

GC-MS olfactometry reveals sesquiterpenes α -humulene and δ -cadinene significantly influence the aroma of treated *Aquilaria malaccensis* essential oil

ABSTRACT

Aquilaria malaccensis is a tropical woody tree that produces agarwood, which is valued for its aromatic properties. Agarwood is widely used in traditional medicines and the cosmetics industry. Natural agarwood production in the wild, which occurs due to fungal infection, is scarce and cannot meet the market demand. Hence, many artificial techniques have been employed to stimulate the production of agarwood. Although many studies have determined the volatile compounds present in naturally produced agarwood, the characterisation of these compounds from differentially treated agarwood samples, particularly *A. malaccensis*, is still limited. This study was conducted to identify and differentiate the volatiles present in treated and healthy *A. malaccensis* wood and essential oil using the solid phase microextraction (SPME) and hydrodistillation techniques, respectively, coupled with gas chromatography-mass spectrometry (GC-MS) analysis. Subsequently, the olfactory active compounds in the treated agarwood essential oil were determined via gas chromatography-mass spectrometry, coupled with olfactometry analysis (GC-MS/O) with four panellists. The essential oil from the treated agarwood was found to be abundant in sesquiterpene and aromatic compounds (80.61%), which was a similar result to that obtained from the volatiles of the wood that yielded 86.94%. Among the major sesquiterpene constituents in the essential oil are α -cadinol (19.40%) and 10-*epi*- γ -eudesmol (13.39%), whereas α -humulene (13.33%), α -copaene (12.49%) and δ -guaiene (10.41%) predominated in the SPME extract. Meanwhile, GC-MS/O analysis revealed that the sweet, woody agarwood aroma is an orchestra of olfactory active compounds that are significantly influenced by sesquiterpenes such as α -humulene and δ -cadinene. This study highlights that although treated agarwood is rich in secondary metabolites, only a handful, particularly those belonging to sesquiterpenes, are actual aroma impact compounds.