

Malaysian-Made Kimchi (FRUV)

Wan Nurhayati Wan Hanafi^{1,*}, Wan Rozianoor Mohd Hassan², Zurianti Abd Rahman³, Umi Marshida Abd Hamid⁴, Rohana Mat Nor⁵ and Roziah Kambol⁶

¹ Universiti Teknologi MARA; wannurhayati@uitm.edu.my;  <https://orcid.org/0000-0002-8021-6308>

² Universiti Teknologi MARA; rozianoor@uitm.edu.my;  <https://orcid.org/0000-0003-0192-2050>

³ Universiti Teknologi MARA; zuria769@uitm.edu.my;  <https://orcid.org/0000-0002-3928-3912>

⁴ Universiti Teknologi MARA; marshida@uitm.edu.my;  <https://orcid.org/0000-0002-3659-8388>

⁵ Universiti Teknologi MARA; rohana_micro@uitm.edu.my;  <https://orcid.org/0000-0002-1141-0086>

⁶ Universiti Teknologi MARA; roziah1259@uitm.edu.my;  <https://orcid.org/0000-0002-6750-4137>

* Correspondence: wannurhayati@uitm.edu.my; 60123635884

Abstract: Kimchi is one of the most popular Korean home-made preserved foods. Nowadays, not only is kimchi popular in Korea, it is also known world-wide. We present herein a range of Malaysianised kimchi using our very own local produce such as bilimbi, guava, winged bean and pennywort. Special attention has been given to bilimbi as it is seldom eaten raw because of its high acidity. Thus, bilimbi fruits often go to waste. Processing the food plants into kimchi is a better option for preserving the food. Given the extended shelf life, people can consume them anytime and store the product between uses. Besides can be used directly, kimchi serves as a multi-purpose whether as a side dish or a paste in cooking. Hence, Malaysia-made kimchi fruit-vegetables-based gives added value not only to bilimbi but also to other local produce. Moreover, the increased intake of fruits and vegetables in diet can boost one's nutrition and health and prevent diseases.

Keywords: preservation; kimchi; bilimbi; guava; winged bean; pennywort.



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1. INTRODUCTION

Malaysia is a blessed land with a tropical climate year-round which allows food plants to grow. However certain plants have short shelf life and are difficult to obtain due to seasonal, pathogenic microbes and other environmental reasons (Muhammad Handayani et al 2017). Therefore, preservation is needed to maintain food quality at the desired level (Amit et al., 2017) and to meet the increasing demands for food and modern consumers (Lan & Hassan, nd). The fruit and vegetables used in this work (bilimbi, guava, winged bean and pennywort) are categorised under the semi-perishable food items which can be preserved for about 6 months under proper storage conditions (Sadat Kamal Amit et al 2017). Since fruits and vegetables are full of nutrients for good health, the preservative of these foods is essential to maximize their benefit to the human body. The shelf life of perishable food can be improved by fermentation (Swain et al., 2014), a widely used food preservation method in households, small-scale food industries as well as in large enterprises (Law et al., 2011).

One of the common fermented foods is kimchi, a term used for a group of salted and fermented vegetables. In kimchi, the vegetables are fermented naturally whereby the microorganisms are present naturally in the raw food or processing environment (Dimidi et al., 2019). A number of bacteria are involved in the fermentation of kimchi, with lactic acid bacteria (LAB) being the dominant species in

the fermentation process (Patra et al., 2016). The quality of kimchi in terms of its flavor and taste depends on the change of bacterial population during kimchi fermentation where the metabolite processing by the bacteria performing the fermentation affects the kimchi properties (Sera Jung et al 2019).

Despite the short shelf life and availability, these fruits and vegetables are highly nutritious for consumption. These include our local produce such as bilimbi, guava, winged bean and pennywort. Bilimbi or locally known as “belimbing besi” has been reported for the treatment of scurvy, bilious colic, whooping cough, hypertension, obesity, and diabetes (Alhassan & Ahmed, 2016). Guava, on the other hand, is remarkable with antioxidant properties (Sarkar, 2018). Winged bean plant is appreciated for their high nutrients composition, especially with respect to proteins, vitamins and minerals including calcium, iron, phosphorous, potassium, sulfur, sodium, magnesium, zinc, manganese, boron, barium, copper, chromium and strontium (Bassal et al., 2020). Pennywort or commonly known as *Centella asiatica* had been used widely in indian and chinese medicine for its wound healing actions. The herb is recommended for the treatment of various skin conditions such as leprosy, lupus, varicose ulcers, eczema, psoriasis, diarrhoea, fever, amenorrhea, diseases of the female genitourinary tract and also for relieving anxiety and improving cognition (Gohil et al, 2010).

This paper is aimed to investigate the potential use of selected Malaysian vegetables and fruits (bilimbi, winged beans, guava, pennywort) in the production of Malaysian-made kimchi and recommend their application as side dish as well as condiments for easy yet healthy cooking.

2. METHOD & MATERIAL

Bilimbi, guava, winged bean and pennywort (Figure 1) at commercial maturity were processed and fermented with homemade kimchi paste for at least 5 days of maturation. Special attention has been given to bilimbi where both fresh and overripe were used as it is seldom eaten raw because of its high acidity.



Figure 1. Fruits and vegetables used for kimchi [a] Bilimbi [b] Guava [c] Winged bean and [d] pennywort (Source: Authors)

3. FINDINGS

3.1 Taste, texture and appearance

Malaysian-made kimchi (FruV) with umami taste was developed after a week of fermentation (Figure 2). Interestingly, the crunchiness of the fruits and vegetables is preserved.



Figure 2. Malaysian-made kimchi (FruV) [a] Kimchi bilimbi [b] Kimchi guava [c] Kimchi winged bean [d] Kimchi pennywort

Figure 3 shows the evaluation of FruV's taste, texture and appearance. Most respondents were very satisfied with the taste and texture of the FruV. All 20 respondents were very satisfied with the taste and texture and 15 respondents (75%) were satisfied with the appearance of FruV. However, there were 2 respondents (10%) who were not satisfied with the taste. The respondents commented that the taste of certain vegetables was not completely infused with the kimchi as the kimchi taste is stronger than the vegetables itself and appeared to be more prominent as compared to the vegetable or fruit taste collectively.

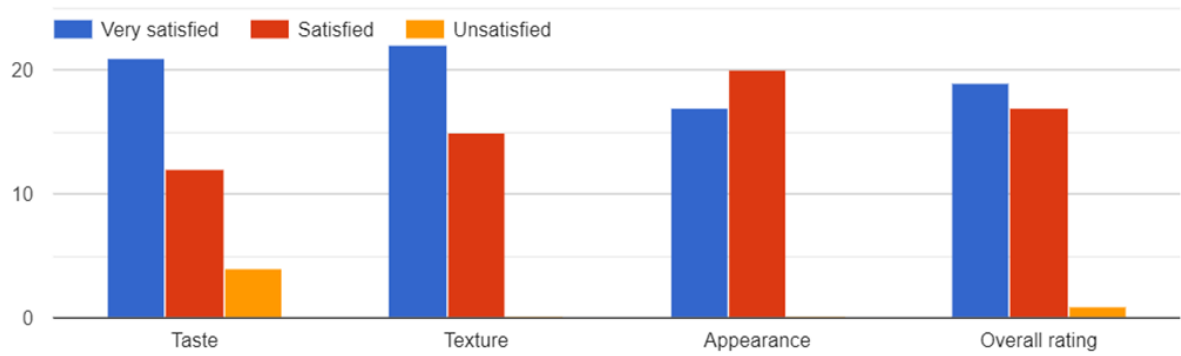


Figure 3. Evaluation of FruV's taste, texture and appearance

3.2 Cooking suggestion

Besides being eaten directly like pickles, FruV's serve as multi-purpose condiments that can be used as a side dish (Figure 4) or in cooking. Figure 4 shows the FruV served as a paste in cooking seafood fried rice. The taste of spiciness and sourness of FruV mixed very well resulting in the flavourful seafood fried rice. Other suggested dishes using FruV are as a sauce for grilled fish or chicken (Figure 5). The sourness in FruV reduces the fishy taste in the grilled fish and results in tasty grilled FruV fish.



Figure 4. Kimchi winged bean fried rice recipe [a] Stir fry squid until cooked [b] Add in Kimchi winged bean [c] Pour in rice, seasoning and stir well [d] Serve on a plate (Source: Authors)



Figure 5. FruV bilimbi as sauce for grilled fish [a] Clean fish thoroughly and wipe off excess moisture with kitchen towel, [b] marinate fish with Kimchi bilimbi for 4 hours, [c] set the induction cooker at 80°C and grill for about 30 minutes, [d] serve on a plate (Source: Authors).

4. DISCUSSION

Malaysian-made kimchi (FruV) presented local produce such as bilimbi, guava, winged bean and pennywort. The taste, texture and appearance of these local produce were well preserved via the fermentation process. These are supported by the evaluation of the respondents on FruV (refer Figure 3). Besides being able to preserve bilimbi and guava from being soggy, fermentation is also able to preserve the texture of winged bean and pennywort. Fermentation indeed can maintain the nutritional value, texture and flavour (Blackburn, 2006) of food. In addition, the umami taste is also developed one week after the fermentation process indicating the success of the kimchi preparation process.

The vegetables selected for this project were hardly found all year round and this method of preservation by transforming them into kimchi had increased their shelf life and nutritional value as well as minimising the local produce wastage. Kimchi, at the same time, is seen as one of the solutions in promoting a healthy culture of eating vegetables among Malaysians when currently more than 95% of Malaysians did not consume enough vegetables for their diet (Bernama, 2022). Taken together, kimchi as a popular fermentation food is important to minimise pathogenic bacteria (Alzamora et al., 2016) as to keep food at its best quality (Muhammad Handayani et al., 2017).

5. CONCLUSION

As a conclusion, FruV preserved fruits and vegetables as kimchi would keep food at its best quality thus minimising wastage and increasing their functional food properties. On top of that, it has potential use as side dish and condiments for easy yet healthy cooking.

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