

Resolution of Complex Sesquiterpene Hydrocarbons in *Aquilaria malaccensis* Volatile Oils Using Gas Chromatography Technique

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ABSTRACT

Agarwood or *gaharu* is resin-impregnated wood of the tree genus *Aquilaria* (Thymelaeaceae). In Malaysia, the main agarwood producer is *Aquilaria malaccensis* and oil extracted from this species is highly priced. One of the challenges in commercializing agarwood is the lack of universal standard to classify the aromatic oils. Our present knowledge places the main aromatic compounds of agarwood oil in the sesquiterpene hydrocarbon region. In this work, we extracted agarwood oil using hydrodistillation method in the laboratory and compared with a commercial-scale extraction in the factory. We analyzed the sesquiterpene hydrocarbon region using several highly sophisticated detection systems. Using GC-FID, 12 sesquiterpene hydrocarbons were identified, while another eight were determined using GC-MS. Five compounds were identified in both analytical techniques: aromadendrene, α -bulnesene, α -guaiene, γ -gurjunene, and β -maaliene. Advanced analysis using GC \times GC/TOFMS detected 24 sesquiterpene hydrocarbons in both laboratory and pilot scale agarwood oils. Many of the sesquiterpene hydrocarbons identified provide the woody aroma to the agarwood oil. Specifically, α -gurjunene and α -guaiene contribute to the woody balsamic aroma, while α -copaene contributes to the spicy-wood aroma. In total, 33 sesquiterpene hydrocarbons were identified from *A. malaccensis* in the present study, with high certainty. Results from this study can be used toward establishing a universal standard for agarwood oil from the genus *Aquilaria* in the global market, which is presently lacking.

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