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Natural Product Research
Formerly Natural Product Letters

ISSN: 1478-6419 (Print) 1478-6427 (Online) Journal homepage: https://www.tandfonline.com/loi/gnpl20

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To cite this article: Muhammad Zul Afiq Anuar, Wan Mohd Nuzul Hakimi Wan Salleh, Shamsul Khamis, Mohd Azlan Nafiah & Zahid Mat Said (2019): Essential oil composition of *Alseodaphne perakensis* (Gamble) Kosterm from Malaysia, Natural Product Research, DOI: 10.1080/14786419.2019.1636245

To link to this article: https://doi.org/10.1080/14786419.2019.1636245

NATURAL PRODUCT RESEARCH
https://doi.org/10.1080/14786419.2019.1636245

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SHORT COMMUNICATION

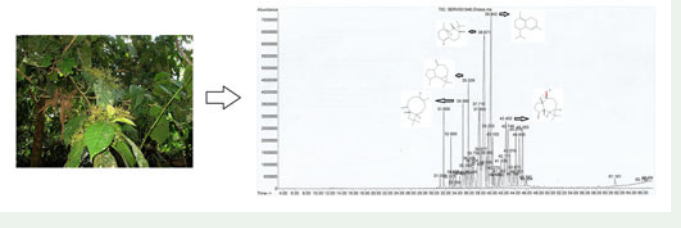
Essential oil composition of *Alseodaphne perakensis* (Gamble) Kosterm from Malaysia

Muhammad Zul Afiq Anuar[a], Wan Mohd Nuzul Hakimi Wan Salleh[a], Shamsul Khamis[b], Mohd Azlan Nafiah[a] and Zahid Mat Said[c]

[a]Department of Chemistry, Faculty of Science and Mathematics, Universiti Pendidikan Sultan Idris (UPSI), Tanjung Malim, Perak, Malaysia; [b]School of Environmental and Natural Sciences, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, Bangi, Selangor, Malaysia; [c]Department of Biology, Faculty of Science and Mathematics, Universiti Pendidikan Sultan Idris (UPSI),Tanjung Malim, Perak, Malaysia

ABSTRACT

The chemical composition of the essential oil from the leaves of *Alseodaphne perakensis* (Gamble) Kosterm (Lauraceae) growing in Perak, Malaysia was investigated for the first time. The essential oil was obtained by hydrodistillation and fully characterized by gas chromatography (GC) and gas chromatography-mass spectrometry (GC-MS). A total of 37 components (90.9 ± 2.5%) were successfully identified in the essential oil which were characterized by high proportions of bicyclogermacrene (15.8 ± 0.5%), δ-cadinene (11.7 ± 0.2%), γ-cadinene (6.3 ± 0.4%), and aromadendrene (5.6 ± 0.5%).



ARTICLE HISTORY
Received 11 May 2019
Accepted 16 June 2019

KEYWORDS
Essential oil; Alseodaphne perakensis; Lauraceae; bicyclogermacrene; hydrodistillation

1. Introduction

Alseodaphne belongs to family Lauraceae is a genus of small to medium-size trees of the wet evergreen tropical forests. It is distributed in tropical belt of India, Cambodia, China, Indonesia, Laos, Malaysia, Myanmar and Philippines, which consist of more than 50 species (Ng 1989). *A. perakensis* (Gamble) Kosterm is a small tree of about 6–12 meters in height and with yellow-green flowers. The colour of the twigs are greyish white. The leaves spirally arranged, sometimes clustered towards ends of the twigs. The stalk sized about 1–5cm long. The midrib raised or flattened above. The secondary

CONTACT Wan Mohd Nuzul Hakimi Wan Salleh wmnhakimi@fsmt.upsi.edu.my

Supplemental data for this article can be accessed at https://doi.org/10.1080/14786419.2019.1636245.

nerves is about 12–17 pairs, curving and joining near margin, prominently raised below and generally sunken above. The flowers of this species are axillary panicles with red pedicels, about 1–1.5cm long. The shape of the fruits is obovoid, 6 × 5cm long, seated on enlarged perianth tube. The plant is uncommon and found in lowland and hill forest in Kedah, Perak, Kelantan, Terengganu, Pahang, Selangor, Negeri Sembilan, Johor and Borneo (Burkill 1966; Nafihah 2009). There has been no information of this plant in traditional or folk medicine practice. Most of the species of genus are unexplored, both, pharmacologically and phytochemically. Previous phytochemical investigations of *Alseodaphne* have resulted in the isolation of alkaloids (aporphines, bisbenzyl-isoquinoline, morphinandienones) (Mukhtar et al. 2009; Nafiah et al. 2010; 2011), lactones (Lee et al. 2001), neolignans (Chang et al. 2000) and phenanthrenes (Mahmud et al. 1992). Although many members of the family Lauraceae are renowned for their valuable essential oils (Salleh et al. 2015, 2016a, 2016b), the genus *Alseodaphne* is still poorly explored as far as its essential oil composition is concerned. Therefore, it is interesting to report the essential oil composition of *A. perakensis* for the first time from Malaysia. To the best of our knowledge, there is no report on the essential oil composition of *A. perakensis*.

2. Results and discussion

The chemical composition of the essential oil of *A. perakensis* are listed in Table S1. In total, 37 chemical components, accounting for 90.9% of the total composition, were successfully characterized. They were grouped into sesquiterpene hydrocarbons and oxygenated sesquiterpenes. Sesquiterpene hydrocarbons were the most dominant components which constituted of 29 compounds, accounting for 71.8% of the total composition. Meanwhile, oxygenated sesquiterpenes were present in appreciable amounts which comprised of 8 compounds, accounting for 19.1% of the total composition. The major components were bicyclogermacrene (15.8%), δ-cadinene (11.7%), γ-cadinene (6.3%), and aromadendrene (5.6%). In addition, germacrene D (3.6%), globulol (3.5%), α-cadinol (3.4%), α-cubebene (2.7%), 1-*epi*-cubenol (2.6%), β-selinene (2.2%), and spathulenol (2.1%) were also detected in the oil.

A review of the existing literature on essential oils of the genus *Alseodaphne* revealed the presence of only two studies (Salleh et al. 2016c; Verma et al. 2016). We have recently reported the chemical composition and biological activity of the leaf oil of *A. peduncularis* (Salleh et al. 2016c). Sesquiterpene hydrocarbons were the major components in the essential oil (67.6%) with β-caryophyllene (24.0%) being the most substantial component, followed by δ-cadinene (15.9%), and germacrene B (12.2%). The leaf oil also showed weak activity in the DPPH radical scavenging (IC_{50} of 253.2 μg/mL) and phenolic content (32.5 mg GA/g), while moderate inhibition activity against AChE (percentage inhibition of 45.2%) and BChE (percentage inhibition of 48.6%). In addition, the leaf oil of the Indian species *A. semecarpifolia* were characterized by the predominance of (*E*)-caryophyllene (31.5%), (*E*)-nerolidol (9.7%), and germacrene D (7.4%). Whereas the fruit oil were dominated by (*E*)-β-ocimene (14.5%), *epi*-α-cadinol (9.3%), and δ-cadinene (8.6%) (Verma et al. 2016). The chemical differences among *Alseodaphne* species may depend on the extraction procedure, the season, the

stage of development and the distinct habitat in which the plant was collected (Salleh et al. 2016b).

Previous phytochemical study of the bark of *A. perakensis* have resulted in the isolation of a new aporphine alkaloid, identified as *N*-cyanomethylnorboldine, together with *N*-methyllaurotetanine, and norboldine (Nafiah et al. 2011). Besides, a phenanthrenoid alkaloid, perakensol was also isolated from this species (Mahmud et al. 1992).

3. Conclusions

This work is the first report on the essential oil composition of *A. perakensis* growing in Malaysia. The GC and GC-MS analysis of the essential oil allowed us to identify bicyclogermacrene (15.8 ± 0.5%), δ-cadinene (11.7 ± 0.2%), γ-cadinene (6.3 ± 0.4%), and aromadendrene (5.6 ± 0.5%) as the major components. The next step will be to evaluate the biological activities of the essential oil in order to valorize this species with a special ecological character. This study also provides valuable and useful information and indications for further exploring the potential nutraceutical and pharmaceutical applications of the genus Lauraceae.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This work was supported by Research University Grant (GPU) [grant number 2018-0208-108-01].

References

Burkill IH. 1966. A dictionary of the economic product of Malay Peninsula. Kuala Lumpur, Malaysia: Ministry of agriculture and co-operatives.

Chang H, Liu L, Tu P. 2000. Chemical constituents of *Alseodaphne hainanensis*. Zhongcaoyao. 31: 725–727.

Lee SS, Chang SM, Chen CH. 2001. Chemical constituents from *Alseodaphne andersonii*. J Nat Prod. 64(12):1548–1551.

Mahmud Z, Khan MN, Lajis NH, Toia RF. 1992. Perakensol: aphenanthrenoid isolated from *Alseodaphne perakensis*. J Nat Prod. 55(4):533–535.

Mukhtar MR, Zahari A, Nafiah MA, Hadi AHA, Thomas NF, Hiroko A, Morita H, Litaudon M, Ahmad K. 2009. 3′,4′-Dihydrostephasubine, a new bisbenzylisoquinoline from the bark of *Alseodaphne corneri*. Heterocycles. 78:2571–2578.

Nafiah MA, Mukhtar MR, Morita H, Ahmad K, Awang K, Hadi A. 2010. Alkaloids from roots of *Alseodaphne corneri* Kosterm. Malays J Sci. 29:281–284.

Nafiah MA, Mukhtar MR, Omar H, Ahmad K, Morita H, Litaudon M, Awang K, Hadi A. 2011. N-Cyanomethylnorboldine: a new aporphine isolated from *Alseodaphne perakensis* (Lauraceae). Molecules. 16(4):3402–3409.

Nafihah MA. 2009. Alkaloids isolated from Alseodaphne species (Lauraceae) and their bioactivities [dissertation]. Kuala Lumpur, Malaysia: University of Malaya.

Ng FSP. 1989. Malayan forest records, tree flora of Malaya. Kuala Lumpur, Malaysia: Forest Research Institute, 4:98.

Salleh W, Ahmad F, Khong HY. 2015. Antioxidant and anticholinesterase activities of essential oils of *Cinnamomum griffithii* and *C. macrocarpum*. Nat Prod Commun. 10(8):1465–1468.

Salleh W, Ahmad F. 2016a. Antioxidant and anti-inflammatory activities of essential oils of *Actinodaphne macrophylla* and *A. pruinosa* (Lauraceae). Nat Prod Commun. 11(6):853–855.

Salleh W, Ahmad F, Khong HY, Zulkifli RM. 2016b. Comparative study of the essential oils of three *Beilschmiedia* species and their biological activities. Int J Food Sci Technol. 51(1): 240–249.

Salleh W, Ahmad F. 2016c. Antioxidant and anticholinesterase activities of essential oil of *Alseodaphne peduncularis* Meisn. (Lauraceae). Turkish J Pharm Sci. 13(3):347–350.

Verma RS, Kumar A, Mishra P, Kuppusamy B, Padalia RC, Sundaresan V. 2016. Essential oil constituents of *Alseodaphne semecarpifolia* from Central Western Ghats, India. Chem Nat Compd. 52(3):516–517.