Aquilaria malaccensis polyploids as improved planting materials

ABSTRACT

Aquilaria malaccensis is an agarwood-producing timber species used in many traditional remedies and modern therapeutic treatments and perfume industries. In this study, we aimed to enhance A. malaccensis phytochemical content through in-vitro polyploidisation. Shoot tip and nodal segment from 8-week-old in-vitro A. malaccensis plantlets were treated with different concentrations of colchicine and trifluralin at various exposure times to obtain polyploids. Tetraploid plantlets (10%) was obtained using nodal segment explants treated with 0.1 mM trifluralin at 120 hours. Chemical profiling of diploid and tetraploid samples (leaf, stem and root) was evaluated separately using headspace-solid phase microextraction (HS-SPME) combined with gas chromatograph mass spectrometry (GCMS). Phytochemical content increased in tetraploid, particularly in stem whereby the total phytochemical contents were 43.19% in tetraploid compared with 5.87% in diploid. The HS-SPME-GCMS analyses showed that tetraploid stem contained high levels of sesquiterpenoids found in agarwood oil such as Ŭ-eudesmol (18.3%), Ŭ-gurjunene (8.61%) and ɔ-gurjunene (6.22%). On the other hand, aromadendrene (2.49%) and Ŭ-humulene (3.38%) were detected in diploid samples. Tetraploid leaf samples were observed to contain Ŭ-humulene (3.79%) while diploid only contained (2E) tridecenol (19%). There were no significant differences between diploid and tetraploid in terms of total phytochemical content in root samples. Nevertheless, high sesquiterpenoid content, ɔ-gurjunene (14.0%), was detected in tetraploid sample while ɔ-muurolene (2.96%), in diploid. Ŭ-Guaiene content was higher in root samples of diploid (6.49%) than tetraploid (1.09%). These results demonstrated that tetraploid plantlets led to higher yield of total phytochemical content and might facilitate production of high quality A. malaccensis clones.

Keyword: Polyploidisation; Colchicine; Trifluralin; Phytochemical content