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Consumer Acceptance on Dried Kaffir Lime Leaves (*Citrus hyxtrix*)
As Food Ingredient

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A thesis submitted in fulfillment of the requirement for the Degree
of Bachelor of Applied Science (Product Development Technology)
with Honors

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DECLARATION

I hereby declare that the work embodied in this report is the result of the original research and has not been submitted for a higher degree to any universities or institutions.

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I certify that the report of this final year project entitled “Consumer Acceptance on the Effect of Temperature and Aroma on Kaffir Lime Leaves (*Citrus hyxtrix*) As Food Ingredient” by Wan Nurnabilah Binti Wan Harmizi, matric number F15A0307 has been examined and all the correction recommended by examiners have been done for the degree of Bachelor of Applied Science (Product Development Technology) with Honors, Faculty of Agro-Based Industry, Universiti Malaysia Kelantan.

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LIST OF ABBREVIATIONS

°C	Celsius
g	Gram
SPSS	Statistical Packaging for the social Science
mL	Milliliter
RM	Ringgit Malaysia
MC	Moisture Content



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Penerimaan Pengguna Terhadap Daun Limau Purut Kering (*Citrus hystrix*) Sebagai Ramuan Makanan

ABSTRAK

C. hystrix atau limau purut digunakan terutamanya pada daunnya. Kebiasaanya daun limau purut digunakan secara meluas sebagai herba yang dimasukkan ke dalam masakan di Asia. Ia memberikan aroma dan rasa. Buah limau purut hampir tidak mempunyai jus tetapi hirisan kulit buah limau purut boleh digunakan. Selain itu, buah ini juga digunakan sebagai salah satu tujuan perubatan tradisional. Tambahan pula, pertumbuhan kulat sering berlaku apabila makanan mengandungi apa-apa jenis air atau cecair. Untuk mengekalkan makanan atau menjaga makanan supaya berada dalam keadaan yang baik, kandungan kelembapan mesti sentiasa berada dalam keadaan yang rendah supaya organisma rosak tidak boleh tumbuh. Daun limau purut melalui kaedah pengeringan dimana merupakan salah satu kaedah tertua dalam mengenal pasti perubahan aroma dengan meningkatkan suhu serta penerimaan oleh pengguna. Kaedah pengeringan yang digunakan adalah pengeringan oven dimana memberi kesan kepada aroma daun limau purut bergantung pada suhu yang dikenakan, peratusan kehilangan lembapan dan aroma juga akan berubah. Walaupun kebanyakan orang lebih suka sampel segar berbanding sampel yang diproses, 71% responden sanggup membeli sampel kering jika didapati di pasaran. Seterusnya ialah masih belum mengambil kira bahawa lebih daripada separuh responden berminat terhadap sampel kering yang mempunyai aroma yang sama dengan sampel segar. Oleh itu, untuk pemilihan suhu amatlah penting dalam menentukan perubahan aroma serta penerimaan pengguna dan juga untuk projek masa akan datang dalam melibatkan ramuan makanan kering sebagai produk.

Kata kunci: Daun limau Kaffir (*Citrus hystrix*), Suhu, Aroma, Kehilangan kelembapan, Penerimaan Pengguna

Consumer Acceptance on Dried Kaffir Lime Leaves (*Citrus hystrix*) As Food Ingredients

ABSTRACT

C. hystrix or the kaffir lime primarily used for its leaves. The leaves are widely used as herbs that added into Asian dishes. It provides the aroma and also flavor. For the fruit, it almost has no juice but the zest and rind might be useful. The fruit also used as one of the traditional medicinal purposes. In addition, mold is susceptible to growth when the food contains any kind of water or fluid. In order to preserve the food or to keep the food in a good condition the moisture content must always be in a low state so that the spoilage organisms cannot grow. Kaffir lime leaves undergo the drying method which is one of the oldest methods to identify the change in aroma by increasing the temperature and also the acceptance by the consumer. The drying method that being used is oven-drying which gives effect on the aroma of the kaffir lime leaves depending on the temperature applied, the percentage of moisture loss and aroma also will change. Even though most of the people more prefer fresh sample over the processed sample, 71% of the respondents are willing to purchase the dried sample if available in the market. Not to mention that more than half of the respondents look forward to the dried sample that has a similar aroma to the fresh sample. Thus, for consumer preferences temperature selection is vital on the aroma change and also for future project in involving dried food ingredient as a product.

Keywords: *Kaffir lime leaves (Citrus hystrix), Temperature, Aroma, Moisture loss, Consumer Acceptance*

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CHAPTER 1

INTRODUCTION

1.0 Research Background

Kaffir lime or the scientific name called *Citrus hystrix* is a tropical plant grown in the Asian countries, including Malaysia, Indonesia, and Thailand. Kaffir lime leaves are widely used as aromatic herb and food ingredient (Tasirin, Puspasari, Lun, Chai, & Lee, 2014). Furthermore, kaffir lime leaves also used in Southeast Asian cuisine and its essential oil is used in perfumery (Ng et al., 2011). The citrus family responsible for the distinctive lime-lemon aroma and flavor which including the kaffir lime leaves. The colour for the leaves is dark green color with the shiny surface. Other characteristics are the leaves come in two parts where the top leaflet is lightly pointed at its tip and is attached to another leaflet beneath that is broader on its upper edge. There will be a distinct aroma when tearing the leaf. Meanwhile, the criteria for fruit is dark green and round, with a distinct nipple on the stem end. It has a thick rind, knobby and wrinkled. As the fruit reach its maturity, the color fades to a lighter, yellowish green.

C. hystrix are widely used in life as well as many uses and can help with the user daily life. Kaffir lime leaves are important in food especially Thai dishes. The leaves are added to dishes in order to make the aroma become more fascinating. Other than adding aroma and be useful to cuisine, kaffir lime also gives benefit in medicinal. The chemical constituents

that identified as monoterpene hydrocarbons, with limonene (30.73%) and β -pinene (18.76%) are the major components, whereas the minor components are terpinene-4-ol (10.63%), α -terpineol (8.35%), γ -terpinene (6.18%), α -terpinene (5.09%) and terpinolene (4.33%) are responsible for the aroma, it is contained in the leaf oil up to 80 percent (Ng et al., 2011.) However, the aroma of the kaffir lime leaves might be changed or affect by the heat depends on the temperature applied.

1.1 Problem Statement

Kaffir lime leaves are precious in order to add aroma in dishes. Since the leaves are producing aroma, many people prefer to include it in their recipe. The issue comes when usually people would purchase the leaves in stalk but only use few leaves. Therefore, the rest leaves would be kept until the next use. Trouble comes when the stored leaves causing the mold growth. Food that contains any kind of water or fluid is susceptible to mold growth (Farrelly, 2018). Hence, the kaffir lime leaves categorized as food that have a short shelf life.

As the kaffir lime leaves fall into food categories, the shelf life can be extended by using preservation method. Drying method can be applied to extend the shelf life (Angraiyati & Hamzah, 2017). Although heat helps to remove the moisture, the heat also drives away the oils, aroma, and flavors. Even in certain temperature the oils and aromas evaporate quickly. Thus, this research was conducted in identify the change in the aroma of kaffir lime leaves by increasing the temperature.

1.2 Objectives

The objectives of this study are:

- 1) to identify the change in the aroma of kaffir lime leaves (*C. hystrix*) by increasing the temperature
- 2) to measure the moisture loss of kaffir lime leaves (*C. hystrix*) based on the temperature and period of drying
- 3) to determine the acceptance of the sample product (*C. hystrix*) based on consumer likeness

1.3 Scope of Study

This study focuses more on kaffir lime leaves as a dried food ingredient. Apart from that, the preservation method to prolong the shelf life is a drying method. The aim of this study how drying method can affect kaffir lime leaves aroma and its shelf life. Furthermore, the necessary of preserve kaffir lime leaves have been studied. Based on the gradual change of the aroma which depends on temperature, consumer acceptance has been analysed. The survey on sensory evaluation has been conducted around UMK Jeli campus to observe the consumer preference.

1.4 Significance of Study

The finding of this study will contribute the benefit to society considering it can improve the economy in our country. Next, this study also might be helped in reducing the wastage. The method which preserves the food proves that can extend the shelf life of the food hence control the consumption of the product. Lastly, through this study also may contribute in the food industry also the agro-industry in processing herb product as a dried food ingredient.



CHAPTER 2

Literature Review

2.1 Kaffir Limes (*Citrus hystrix*)

2.1.1 Introduction to Kaffir Limes

Kaffir limes are botanically classified as *C. hystrix*. The species name is Greek for hedgehog, which is reflective of not only the thorns on the kaffir lime tree, but also of the bumpy appearance of the fruit itself. Kaffir limes are also called as “makrut” limes. *C. hystrix* comes from citrus family which is small tree that subgenus of Rutaceae. The kaffir lime fruits contain acrid oil droplets which inside the juice vesicles and it also inedible even when the fruits are ripe. Figure 2.1 shows kaffir lime and its leaves



Figure 2.1: The kaffir lime and its leaves

Classification taxonomy of kaffir lime are shown as below:

Kingdom: Plantae

Order: Sapindales

Family: Rutaceae

Genus: Citrus

According to Kuntal Kumar, (2008), *C. hystrix* is a thorny bush, 6 to 35 feet (1.8 to 10.7 m) tall, with aromatic and distinctively shaped "double" leaves. *C. hystrix* is a citrus fruit native to tropical Asia, including Malaysia, Indonesia and Thailand. It is relatively dry, and the juice that they do offer is acidic, bitter, and strongly sour. The most extreme aromatic part in kaffir lime are the zest and it juice. Kaffir lime trees bloom in the spring. During the first year, the flowers to encourage root and branch develop. During the fruiting phase, marble-sized limes emerge below the blossoms and continue to swell into full-size limes for

about six months. Fruit color changes from dark green to light yellow and falls from the tree when it is fully ripe.

The chemical composition of the *C. hystrix* was investigated by gas chromatography and gas chromatography-mass spectrometry (Sato, Asano, & Sato, 1990). In addition, Citronellal was characterized as the main component (81%) of the leaf oil. It was also found as the main component of the twig oil (78.64%), and a major component of the peel oil (23.64%) in combination with β -pinene (25.93%) and sabinene (20.36%). In total 57 constituents were characterized in the leaf oil. 2, 6-Dimethyl-5-heptenal, citronellic acid, and safrole were some of the more unusual components found in the various oils of *C. hystrix*. An extract of the juice, which was found to contain β -pinene (39.50%) and terpinen-4-ol (17.55%), was not very similar in composition to an extract of the peel. This latter extract, which contained β -pinene (31.54%), sabinene (15.57%) and citronellal (16.80%), was qualitatively relatively similar in composition to the peel oil. Volatile compounds are present in *C. hystrix*.

2.1.2 Benefits of Kaffir Lime Leaves

Apart from providing a unique aroma and flavor which improve the quality of food or cuisine, kaffir lime leaves include their ability mainly in health benefits. Some of the benefits are helps in the process of detoxification. This herb has been known to be effective in treating numerous oral issues. The leaves of this herb when applied onto teeth and gum can help in killing harmful bacteria and hence is utilised in toothpastes and mouthwash. Other

than that, kaffir lime leaves also helps in treating numerous digestive issues (Staughton, 2018). It has been known to be anti-inflammatory in nature and therefore has been known to cure numerous health issues related to digestion. It has been known as one of the effective cures for constipation and indigestion and can also help in prevention against any future issues occurring within digestive tract. Other benefits also include its ability to detoxify the blood, boost skin health, lower inflammation, aid the immune system, reduce stress, and improve the health of the hair. Paste made out of leaves is also known to have numerous positive health effects.

2.1.3 Economic Value of Kaffir Lime Leaves

Apart from the fresh herbs section in the grocery market, kaffir lime leaves are obtained easily in the Asia since most of people will plant it by themselves in their backyard. By planting the kaffir lime plant would actually more save where kaffir lime leaves price in market actually reach RM109 for 1 kg. People would usually buy them by stalk with the purposes for cooking. The price for kaffir lime leaves in a stalk is around RM1.00-RM2.00 in average. In some area where the kaffir lime tree does not grow well, the market price would be increase since the source is limited. However, for dried kaffir lime leaves the price will be high since it has gone through a drying process.

2.2 Uses of Kaffir Lime

2.2.1 Kaffir Lime in Cooking

Kaffir lime leaves have a fresh, aromatic, explosive fragrance which is floral and citrus-like. Most of them are grown for its aromatic leaves that add authenticity to Asian cuisine. Kaffir lime leaves is a favorite herbs in order to add flavor and fragrance. It is probably one of the most aromatic of all herbs. The leaves have highly aromatic and add their own elegant flavor to the dishes. Usually the intense and fragrance of the kaffir lime leaves cannot be replaced by other spices. Depending on the recipe, kaffir lime leaves can be used either in fresh or dried. However, the kaffir lime leaves cannot be eaten since the leaves purposes is to give fragrance to the cooking and kaffir lime leaves are too tough to just eat, so either kept large and reserved, or sliced thin. Some examples for use include Thai curry dishes and soups, such as Tom Yum and Indonesian curry dishes.

2.2.2 Kaffir Lime in Cosmetic

Another usefulness of kaffir lime is they can be applied as personal remedy. The essential oil of *C. hystrix* is used in aromatherapy and an essential ingredient of various cosmetic and beauty products (Waikedre et al., 2010). Some of the cosmetic and bath products includes kaffir lime juice and extracts which are mixed for its wonderful smell, as

well as its antioxidants properties. Some of the acids found in kaffir limes can help to neutralize free radicals, the dangerous byproducts of cellular respiration that can cause cell mutation or apoptosis, as well as cancer. Antioxidant compounds also slow the breakdown of cells and minimize the appearance of age marks, scars, and pimples (Lertsatitthanakorn, Taweechaisupamong, Aromdee, & Khunkitti, 2006). The essential oil of kaffir limes has been used for its aromatic properties, where the essential oils are used in skincare products as fragrance. The benefits it presents as a skin-care ingredient are not to be missed. Kaffir limes have a high level of antioxidants, and in the essential oil those antioxidants are naturally concentrated. The high level of vitamin C and other nutrients have powerful restorative properties.

Since the skin of kaffir lime contains many limonene, terpenes and especially the citronelolo that has a strong scent, it also being used by industry to produce good perfumes and aromatherapy purposes. Meanwhile, one of the less well-known applications of kaffir lime juice and leaves is in the hair product. For example, the brewed kaffir lime can make the skin become moisture in order to prevent dandruff and it also can improve the appearance. The juice and rinds of the peel are used in traditional medicine in some Asian countries; the fruit's juice is often used in shampoo and is believed to kill head lice (George, Staples, & Kristiansen Michael S, 1999). Oil extracted from the leaves, as well as the leaves themselves, are commonly used for medicinal purposes in cosmetic. The oil is often mixed with shampoos, soaps, salves, fragrances, and other cosmetic products. You can apply decoctions and mixtures to the scalp and hair to slow the onset of male pattern baldness and strengthen the follicles of the hair.

2.2.3 Kaffir Lime in Pharmaceutical

In term of pharmaceutical which associate to medicinal use or health related, the leaves itself include its ability to promote oral health, detoxify the blood, improve digestion, ward off insects, lower inflammation, and reduce stress. In addition, by eliminate harmful bacteria that can build up in the mouth as well as eliminate the bad breath. Kaffir lime is also highly respected in herbal medicine, due to its high content of beneficial organic compounds that can positively affect the body's systems (Staughton, 2018). Oil extracted from the leaves is often mixed in various decoctions for those suffering from blood-borne illnesses or chronic blood-related diseases (van der Riet, Dedkhard, & Srithong, 2012). The unique mix of volatile compounds is known to eliminate those pathogens or foreign agents in the blood, while also helping the liver and lymphatic system strain out dangerous substances and improve your overall health.

For those suffering from rheumatism, arthritis, edema, gout, or some other inflammatory condition, kaffir limes can be a very effective remedy. The juice, leaves, or oil extracts can be use topically on the area that experiencing discomfort or pain. This anti-inflammatory effect also makes kaffir lime juice beneficial for headaches and migraines. Although most people do not think of kaffir limes as being particularly useful in aromatherapy, the oil extracted from these powerful fruits can be used aromatically with great effect. Someone who suffer from anxiety or various nervous disorders can calm the body and mind by spending some time inhaling these soothing vapors (Hongratanaworakit & Buchbauer, 2007).

2.3 Sensory Evaluation

Sensory evaluation, is the process of consumer evaluating products by using the five senses which are taste, smell, touch, sound, and sight. Nowadays, the sensory evaluation is essential in several areas and has a major role to ensure the product quality. Sensory evaluation plays an important role in product development ensuring the attractiveness and consumer acceptability of new products and recipes as producers, using the suggestions and indications of consumers. Considering the fact that humans generally receive about 80% of information through eye-sight, the strongest visual stimulus is obviously the product's color (Kolek, 2006). In other words, the color itself can play a crucial role in attracting consumers and influencing their purchase decisions.

The aim of the sensory testing is to describe or evaluate the product and by evaluate two or more products can distinguish the differences between the quality, its magnitude and direction. Consumer panels are organized to test a particular product before it hits store shelves, using sensory analysis. Results of these tests can determine whether or not a product will ever reach consumers. Many food and drink companies use sensory evaluation to test their products. Companies ask consumer panels to test products, and analysts record their responses. Next, consumer evaluation can help to determine how successful, or unsuccessful, a product will be. It is a way to get feedback on a product before the company releases it to the public.

CHAPTER 3

MATERIALS AND METHODS

3.1 Materials

3.1.1 Plant sample

Kaffir lime leaves (*Citrus hyxtrix*) sample has been obtained from the wet market that located at Jeli, Kelantan

3.1.2 Types of Equipments

The equipment used in this experiment were aluminium foil, weighing scale (Sartorius – BSA42025 – CW), drying devices (Memmert UN 30 115V Model UN Universal Oven), beaker, distilled water, wire gauze, tripod, bunsen burner, plastic container.

3.2 Method

3.2.1 Preparation of dried sample

The sample, kaffir lime leaves were obtained from a market that located in Jeli, Kelantan. After the sample gained, the sample washed thoroughly until the dirt was removed. Then the washed sample was placed and being dried in a room temperature. The sample weight before drying process has been recorded. The kaffir lime leaves sample has been labelled which are A, B, C, D and E which indicated different temperature that had applied. The sample had placed on a tray in order to put in the oven. The sample was not being cut since the size already in small size. Tray that contained sample B had entered the oven with 40°C temperature. After 24 hours, the sample been taken out and the weight after dried had recorded. After being weighed, the samples placed into oven again until the moisture content loss completely which the weight become constant or does not change anymore.

Since the compound is volatile, it will evaporate easily so that the sample that has loss the moisture content completely will be stored in a container which is air-tight in order to prevent the aroma evaporate to the atmosphere. The steps been repeated for different effects of temperature on the kaffir lime leaves which was 50°, 60°C, and 70°C and label C, D and E respectively. The water loss for each sample is being calculated by using formula :

$$MC = \frac{\text{Weight of water}}{\text{Weight of sample}} \times 100\% \quad (1)$$

The weight of the sample does not include any water. It is the weight of the sample after oven-dry and all water has been removed. The weight of the water is difference of the sample before and after the oven-drying. Therefore, Equation 2 used to calculate water loss:

$$MC = \frac{\text{Initial weight} - \text{final weight}}{\text{Initial weight}} \times 100\% \quad (2)$$

Formula one and two are the same, one is for conceptual, and two is the one that need to put into the data record.

3.2.2 Designing a Questionnaire

Questionnaires are frequently used in quantitative marketing research and social research. They are a valuable method of collecting a wide range of information from a large number of individuals, often referred to as respondents. The purpose of this questionnaire is to implement one of the objectives which to determine consumer preferences based on their likeness. One of the principle in designing questionnaire is that generalized question should be placed before specific question to prevent or minimize any survey bias.

Basically the questionnaire that was provided is consist of 5 section. Part A in this survey questionnaire involved the demographic data which is the respondent characteristics (e.g., age, gender). Part B(I) and B(II) are the sections where the respondents need to test the sample. The difference between Part B(I) and B(II) are the type of samples. Part B(I) indicates the dried sample while B(II) is the water sample of the food ingredient. Next is Part C which is background knowledge on food ingredients which to understand the respondent

idea on the food ingredients. The fourth section that represent Part D is about cooking experience. Lastly, Part E is a section that identify the customer preference on the food ingredients samples. This section is important since it explaining customer or consumer behavior and expectations on the product. The data gathered may be used for research development, to improve a given service, or for simple record-keeping (See Annex I).

3.2.3 Sample Preparation for Sensory Evaluation

For the preparation of dried sample, the dried sample was kept inside an airtight container to prevent the aroma from evaporate. 5 different containers were labelled where Sample A represent the fresh sample, sample B, C, D and E represent different temperatures which are 40 °C 50°, 60°C, and 70°C respectively. During the sensory evaluation, the respondents take turn open the container one by one following the order inside the question.

Meanwhile for the water sample preparation, amount of kaffir lime leaves sample that been prepared represent the amount of per serving which is 0.62 gram. In a 250 ml beaker, 50 ml of distilled water was being boiled by using heating process. The amount per serving of the sample had placed inside a sachet and then put in a beaker that contained boiling distilled water. The prepared water sample was placed inside an airtight container. The process being repeated by using different samples and been labelled including the fresh kaffir lime leaves as control.

3.2.4 Sensory Evaluation Survey

A survey on effect of temperature and aroma on dried food, kaffir lime leaves (*C. hyxtrix*) was being implemented around the UMK Jeli campus. The respondents were consisted of the students and staff. Around 80 people were being selected to cooperate in answering the survey. Sample was being prepared before distribution of the questionnaire. The answering method were simultaneously done with evaluate the sample. The questionnaire are being collected afterwards in order to obtain the data.

3.2.5 Data Analysis

The data from the survey questionnaire was analysed. Each data response from 80 respondents were being recorded. Statistical package for the social sciences (SPSS) was used as the medium to gather the data. The gathered data were being analysed one by one and disclose it as frequency table and chart.

CHAPTER 4

RESULTS





Table 4.1 indicates the data collected based on the samples weight from the beginning of experiment until the end of the experiment and the calculation for percentage of water loss on the dried samples.

Table 4.1 Initial weight, final weight, total water loss and percentage of water loss of kaffir lime leaves after drying.

Temperature (°C)	Initial weight (g)	Final weight (g) Day 1	Final weight (g) Day 2	Final weight (g) Day 3	Final weight (g) Day 4	Final weight (g) Day 5	Total water loss (g)	Percentage of water loss (%)	Day to dry
40	24.14	11.07	9.10	8.10	8.03	8.03	16.11	66.74	4
50	30.13	17.54	13.89	13.84	13.84	-	16.29	54.07	3
60	29.07	12.87	11.20	9.40	9.40	-	19.67	67.66	3
70	31.50	11.56	11.56	-	-	-	19.94	63.30	1

Table 4.2 shows the colour of the kaffir lime leaves sample that has been dried by using different temperatures. Each of the sample have different colours depends on the heat applied. However, the original colour after purchasing should also be considered.

Table 4.2 Colour of the kaffir lime leaves sample

Sample A Fresh Sample	Sample B (Dried at temperature 40 °C)	Sample C (Dried at temperature 50 °C)
		
Light green	Greenish yellow	Green
Sample D (Dried at temperature 60 °C)	Sample E (Dried at temperature 70 °C)	
		
Moss green	Moss green	

4.3 Questionnaire Analysis

4.3.1 Part A Demographic

Figure 4.1 shows the percentage of the respondent's gender. The percentage of female respondent is slightly higher than the male respondent which female is 65% while male is 35%.

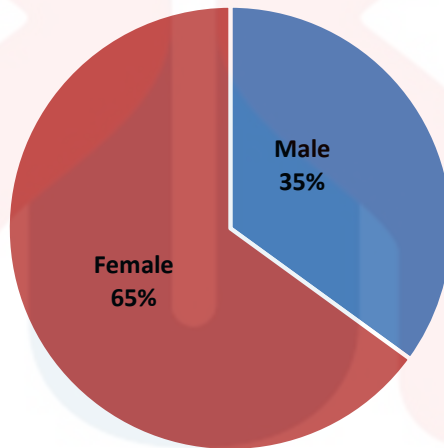


Figure 4.1: Respondent gender

Figure 4.2 shows the percentage of the respondent age. Since most of the respondent consist of students, the highest percentage is 93% which is 15-24 years old and the rest of the respondent are 25-34 years old which is 6% and 45 years old and above that only 1%.

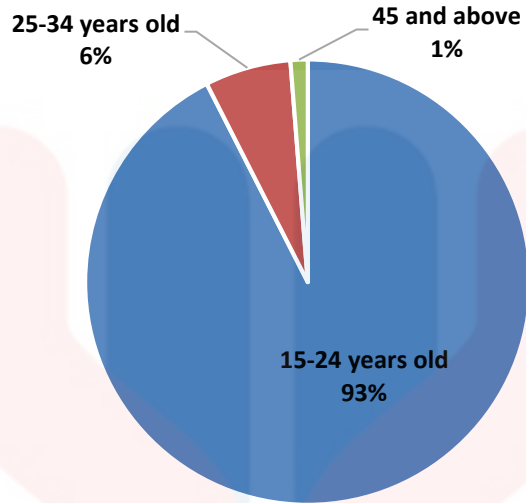


Figure 4.2: Respondent age

Figure 4.3 shows the percentage of respondent race where Malaysia is a country that stand with many race including Malay, Chinese, Indian and others. From the respondents, 84% of them are Malay and 1% consists of Sabahan.

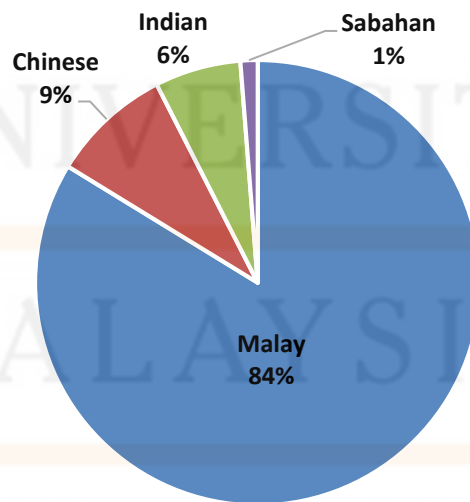


Figure 4.3: Respondent race

Figure 4.4 shows the percentage of the respondent residence where most of the respondent comes from city. Residency status of the respondent symbolize the lifestyle of them which affect in the answering section of the questionnaire.

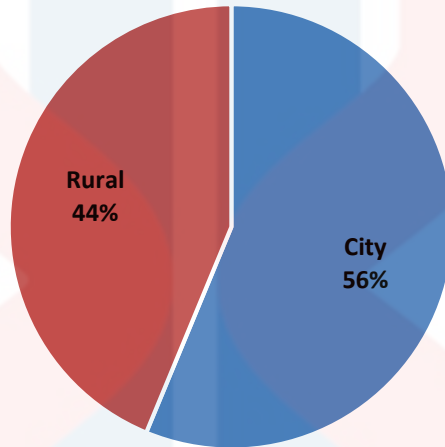


Figure 4.4: Respondent residency status

Last but not least, Figure 4.5 in Part A indicate the percentage of the respondent job. Since the survey was conducted around UMK Jeli Campus, majority of the respondent comes from students where 90% of the respondents are students and 10% of the respondents are UMK staff.

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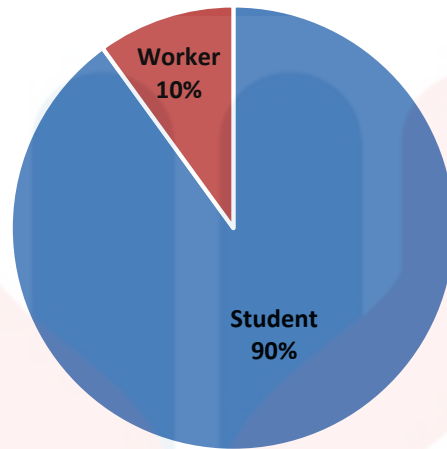


Figure 4.5: Respondent job

4.3.2 Part B(I) Sensory Evaluation

Part B (I) indicates the section in survey questionnaire that represent dried sample which is the kaffir lime leaves that have undergone the drying process.

There are not much difference between the samples in selection the strongest aroma of dried sample. However, sample D get the highest percentage which is 35% meanwhile sample E was chose as the least strong aroma among all the samples which is 14% (Figure 4.6).

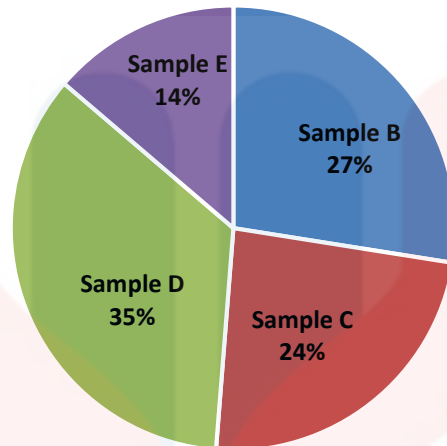


Figure 4.6: Strongest aroma of dried sample

Majority of the respondents (46%) had chosen that sample B is the sample that has the closest aroma to sample A which is the fresh sample. Sample E was chosen as the sample that has the least close aroma to fresh sample, 10% (Figure 4.7).

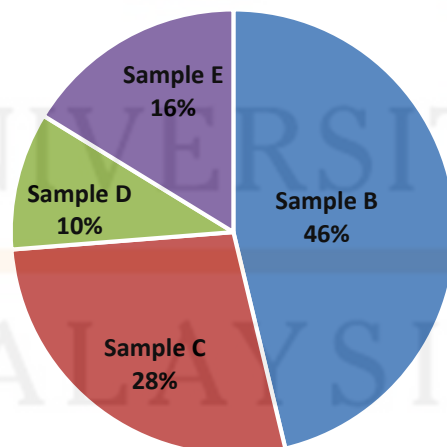


Figure 4.7: Samples that have closest aroma to sample A

Figure 4.8 shows the data collected from the respondents on the aroma that they respondents like the most. Sample E was chosen as the most favored aroma among the samples with 29%. There are some errors where 2% had chosen sample A where it is actually not include as an options since sample A not going through any processes.

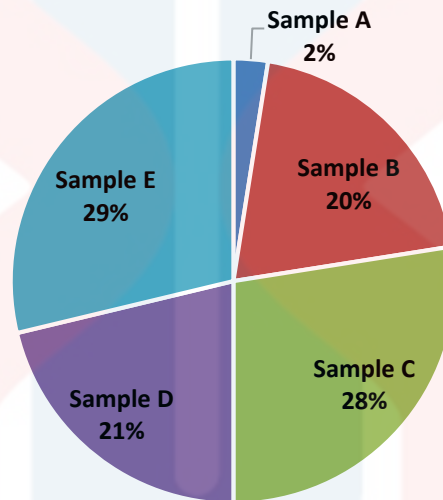


Figure 4.8: Most favored aroma of dried sample

Colour is important in attracting the consumer. Based on the figure 4.9, sample C was the most favored colour by the respondents which is 38%. The least favored colour by the respondents is sample E (10%).

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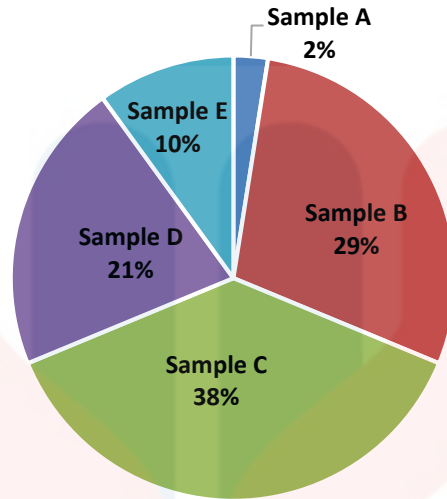


Figure 4.9: Most favored colour of dried sample

4.3.3 Part B(II) Sensory Evaluation

Part B (II) shows the section in survey questionnaire that represent water where the dried kaffir lime leaves sample were dissolved with boiling water and form water sample.

In Figure 4.10, 33% of the respondents had chosen sample B as sample that have the strongest aroma. The less aroma goes to sample C where the percentage is 19%.

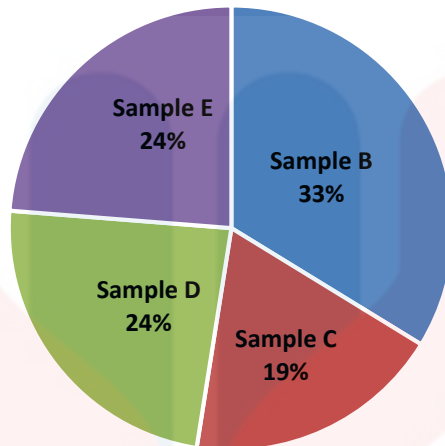


Figure 4.10: Strongest aroma of water sample

For the water sample, half of the respondents had chosen sample B as the sample that has closest aroma to fresh sample while the least close aroma to sample A is sample D which the percentage of the respondents only 7% (Figure 4.11).

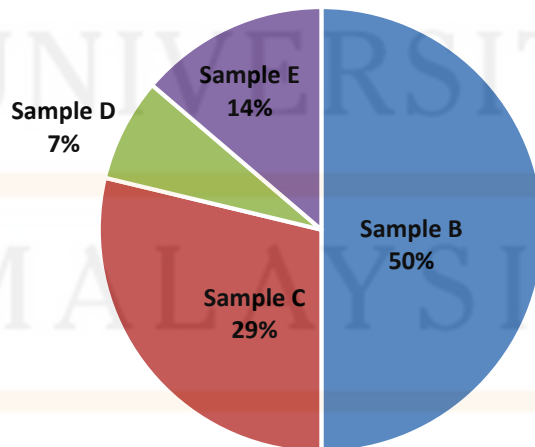


Figure 4.11: Samples that have closest aroma to sample A

Figure 4.12 shows the percentage of the aroma that like the most by the respondents on samples B, C, D and E. There are no significant difference between the sample selection. However, sample C was choose as the most like aroma by the respondents which is 29%. The least favored aroma is 22% of the respondents which is sample D.

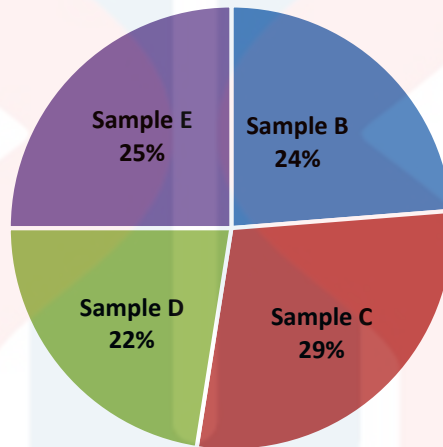


Figure 4.12: Most favored aroma in water sample

Figure 4.13 shows the percentage of the respondents in choosing the most favored colour. 36% of the respondents had chosen sample C as the most attracting colour. Moreover, the least selected colour that favored by the respondents is sample B where the percentage only 19%.

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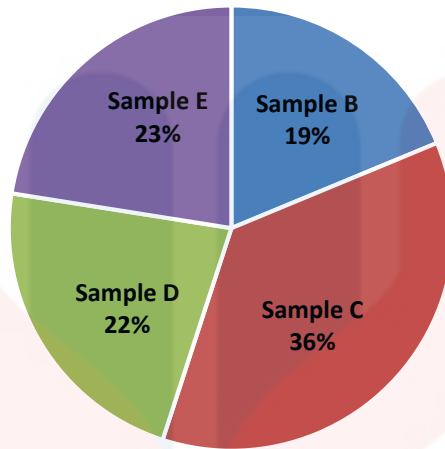


Figure 4.13: Most favored colour of water sample

4.3.4 Part C Background Knowledge On Food Ingredients

Based on Figure 4.14, more than half which 79% of the respondents are familiar with kaffir lime leaves. Meanwhile, the other 21% of the respondents are not familiar or well known with the food ingredient.

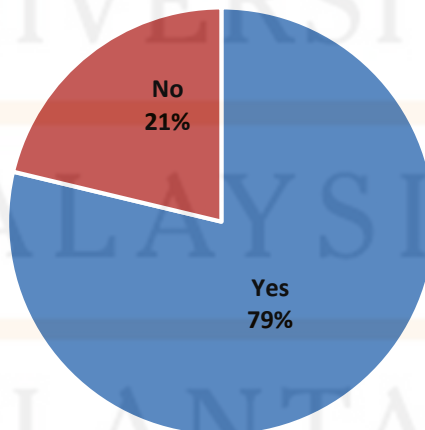


Figure 4.14: Familiar with the food ingredient

Most of the respondents know the purpose of kaffir lime leaves. Majority of the respondents agree that kaffir lime leaves acts as aroma and 41% of the respondents agree on kaffir lime leaves acts as flavor. However, only 4% of the respondents response as kaffir lime leaves acts as colour (Figure 4.15).

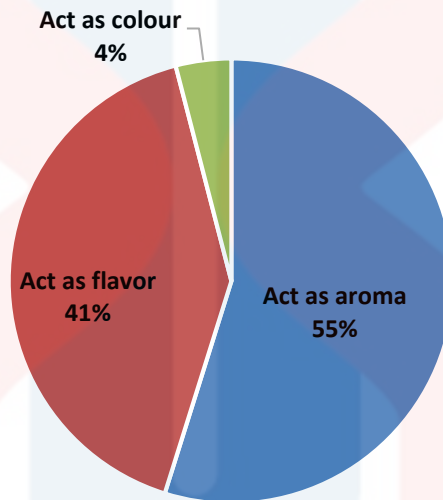


Figure 4.15: Purpose of the food ingredients

There are few places to get the kaffir lime leaves including supermarket, grocery shop and night market. From the options, 47% of the respondents chose supermarket as the place that can get the food ingredients easily. 30% of the respondents choose night market and only 23% choose night market (Figure 4.16).

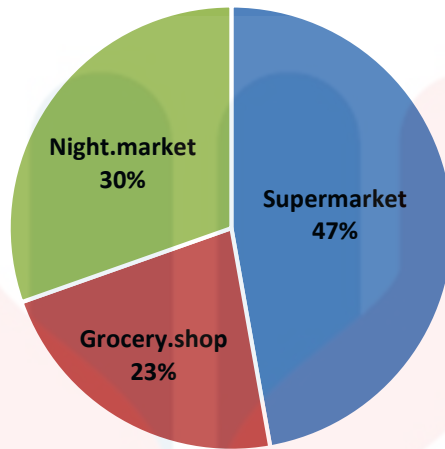


Figure 4.16: Place to get the food ingredients

In Figure 4.17, almost all the respondents (76%) agree that kaffir lime leaves cannot be replaced by other ingredients. However, 24% of the respondents might have another thought on replacing the food ingredients.

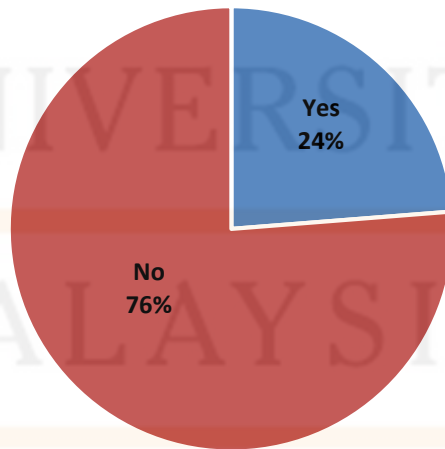


Figure 4.17: Replaced ingredient for kaffir lime leaves

From previous Figure 4.17, indicates the 24% respondents that suggest the kaffir lime leaves can be replaced by other ingredients. Most of the respondents suggest that the kaffir lime leaves can be replaced by lime which is 79%. Adding to that, other respondents suggestion are “asam jawa”, kaffir lime zest, lemon and vinegar (Figure 4.18)

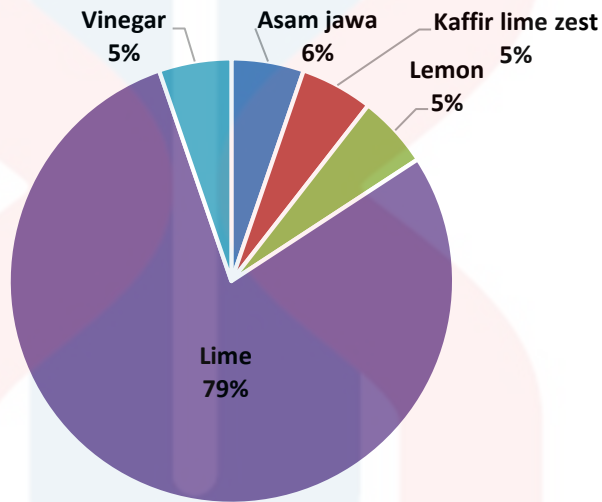


Figure 4.18: Ingredients to replace the food ingredient

4.3.5 Part D Cooking Experience

As food ingredients, there are many method that can be used in order to cook. Based on the data collected in Figure 4.19, 42% of the respondents have the same opinion that the kaffir lime leaves can be cooked by using boil method. On top of that, the options fry and steam are divided into two where each of them are 29%.

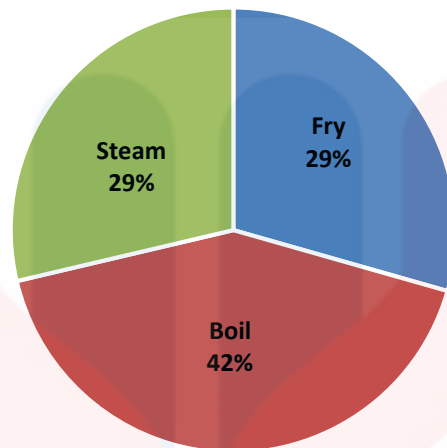


Figure 4.19: Method used for cook the food ingredients

Based on Figure 4.20, 79% of the respondents have been used the food ingredients either by consume it or by cooked. Meanwhile, 21% of the respondents never use the food ingredients.

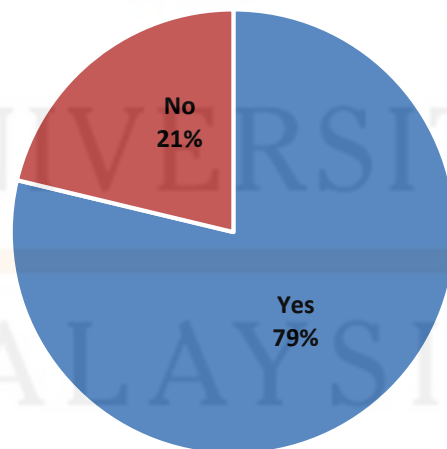


Figure 4.20: Respondents that have used the food ingredients

Figure 4.21 indicates the suggestion taken by the respondents on cuisine or dish that can be made from the food ingredients. Majority of the respondents were suggest “Tomyam” and “Paprik” as the dish that suitable to be made from the food ingredients. Other than that, the respondents also suggested “Asam Pedas” and “Rendang”.

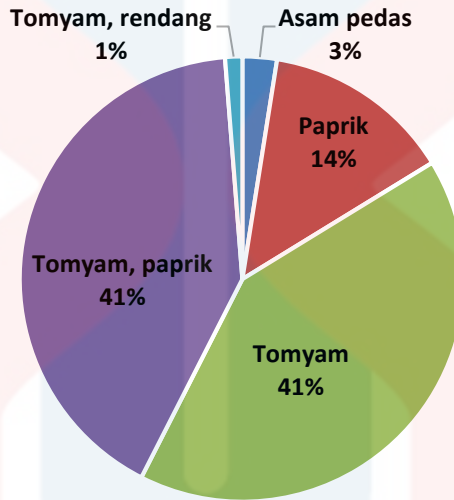


Figure 4.21: Types of dish made from food ingredients

Based on Figure 4.22, there are no significant difference on the handling method of the food ingredients. 52% of the respondents would usually store in fridge before using the food ingredients while 48% of the respondents prefer to use the food ingredients immediately after buy.

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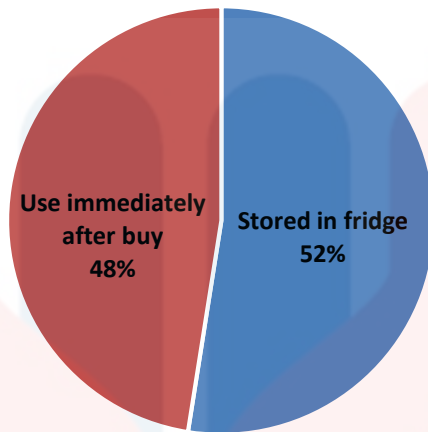


Figure 4.22: Handling method of the food ingredients

4.3.6 Part E Customer Preference

Figure 4.23 shows that more than half of the respondents would buy the dried food ingredients if available in market while 29% of the respondents prefer to not buy the dried product..

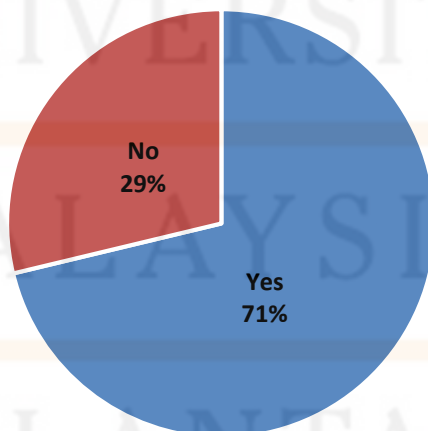


Figure 4.23: Respondent that will buy the sample if available in market

Even if the dried sample have exactly the same aroma with the fresh sample, 70% of the respondent prefer to purchase the dried sample. However, 30% of the respondents prefer to buy the fresh sample more. (Figure 4.24)

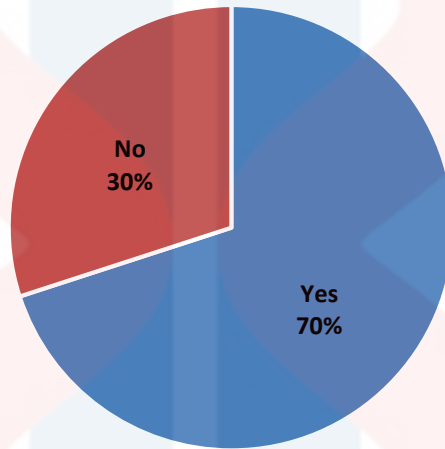


Figure 4.24: Respondents that prefer to purchase if the sample have exactly the same aroma with fresh sample

Based on the Figure 4.25, 51% of the respondents which more than half are not willing to purchase the dried food ingredients if the price is slightly higher. Only 49% of the respondents are willing to purchase the dried food ingredients even in higher price.

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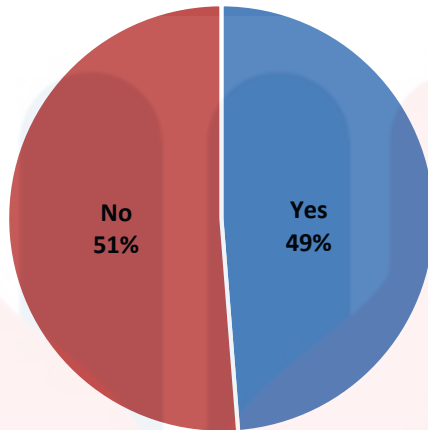


Figure 4.25: Respondents that willing to purchase in higher price

As packaging is important to food in term of protecting the food also in attracting the consumer, there are few suggested packaging by the respondents in Figure 4.26. Half of the respondents suggest sachet as the packaging for the dried food ingredients while 20% suggested paper box. In addition, 17% suggested plastic as packaging and 13% of the respondents suggest glass container.

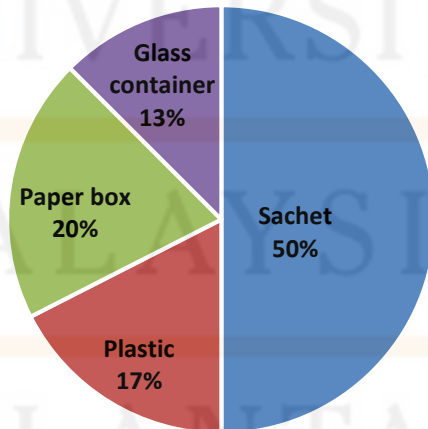


Figure 4.26: Suggested type of packaging for the food ingredient

Last but not least, Figure 4.27 shows the overall data of the respondents on the likeness of the dried sample. Figure 4.27 indicates the hedonic scale in the questionnaire. It can be conclude that majority of the respondents, 36% had chosen intermediate of the scale which is like slightly (5).

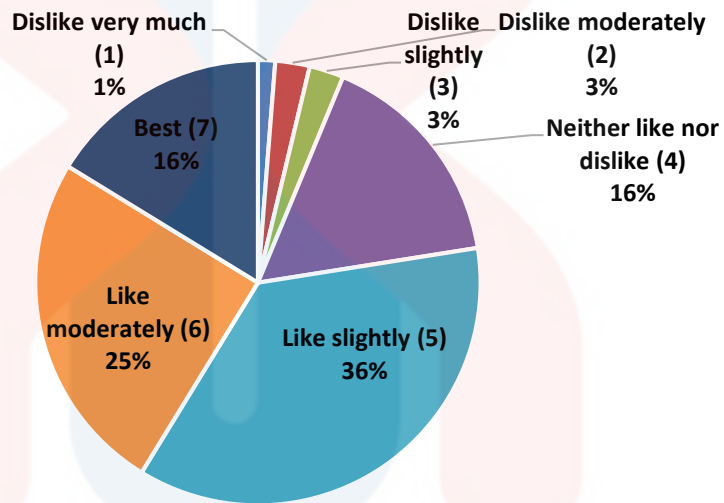


Figure 4.27: The overall acceptance of dried sample by the respondent

CHAPTER 5

DISCUSSION

5.1 Preparation Of Dried Kaffir Lime Leaves

Drying purposes is to keep the residual moisture low enough to prevent product deterioration. For food, the drying method is actually considered as one of the preservation method where the drying method inhibit the growth of bacteria, mold and yeast when the water is being removed. Without the existence of water, the growth of those bacteria can be control and hence the food can be stored longer (Tasirin et al., 2014). Phoungchandang and Srinukroh (2008) have reported that when heat is added to the drying air, the rate of drying increases, depending on the selected drying temperature and air velocity. Based on Table 4.1, the highest total water loss was at the highest temperature which is 70°C and the lowest total water loss was at temperature 40°C. Reeb & Milota, (1999) stated that if the oven temperature is too low, the relative humidity in the oven will not be low enough.

Since there was no pattern to the data percentage of water loss , the only conclusion that can be made is that the oven dry method drives volatile compounds out of samples and therefore cause too high of a moisture content to be calculated. In addition, the uneven initial weight of the sample contribute to the no pattern data. It was observed that weight loss had proportional relationship with temperature (Hihat, Remini, & Madani, 2017). The ambient

air contains moisture and raising its temperature simply lowers its relative humidity causing a lower equilibrium moisture content (Reeb & Milota, 1999). The time taken to observed the data for the dried sample also different depends on the temperature. The total time of drying reduced substantially with the increase of temperature. As in the result, the highest temperature 70°C take the least day which only 2 days to reach constant weight meanwhile the lowest temperature 40°C take long time for the sample to become dry which was 5 days.

This experiment involve leaves which have numerous cells containing chlorophyll, which give the leaves its green color. Chlorophyll is not a very stable compound. It requires sunlight which makes it critical for photosynthesis, and it is responsible for the green in leaves. Temperature has an influence on the leaves colour. At a high temperature, it may cause damage on the colour of the dried leaves. Apart from the temperature, the time taken for the leaves to be dried also involve in the quality colour of the sample. Based on Table 4.2, there are differences on the colour of fresh sample and the sample that had undergo the drying process. The colour of kaffir lime leaves that been dried on 40°C is greenish yellow while for temperature 50°C the colour of the kaffir lime leaves is in green colour. For temperature 60°C and 70°C the colour of kaffir lime leaves are both moss green. However, another factor to be considered is the quality of colour of the kaffir lime leaves itself during purchasing. The condition from the beginning itself gives great impact on the sample colour.

5.2 Questionnaire Analysis

On the first section of the questionnaire which is Part A is consisted of demographic data of the respondents. Demographic data is important since it is a process where to identify or analyse how the wide variety of population can lead to an outcome. In this study, the demographic data represent the personality of the consumer in acceptance of the dried food ingredient product. The questionnaire was being answered by 80 respondents. Figure 4.1 shows, among the respondents more than half of them (65%) were female which are 52 and the remaining is male. Schifferstein, (2006) suggested that gender difference may be due to women focusing more on their senses and the actual sensation they experience, while men may be focusing more on any cognitive information they receive about the product. Next, figure 4.2 shows majority of respondents are in the age of between 15-24 years old which is 93% from the total respondent. Meanwhile for 45 years old and above only had 1 respondent. In certain studies, age has also been found to influence the liking, acceptance, preference, or perception of food.

Michon, O'Sullivan, Sheehan, Delahunty, & Kerry, (2010) did examine the influence of age on food liking and acceptance with age categories ranging from 20-year-olds to over 70-year-olds. Each of their preferences are differently between age groups depends on the youngest participants and participants aged over 60. Since the process of sensory evaluation of the food ingredient sample was conducted around the UMK Jeli campus, most of them consist of students and only few of the respondents are the staff. Majority of the respondents were Malay and only few consisted of Chinese and Indian. Culture of each race can impact in so many different aspects of people including their preferences in consuming food. In

addition, the residency status of the respondents represent their personality on how the respondents experienced the environment. Mostly, people that stay at in city are not open or exposed to any type and further knowledge of the herbs. Hence, the background of respondents were affecting the results.

For Part B in the questionnaire consisted of two sections which involved sensory evaluation and each section represents different samples. The purpose for the sensory analysis to be done before answering further question is to prevent from the respondent become bias toward the food ingredient sample. The first section of Part B represent the dried sample while for the second section is for the water sample of the food ingredient. Sample A is a fresh sample while sample B, C, D and E are the sample that have been dried by using different temperature which were 40°C, 50°C, 60°C and 70°C, respectively. There are different preference of the respondent as consumer on the dried sample and water sample. For the dried sample, the highest choice of the sample that have the strongest aroma was sample D (Figure 4.6) while for water sample the respondent choose sample B as the strongest aroma (Figure 4.10). One of the aim of this research is to keep the food ingredient similar to the fresh sample.

According to Joe Himmelheber, (2017) quality or freshness of product is the top concern of customer satisfaction more than price. For both dried food ingredient sample and water sample, the respondent agreed that sample B has the closest aroma to sample A which means the sample that undergone the lowest temperature 40°C preserve the best aroma that similar to fresh aroma. Based on Figure 4.8 the most favor aroma or sample that the respondent like the most from dried sample where 29% of the respondents choose was sample E. While for second section which is water sample, 29% of the respondents choose sample C as their most like aroma (Figure 4.12). Other than the aroma, the preference also important

where the colour of the sample play role in attracting the respondent. On both sections the respondents agreed on sample C as the most colour of the sample that they like. The first section consist of 38% of the respondent while for the second section 36% of the respondent choose sample B as the colour of the sample that they like the most.

Next, in Part C the questions are more on the background knowledge on food ingredients or the sample species. The purpose of this question is to understand the respondent idea on the food ingredients. It is also important to assess prior knowledge since such information could be used in order to answer the question. Some data from the demographic section are related to the background knowledge on food ingredients. For example, gender and age can be the factor of someone either can get the idea about the food ingredient or not. People in old age might have different experience from the youngster and most of the female are having basic knowledge on food ingredients compared to male. Some researchers attributed this behaviour to the fact that the elderly present a poorer discriminative power compared to younger participants that would there-fore lead to higher liking scores (Michon et al., 2010). The data obtained might be affected.

From Figure 4.14, more than half which is 79% of the respondent are familiar with the food ingredients and most of them definitely sure about the purpose of the food ingredient which act as aroma and as flavor. Based on the respondents opinion, kaffir lime leaves is one of the food ingredients that easily to obtain. Based on Figure 4.16, the highest possibility to get the kaffir lime leaves is at the supermarket and the night market. From the viewpoint of the respondent, 76% of the respondents think that kaffir lime leaves cannot be replaced with other ingredient in cooking. Since kaffir lime leaves has it very distinctive aroma, it is impossible to replace with other ingredient. However, the rest of the respondents (24%) get

an idea to replace kaffir lime leaves with other ingredient such as lemon, kaffir lime zest, vinegar and 'asam jawa' (Figure 4.18).

In addition, Part D is a section that question include the cooking experience. Cooking is actually a skills where from experience they can determine the quality and the usability of certain food ingredients. Respondents that have the experience might evaluate the sensory evaluation without any bias and can evaluate more precise based on their experience. From the result, majority of the respondents agreed that the kaffir lime leaves can be use by using method boil, fry and steam and 79% of the respondents have used the food ingredients either in cooking or by consume it (Figure 4.20). Most of the respondents get the idea on type of dish that can be made from food ingredient. Based on Figure 4.21, the respondents have listed the types of dish that can be made which are paprik, tomyam and rendang. As a person who have the experience on cooking or not, majority of the respondents choose to store the food ingredient in fridge before use it as their handling method. 52% of the respondents choose to store in fridge and the rest 48% choose to use immediately after buying (Figure 4.22).

Last section in the questionnaire is Part E which asking about the customer preference. Customer preference is important since it identifying the customers' needs and preferences which allows to shape the strategies and methods to use in the marketing plan. Voicu, (2008) state that preferences are the result of a long-term relationship between the brand and the consumer. Based on the result outcomes, 71% of the respondents which more than half will buy this sample if available in market. This shows that this sample is highly accepted by the respondents to become a real product. Even though the sample have exactly the same aroma with fresh sample, 70% of the respondents are willing to purchase the sample instead of fresh sample. The level of satisfaction may be influence by various attitudes from internal, external factor (Joshi, 2012).

Since the dried food ingredient are going through some process and will cost in every aspect which cause the price become higher, more than half of the respondents are not willing to purchase the food ingredients even though it will able to be kept in longer time (Figure 4.25). Apart from packaging purpose to protect the product from damage, packaging is as important as the product itself because it's a crucial marketing and communication tool for business. Based on the Figure 4.26, respondents have suggested that if the product available in the market, half of the respondents would like to suggest the food ingredient in a sachet packaging while 20% of the respondents suggested paper box as packaging and the least 13% of the respondent suggest glass container as packaging.

CHAPTER 6

CONCLUSION AND RECOMMENDATION

6.1 Conclusion

It can be conclude that the moisture content in food play major role in determine the food quality. Drying method is the best way in order to preserve the food quality along with prolong the shelf life. Temperature 40°C is the most suitable temperature in producing dried food ingredient as the temperature is not too high so that the aroma does not drives completely.

Nowadays, dried food ingredient are very important to working people who have no time to spend on grocery shopping. Most of the people would stored the groceries in fridge. Thus, dried food ingredient would give benefits to those people. Although fresh food are majority first choices, most of the respondents would purchase the sample if available in market not to mention if the dried sample have exactly the same aroma with the fresh sample. However, unlike previous choices the respondents were not willing to purchase the dried food ingredients in higher price despites

it can be kept in longer time. Last but not least is the most suggested packaging for the dried food ingredients if exist in market is in sachet form. Other than incredibly convenient form of packaging for the consumer, sachet packaging also look as appealing and tempting as possible towards the customers.

6.2 Recommendation

For future research in sample preparation, never include the wet samples together with sample that almost dry inside the oven. Water from the wet samples will evaporate and be picked up by the drier which causing an error in weighing process due to a temporary increase in moisture content. In addition, during the preliminary stage of the experiment it would be nice to equate all the sample weight before going through drying process to prevent any error during data collection. Apart from being convenience, dried food ingredient also can be kept for a long time. First impression is very important for any products. Packaging play the major role in appealing the customer to purchase a product. For dried food ingredient, sachet or paper box would be the best choice to act as packaging. Figure 6.1 show the suggested packaging that suitable for the food ingredients.



Figure 6.1: The packaging for dried food ingredients

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APPENDIX

ANNEX I

QUESTIONNAIRES ON MARKET ACCEPTANCE OF FOOD INGREDIENT

Good day! This survey is dedicated to improve the dried product as raw ingredient. Through this brief survey, your answers will be helpful in enhancing drying product and meeting market needs. Your response will only be used for survey purposes. Thank you very much for your time.

PART A: DEMOGRAPHIC

Instruction: Please (/) only one answer for each question

In this part, demographic data will be collected. The purpose of this section is to identify statistical characteristics of human populations such as gender, race and etc. which used specially to identify markets. The market that are involve here are dry ingredients.

1. Gender

Male

Female

2. Age

15 – 24 years

35 – 44 years

25 - 34 years

45 and above

3. Race

Malay

Indian

Chinese

Others:

4. Please state your residential area

City

Rural

5. What is your current job?

Student

Otherr

Worker

PART B (I): SENSORY EVALUATION**Instruction: Please (/) only one answer for each question**

The aim of this section is to determine the food quality characteristics and analyse the **dried sample** with their senses and answer the question with multiple choices and 7 hedonic scale.

1. Which of the sample have the strongest aroma?

 Sample B Sample D Sample C Sample E

2. Which of the sample have the closest aroma to sample A?

 Sample B Sample D Sample C Sample E

3. Which aroma of the sample that you like the most?

Sample: _____

4. Which colour of the sample that you like the most?

Sample: _____

PART B (II): SENSORY EVALUATION**Instruction: Please (/) only one answer for each question**

The aim of this section is to determine the food quality characteristics and analyse the **water sample** with their senses and answer the question with multiple choices and 7 hedonic scale.

1. Which of the sample have the strongest aroma?

 Sample B Sample D Sample C Sample E

2. Which of the sample have the closest aroma to sample A?

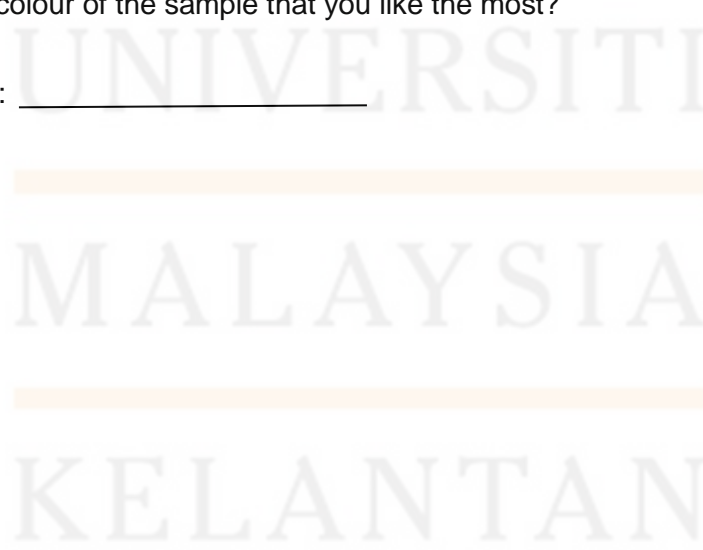
 Sample B Sample D Sample C Sample E

3. Which aroma of the sample that you like the most?

Sample: _____

4. Which colour of the sample that you like the most?

Sample: _____



PART C: BACKGROUND KNOWLEDGE ON FOOD INGREDIENTS**Instruction: You may (/) more than one answer for each question**

For this section, the question will test the evaluator background knowledge of the food ingredients. The objective is to understand the evaluator idea on the food ingredients.

1. Do you familiar with this food ingredient?

Yes No

2. What is purpose of the food ingredient?

Act as aroma

Act as flavor

Act as color

Others:

3. In your opinion, which place you can get the food ingredient easily?

Supermarket

Grocery shop

Night market

4. In your opinion, does the food ingredient can be replaced with other ingredient in cooking?

Yes No

Please state: _____

PART D: COOKING EXPERIENCE

Instruction: You may (/) more than one answer for each question

The question in this part will focus on the cooking experience of the evaluator. Any cooking method like boiling, frying and etc. are the example of cooking experience.

1. What basic cooking method being used for the food ingredient?

Fry

Steam

Boil

Others: _____

2. Have you ever been use the food ingredient?

Yes

No

3. In your opinion, what kind of dish can be made from the food ingredient?

4. Based on your experience, how do you handle the food ingredient?

Stored in fridge

Use immediately after buying

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PART E: CUSTOMER PREFERENCE

Instruction: Please (/) only one answer for each question

The main purpose of this section is to identify evaluator expectations, likes, dislikes, motivations and inclinations that drive customer purchasing decisions. They complement customer needs in explaining customer behaviour that allow marketer to improve the product.

1. If this sample available in market, will you buy it?

Yes

No

2. If the dried sample have exactly the same aroma with the fresh sample, do you prefer to purchase?

Yes

No

3. Are you willing to purchase in higher price if the food ingredient able to be kept in longer time?

Yes

No

4. If this product exist in the market, which type of packaging do you suggest?

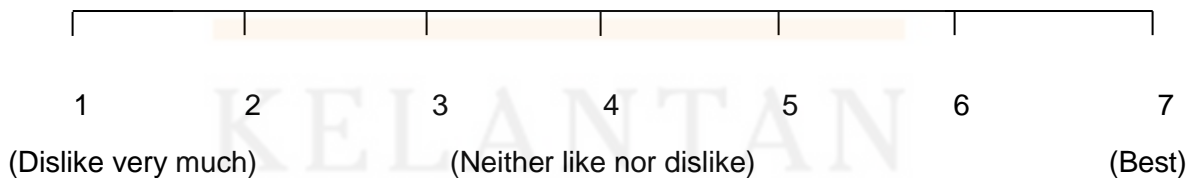
Sachet

Paper box

Plastic

Glass container

5. Overall, how much do you like or dislike this dried food ingredient sample?



ANNEX II

Table A1 : Statistics analysis on sensory evaluation survey questionnaire.

		Gender			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	28	35.0	35.0	35.0
	Female	52	65.0	65.0	100.0
	Total	80	100.0	100.0	

		Age			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	15-24 years old	74	92.5	92.5	92.5
	25-34 years old	5	6.3	6.3	98.8
	45 and above	1	1.3	1.3	100.0
	Total	80	100.0	100.0	

		Race			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Malay	67	83.8	83.8	83.8
	Chinese	7	8.8	8.8	92.5
	Indian	5	6.3	6.3	98.8
	Others	1	1.3	1.3	100.0
	Total	80	100.0	100.0	

		Residential Area			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	City	45	56.3	56.3	56.3
	Rural	35	43.8	43.8	100.0
	Total	80	100.0	100.0	

		Job			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Student	72	90.0	90.0	90.0
	Worker	8	10.0	10.0	100.0
	Total	80	100.0	100.0	

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Sample That Have Strongest Aroma

	Frequency	Percent	Valid Percent	Cumulative Percent
Sample B	22	27.5	27.5	27.5
Sample C	19	23.8	23.8	51.3
Valid Sample D	28	35.0	35.0	86.3
Sample E	11	13.8	13.8	100.0
Total	80	100.0	100.0	

Sample That Have Closest Aroma to Sample A

	Frequency	Percent	Valid Percent	Cumulative Percent
Sample B	37	46.3	46.3	46.3
Sample C	22	27.5	27.5	73.8
Valid Sample D	8	10.0	10.0	83.8
Sample E	13	16.3	16.3	100.0
Total	80	100.0	100.0	

Sample Aroma That Like The Most

	Frequency	Percent	Valid Percent	Cumulative Percent
Sample A	2	2.5	2.5	2.5
Sample B	16	20.0	20.0	22.5
Valid Sample C	22	27.5	27.5	50.0
Sample D	17	21.3	21.3	71.3
Sample E	23	28.8	28.8	100.0
Total	80	100.0	100.0	

Sample Colour That Like The Most

	Frequency	Percent	Valid Percent	Cumulative Percent
Sample A	2	2.5	2.5	2.5
Sample B	23	28.8	28.8	31.3
Valid Sample C	30	37.5	37.5	68.8
Sample D	17	21.3	21.3	90.0
Sample E	8	10.0	10.0	100.0
Total	80	100.0	100.0	

Overall

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dislike very much (1)	1	1.3	1.3	1.3
	Dislike moderately (2)	2	2.5	2.5	3.8
	Dislike slightly (3)	2	2.5	2.5	6.3
	Neither like nor dislike (4)	13	16.3	16.3	22.5
	Like slightly (5)	29	36.3	36.3	58.8
	Like moderately (6)	20	25.0	25.0	83.8
	Best (7)	13	16.3	16.3	100.0
Total		80	100.0	100.0	

Sample That Have Strongest Aroma

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Sample B	27	33.8	33.8	33.8
	Sample C	15	18.8	18.8	52.5
	Sample D	19	23.8	23.8	76.3
	Sample E	19	23.8	23.8	100.0
	Total	80	100.0	100.0	

Sample That Have Closest Aroma to Sample A

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Sample B	40	50.0	50.0	50.0
	Sample C	23	28.8	28.8	78.8
	Sample D	6	7.5	7.5	86.3
	Sample E	11	13.8	13.8	100.0
	Total	80	100.0	100.0	

Sample Aroma That Like The Most

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Sample B	19	23.8	23.8	23.8
	Sample C	23	28.8	28.8	52.5
	Sample D	18	22.5	22.5	75.0
	Sample E	20	25.0	25.0	100.0
	Total	80	100.0	100.0	

Sample Colour That Like The Most

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Sample B	15	18.8	18.8	18.8
	Sample C	29	36.3	36.3	55.0
	Sample D	18	22.5	22.5	77.5
	Sample E	18	22.5	22.5	100.0
	Total	80	100.0	100.0	

Familiar With The Food Ingredient

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	63	78.8	78.8	78.8
	No	17	21.3	21.3	100.0
	Total	80	100.0	100.0	

\$purpose Frequencies

		Responses		Percent of Cases
		N	Percent	
Purpose of The Food Ingredient ^a	Act.as.aroma	68	54.8%	85.0%
	Act.as.flavor	51	41.1%	63.8%
	Act.as.colour	5	4.0%	6.3%
Total		124	100.0%	155.0%

\$to.get Frequencies

		Responses		Percent of Cases
		N	Percent	
Where To Get The Food Ingredient ^a	Supermarket	59	47.2%	74.7%
	Grocery.shop	28	22.4%	35.4%
	Night.market	38	30.4%	48.1%
Total		125	100.0%	158.2%

a. Dichotomy group tabulated at value 1.

Does The Food Ingredient Can be Replaced With Other Ingredient In Cooking

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	19	23.8	23.8	23.8
	No	61	76.3	76.3	100.0
	Total	80	100.0	100.0	

State

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		61	76.3	76.3	76.3
	Asam jawa	1	1.3	1.3	77.5
	Kaffir lime zest	1	1.3	1.3	78.8
	Lemon	1	1.3	1.3	80.0
	Lime	15	18.8	18.8	98.8
	Vinegar	1	1.3	1.3	100.0
	Total	80	100.0	100.0	

\$Method Frequencies

		Responses		Percent of Cases
		N	Percent	
Cooking Method Use For Food Ingredient ^a	Fry	40	29.4%	50.0%
	Boil	57	41.9%	71.3%
	Steam	39	28.7%	48.8%
Total		136	100.0%	170.0%

a. Dichotomy group tabulated at value 1.

Have Ever Been Use The Food Ingredient

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	63	78.8	78.8	78.8
	No	17	21.3	21.3	100.0
	Total	80	100.0	100.0	

Kind of Dish That Can be Made From Food Ingredient

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Asam pedas	2	2.5	2.5	2.5
	Paprik	11	13.8	13.8	16.3
	Tomyam	33	41.3	41.3	57.5
	Tomyam, paprik	33	41.3	41.3	98.8
	Tomyam, rendang	1	1.3	1.3	100.0
	Total	80	100.0	100.0	

Handling Method of the Food Ingredient

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stored in fridge	42	52.5	52.5	52.5
	Use immediatly after buy	38	47.5	47.5	100.0
	Total	80	100.0	100.0	

Will Buy If Available In Market

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	57	71.3	71.3	71.3
	No	23	28.8	28.8	100.0
	Total	80	100.0	100.0	

Do Prefer To Purchase If Have Exactly The Same Aroma With Fresh Sample

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	56	70.0	70.0	70.0
	No	24	30.0	30.0	100.0
	Total	80	100.0	100.0	

Willing To Purchase In Higher Price

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	39	48.8	48.8	48.8
	No	41	51.3	51.3	100.0
	Total	80	100.0	100.0	

Suggested Type of Packaging

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Sachet	40	50.0	50.0	50.0
	Plastic	14	17.5	17.5	67.5
	Paper box	16	20.0	20.0	87.5
	Glass container	10	12.5	12.5	100.0
	Total	80	100.0	100.0	