

RAPID PORTABLE GC-MS ANALYSIS FOR ON-SITE SCREENING OF PHYTOCHEMICAL LEAF OILS IN AN AUSTRALIAN NATIVE BOTANIC GARDEN

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The plant volatile compound fraction is an important marker that is diagnostic of plant origin, phenotype, and variety/cultivar. Numerous analytical arrangements (comprising both sampling and instrumental techniques) have been reported for this task, aiming to identify the best trade-off between extraction, separation and analysis time. In this study, we demonstrated rapid on-site screening of volatiles emissions from leaves of living plants, using headspace solid-phase microextraction (HS-SPME) with a portable low-thermal mass gas chromatography (GC) method, equipped with an ion trap mass spectrometer (ITMS). The study was conducted at the Royal Botanical Garden, Cranbourne, with sampling located in the Peppermint Garden. Twelve designated plants in the families of Myrtaceae and Rutaceae were chosen for this field study. SPME is recommended for sample introduction with this instrument, and is well-suited to the present analysis; leaves were collected into a 20 mL vial, equilibrated for 10 min (at prevailing environmental temperature), SPME sampling onto a PDMS/DVB – coated fibre for 2 min, and desorption at 270 °C in the splitless-mode injector for ca. 10 s. The portable GC-MS analysis comprised on-board battery operation providing at least 4 h operation, and an external size D He cylinder. A MXT-5 column of dimension 5 m × 0.1 mm I.D. × 0.4 μm d_f was resistively heated. The short SPME sampling time combined with fast separation (2 °C/s temperature program rate; total run time of 3 min), provided a near-real-time measurement of leaf volatiles released from the plant. Results were further processed by “chromatographic fingerprinting”, and “template matching” based on MS fragmentation pattern similarity criteria and retention indices. Unsupervised multivariate analysis was performed to improve effectiveness and specificity for the classification of different plant volatiles. The combination of HS-SPME and the portable GC-ITMS system proved to be a promising technique for rapid chemical expression of the plant volatiles genotype.