GC-MS analysis of *Aglaia odoratissima* B. leaves

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Abstracts
Aglaia odoratissima was studied to identified and confirmed existing compounds using gas chromatograph-mass spectrum (GC-MS). Leaves of Aglaia odoratissima were extracted using hexane, ethyl acetate, chloroform and methanol as solvents show50, 50, 59 and 29 compounds respectively recorded by GC-MS analysis. Extracts from hexane, ethyl acetate and chloroform showed that the highest peak of the GC-MS graph analysis was represented by sesquiterpenoid and triterpenoid compound. Lupenol and acetic acid presence detected in A. odoratissima leaves has potential as insecticidal and herbicide properties.

Keywords: *Aglaia odoratissima*, GC-MS, compounds, lupenone, acetic acid

Introduction

There are 130 species of *Aglaia* found in Indo-Malaysia, South China and the Pacific Islands (Satasook *et al.*, 1994). *Aglaia* also known as bekak in Malaysia with 44 species has been recorded as mentioned by Smith (1999). *Aglaia* species have been reported to have a potential as insecticidal properties to kill insects (Brader et al., 1998; Janthip *et al.*, 1993). In survival and growth inhibition tests on the leaves, stem, and root bark, the root extracts of some collections of *Aglaia* spp. are shown to possess the highest insecticidal activities (Brader et al., 1998). Some *Aglaia* species especially *A. odoratissima* have been found to have

active properties that can be extracted by using serial exhaustive extraction methods as mentioned by Tiwar *et. al.* (2011). According to Tiwar *et. al.*, different plants properties can be extracted by different types of solvent used and each solvent has polarity level ranging from non polar (hexane) to more polar solvent (methanol). Due to lack of information of potential properties contained in *A. odoratissima,* leaves of these species was extracted and analyzed by GC-MS method to detect and confirm compounds present.

Materials and methods

Plant leaves of *Aglaia odoratissima* was collected from Gombak Forest Reserve, Selangor and brought to Fakulti Perhutanan, Universiti Putra Malaysia (UPM), Serdang. The leaves were washed and air dried at an open area at the Fakulti Perhutanan. After almost 2 weeks, the color of the leaves changed brownish, then they were grounded by using an electric grinding machine (Dickson: DF-20, China) to get the fine powder of the leaves. About one kilogram of grounded leaves *A. odoratissima* extracted successively with 1500 to 2000ml of hexane (Merck, Germany), chloroform (Merck, Germany), ethyl acetate (Merck, Germany) and methanol (Merck, Germany) in 5000ml glass flask for three days (72h). The leaf extracts were covered with aluminum foil and left in fume cupboard in room temperature. After three days, the leaf extract was filtered using a filter paper (ADVANTEC No.1), 33cm in diameter to get the crude extracts and then residues were discarded. The solvent from each crude extract was removed using a rotary evaporator (Eyela, N-1000-S with OSB-2000, U.S.A) to get the pure crude extracts. The crude extarcts analyzed by using GC-MS to identify the volatile compounds and substances by comparing its mass spectroscopy profiles with NIST library. Crude extracts of *A. odoratissima* leaves was identified by GC-MS by using column 30m x 0.25mm I.D x 0.25 μm film thickness as can be seen on table 1.

Results and Discussion

The compounds detected in each solvent of *A. odoratissima* extracts were identified by comparing its mass spectrum fragmentation pattern with the NIST library data available in the system. A major constituent identified and selected according to ten compounds highly presence and detected in the extract by referring to their peak area. Ethyl acetate extracts of *A. odoratissima* show 59 compound presences, while hexane and chloroform extract show 50 compounds and methanol extract with 29 compounds detected as can be seen on Figure 1. Table 2, show hexane extract of *A. odoratissima* was highly presence with sesquiterpenoid compound with beta seline (13.88%) and alpha copaene (13.09%) have been recorded. Lupenone, one of the potential compounds from triterpenoid group also detected in hexane crude extract (3.26%). Chloroform extract highly contain with triterpenoid compound with 18.72% peak area height followed by sesterpenoid compound with 15.67% peak area height. However, both compound were unidentified by using NIST Library data. Ethyl acetate extract has recorded triterpenoid as the most major constituents with 13.48% peak height followed by peak number 43 with of 8.68% peak height. The results also showed that ethyl acetate also detected lupenone as a part of the major constituents. Methanol extracts of *A. odoratissima* detected acetic acid as major constituents with 55.25% of peak area. The results of GC-MS of A. odoratissima have shown that terpenes group was abundantly detected for almost each extract especially sesquterpinenoid and triterpenoid compounds. Lupenone compound had proven by previous researcher as insecticidal properties (Hilman A. and Arifnuradin, 1998), while acetic acid compound have reported by Dayan *et. al.,* 2009 to be effective towards weed. Besides, according to Gopalakrishnan (2011), hexadeconoic acids in methanol extract of *A. odoratissima* also have proved to be effective towards nematode and insects. Above all, studies against *Aglaia odoratissima* have shown sesquiterpenoid and triterpenoid compound highly detected.

Table 1: Volume, injection and oven temperature and total time for GC-MS analysis

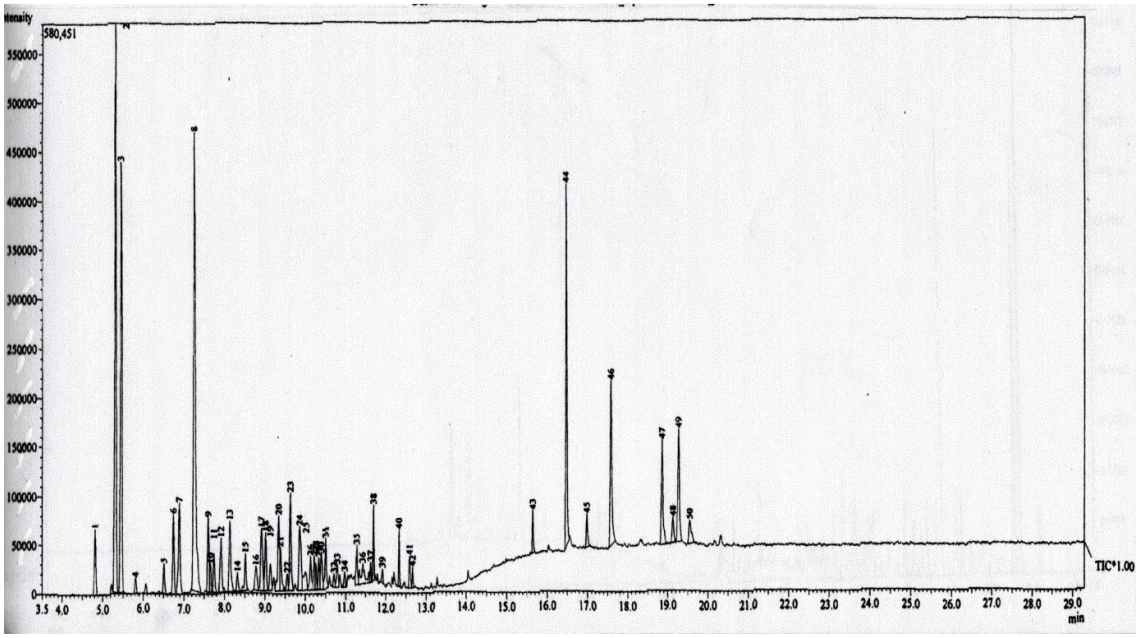
Solvents	**Injection volume (µl)**	**Injection temperature (ºC)**	**Oven temperature (ºC)**	**Total time (minutes)**
Hexane	0.3	250	140-320	29.30
Chloroform	0.3	250	100-320	41.00
Ethyl acetate	1.5	250	100-320	41.00
Methanol	0.2	230	50-240	44.10

Table 2: Compound identified in *Aglaia odoratissima* leaves extract

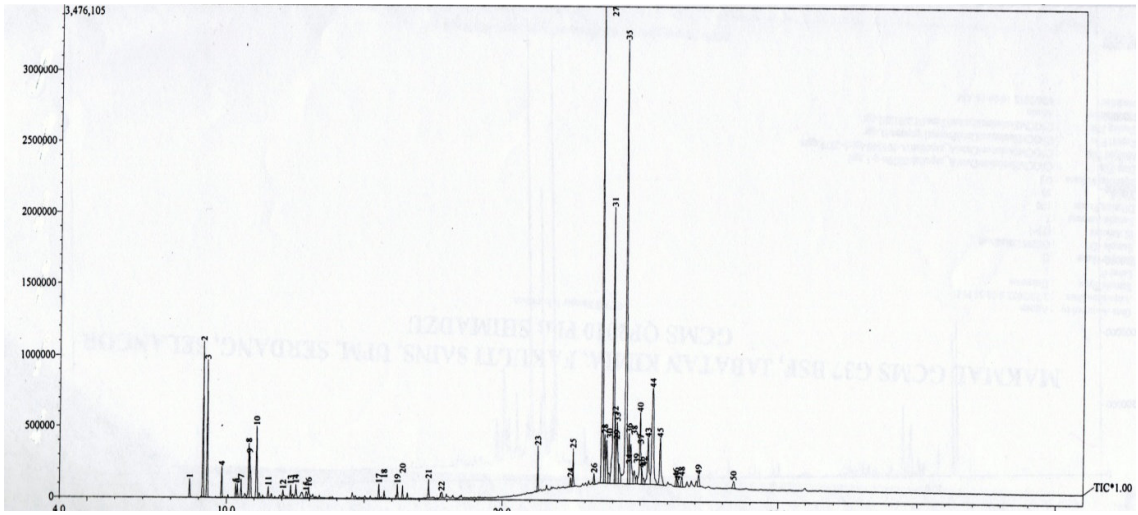
Solvent	**Peak Number**	**Formula**	**Compound Name**	**Mol Weight**	**Peak Area (%)**
Hexane	2	$C_{15}H_{24}$	alpha-copaene	204	13.09
	3	$C_{15}H_{24}$	beta-cubebene	204	9.87
	7	$C_{15}H_{24}$	gamma-muurolene	204	2.66
	8	$C_{15}H_{24}$	beta-selinene	204	13.88
	20	$C_{15}H_{26}O$	(-)-globulol	222	2.41
	23	$C_{15}H_{24}O$	unidentified	220	2.45
	44	$_{36}H_{74}$	xatriacontane	506	6.77
	46	$C_{36}H_{74}$	unidentified	506	4.38
	47	$C_{30}H_{48}O$	picen-3-one deravitive	424	2.95
	49	$C_{30}H_{48}O$	lupenone	424	3.26
Chloroform	2	$C_{15}H_{24}$	alpha-copaene	204	3.78
	3	$C_{15}H_{24}$	beta cubebene	204	3.46
	27	$C_{27}H_{42}O$	unidentified	382	15.67
	31	$C_{28}H_{44}O$	unidentified	396	11.29
	32	$C_{29}H_{48}O$	unidentified	412	2.38
	33	$C_{29}H_{48}O$	stigmasterol	412	2.75
	35	$C_{31}H_{48}O_2$	unidentified	452	18.72
	40	$C_{30}H_{48}O$	2H-picen-3-one	424	3.02
	43	$C_{30}H_{48}O$	unidentified	424	2.50
	44	$C_{30}H_{50}O_2$	(3β,23E)-Cycloarta-23-ene-3,25-diol	442	6.59
Ethyl acetate	8	$C_{15}H_{24}$	valencene	204	4.54
	9	$C_{15}H_{24}$	Isoledene	204	2.38
	13	$C_{15}H_{24}O$	unidentified	220	2.30
	29	$C_{20}H_{40}O$	Phytol	296	5.09
	43	$C_{27}H_{42}O$	unidentified	382	8.68
	48	$C_{28}H_{44}O$	unidentified	398	6.82

	50	$C_{29}H_{48}O$	Stigmasterol	412	2.51
	52	$C_{31}H_{48}O_2$	unidentified	452	13.48
	55	$C_{30}H_{48}O$	2H-picen-3-one derivative	424	2.73
	58	$C_{30}H_{48}O$	Lupenone	424	4.04
Methanol	3	$C_2H_4O_2$	acetic acid	60	55.25
	12	$C_{17}H_{34}O_2$	methyl hexadecanoate	270	1.70
	16	$C_5H_8O_4$	mono-metyl succinate	132	3.57
	17	$C_6H_7NO_2$	N-Methylpyrrole-2-carboxylic acid	125	5.77
	18	$C_7H_6O_2$	benzoic acid	122	5.16
	21	$C_{20}H_{40}O$	phytol	296	2.31
	22	$C_{16}H_{32}O_2$	n-hexadecanoic acid	256	4.90
	23	$C_7H_6O_3$	4-Hydroxybenzoic acid	138	4.77

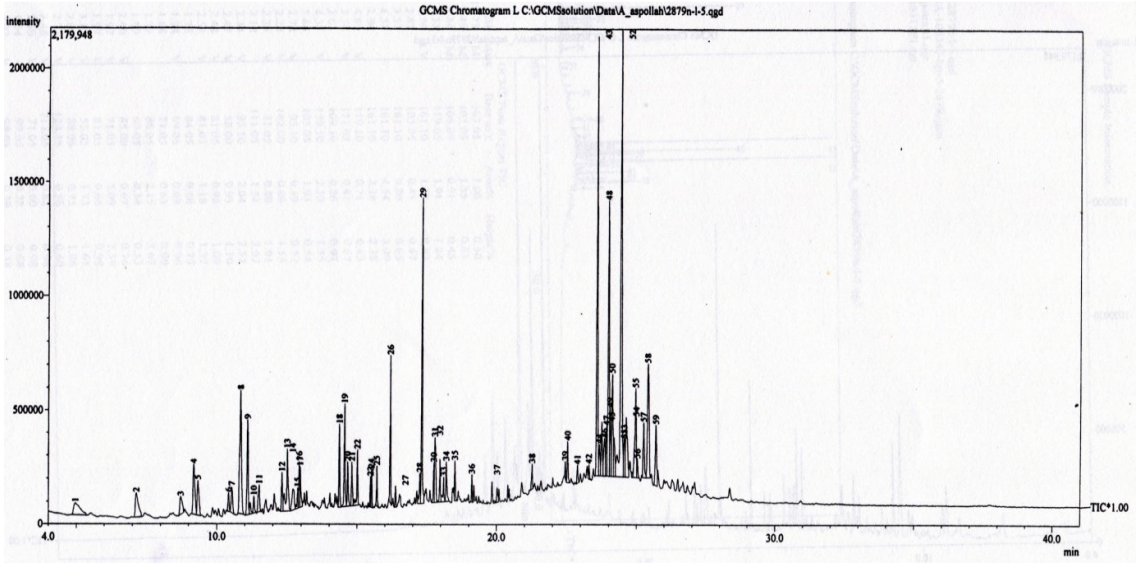
Figure 1: Chromatogram of *Aglaia odoratissima* by GC-MS



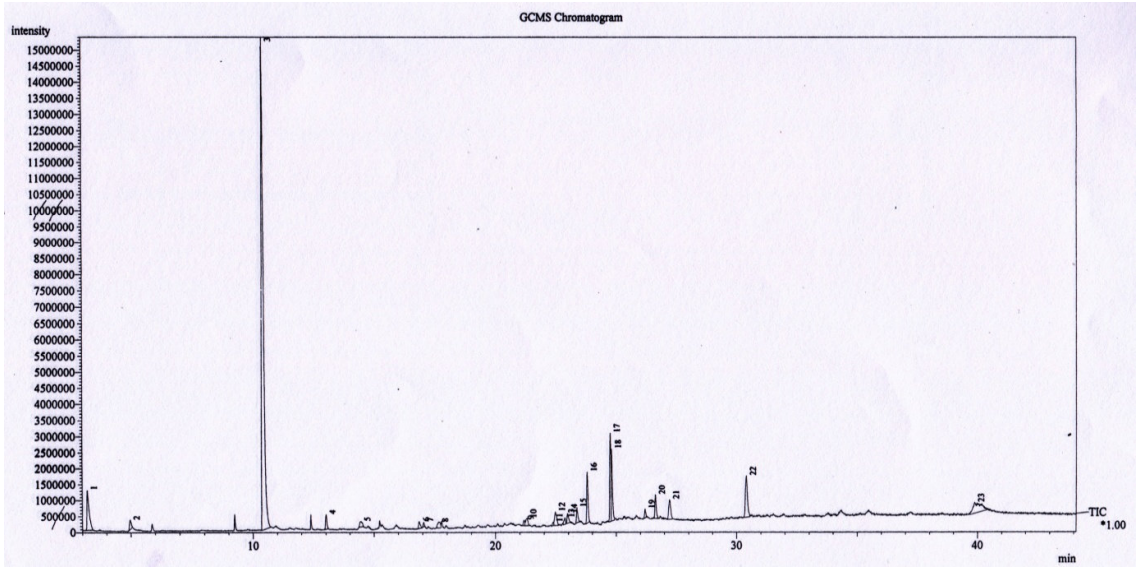
(a)Hexane solvent



(b)Chloroform solvent



(c)Ethyl acetate solvent



(d) Methanol solvent

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