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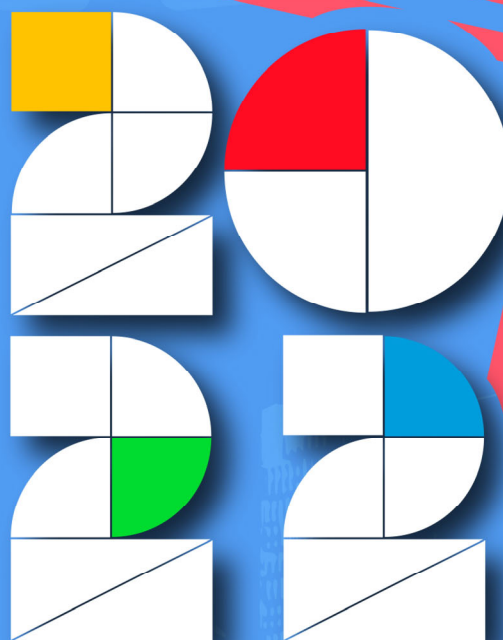
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Tesshi



Reengineering
Knowledge &
Creativity for
Global Excellence

30
June



***E-PROCEEDINGS
TECHNOLOGY, SCIENCE, SOCIAL SCIENCES AND
HUMANITIES INTERNATIONAL CONFERENCE
TeSSH I 2022***

**Reengineering Knowledge and Creativity
for Global Excellence**

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Technology, Science, Social Sciences and Humanities
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30 June 2022
UiTM Cawangan Kedah, Merbok
Kedah, Malaysia**

UNIVERSITI TEKNOLOGI MARA CAWANGAN KEDAH

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Foreword

The papers compiled in these e-proceedings are papers presented online at Technology, Science, Social Sciences and Humanities International Conference 2022 (TeSSH I 2022) held on 30 June 2022 at Universiti Teknologi MARA (UiTM) Cawangan Kedah, Kedah, Malaysia. With the theme, ***Reengineering Knowledge and Creativity for Global Excellence***, the conference has brought together presenters of diverse background who shared their conceptual and empirical papers in broad areas that are subsumed under the fields of Technology, Science, Social Sciences and Humanities. These e-proceedings comprise current researches that were undertaken with the rigorous endeavour of knowledge enhancement to ensure that the world of academia will continue to flourish. It is thus hoped that readers will significantly benefit from knowledge contained in these proceedings.

TeSSH I 2022 and these e-proceedings would not have been possible without the great efforts from the presenters, and the generous support from the TeSSH I 2022 committee members and the Rector of UiTM Cawangan Kedah, Prof. Dr. Mohamad Abdullah Hemdi. A heartfelt gratitude is extended to all involved. It is hoped that these e-proceedings will be an impetus to stimulate further studies and research that benefit the society at large.

TABLE OF CONTENTS

1	A Conceptual Paper on Factors That Affect the Shariah Compliance Auditing Among the Islamic Financial Institutions in Malaysia	1
	Saifulrizan Norizan & Marjan Mohd Nor	
2	A Qualitative Study of Entrepreneurial Intention Among UiTM Kedah Accounting Students During Covid-19 Pandemic	8
	Mazlifa Md. Daud, Noora'in Omar, Muhammad Hariz Hamid, Mohd Hafiz Hashim & Anwar Johari	
3	A Review on By-Laws of Alor Setar City Council (MBAS)	21
	Nor Zaini Zainal Abidin, Nur Irinah Mohamad Sirat & Nurul Mazrah Manshor	
4	Accounting For Agriculture in Malaysia: A Special Attention to Aquaculture	27
	Saifulrizan Norizan, Mohd Halim Kadri, Zarina Abu Bakar & Juyati Mohd Amin	
5	Age-Friendly Environment for Older People: Challenges and Plans	34
	Noorlailahusna Mohd Yusof & Suziana Mat Yasin	
6	Aplikasi Inovasi E2 Kit 1.0 Dalam Proses Pengajaran Dan Pembelajaran Litar Asas Elektrik	40
	Siti Rohaiza Zainol, Noor Aziana Abu Taib & Wan Nadirah Rosli	
7	Basic Of Differentiation Using Three Alternative Approach in Seberang Perai Polytechnic	50
	Siti Faridah Ismail, Rosila Adnan & Rohani Hamsan	
8	Bio Natural Food Seasoning from Eugenia Cephalanthum Using Dehydration Method	60
	Hidayah Julaihi, Theivya A/P Santhanasamy & Felicia Bong Lee Chen	
9	Cabaran dan Masa Depan Muzium Negeri Kedah	68
	Juaini Jamaludin	
10	Co-Integration Between Malaysia Stock Market, ASEAN and ASEAN Plus Three Countries During Pre and Post 14th Malaysia's General Election: A Short Run Analysis	72
	Anas Fathul Ariffin, Muhammad Akmal Hakim & Muhammad Hilmi Samian	
11	Computer Science Students' Learning Preferences, Mental Health, And Emotional Issues During Pandemic Covid-19 While Moving Towards Endemic	78
	Ahmad Faiz Ghazali, Noor Azrin Zainuddin, Ahmad Kamalrulzaman Othman & Yusnita Sokman	
12	Customer's Satisfaction: The Role of Food Quality, Service Quality and Ease of Website in Online Food Delivery	86
	Nur Afifah Aliah Husaini, Norhamizan Hamir, Rashid Salleh & Zamri Ahmad	
13	Digital inheritance: Legal Challenges in Malaysia	98
	Nor Azlina Mohd Nor & Ahmad Shamsul Abd Aziz	

14	Digital Literacy: Presentation Made Easy with ACE Alice Shanthi, Nur Izzah Jamil, Sheela Paramasivam, Siti Noor Dian Ahmad & Mohd Nur Fitri Mohd Salim	106
15	Diploma Students' Perceptions of Online Assessment: The Anchor That Holds Them in The ESL Classroom Jaqueline Susan Rijeng, Imelia Laura Daneil, Kimberley Lau Yih Long, Tang Howe Eng & Christine Jacqueline Runggol	115
16	Evolusi Tadbir Urus Dan Perundangan Wakaf Di Malaysia: Satu Analisis Rohayati Hussin, Mohd Zulharmey Abdullah, Afiffudin Mohammed Noor & Farahdina Fazial	125
17	Exploring Strategies to Reduce Adolescents' Involvement in Risky Behaviours from The Perspective Of A Probation Officer Lina Mursyidah Hamzah, Sharifah Muzlia Syed Mustafa, Nurul Fitriah Alias & Norazah Abdul Aziz	142
18	Factors That Lead to Poor Mental Health of Social Media User among UiTM Kedah Degree Students Nur Elisa Aqila Amir Yusrie, Sarah Sabir Ahmad, Azfahane Zakaria & Mhd Azmin Mat Seman	147
19	How The Covid-19 Pandemic Has Increased the Risk of Compulsive Buying Behaviour And Online Shopping Addiction For Apparel Purchasing In Malaysia: An Overview Of Generation Y And Generation Z Normaziana Hassan, Basitah Taif & Rosita Mohd Tajuddin	155
20	Hubungan Antara Impak Teknologi Maklumat Dan Budaya Organisasi Dalam Kalangan Kakitangan FRIM Nor Arinah Mohamed Zemudin, Muhammad Badri Ishak, Nurul Madiha Mohd Ilham & Wan Nur Syazmira Wan Suhaimi	168
21	Inhibiting Factors to Successful Virtual Teaching and Learning in Engineering Science Topic from the Perspectives of Polytechnic Lecturers Nurul Ain Saipudin, Noorul Amilin Saipudin & Nornazira Suhairom	174
22	Inovasi Sosial Melalui Program Akademik Intensif untuk Pelajar STPM Aliran Sains Tercicir Marinah Muhammad, Wong Hie Ling, Aainaa Syazwani Mohamad Amir Hamzah & NoorJanatun Naim Jemali	183
23	Investigating the Usefulness of TikTok as an Educational Tool in Learning Chemistry Nur Farha Shaafi, Mohammad Mubarrak Mohd Yusof, Nurul Nabilla Mohammad Khalipah & Norhazly Mohd Hanif	187
24	IPQUEUE: Indoor Premises Control Using Quick Response (QR) Code for Covid-19 Pandemic Mohd Suffian Sulaiman, Zuraidah Derasit & Sharizah Shahar	200

25	Kajian Arah Kiblat Liang Lahat Lama Bagi Tanah Perkuburan Islam Syed Idrus Syed Salim & Nor Asmadi Asri	213
26	Keberkesanan Kaedah Masa Hakiki Sistem Penentududukan Sejagat Dalam Penubuhan Stesen Kawalan Kerja Ukur Tanah Asiah Abdul Satar, Nor Azme Nordin & Sulzakimin Mohamed	220
27	Kesediaan Pensyarah Sains Kejuruteraan Dalam Pelaksanaan Mini Projek Secara Hibrid Di Politeknik Tuanku Sultanah Bahiyah Nur Elyani Musa, Shamsul Arif Ismail & Azlina Hassan	229
28	Keunikan Partikel 'Lah' Dalam Terjemahan Surah Yasin di Malaysia Mohd Sufian Ismail & Anida Sarudin	238
29	LEVs As an Assessment Tool for Affective Domain In Laboratory Courses For Diploma In Civil Engineering Narita Noh, Noor Raifana Ab Rahim, Nur Zaidani Wati Mohd Darwis & Juwita Asfar	246
30	Measurements of Customer's Satisfaction towards Courier Services in Malaysia during Covid-19 among Students in UiTM Kedah Siti Nursyahirah Zaffendee, Sarah Sabir Ahmad, Azfahane Zakaria & Mhd Azmin Mat Seman	256
31	Measurements Of Depression Level Among Students in UiTM Kedah Adlin Mohd Anizam, Sarah Sabir Ahmad, Azfahane Zakaria & Syed Mohammed Alhady Syed Ahmad Alhady	264
32	Media Arts as An Art-Based Interventions in the Institutional Care Environment Raja Eda Shabina Raja Raimie, Mohammad Kamal Sabran & Nur Zaidi Azraai	270
33	Mengatasi Kesalahan Umum Yang Pelajar Lakukan Semasa Menjawab Soalan Peperiksaan Sains Kejuruteraan Nur Azilina Abdul Aziz, Koa Chee Hoon & Siti Aishah Azmi	279
34	Pelaksanaan Wakaf Air di Malaysia: Satu Tinjauan Tadbir Urus Dan Perundangan Nurul Mazrah Manshor, Rohayati Hussin, Syatirah Abu Bakar, Nur Irinah Mohamad Sirat & Salmah Roslim	288
35	Pembangunan MOOC Bagi Kursus Foundation Mandarin (Level II) Berpanduan Model ADDIE Ting Hie Ling	294
36	Pengaruh Budaya Merantau Terhadap Evolusi Seni Bina Rumah Tradisional Negeri Sembilan, Malaysia Mohamad Hanif Abdul Wahab, Azizi Bahauddin & Nor Aniswati Awang Lah	302
37	Pengesanan Graduan Kolej Komuniti Jelebu Ketika Pandemik Covid-19 Noor Aziana Abu Taib, Siti Rohaiza Zainol & Zainatul Fakhir Zainon	313
38	Penggunaan iPad Dalam Menambakbaik Interaksi Di Kalangan Pensyarah Dan Pelajar Bagi Kursus Matematik Kejuruteraan 1 Mohd Syukor Che Omar & Azlina Hassan	317

39	Penggunaan Video <i>YouTube</i> Dalam Pengajaran dan Pembelajaran Bahasa Mandarin: Satu Tinjauan Awal	328
	Lee Chai Chuen & Nor Azrina Mohd Yusof	
40	Penguatkuasaan Undang-Undang Dalam Menangani Penyalahgunaan Media Sosial di Malaysia	333
	Ahmad Shamsul Abd Aziz & Nor Azlina Mohd Nor	
41	Penyampaian Amalan Pengajaran Dan Pembelajaran (Laboratory Work) Secara Atas Talian Terhadap Pembelajaran Pelajar Diploma Geomatik Politeknik Sultan Haji Ahmad Shah	343
	Nur Aisah Ab Moin & Asiah Abdul Satar	
42	Pelaksanaan Ujian Pra Sebagai Alternatif Untuk Meningkatkan Pencapaian Markah Pelajar Bagi Kursus DBM20023 Matematik Kejuruteraan 2	351
	Siti Norhazlina Shafie & Rosila Adnan	
43	Persepsi Pelajar Terhadap Penggunaan E-Book Dalam Menyelesaikan Tugas Kajian Kes	359
	Farah Abdul Malek, Rohaida Abu Bakar & Liyana Murni	
44	Promoting Learner Autonomy Through Online Global Interactions Among ESL Students	365
	Sharina Saad, Rafidah Amat & Nor Asni Syahriza Abu Hassan	
45	Remote Learning in The Time of Post - Covid-19: The Conceptual Framework of An Interactive PdPR For Primary School Via Visual Basic Programming	380
	Aslina Omar, Samsiah Abdul Razak, Nur Insyirah Mohamad Radzi & Ini Imaina Abdullah	
46	Strategi Pembelajaran Bahasa Melayu dalam Kalangan Murid Cina di Sekolah Jenis Kebangsaan Cina	385
	Wee Kee Quan, Zamri Mahamod & Shamsul Aizuwani Nawi	
47	Stres Dan Kepuasan Kerja: Analisis Inferensi Faktor Gender Dan Status Perkahwinan Dalam Kepuasan Kerja Pensyarah IPG	397
	Punitha Muniandy, Khairani Zakariya, Azhar Mohd Ali & Ahmad Sukari Mohamad	
48	Student Satisfaction of Public Transportation at UiTM Kedah	408
	Muhammad Azizi Azizurrahim, Sarah Sabir Ahmad, Azfahane Zakaria & Mhd Azmin Mat Seman	
49	Sustainable Smart Retirement City: A Concept Paper	417
	Nazmi @ Nazni Noordin, Zaherawati Zakaria, Mohd Zool Hilmie Mohamed Sawal, Mohd Syahmizan Azmi & Adnan Aminuddin	
50	Teknik Retorik Lafaz-Lafaz Berkaitan Dengan Syaitan Dalam Al-Quran	425
	Muhamad Khairul Anuar Zulkepli, Burhanuddin Wahab, Ahmad Fauzi Yahaya & Mohd Zulkhairi Abd Hamid	
51	The Determinants and Impact of Social Media Content on Consumer Engagement	438
	Marha Abdol Ghapar, Azlina Shamsudin, Nazlin Emieza Ngah & Nur Dalila Adenan	

52	The Distraction That Affects Students Focus Nur Khalyda Kamarol Hisham, Sarah Sabir Ahmad, Azfahanee Zakaria & Syed Mohammed Alhady Syed Ahmad Alhady	446
53	The Effects of Varying the Duty Cycle to The Output Voltage in Buck Converter Nurhazwani Saleh	455
54	The Impact of i-Pulih Model Towards Methamphetamine Addicts Recovery in PUSPEN Tampin, Melaka Muhammad Dhamir Audi Azizul, Wan Munira Wan Jaafar, Azlina Mohd Khir & Samir Muhazzab Amin	462
55	The Implementation of National Education Assessment System in Malaysian Primary Schools Shanusi Ahmad, Nor Hasnida Che Md Ghazali & Mohd Nazir Md Zabir	473
56	The Influence of Leadership Style on Lecturer's Performance Azlina Shamsudin, Nalin Emieza Ngah, Marha Abdol Ghapar & Nur Dalila Adenan	481
57	The Internet Addiction (IA) Among Youth Generation Muhammad Arif Ikhwan Aminuddin, Sarah Sabir Ahmad, Azfahanee Zakaria & Mhd Azmin Mat Seman	487
58	The Relationship Between Curricular Activities Among Students' Leadership Syarifah Nur Bahirah Syed Jamalulil, Sarah Sabir Ahmad, Azfahanee Zakaria & Syed Mohammed Alhady Syed Ahmad Alhady	493
59	The Role Entrepreneurship Education in Moderating Intention to Be An Entrepreneur Among Students With Learning Disabilities In Malaysia Nazlin Emieza Ngah, Nur Dalila Adenan, Azlina Shamsudin & Marha Abdol Ghapar	504
60	The Usage of Open Green Space (Planting Strip Area) at the Perimeter of Terrace House Unit by The Residents: Case Study in Taman Sinar Intan, Sungai Petani Mohd Zikri Mohd Zaki, Nurul Izzaty Zulkipli, Ahmad Faisol Yusof & Tajul Edrus Nordin	511
61	The Use of Scaffolding in Helping Students Complete Tasks That Require Higher Order Thinking Skills Syakirah Mohammed, Fathiyah Ahmad @ Ahmad Jali, Robekkah Harun & Sharina Saad	525
62	Time Passed and How Much Time Is Left? A Study on Motivation to Graduate on Time (GOT) Nur Dalila Adenan, Marha Abdol Ghapar, Nazlin Emieza Ngah & Azlina Shamsudin	537
63	Underground Mapping for Islamic Mausoleum Syed Idrus Syed Salim, Nor Azme Nordin & Sulzakimin Mohamed	546

Bio Natural Food Seasoning From Eugenia Cephalanthum Using Dehydration Method

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ABSTRACT

The use of Monosodium Glutamate (MSG) is the main ingredient needed in cooking. But many still do not know the side effects on human health. To deal with the issue, a study on Eugenia cephalanthum or Bunggang leaves, which were naturally occurring plants, were being tested. Traditionally, taste sensations are classified into five basic qualities: sour, sweet, salty, 2 bitter and umami. The project was carried out by producing bio natural food seasoning in cube shape form from Eugenia cephalanthum by using dehydration method and to compare the nutrients content between Mono Sodium Glutamate (MSG) and Bunggang leaves. This leaves will be processed in powder form and then will compact in cube shape form by using dehydration method to make it easier and available in market. Therefore, the provision of this plant is more focused in terms of hygiene preparation. By using FTIR, it was found that some of the functional groups of Bunggang leaves are same as Ajinomoto. Bunggang has the potential to become better food additives than Ajinomoto as it does not give any harmful side effect like Ajinomoto.

Key Words: eugenia cephalanthum, dehydration method, MSG, nutrients

INTRODUCTION

A variety of seasoning techniques exist in various cultures. Bunggang (Eugenia cephalanthum) are well-known as food flavouring in the Dayak tribe's foods. According to Cahyadi (2008), flavouring can change, modify, enchant, mask, form or neutralize aroma. These flavouring can be either natural or synthetic flavouring. Although today synthetic flavouring is already available in the markets, however the natural flavouring contains nutrition or phytochemicals that are essential to health of humans and more favourable than the synthetic one. Until now, these plants have been identified that has been used in cooking by the local rural Dayak as there is no chemical content and 100% organic.

Traditionally, taste sensations are classified into five basic qualities: sour, sweet, salty, 2 bitter and umami. Taste is one of the flavour components which is important to consumer to evaluate the quality of foods. Although most of researchers reported that aroma compounds influenced more to the food flavour, the taste compounds have been identified as a precursor to aroma. Most of researcher's report about the contribution of taste compounds from animal-derived food materials, while that from plant-derived compounds is rarely reported. Some of precursors were amino acids,

sugars, nucleotides, organic acids and minerals. These compounds are well-known as taste active of food ingredients. (Ottinger & Hofmann, 2003; Madruga et al., 2010).

The Bungkang leaves are usually mixed for cooking meat (regular dishes) and uses of the leaves is to rejuvenate the cooking, eliminate the stinking smell, thus applying the smell of the cuisine, softening the meat and reducing the consumption of Monosodium Glutamate (MSG) which can affect health (MCM, 2009).

LITERATURE REVIEW

Eugenia cephalanthum or locally known as Bungkang which is belongs to myrtaceae family is a kind of plant growing in vicinary of the Sarawak jungle, around the foothills and down the river. Due to many uses in the field, nowadays most Bungkang leaves are largely planted by the Dayak people around the longhouse or backyard of the village. This plant grows almost to 8 meters in height. The leaves are oval with a pointed rip and dark green leaves with a bone snaped ellipse. It has a light green stem and with brown trunk and a taproot that is hard (Ensurai, 2011). Moreover, it is also used by Dayak people to relieve diarrhoea and to treat cuts and wounds and to stop bleeding. For preparation, as vegetable, the young leaves are cooked in the water and some 8 ingredients are added as well to make a dish whereas young leaves are used for flavouring meat and fish cooked inside bamboo (<http://www.doa.sarawak.gov.my>). Shallots and garlic are an authentic ingredient of many Asian cuisines from Thai soups and red and green curries to Indonesian and fried rice dishes (<http://ukshallot.com>).

And for the first time, MSG was a banned ingredient at the Natural Products Expo East in 2016. That was not a sweeping change, however, since MSG is not a common ingredient in the products that are displayed at New Hope's Natural Product Expos anyway. Between 2013 and 2015, only 24 products (or a fraction of 1 percent) exhibiting at the listed MSG in their ingredients. In that same time, however, there were 1,625 products that made a "No MSG" claim in their marketing and/or packaging (Jessie, 2016)

Dehydration, in food processing, means by which many types of food can be preserved for indefinite periods by extracting the moisture, thereby inhibiting the growth 18 of microorganisms. Dehydration is one of the oldest methods of food preservation and was used by prehistoric peoples in sun-drying seeds (Shafiur, 2002). This project used Fourier Transform Infrared Spectroscopy (FTIR) to identify chemical bonds in a molecule by producing an infrared absorption spectrum. The spectra produce a profile of the sample, a distinctive molecular fingerprint that can be used to screen and scan samples for many different components.

Tubu leaves are being used by our ancestors since of yore. The functions of tubu leaves are same as the Monosodium Glutamate (MSG) which are using nowadays but tubu leaves has its own advantages. Tubu leaves and Ajinomoto sample was sent to the SP Lab for the nutrition test. In the previous research as shown in Table 1, tubu leaves contained high energy, carbohydrates, protein, and fat compared to the Ajinomoto. However, tubu leaves contain less protein compared to the 20 Ajinomoto which is 15.4g and 43.15g respectively. It is because Ajinomoto made from high protein ingredients such as seaweed and potato that contain high protein. The nutrition contain in tubu leaves also does not exceeded the value that had been decided in Nutrition Act 1983, and Nutrition Regulations (Yusoff, 2016).

Table 1. Nutrition information of tubu leaves & Ajinomoto

Material Tested Type of Test	Tubu Leaves		Ajinomoto	
	Per 100g	Per serving (9g)	Per 100g	Per serving (9g)
Energy	371.37kCal (1555.86kJ)	33.46kCal (140.03kJ)	239.42kCal (1002.97kJ)	21.55kCal (90.19kJ)
<u>Carbohydrate.g</u>	68.97	6.21	15.77	1.42
<u>Protein.g</u>	15.4	1.39	43.15	3.88
<u>Fat.g</u>	0.34	0.03	0.42	0.04

Table 2. Nutritional composition of indigenous leafy vegetables of Sarawak

Table 2. Nutritional composition of indigenous leafy vegetables of Sarawak																
Food item	Nutritional composition per 100 g edible portion															
	Proximate composition							Minerals								
	Energy (kcal)	Moisture (%)	Protein (%)	Fat (%)	CHO (%)	Crude fibre (%)	Ash (%)	P (mg)	K (mg)	Ca (mg)	Mg (mg)	Fe (mg)	Mn (p.p.m.)	Cu (p.p.m.)	Zn (p.p.m.)	Vitamin C (mg)
Anak mambung (<i>Sonchus</i> sp.)	22	92.5	1.6	0.7	2.4	0.8	2.0	32	586	58	16	2.7	16	6.3	8.8	1.2
Akar kuta (<i>Cissus repens</i>)	32	90.9	1.9	0.6	4.8	1.0	0.8	26	199	84	53	2.4	7	1.5	1.5	5.0
Bungkang (<i>Eugenia</i> sp.)	115	67.4	3.1	2.0	21.2	4.4	1.7	39	310	313	80	2.0	6	17.3	10.4	—
Gemi (<i>Portulaca oleracea</i>)	25	90.8	1.3	0.3	4.4	0.9	2.3	32	292	42	57	42.6	21	2.1	9.8	0.0
Kacam rumpang (<i>Embelia</i> sp.)	86	80.1	2.6	4.4	9.1	2.7	1.1	30	336	129	22	0.4	7	0.0	5.4	1.8
Kepayang (<i>Pangium edule</i>)	106	71.2	6.2	2.3	15.0	3.3	2.0	66	231	439	95	7.3	19	8.9	25.0	2.3
Keremak (<i>Alternanthera sessilis</i>)	46	82.3	2.0	0.3	8.9	2.7	3.8	27	474	65	104	42.4	83	8.5	45.6	NA
Letup (<i>Passiflora foetida</i>)	73	79.1	6.5	1.1	9.2	1.8	2.2	98	660	261	71	5.4	32	2.7	26.1	2.9
Melinjau (<i>Gnetum gnemon</i>)	57	81.7	4.2	1.5	6.6	4.7	1.3	68	419	94	37	3.8	41	1.5	12.1	1.5
Merudang (<i>Smilax barbata</i>)	39	88.1	3.1	0.1	6.4	1.0	1.3	52	396	49	19	1.9	38	2.5	6.2	16.0
Miding (<i>Stenochlaena palustris</i>)	33	92.3	2.5	0.9	3.4	0.6	0.9	56	295	12	21	3.1	6	3.3	1.2	1.75
Paku ikan (<i>Athyrium esculentum</i>)	24	92.5	2.7	0.5	2.2	0.8	1.2	83	410	14	19	1.8	3	1.9	0.6	0.0
Paku kelindang (<i>Blechnum orientale</i>)	40	88.5	1.2	0.7	7.2	1.3	1.1	21	338	26	33	2.4	3	14.5	2.1	0.3
Paku kubuk (<i>Nephrolepis acutifolia</i>)	28	92.4	1.5	1.0	3.3	0.9	1.0	43	371	22	27	3.0	5	10.3	0.6	0.6
Riang batu (<i>Begonia chlorosticta</i>)	25	91.9	0.7	0.6	4.2	2.1	0.6	34	69	70	20	2.8	37	0.9	6.5	0.6
Rinyuh (<i>Vernonia</i> sp.)	70	81.0	2.9	1.4	1.2	1.7	1.8	57	568	127	42	1.2	10	4.2	7.2	0.4
Sawi nusa (<i>Erechtites hieracifolia</i>)	30	89.7	2.2	0.4	4.4	1.3	2.0	129	417	78	45	1.3	14	3.2	68.0	NA
Sempulang padi (<i>Costa speciosus</i>)	69	80.7	2.3	1.9	10.6	2.3	2.2	15	587	114	44	2.6	151	22.2	4.3	—
Sepang (<i>Acalypha</i> sp.)	60	81.8	4.1	0.8	9.5	2.0	1.8	60	400	280	151	2.8	103	74.3	20.0	—
Sindu (<i>Scorodocarpus borneensis</i>)	93	66.5	3.7	3.6	11.6	13.7	0.9	46	405	0	33	0.0	20	0.0	10.0	3.5
Singkil (<i>Premna cordifolia</i>)	76	78.0	3.6	0.4	14.4	1.9	1.7	55	393	116	77	1.4	28	6.8	25.7	—
Tenggang (<i>Gnetum</i> sp.)	74	77.8	4.7	3.5	5.8	7.1	1.0	21	32	42	51	1.2	29	0	14.4	4.6
Teh kampung (<i>Leucosyke capitellata</i>)	74	75.0	3.3	0.5	14.2	3.8	3.3	35	310	403	626	3.5	8	3.1	3.1	6.5
Tongkat langit (<i>Helminthostachys</i> sp.)	56	85.0	3.2	1.9	6.5	1.5	1.9	50	342	53	32	84.4	34	2.0	0.9	0.0
Tubu (<i>Pycnarrhena tunetacta</i>)	110	63.5	7.3	2.2	15.3	10.3	1.4	48	340	215	33	2.9	14	6.8	6.8	—

26

BH Voon and HS Kuah

MSG is short for monosodium glutamate. It is a common food additive that is used to enhance flavour. It has the e-number E621. MSG is derived from the amino acid glutamate, or glutamic acid, which is one of the most abundant amino acids in nature. Glutamate is one of the non-essential amino acids, meaning that the human body can produce it. It serves various functions in the human body and is found in virtually all foods (Aquilar et. al., 2017).

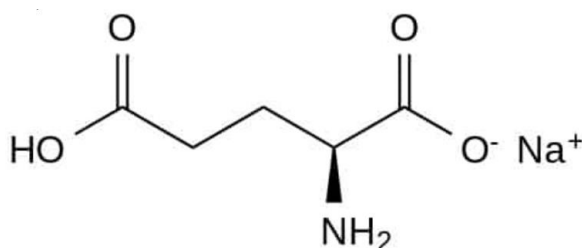


Figure 1. Chemical structure of MSG

MATERIALS AND METHODS

The raw materials used were Bungkang leaves, garlic, shallot, Ajinomoto and distilled water. The equipment used such as dehydrator, oven, pestle and mortar, grinder, knife, spoon, ice cube tray, container, and zipping plastic. This study was conducted based on the data from Nutrition Act 1983, and Nutrition Regulations (Yusoff, 2016) stated that 100 gram of Bungkang contains energy of 115 kcal, 67.4% of moisture, 3.1% of protein, 2.0% of fat, 21.2% of CHO, 4.4% of crude fibre, 1.7% of ash, 39 miligram (mg) of phosphorus, 310 mg of potassium, 313 mg of calcium, 80 mg of magnesium, 2.0 mg of iron, 6 parts per million (p.p.m) of manganese, 17.3 p.p.m of copper and 10.4 p.p.m of zinc. In this study, supporting data will be using surveys. The process of Bungkang cube is shown in Figure 2. The *Eugenia cephalanthum* or Bungkang leaves were collected and were weighed before and after drying.

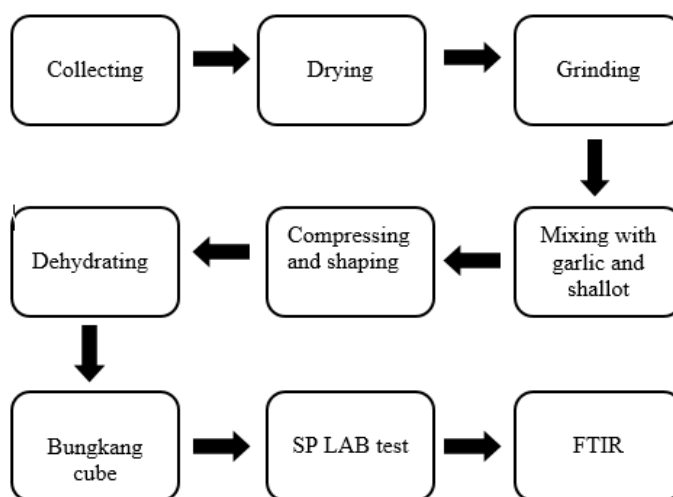


Figure 2. Process flow chart of Bungkang cube

The leaves were dried using microwave oven and ground into finely powder. In drying method analysis, 1kg of Bungkang leaves was collected. The leaves were dried using oven. By using the formula shown in the Figure 3, the percentage of dry weight of Bungkang leaves were determined. This dry matter analysis is a method used to determine the total major and trace element content in the leaf. It measures the mass of the leaves when they were completely dried.

$$\text{Percentage of dry weight} = \frac{\text{Weight of dry leaves}}{\text{Weight of wet leaves}} \times 100\%$$

Figure 3. Dry weight formula

The sample of the Bungkang powder was sent to SP Lab test to determine the nutrient contents such as fat, protein, energy, and carbohydrate. The nutrition content of Bungkang was compared with nutrition content of Ajinomoto. The leaves were boiled to get the extraction to obtain pH value. While shallot and garlic were ground in pestle and mortar.

50g of Bungkang powder were mixed with 15g of ground shallot and 15g of ground garlic in the ratio of 10: 3 : 3. Then, the mixture was compact into cube shape forms using ice cube tray. 18 cubes (2cm × 1cm) were made from that ratio. Finally, the cube was placed in the dehydrator at the temperature of 55°C for 8 hours. The cube also was sent to SP Lab test to obtain the nutritional content. The Bungkang powder, Bungkang cube and Ajinomoto were sent to Fourier Transform Infrared Spectroscopy (FTIR) to determine the functional groups. The cubes were packed.

From the Journal of Petrochemical Engineering Department, it was reported that tubu leaves as 100% bio natural food additives. This journal also used to obtain the nutritional value of MSG and the side effects of MSG that are harmful to human health. Surveys are conducted to gather more information about food seasonings that are being marketed. Surveys focused on the ingredients added together with main component in food seasoning. A survey about the taste Bungkang leaves and Ajinomoto has been conducted in Politeknik Kuching Sarawak. This survey is conducted on 30 students of the Politeknik Kuching Sarawak. Two types of soup labelled as A and B were prepared by adding Bungkang cube and Ajinomoto respectively. The candidates were given a spoon of each soup to taste and answer the survey question as shown in Table 3.

Table 3. Survey's Question

Which one tastes better?		
A (Soup used Bungkang cube?)	B (Soup used Ajinomoto?)	C (Both have better tastes?)

The cost of making this project is around RM300 for purchasing dehydrator. Shallots and garlicks were bought from the grocery store at the cheaper price.

RESULTS AND DISCUSSION

The dry matter of the leaves would be solids consist of all its constituents except the water content. When the percentage of dry weight reached a steady point, it shows that there is no water left inside the leaves and they were completely dried. As shown in the Table 4, the percentage of dry weight for the Bungkang leaves had reached a constant value after drying using oven. This shows that the ratio of the water constituents was lower in the Bungkang leaves.

Table 4: Percentage of dried Bungkang leaves

Bungkang leaves dry weight	
Weight of Wet (g)	1226
Weight of Dry (g)	275
Percentage %	22.43

The result of the survey was shown as in the Table 5. Based on the result, there were 20 students said that Bungkang leaves has a better taste than Ajinomoto. The candidates also said that Bungkang leaves has a tasty smell compared to the Ajinomoto. There were only 7 students choose Ajinomoto and 3 students choosed both have a better taste. This shows that Bungkang leaves has a potential to become a worldwide food additive and can be commercialized either in powder form or in cube shape forms.

Table 5. Survey's Result

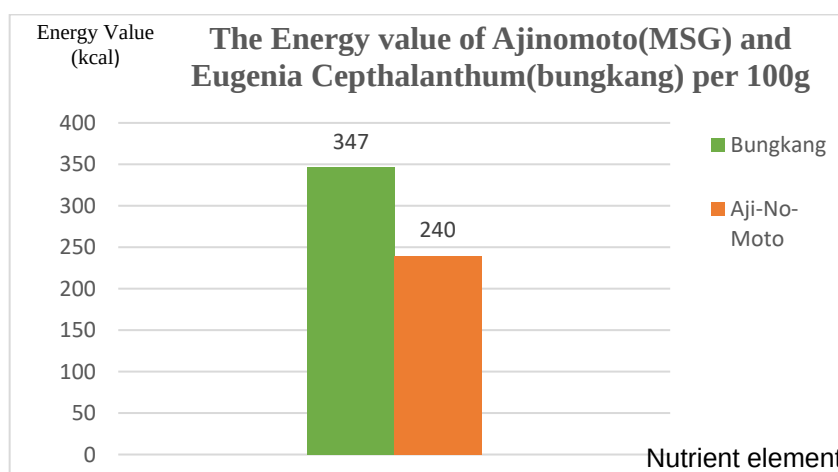
Which one tastes better ?		
A	B	C
30	12	2

Bungkang powder and Bungkang cube were sent to the SP Lab for the nutrition test. Meanwhile, the nutrition content of Ajinomoto was obtained from previous research. The methods of analysis that was used to analyse the value of nutrients content of Ajinomoto (MSG) and Bungkang

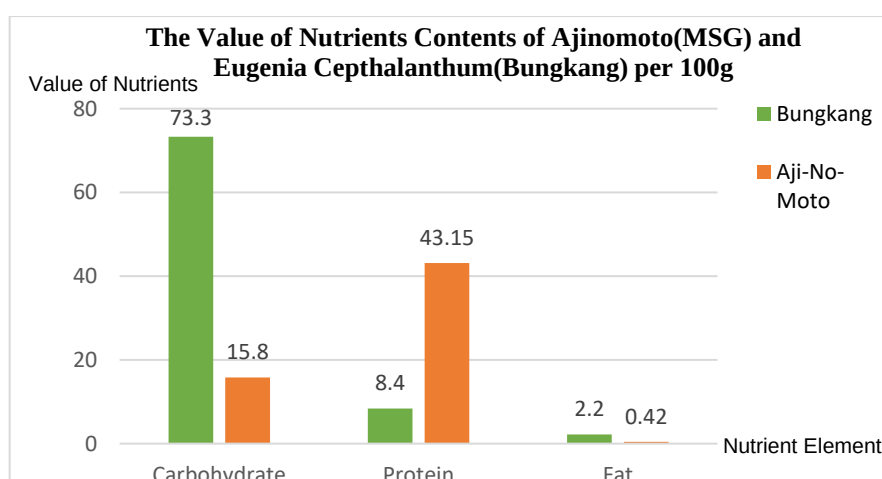
leaves and cube are “In house based on David Pearson (The Chemical Analysis of Food)” for fat and protein. Table 6 shows the nutritional contents of Bungkang and Ajinomoto per 100g.

Table 6. Nutritional Information of Bungkang Leaves and Ajinomoto

NUTRITIONAL INFORMATION		
Type of Test	Bungkang leaves (Eugenia Cephalanthum)	Ajinomoto
Material Tested	Per 100g	Per 100g
Energy	347kCal (1452kJ)	239.43kCal (1002.97kJ)
Carbohydrate. g	73.3	15.77
Protein. g	8.4	43.15
Fat. g	2.2	0.42



Graph 1. The Energy value (Kcal) of Ajinomoto (MSG) and Bungkang per 100g



Graph 2. The value of nutrients contents of Ajinomoto and Bungkang per 100g

Based on the tables and graphs above, the value of nutrients content for Bungkang for energy, carbohydrate and fat are higher compared to Ajinomoto, meanwhile protein for Bungkang is lower than Ajinomoto which is 8.4g and 43.15g respectively. This is because Ajinomoto is made from high protein ingredients such as seaweed and potato. The data of analysis showed that nutrients content

of Bunggang followed the evaluation of Nutrition Reference Value (NRV) based on Nutrition Act-1938 and has the potential to become a healthier food additive compared to Ajinomoto (MSG) because it is bio natural and contain no chemical substance that can affect health or give negative long term impacts towards consumer's health.

Bunggang cube, Ajinomoto and Bunggang powder were sent for FTIR Test at Polytechnic Kuching Sarawak to obtain the functional groups.

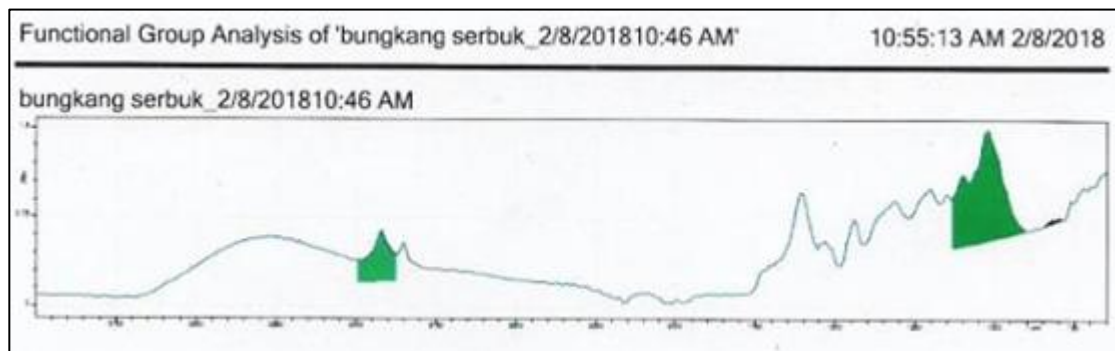


Figure 4. FTIR of Bunggang (Eugenia Cephalanthum)

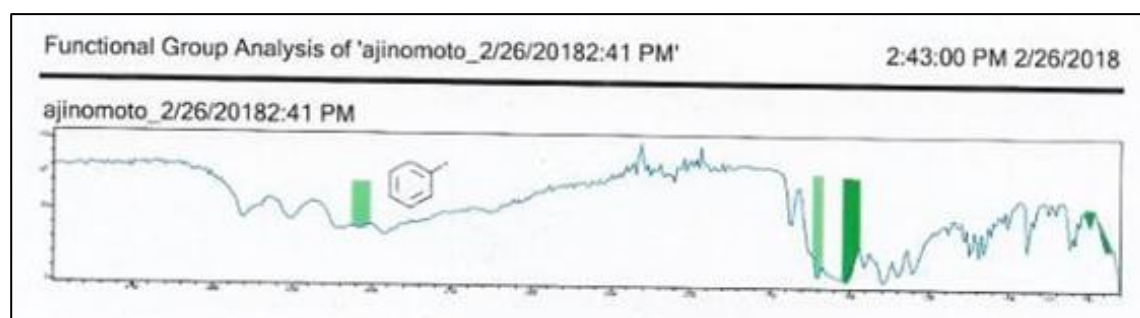


Figure 5. FTIR of Ajinomoto

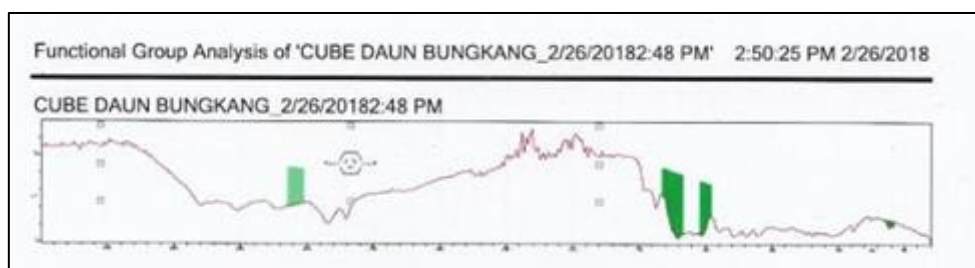


Figure 6. FTIR of Bunggang cube

From the figures above, it can be concluded that some of the functional groups are same between Ajinomoto and Bunggang which are Hydroxy. Possibly 1,2-Diol, Primary Alcohol, CF₃ Group, Unsaturated Hydrocarbon and Aliphatic Alkoxyl, Methoxy. Since some of the functional groups of Bunggang are same as Ajinomoto, Bunggang has the potential to become better food additives than Ajinomoto as it does not give any harmful side effect like Ajinomoto.

SUMMARY

In conclusion, this project serves to enhance *Eugenia cephalanthum* as a food seasoning and to be marketed in nationwide and also international wide so that the consumption of Ajinomoto (MSG) will reduce and thus improve the image of community in Sarawak. From the previous

research, food seasoning was made in only powder form. Therefore, there must be a better method on producing them. From the research made, food seasoning in cube shape forms using dehydration method was made to prevent the growth of microorganisms so that it can be stored for a long period of time. Shortly to say the first objectives of the project was successfully achieved.

Besides, the findings of this study are to create awareness among people of harmful effects of consuming MSG and to produce bio-natural food additives from *Eugenia cephalanthum* leaves that is healthy and follows the evaluation of Nutrition Reference Value (NRV) based on Nutrition Act-1938 without content of chemical substance that can affect health or give negative long-term impacts towards consumer's health. In achieving that, the nutrition contents, and functional groups of Bunggang and Ajinomoto were compared through SPLab test and FTIR test. From the result obtained, Bunggang has the potential to become better and healthier food additives compared to Ajinomoto. Thus, second objectives also were achieved.

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