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Metabolites fingerprint leaf extract of Bekkai plant, *Albertisia papuana* Becc as natural food seasonings using by Dayak Ethnics Community In North Kalimantan, Indonesia

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Abstract. Bekkai plant, Albertisia papuana is one of the unique and valuable germplasm because it is utilized by Dayak Ethnics North Kalimantan community as natural flavoring food and medical treatment. There is little data about their phytocompounds characteristic. The objective of this research was to describe the metabolites fingerprint leaf extract of A.papuana which be consumed as natural food seasonings. Ethanol leaf extracts from Dayak community originated from Tanjung Selor, North Kalimantan were analyzed using untargeted Gas Chromatography-Mass Spectrometry (GCMS). The investigation led to the identification of 22 constituents, was dominated by Capsaicin (10.06%),Capsaicin(6.41%),Capsaicin (21.33%), Dihydrocapsaicin (2.16%) and Squalene 7.69%,2,5-Furandione,3-(dodecenyl)dihydro (5.88%), 2-Octadecyl-propane-1,3-dio l(5.55%), Phytol(5.14%), Citronellylformate(3.85%), A cembratrienol (3.93%), P=Ethyguaicol(3.39%), 4,22-Stigmastadiene -3-one (3.00%), Alpha limone diepoxide (2.79%), 2,6,6-Trimethylbicylo(3.1.1) heptane(1.00%), Pentadecyl bromide (2.28%), Hexadecanoic acid (2.21%),Z-10-Tetradecen-1-olacetate(2.03%),Heptamethylene dibromide(2.00%),7-Oxabicyclo[4.1.0]heptane,2,26-trimethyl-1-(3-methyl-1,3butadienyl)-5-m ethyllene(1.78%),4,4-Dimethyl-oct-5-enal(1.64%),4,4-Dimethylcholestan-3-one(1.86%),17-Pentatriacontene (1.12%).

1. Introduction

Plants are the traditional sources for many chemicals used as pharmaceutical biochemicals, fragrances, food, and flavors. Bekkai, A.papuana are the most spice grown in North Kalimantan region. Their leaves were used by the Dayaks community as a flavoring for replacement of Monosodium Glutamate in food. This plant also uses as a medicinal plant, which functions in several diseases. The root and their endophyte are cytotoxic to cancer cells [1,2,3].

A.papuana belong to the Menispermaceae. Based on existing morphological characteristics, according to Heyne [4], the taxonomy of this plant is as follows:

Kingdom: Plantae
Division: Magnoliophyta
Class: Liliopsida
Order: Ranunculuses

Family: Menispermaceae
Genus: Albertisia
Species: Albertisia papuana Becc.

This plant is a liana that creeps by wrapping its stem, round rod shape, smooth bark texture, green bark color, leafy compound, swollen petiole at both ends, elliptical leaf blade with elliptical shape, 2-5 cm leaf stalk, a shiny green leaf upper shade, leaf color green, tapered leaf tip, long ± 30 cm long and width ± 9 cm, the leaf surface is lustrous and slippery, dark green leaf color, pointed leaf tip and flat leaf edge[5].

This plant (Fig.1) has long sold traded, their processing is very simple that is by harvesting old leaves, then put into cooking as flavor.

Figure 1. The plant Albertisia papuana

Plants provide us with rich sources of natural antioxidants[6] and the phytochemical investigation on the extract for their main phytocompounds is very vital. Before identifying the bioactive compounds, the plants are extracted first[7]. There little information a report of research that indicates the profiling of bioactive leaves extracts of bekkai plant that contribute as a flavor enhancer. The general objective of this research to description chemical compounds of bekkai plan leaf extracts as a flavoring. This study is aimed at the determinants of chemical profiling leaf extract. The result of this study can be used to understand the compounds in the flavoring of Bekkai plant.

2.Materials and Methods

2.1.Plant Material

Specimens were identified by applying key plant taxonomy in Biodiversity Laboratory, Faculty of Mathematics and Natural Sciences, Mulawarman University. The sample was cut into pieces and dried at room temperature in the laboratory for 2 weeks. Once sample dry, plant parts were separated and smoothed with a uniform texture, measuring 3 mm using an electric mill and then milled. The products were sieved with a sieve sized of 40-60 mesh.

2.2.Extraction of plant materials

Two hundred grams of Bekkai leaf powder is soaked with 400 mL of 95% ethanol in a 1000 ml flat bottom flask then put in place for 24 hours, filtered, and the filtrate is collected in Erlenmeyer. The residue is soaked again with ethanol and put in place for 24 hours. Do the same method so that the filtrate from Bekkai leaves is immersed for 3 x 24 hours. After extracting it in the form of filtrate, the solvent evaporation process is carried out with a rotary evaporator until the crude extract is dried. a yield of 1.20% of the dry weight of the sample powder. Further, these extracts were used for phytochemical and GC-MS analysis.

2.3.Gas Chromatography Mass Spectroscopy (GC-MS) analysis

The GC-MS analysis was carried out at the Regional Health Laboratory (Labkesda), DKI Jakarta. The potent open-column samples were injected into the Agilent Technologies 7890A/5975A GC-MS system with EA 01.00 MSD ChemStation. This instrument was set to electron impact using ionization mode with electron energy 70eV. The column used for analysis was a capillary column HP Ultra 2L, length (m) 30x0.25 (mm) I.D. X 0.25 (μm) film thicknesses. The instrument used was the column Perkin Elmer Elite-5 capillary column measuring 30m ×0.25mm with a film thickness of 0.25mm composed of 95% Dimethylpolysiloxane.

3. Results and Discussion

3.1.Results

The gas chromatography profile of crude extract of bekkai leaf was displayed in Table 1. The result showed the of 22 constituents, was dominated by Capsaicin (10.06%),Capsaicin(6.41%), Capsaicin (21.33%), Dihydro capsaicin (2.16%) and Squalene7.69%, 2,5-Furandione,3-(dodecenyl) dihydro (5.88%), 2-Octadecyl- propane-1,3-diol(5.55%), Phytol(5.14%), Citronellylformate(3.85%), A cembratrienol (3.93%),P=Ethyguaicol(3.39%),4,22-Stigmastadiene -3-one (3.00%), Alpha limone diepoxide (2.79%), 2,6,6-Trimethylbicylo(3.1.1) heptane(1.00%), Pentadecyl bromide (2.28%), Hexadecanoic acid (2.21%), Z-10-Tetradecen-1-ol acetate (2.03%), Heptamethylenedibromide(2.00%), 7-Oxabicyclo [4.1.0]heptane ,2,26-trimethyl-1-(3-methyl-1,3butadienyl) -5-methyllene(1.78%), 4,4-Dimethyl-oct -5-enal (1.64%), 4,4-Dimethylcholestan-3-one(1.86%), 17-Pentatriacontene (1.12%).

Table 1. GC/MS analysis of Ethanolic Leaf Extract of Bekai plant, *A.papuana*

No	Compound	Retention time	Contents(%)
1	2,6,6-Trimethylbicylo[3.1.1] heptane	27.076	1.00
2	Hexadecanoic acid	28.979	2.21
3	Phytol	29.420	5.14
4	Z-10-Tetradecen-1-ol acetate	29.613	2.03
5	2,5-Furandione,3-(dodecenyl)dihydro	29.944	5.88
6	A cembratrienol	30.158	3.93
7	4,4-Dimethyl-oct-5-enal	30.385	1.64
8	P=Ethyguaicol	31.420	3.39
9	Pentadecyl bromide	31.482	2.28
10	Capsaicin	31.628	10.06
11	Capsaicin	32.040	6.41
12	Capsaicin	32.164	21.33
13	Dihydrocapsaicin	32.385	2.16
14	Heptamethylene dibromide	32.385	2.00
15	7-Oxabicyclo[4.1.0]heptane,2,26-trimethyl-1-(3-methyl-1,3butadienyl)-5-methyllene	38.674	1.78
16	Alpha limone diepoxide	39.508	2.79
17	4,22-Stigmastadiene-3-one	40.011	3.00
18	Citronellyl formate	42.080	3.85
19	4,4-Dimethyl cholestan-3-one	43.231	1.86
20	17-Pentatriacontene	47.596	1.12
21	2-Octadecyl-propane-1,3-diol	47.706	5.55
22	Squalene	48.306	7.69

3.2.Discussion

Early documentation of metabolites is needed to evaluate the potential of Bekai plants to provide functional metabolites. Gas chromatography (GC) was served as metabolites separator while mass spectrometer was the metabolites detector.

The principle of GC as metabolites separator depends upon the interaction power of metabolites with a stationary phase. Artificial flavorings usually contain MSG (Monosodium Glutamate), but the Dayak tribe of Bulungan Regency, North Kalimantan, has been passed down through generations using natural flavoring leaves as a kitchen spice. Information obtained and collected from the local community, this leaf has been used by the community, especially their ancestors who lived in the interior for flavoring dishes. The leaves used can be direct of fresh leaves or dried for use when needed.

The dried leaves can also be ground or mashed. Furthermore, it is used for flavoring by adding the powder while cooking. Naturally, umami compound is present in many protein-rich foods, such as animal meat, fish, and fungi. Until now, this compound from A. papuana little information. This research, reports that the GCMS analysis of the concentrated ethanol extract resulted in 39.96% consisting of a group of capsaicin compounds.

The frequency or the hot taste of bekkai leave is attributed mainly to capsaicinoid, which adds flavors to when used as spices. Sulvi, et al. [8], reported that 48.31g MSG / 100 g equivalent of umami extract from Bekkai leaf extract was obtained umami concentration at pH 8. This shows the potential of the umami content of this crude extract in the medium category.

Purwayantie, et al [9], reported that the alkali crude extraction process of bekkai leaves at pH 8 can detect the compounds Alanine, Oxalic Acid, Malic Acid, Gallic Acid, Sucrose, Fructose, Glucuronic Acid, Na, K, Mg, Ca, and P. but umami compounds are not detected.

The results of this study, using ethanol solvents produced several umami compounds and different results with previous researchers who conducted alkaline extraction. According to the results of a study by Soldo et al. [10], pH values can greatly affect the recovery of umami compounds, especially at pH 5-7.

4.Conclusion

This research was to evaluate the metabolites of fingerprinting of A.papuana leaf ethanolic extract by GC-MS method. The GC–MS analysis of A.papuana ethanolic extract showed the presence of 22 different chemical components such as Capsaicin,Dihydrocapsaicin, Squalene, 2,5-Furandione, 3-(dodecenyl) dihydro, 2-Octadecyl-propane-1,3-diol, Phytol, Citronellylformate, A cembratrienol, P=Ethyguaicol,4,22-Stigmastadiene-3-one,Alpha Limone diepoxide, 2,6,6- Trimethyl bicylo (3.1.1) heptane, Pentadecyl bromide, Hexadecanoic acid, Z-10-Tetradecen-1-ol acetate, Heptamethylenedibromide,7-Oxabicyclo [4.1.0] heptane , 2,26-trimethyl-1- (3-methyl- 1,3butadienyl) -5-methyllene, 4,4-Dimethyl-oct -5-enal, 4,4-Dimethylcholestan-3-one, 17- Pentatriacontene.

A group of capsaicin compounds dominan were 39.96%, followed by Squalene7.69%, 2.5-Furandione, 3-(dodecenyl)dihydro(5.88%),2-Octadecyl-propane1,3-diol(5.55%),Phytol(5.14%), Citronellylformate (3.85%), A cembratrienol (3.93%), P = Ethyguaicol (3.39%), 4,22-Stigmastadiene -3-one (3.00%) and other compounds below 3%.

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