Chemical composition of essential oils from native plants of the Philippines

Genesis Albarico[1,3], Klara Urbanová [2], Marketa Houdkova[1], Marlito Bande[3], Edgardo Tulin[3] and Ladislav Kokoška [1,*]

[1]Department of Crop Sciences and Agroforestry, Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague, Kamycka 129, 165 00 Prague 6 - Suchdol, Czech Republic, *Corresponding author. Email: kokoska@ftz.czu.cz

[2]Department of Sustainable Technologies, Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague, Kamycka 129, 165 00 Prague 6 - Suchdol, Czech Republic, [3]Visayas State University, Visca, Baybay City, Leyte, Philippines 6521-A

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Introduction

Indigenous plant species are considered as potential sources of new phytochemicals such as those present in essential oils (EOs)[1]. These plants are commonly found in biodiversity dense areas such as in the tropics. The Philippines, a tropical archipelago in Southeast Asia, is one of the top biodiversity hotspots in the world [2]. Some of its flora species are EO-bearing plants belonging to the Lauraceae, Myrtaceae, Piperaceae, and Zingiberaceae families. The enormous variety of plants in the country suggests various EOs with possible significant economic and commercial importance. In this study, we aimed to determine the chemical composition of volatile compounds present from six Philippine indigenous plant species, namely *Alpinia elegans* (C.Presl) K.Schum. (seeds), *Alpinia haenkei* C. Presl (pericarp), *Cinnamomum iners* Reinw. (leaves), *Litsea leytensis* Merr. (leaves), *Piper philippinum* Miq. (leaves) and *Xanthostemon verdugonianus* Náves (leaves). This will be the first time that these plant species will be reported for their EO-bearing qualities and the corresponding chemical profile of their EOs, hence this study.

Materials and Methods

Plant samples from the Philippines were collected, processed and identified by Prof. Ing. Ladislav Kokoska. Voucher specimens were deposited at the Herbarium of the Czech University of Life Sciences Prague. Samples were air dried, ground, analyzed for moisture content and hydrodistilled according to the method of the European Pharmacopeia. The chemical components of essential oils were analyzed using the dual-column (HP-5MS and DB-HeavyWAX)/dual-detector Agilent GC-7890B model gas chromatograph with two inlets and flame ionization detector (FID) coupled with single quadruple Agilent MSD-5977B model mass selective detector (Agilent Technologies, Santa Clara, CA, USA). Chemical constituents were identified by matching their spectra against the National Institute of Standards and Technology (NIST) library and comparing retention times with authentic standards as well as comparing calculated retention indices with literature data. The quantitative analysis of volatile compounds was performed using GC-FID.

Results and Discussion

EOs from the six native plants had colors from pale to light yellow and distillation yields of 0.09, 1.25, 0.40, 0.14, 0.77 and 2.86 % (v/w) (dry basis) for *A. elegans* seeds, *A. haenkei* pericarp, *C. iners* leaves, *L. leytensis*, *P. philippinum*, and *X. verdugonianus* leaves, respectively (Fig.1). GC/MS analysis of the EO using HP-5MS/DB-HeavyWAX columns revealed various compounds present in each EO as shown in Table 1. The chemical components on the EO of *A. elegans* seeds is first described in this study as well for the EO of *A. haenkei* pericarp. Several reports have shown previous EO analysis *A. haenkei* plant parts but not for its fruit pericarp. Moreover, it is revealed for the first time the chemical components on the EO analysis for the leaves of *C. iners, L. leytensis, P. philippinum and X. verdugonianusthe* (Fig. 2). Results also showed that monoterpenes and sesquiterpenes are the leading chemical classes among the major constituents of EOs analyzed.

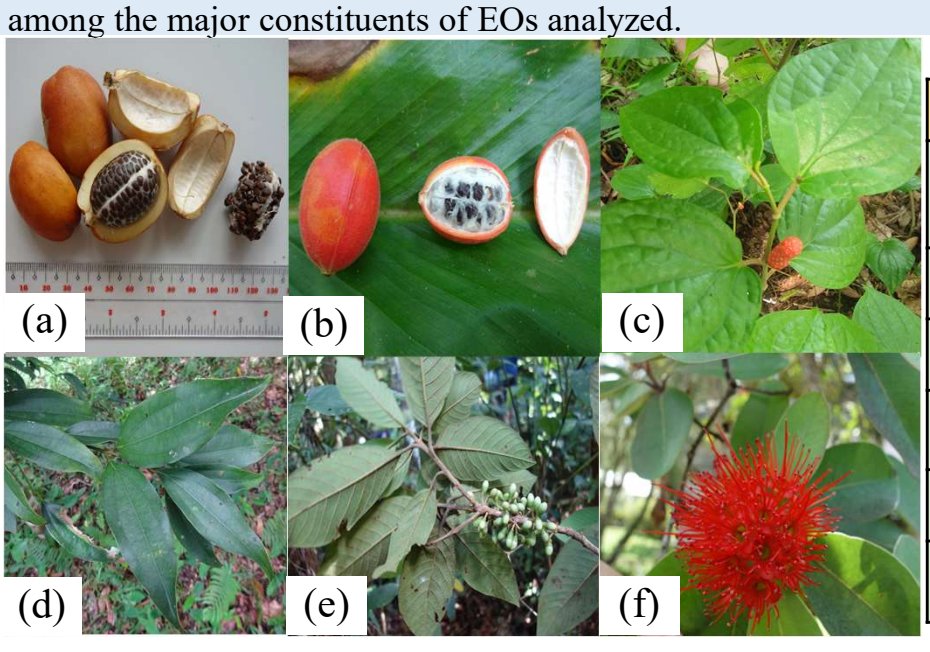

Fig. 1. *A. elegans* (seeds) (a), *A. haenkei* (pericarp) (b), *P. philippinum* (leaves) (c), *C. iners* (leaves) (d), *L. leytensis* (leaves) (e), and *X. verdugonianus* (leaves) (f).

Table 1. Major EO components of the six native Philippine plants.

No.	Species	Part	Main compounds
1	*Alpinia elegans*	seeds	Limonene (16.77/15.39%), α-Pinene (13.66/12.24%), Caryophyllene oxide (11.37/10.78%); Total components: 93.64/93.19%
2	*Alpinia haenkei*	pericarp	(E)-Methyl cinnamate (86.99/88.39%), Fenchol (1.86/1.89%); Total components:93.41/92.69%
3	*Cinnamomum iners*	leaves	Caryophyllene (21.00/34.90%), Linalool (15.47/13.90%); Total components: 95.57/96.67%
4	*Litsea leytensis*	leaves	Caryophyllene oxide (15.7/10.3%), α-Copaene (9.88/10.33%), Caryophyllene (9.86/11.70%); Total components: 88.99/85.50%
5	*Piper philippinum*	leaves	Ishwarane (26.9/24.9%), trans-Nerolidol (8.19/8.58%); Total components: 88.71/88.81%
6	*Xanthostemon verdugonianus*	leaves	α-Gurjunene (32.28/19.51%), Cyperenone (22.65/52.69%); Total components: 94.76/96.11%

Main compounds are reported as percent components in (HP-5MS/DB-HeavyWAX) columns. Literature RI values (Adams, 2007), Identification method: GC-MS = Mass spectrum was identical to that of National Institute of Standards and Technology Library (ver. 2.0.f).

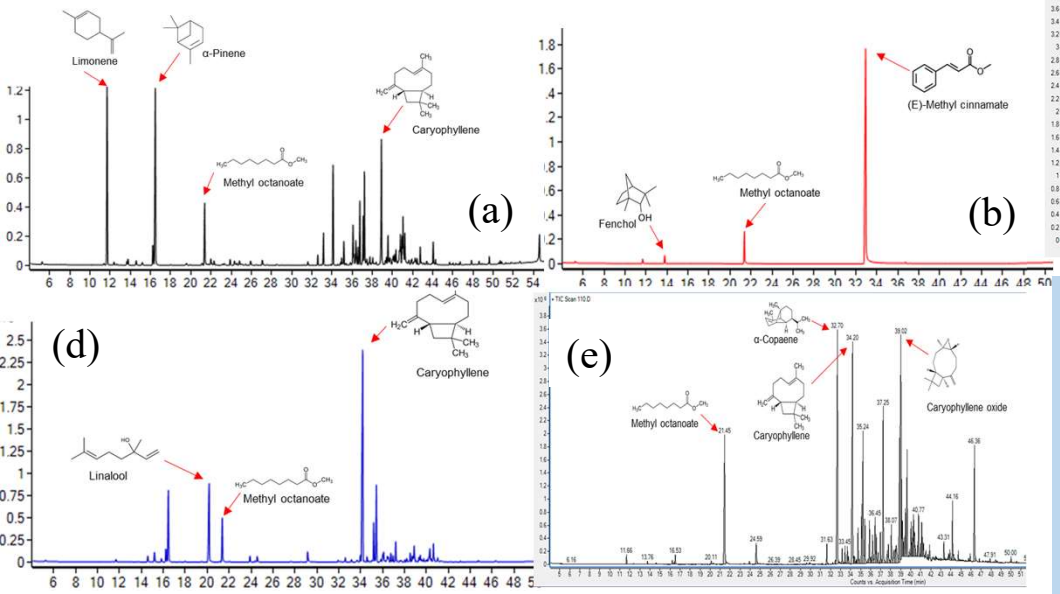

Fig. 2. GC-MS chromatogram (HP-5MS) of *A. elegans* (seeds) (a), *A. haenkei* (pericarp) (b), *P. philippinum* (leaves) (c), *C. iners* (leaves) (d), *L. leytensis* (leaves) (e), and *X. verdugonianus* (leaves) (f).

Conclusion

In general, we reveal for the first time the chemical components of the essential oils from six native plant species of Leyte, Philippines analyzed using the dual-column/dual-detector Agilent GC-7890B model gas chromatograph. These results will contribute to the knowledge on the phytochemistry of Southeast Asian plant taxa, especially on the chemical composition of essential oil-bearing plant species and their volatile compounds.

Acknowledgement

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References

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