

(215)

Comparison of Chemical Composition of Biologically Induced Agarwood Resins in *Aquilaria crassna*

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Abstract

Agarwood is a highly valuable aromatic substance which is derived from the heartwood of *Aquilaria* and *Gyrinops* species of family Thymalaeaceae. Healthy heartwood of the above species is relatively pale in colour and low in density. Those species produce dark, dense and highly fragrant aromatic agarwood resin as a defense mechanism to protect the internal stem tissues from pathogenic invasions. Fungal species can be used to induce agarwood formation of agarwood in artificial manner. This study tested the quality of the agarwood formed in *A. crassna* induced by nine different fungal species. Spore suspensions of *Aspergillus*, *Botryosphaeria*, *Colletotrichum*, *Fusarium* and *Nigrospora* which were previously identified from naturally formed agarwood tissues of *A. crassna* and *G. walla* were used as inocula to induce agarwood formation. Inoculations were made at two opposite points of 10 year old *A. crassna* tree stems with three replicates. Agarwood tissues formed due to above fungal species were collected after six months of inoculation. Agarwood resin content was analysed by solvent extraction and constituents were identified by GC-MS method. According to the results, the average oil contents varied from $0.86\pm 0.03\%$ to $5.57\pm 0.24\%$. The highest resin content was produced by *F. solani* while the lowest content was produced by *C. gleosporoides*. According to GC-MS analysis, the highest number of constituents was formed due to *A. sojae* (16) followed by *F. solani* (15) and *Botryosphaeria* sp3 (12). Among the constituents identified, the most common ones were valencene, eudesmol, caryophyllene, cadinene, selinene, 10-epi-elemol and ermarphillane. Trans- α -bergamotene, eudesma-3,7(11)-diene and elemene was the least common constituent. Ermarphillane, 10-epi-elemol and eudesmol were present respectively in the highest amounts in agarwood resins formed by all fungal species. Based on the results, *F. solani* can be considered the most suitable species to form high quality agarwood resins.

Keywords: *Aquilaria crassna*, Fungal species, *Fusarium solani*, Agarwood resin, Chemical composition

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