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Beyond Classical Approaches

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CHEMOTAXONOMIC INVESTIGATION OF ESSENTIAL OIL COMPOUNDS IN THREE SPECIES OF *ETLINGERA*

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Abstract

Volatile constituents of *Etlingera nasuta, Etlingera coccinea and Etlingera brevilabrum* were extracted using hydrodistillation method and their chemical constituents were investigated by gas chromatography/flame ionization detector (GC/FID) in optimized conditions. The major constituent of leaf, stem and rhizome oils of *E. nasuta* were methyl laurate (22.24%), (-)-ß-bisabolene (25.51%) and germacrene D (21.43%) respectively. The leaf, stem and rhizome oils of *E. coccinea* were rich in heptanol (77.76%), 2-dodecenal (10.48%) and ethylfuranone (26.18%) respectively. While the leaf, stem and rhizome oils of *E. brevilabrum* contained high abundance of acetylpyrazine (11.93%), ß-bourbonene (71.27%) and methyl eugenol (34.61%) respectively. The data obtained were statistically processed by using cluster analysis and the dendrogram obtained shows that there is a close relationship between stem and rhizome oils of *E. nasuta*. There are also similarities found in leaf oils of *E. brevilabrum* and *E. nasuta*. There are six common chemical compounds detected in essential oils from the leaf of the *Etlingera* species and four identical compounds detected in stem oils of *Etlingera* species. While eight similar compounds found in their rhizome oils. These common compounds can be used as chemotaxonomic markers for *Etlingera* species.

Keywords: *Etlingera*, Chemotaxonomy, Essential Oils

INTRODUCTION

Etlingera is one of the genera from the *Zingiberaceae* family. *Etlingera* is an important genus in Sarawak with species often dominant in lowland forest and several utilized as flavouring aromatics. *E. elatior* is an aromatic plant that is widely used as traditional flavouring and medicine. *E. elatior* is the well-known *Etlingera* species which apart of being a popular cut flower and landscaping ornamental as it has the unopened inflorescences, also used as flavouring in Sarawak laksa (Boyce, 2006). It also can be used in the local dishes like tom yam, *nasi kerabu* and *Laksa asam*. The post-partum women used the water mixed with leaves of *E. elatior* and other aromatic herbs for bathing to remove body odour (Chan *et al.*, 2007). These traditional uses may be because of the existence of biologically active volatile constituents. Another species, like *E. coccinea* is also used in the similar way and known as tipu by the local Bidayuh people of western Sarawak (Boyce, 2006). Zoghbi *et al.* (2005) reported the main components identified in the oils of inflorescence and inflorescence axes of *E. elatior* from Brazil were dodecanol, dodecanal and α-pinene. Jaafar *et al.* (2007) reported the constituents of essential oils in leaf, stem, flower and rhizome of *E. elatior* (Jack) R. M. Smith characterized by gas chromatography/mass spectrometer. The leaf oil contained β–pinene, caryophyllene and (*E*)-β-farnesene as their major compounds, whereas the stem oil was dominated by 1,1-dodecanediol diacetate and (*E*)-5-dodecane. The main components identified in the flower and rhizome oils were 1,1-dodecanediol diacetate and cyclododecane.

Volatile constituents have been used as taxanomic characters, especially at the generic or family level (Larsen *et al.*, 1999). Dunlop *et al.* (1999) have utilized essential oils to compare eight taxa of *Angophora (Myrtaceae)*. Furthermore, the terpenoid composition of the essential oil in *Cannabis* was used for chemotaxonomic discrimination study where 162 greenhouse grown plants of diverse origin were analyzed by gas chromatography (Karl, 2004). Hsioa & Lin (1995) have analyzed leaf essential oils of nine *Clerodendrum* taxa native to Taiwan using gas chromatography and the relationship among taxa was assesed by aid of cluster analysis. The cluster analysis