầu này được nghiên cứu bằng phương pháp sắc ký khí và sắc ký khí khối phổ. 12 chất, chiếm 98,8% trong tinh dầu đã được xác định, trong đó camphor là chất chính, chiếm tới 87.5%. 11 chất khác được tìm thấy với hàm lượng thấp hơn. Các kết quả của nghiên cứu này đã chỉ ra rằng loài *Cinnamomum longepetiolatum* Costerm. apud Phamh. là nguồn cung cấp camphor tự nhiên mới được tìm thấy ở Việt Nam.