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Organoleptic acceptability and nutritional properties of the sweetpotato-based traditional cakes produced using sweetpotato flour

(Penerimaan organoleptik dan nilai pemakanan kuih tradisional berasaskan keledek yang disediakan menggunakan tepung keledek)

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Key words: sweetpotato, sweetpotato flour, traditional cakes, acceptability, nutritional properties

Abstract

Sweetpotato is a supplemental food and consumed in various ways such as boiled, fried, baked or steamed with or without additional ingredients. The use of sweetpotato as the main ingredient in making delicious traditional cakes or local desserts and puddings are quite popular in Malaysia. Several sweetpotato varieties were used in the production of sweetpotato flour to make sweetpotato-based traditional cakes as to promote demand for convenience products. The flour has a very good shelf life due to its low moisture content. The percentage recovery of flour ranged from 20–30% based on the fresh unpeeled tubers and depends on the varieties of sweetpotato and the sizes of the tubers. The sweetpotato flour was used in the preparation of nine locally accepted sweetpotato-based traditional cakes premixes. The traditional cakes, produced using sweetpotato flour as a substitute to fresh sweetpotato tubers, were highly acceptable. There was no significant difference between products developed using sweetpotato flour and fresh sweetpotato in terms of organoleptic quality.

Introduction

Sweetpotato *(Ipomea batatas)* is widely grown throughout the tropics and warm temperate regions of the world. In Malaysia, it ranks second among the tuber crops next to cassava and has been cultivated on a small scale since the 17th century. It provides a tasty and nutritious food for people in many parts of the world and was consumed as an alternative or supplement to rice during the Japanese occupation.

The tubers are grown mainly as cash crop or subsistence crop, in small farms or home gardens for home consumption or for fresh food market. Sweetpotato is a supplemental food and consumed in various ways such as boiled, fried, baked or steamed with or without additional ingredients. Sweetpotato can be processed into flour which is used in the production of cakes, muffins, cookies and noodles (Salma and Siti Meriam 2004), extruded snacks (Lee and Hamidah 1997) and chiffon cakes (Amante 1994). Sweetpotato flour is a substantial source of vitamin C and contains moderate amounts of thiamine, riboflavine and niacin (Woolfe 1992).

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Wheat is the main flour traded in the world. In Malaysia, wheat is an imported commodity valued at RM33,851,329 per year. As sweetpotato is grown locally, research was carried out to produce sweetpotato flour and to use it in sweetpotato-based traditional cakes.

The use of sweetpotato as a main ingredient in making local cakes or desserts such as *kuih kacau keledek, bingka keledek, kuih keria, cek mek molek, onde-onde keledek, kuih lopes keledek* and pudding is quite popular in Malaysia. These traditional cakes are processed and sold daily because of their short shelf life. As the preparation of such products are labour intensive, sweetpotato-based traditional cakes (SPBTC) premixes, using sweetpotato flour as a substitute for fresh sweetpotato, were produced. The traditional cakes premixes are in ready-to-cook form, very convenient and have comparatively longer shelf life than those cakes prepared traditionally using fresh sweetpotato. The traditional cakes prepared using these flour premixes have their own unique taste and flavour, and are comparable to those prepared traditionally using fresh sweetpotato.

The main objective of the study was to evaluate the organoleptic acceptability of the SPBTC produced using SPBTC premixes. The study was also intended to determine the nutritional properties of sweetpotato flour and SPBTC premix. This paper reports on the sweetpotato flour production, its nutritional properties and the acceptability of nine sweetpotato-based traditional cakes using sweetpotato flour and their proximate composition.

Materials and methods

Production of sweetpotato flour

Sweetpotato varieties such as Batang Merah, Cameron, Gendut, Jepun, Kapar Muar, Mahsuri, Senduduk Kulit Merah, Senduduk Kulit Putih and Sg. Baging 3, obtained from plantation in Tumpat and Bachok (Kelantan), were used in the production of sweetpotato flour. The tubers were peeled after washing with water to remove adhering mud and dirt. Peeled tubers were cut into strips of approximately 0.5 cm thickness along the length of the tuber using an automatic slicer (IMURA, Japan) before being soaked in 0.2% sodium metabisulphite solution for 30 min. The strips were then hot water blanched for 1 min and dried in the cabinet dehydrator at 60 °C until final moisture content of not greater than 7% was achieved. The dried strips were ground into fine flour using Super Muscolloider grinder (Japan) with grinding stone, E 10-16 and a speed of 2,000 rpm, sieved through 300 µm mesh, packed in paper/AL/PE bags and stored at ambient temperature until analysed or being used in the preparation of SPBTC premixes. The recovery of flour was determined in duplicate on two batches of samples.

Preparation of sweetpotato-based traditional cakes premixes

Premixes of nine sweetpotato-based traditional cakes such as *cek mek molek, onde-onde, kuih kacau, kuih lopes, kuih keria, kuih lapis, bingka,* sweetpotato pudding and *seri muka* were prepared as shown in *Figure 1*.

Sweetpotato flour and wheat flour or tapioca flour were first mixed and sieved to produce uniform flour mixture before they were mixed with other ingredients according to the accepted formulations as shown in *Table 1*. These premix formulations were established in earlier preliminary work. They were formulated to closely resemble the traditionally prepared SPBTC using fresh sweetpotato. The premixes were then sieved through a 300 µm mesh, packed according to the determined weight of each type of SPBTC in either paper/AL/PE or high density PE and repacked in a box as a secondary packaging and ready to be further processed into traditional cakes.

Chemical analysis and sensory evaluation

The sweetpotato flour and the premixes were evaluated for moisture, protein, crude

fibre, fat, ash, carbohydrate and energy. Sweetpotato flour was also evaluated for retinol, ß-carotene, vitamins A, B1 (thiamine), B2 (riboflavin), C, calcium, phosphorous, iron, sodium and potassium. Percentage moisture, protein, fat, ash, calcium, phosphorous, iron, sodium and potassium were determined in duplicate for each sample using standard analytical procedures with reference to the methods of AOAC (AOAC 1990). Crude fibre was determined using Tecator (1978) method while retinol, ß-carotene, vitamins B1, B2 and E by Tee et al. (1996) methods. Vitamin C was determined by FAO (1986) method. Carbohydrate content was determined by means of difference, whereas energy values were calculated from protein, fat and carbohydrate results by multiplying the values by Atwater's factors 4, 9 and 4 respectively.

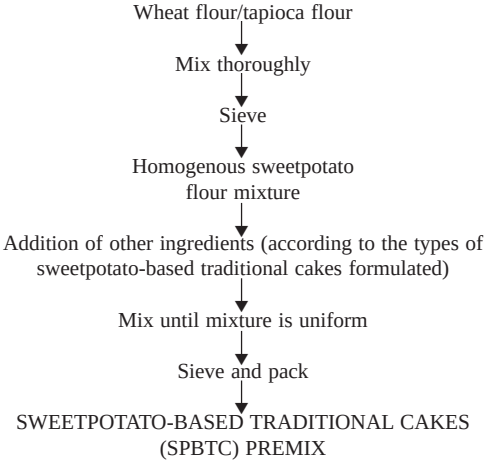

Figure 1. Processing of sweetpotato-based traditional cakes premix

Finally, the prepared sweetpotato-based traditional cakes (*cek mek molek, onde-onde, kuih kacau, kuih lopes, kuih keria, kuih lapis, bingka, seri muka* and pudding) processed by blending the premixes with various ingredients as listed in *Table* 2, were subjected to organoleptic evaluation by 20 taste panellists. The processing methods were established in earlier preliminary work. The organoleptic evaluation was carried out to assess the preference and acceptability of the prepared traditional cakes. The traditionally prepared SPBTC using fresh sweetpotato were used as comparison. A nine point hedonic scale ranging from 1 (dislike extremely) to 9 (like extremely) was used and the data collected were statistically analysed by analysis of variance (Larmond 1977).

Results and discussion

Sweetpotato flour

The processing of sweetpotato flour and the SPBTC premixes was carried out under constant condition using the developed formulation and procedure. This was to ensure that any differences in flour and the premixes, other than that due to the characteristics of the tubers, were minimized. Tubers were immediately washed and processed on arrival to retain food flavour and colour. The sweetpotato flour developed its own sweetpotato flavour and colour depending on the variety of the tubers.

The quality of sweetpotato flour was determined by its colour, flavour, texture and the nutritional composition (*Tables 3*

Table 1. Standard formulation of 9 sweetpotato-based traditional cakes premixes

	Cek mek molek	*Onde-onde*	*Kuih kacau*	*Kuih lopes*	*Kuih keria*	*Kuih lapis*	*Bingka*	*Seri muka*		Pudding
								Body	Topping	
Sweetpotato flour (%)	71.43	75	52.76	75	76.92	20.9	36.6	52.92	–	65.28
Wheat flour (%)	28.57	–	8.44	–	11.19	1.04	18.28	–	–	–
Tapioca flour (%)	–	25	–	25	–	33.4	–	26.46	15.2	–
Coconut milk powder (%)	–	–	12.94	–	10.49	12.52	10.97	15.87	20.68	–
Sugar (%)	–	–	25.82	–	–	31.31	32.91	2.64	62.06	34.35
Seasonings (%)	–	–	0.04	–	1.4	0.83	1.24	2.11	2.06	0.37

Table 2. Utilisation of the sweetpotato-based traditional cakes premixes

Sweetpotato-based traditional cakes	Premix flour	Additional ingredients	Cooking method
Cek mek molek	*Cek mek molek* premix (280 g/pack)	Margarine, water, sugar (fillings)	Fry at 180 °C until golden brown
Onde-onde	*Onde-onde* premix (200 g/pack)	Gula melaka (fillings), coconut (coatings), salt, water	Cook in boiling water until float to the surface
Kuih kacau	*Kuih kacau* premix (380 g/pack)	Margarine, egg, water	Cook under direct heat until it turns into a cooked mass
Kuih lopes	*Kuih lopes* premix (200 g/pack)	Coconut (coatings), salt, water, brown sugar syrup	Cook in boiling water until float to the surface
Kuih keria	*Kuih keria* premix (130 g/pack)	Water, sugar (coatings)	Fry at 180 °C until golden brown
Kuih lapis	*Kuih lapis* premix (480 g/pack)	Water	Steam for 30 min
Kuih bingka	*Kuih bingka* premix (480 g/pack)	Water, egg	Bake at 180 °C for 30 min
Seri muka	*Seri muka* premix (440 g/pack)	Water	Steam for 90 min
Pudding	Pudding premix (295 g/pack)	Water, butter, egg	Steam for 40 min

Table 3. Proximate composition of sweetpotato flour from several varieties

Variety	Moisture (%)	Protein (%)	Fat (%)	Ash (%)	Crude fibre (%)	Carbohydrate (%)	Energy (Kcal/100 g)
Batang Merah	5.3	3.2	1.1	2.2	3.5	84.7	362.0
Cameron	5.7	3.7	1.0	0.7	3.4	85.5	366.0
Gendut	5.1	3.2	0.8	2.0	3.0	85.9	364.0
Jepun	5.0	2.5	1.1	2.0	2.8	86.6	366.0
Kapar Muar	6.9	4.4	0.4	0.3	2.7	85.3	354.0
Mahsuri	6.2	4.2	2.4	2.7	3.7	80.8	361.0
Senduduk Kulit Merah	3.4	3.2	0.5	2.0	2.3	88.6	372.0
Senduduk Kulit Putih	5.0	1.3	0.7	1.9	2.5	88.6	366.0
Sungai Baging 3	4.3	3.4	0.8	2.6	2.8	86.1	365.0
Wheat flour*	345.0	12.5	13.1	1.6	69.6	2.0	1.2
Rice flour*	372.0	7.9	6	1.0	84.7	0	0.4
Corn flour*	355.0	12.0	0.5	1.4	85.0	0	1.1

*Source: Tee et al. (1997)

and *4*). These are affected by freshness, varieties of the sweetpotato tubers as well as processing operations especially sulphiting and blanching. Blanching resulted in brighter colour flour due to the inactivation of the oxidative enzyme. Sulphiting process helps in stabilizing the colour of sweetpotato flour.

One of the main problems in the processing of sweetpotato flour is the discolouration of the product. This could probably be due to polyphenols, polyphenol oxidase or iron ion (III) present in the tubers

Table 4. Vitamin and mineral composition of sweetpotato flour from several varieties (per 100 g of sweetpotato flour)

Variety	Retinol (µg)	ß-carotene (µg)	Vit. A (µgRE)	Thiamine (mg)	Riboflavine (mg)	Vit. C (mg)	Ca (mg)	P (mg)	Fe (mg)	Na (mg)	K (mg)
Batang Merah	435	15	438	0.02	0.14	40.1	51	154	19.3	51	443
Cameron	521	118	541	na	na	17.8	na	na	na	na	na
Gendut	6	16	9	0.04	0.04	34.9	53	127	3.3	842	341
Jepun	3	1	3	0.14	0.12	37.5	41	169	14.6	112	688
Kapar Muar	66	0	66	na	na	10.7	na	na	na	na	na
Mahsuri	182	0	182	na	na	36.2	na	na	na	na	na
Senduduk Kulit Merah	1	0	1	0.06	0.06	9.6	39	130	10.1	62	666
Senduduk Kulit Putih	5	6	6	0.14	0.08	4.4	27	131	4.7	54	641
Sungai Baging 3	7	19	10	0.03	0.1	37.9	33	148	9.4	40	733
Wheat flour*	0	0	0	0.24	0.05	0	92	245	2.1	6	45
Rice flour*	0	0	0	0.01	0.01	0	36	13	10	3	34
Corn flour*	0	0	0	0.06	0.02	2.4	15	155	1.4	11	24

*Source: Tee et al. (1997)

Table 5. Percentage recovery of sweetpotato flour

Sweetpotato variety	Recovery of flour (%)
Batang Merah	30
Cameron	21
Gendut	19
Jepun	24
Kapar Muar	3
Mahsuri	6
Senduduk Kulit Merah	27
Senduduk Kulit Putih	24
Sungai Baging 3	25

and peel rags. It can be overcome by imposing the sulphiting and blanching process to the fresh sweetpotato strips prior to drying. However, discolouration and off-flavour are also developed during storage if improper packaging materials are used for packing. This is due to the rapid oxidation of carotenoids and unsaturated fatty acids present in the flour (Walter and Purcell 1974). To avoid this, the flour should be packed in packaging materials such as paper/AL/PE which exclude oxygen as well as moisture.

The moisture of the flour must be below 11% to prevent spoilage due to microbial activity. According to Hanson (1974), when the moisture content exceeds 11%, there will be growth of mould and bacteria on the product. The percentage recovery of sweetpotato flour ranged from 20–30% based on the unpeeled fresh tubers. The recovery varied with varieties and sizes of tubers *(Table 5)*. The percentage recovery of sweetpotato flour is higher than pumpkin flour (Zainun and Zahara 1996) and banana powder (Zainun 1992). This is due to the high carbohydrate content of sweetpotato.

Proximate analysis of the sweetpotato flour showed that the major component was total carbohydrate *(Table 3)*. This is due to the fact that starch is the major constituent of sweetpotato. The flour was fairly dry because a large amount of moisture was removed from the sweetpotato strips during drying.

Sweetpotato flour has low protein content. The protein content for the

sweetpotato varieties ranged from 2.5–4.4% and is lower than the wheat flour and rice flour. Protein, though proportionately low in sweetpotato flour, is still a very important factor in judging the overall nutritive value of the SPBTC premixes.

Vitamin A content in sweetpotato is related to the flesh colour of the tubers. Sweetpotato with orange flesh contained higher vitamin A as shown by Batang Merah and Cameron varieties with the values of 438 and 541 µg RE respectively *(Table 4)*. Senduduk Kulit Putih which is purple flesh, is high in vitamin E (Salma and Hamidah 2000). The vitamin C content of all sweetpotato varieties studied was higher than wheat flour, rice flour or corn flour ranging from 4.4–40.1 mg/100 g flour. It also has a reasonable amount of vitamin B compared to other flour. The potassium content is very high ranging from 341–733 mg/100 g flour compared to wheat flour, rice flour and corn flour. The most suitable variety for the production of sweetpotato flour in terms of colour, flavour and taste was Batang Merah *(Table 6)*. It was more suited for flour production for SPBTC due to its attractive colour, strong sweetpotato flavour and taste, and high recovery rate. The other varieties were also suitable for flour production but the flavour and taste were not as strong as Batang Merah variety.

From the results obtained, it can be seen that sweetpotato flour has more to offer than wheat flour in terms of nutritive value as far as vitamins and minerals are concerned. According to Woolfe (1992), among the mineral elements present, potassium is in greatest proportion, while iron, copper, manganese, sulphur and chlorine are always present. SPBTC premixes will be more nutritive compared to wheat flour because sweetpotato flour is used in the formulation.

Sweetpotato-based traditional cakes (SPBTC) premixes

Sweetpotato from all varieties can be used in producing SPBTC premixes with slight modification to the formulation especially ratio of SPBTC premixes and the amount of water added during the preparation of cakes. The pale coloured sweetpotato flour may need addition of colourings of food grade to make it more attractive. The sweetpotato flour developed has a strong sweetpotato flavour and taste as well as an attractive orange colour. This is very useful in controlling colour, flavour, taste and aroma in foods especially baked products. The reaction that takes place between protein in the flour and reducing sugar will produce desirable colour, flavour and aroma in foods.

Table 6. Mean scores for colour, flavour and taste of 2 types of sweetpotato-based traditional cakes prepared using sweetpotato flour from several sweetpotato varieties

Sweetpotato variety	Colour		Flavour		Taste	
	Onde-onde	*Cek mek molek*	*Onde-onde*	*Cek mek molek*	*Onde-onde*	*Cek mek molek*
Batang Merah	8.0a	8.2a	7.9a	7.8a	7.9a	7.8a
Cameron	8.0a	8.1a	7.6a	7.6a	7.6a	7.5a
Gendut	7.7a	7.8a	7.7a	7.6a	7.7a	7.4a
Jepun	7.7a	7.8a	7.5a	7.3a	7.5a	7.4a
Kapar Muar	7.7a	7.8a	7.5a	7.4a	7.5a	7.4a
Mahsuri	8.0a	8.1a	7.5a	7.5a	7.5a	7.3a
Senduduk Kulit Merah	7.2b	7.3b	7.8a	7.7a	7.8a	7.6a
Senduduk Kulit Putih	7.2b	7.4b	7.8a	7.7a	7.8a	7.7a
Sungai Baging 3	7.7a	7.6b	7.5a	7.6a	7.8a	7.6a

Means in the same row with the same letter are not significantly different ($p < 0.05$)

The moisture content of SPBTC premixes was slightly lower than the sweetpotato flour except for *kuih kacau* mix and they were within desirable level, which could provide a good shelf life *(Table 7).* The SPBTC premixes produced contained relatively higher amount of protein compared to sweetpotato flour. This showed that wheat flour or tapioca flour used in the formulation had improved the protein content of premixes since sweetpotato flour has low protein content.

Results on Preference Test *(Table 8)* indicated that the traditional cakes prepared from SPBTC premixes were well accepted although sweetpotato flour is incorporated in the product as substitute for fresh sweetpotato. The cakes prepared were as good as those prepared traditionally using fresh sweetpotato. In general, there was no significant difference between product developed traditionally using fresh sweetpotato and SPBTC premixes in terms of colour, flavour, texture and overall acceptability. Thus, sweetpotato flour used in the product formulation had no significant influence on the sensory attributes evaluated.

Table 7. Nutrient composition of sweetpotato-based traditional cakes premixes (Variety: Batang Merah)

SPBTC premixes	Moisture (%)	Protein (%)	Fat (%)	Ash (%)	Crude fibre (%)	Carbohydrate (%)	Energy (Kcal/100 g))
Cek mek molek	4.86 ± 0.01	9.80 ± 0.06	0.62 ± 0.03	1.46 ± 0.10	1.75 ± 0.01	83.26 ± 0.08	394.47 ± 0.07
Onde-onde	4.46 ± 0.01	6.50 ± 0.14	0.28 ± 0.09	1.47 ± 0.08	1.85 ± 0.04	87.28 ± 0.10	395.10 ± 0.08
Kuih kacau	3.55 ± 0.01	6.70 ± 0.21	0.83 ± 0.11	2.04 ± 0.09	1.54 ± 0.01	86.88 ± 0.12	399.17 ± 0.06
Kuih lopes	4.46 ± 0.01	6.50 ± 0.14	0.28 ± 0.09	1.47 ± 0.08	1.85 ± 0.04	87.28 ± 0.10	395.10 ± 0.08
Kuih keria	5.50 ± 0.02	5.42 ± 0.02	9.32 ± 0.02	3.00 ± 0.05	1.90 ± 0.02	74.92 ± 0.07	405.24 ± 0.02
Kuih talam	4.03 ± 0.01	2.43 ± 0.11	6.74 ± 0.07	1.12 ± 0.11	0.87 ± 0.02	84.89 ± 0.12	409.94 ± 0.10
Kuih bingka	4.00 ± 0.01	4.61 ± 0.12	5.92 ± 0.12	2.63 ± 0.06	1.60 ± 0.01	81.30 ± 0.10	396.92 ± 0.04
Seri muka	3.90 ± 0.01	3.35 ± 0.08	11.44 ± 0.02	1.42 ± 0.04	1.70 ± 0.01	77.46 ± 0.08	426.2 ± 0.06
Pudding	3.80 ± 0.02	2.04 ± 0.21	1.02 ± 0.03	3.02 ± 0.10	1.50 ± 0.04	90.34 ± 0.10	378.54 ± 0.07

Each figure represents the means of three replicates ± s.d

Conclusion

Sweetpotato-based traditional cakes produced using sweetpotato flour was found to be as original as those produced using fresh sweetpotato tubers in terms of colour, flavour, texture and overall acceptability. Thus, it can be concluded that sweetpotato flour can be used as substitute for fresh sweetpotato in making various types of sweetpotato-based traditional cakes either in fresh form or ready-to-cook form.

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Table 8. Mean scores for colour, texture, flavour and overall acceptability of sweetpotato-based traditional cakes prepared using fresh sweetpotato and SPBTC premixes

Sweetpotato-based traditional cakes	Colour		Texture		Flavour		O/Acceptability	
	Fresh	Flour	Fresh	Flour	Fresh	Flour	Fresh	Flour
Cek mek molek	6.84a	7.7a	6.4a	6.7a	6.8a	6.9a	6.5a	7.4a
Kuih kacau	6.7a	6.8a	6.8a	6.7a	6.6a	6.6a	6.7a	6.6a
Onde-onde	6.8a	6.9a	6.9a	7.4a	7.3a	7.1a	7.2a	7.3a
Kuih lopes	6.9a	6.6a	6.9a	7.3a	7.4a	7.0a	7.2a	7.2a
Kuih keria	7.7a	7.7a	7.4a	7.2a	7.7a	7.2a	7.2a	7.0a
Kuih talam	6.2a	7.1a	6.8a	6.5a	6.5a	7.3a	7.3a	7.0a
Kuih bingka	7.0a	7.2a	6.4a	6.6a	6.7a	6.6a	6.6a	6.7a
Seri muka	7.7a	7.6a	6.9a	7.2a	7.5a	6.9a	6.9a	7.2a
Pudding	7.1a	7.6a	7.0a	7.6a	7.4a	7.1a	7.1a	7.2a

Means in the same row with the same letter are not significantly different ($p < 0.05$)

References

Amante, V.d.R. (1994). Bakers can earn more by using sweetpotato flour. *Sapprad newsletter 8 (1):* 12–5

AOAC (1990). *Official methods of analysis.* 15th ed. Washington, D.C.: Association of Official Analytical Chemists

FAO (1986). *Food analysis: Quality, adulteration and test of identify.* FAO food and nutrition paper 14/8. 338 p. Manual of food quality control. City: FAO

Hanson, L.P. (1974). Vegetable protein processing. *Food Techno Review,* No.16, Noyes Data Corporation

Larmond, E. (1977). *Laboratory methods for sensory evaluation of food*. Ontario: Canada Dept. of Agriculture

Lee, S.Y. and Hamidah, A. (1997). Some physico-chemical characteristic of taro, sweetpotato and potato flour and their extrudates. *J. Trop. Agric. and Food Sc. 25(1):* 77–83

Salma, O. and Hamidah, H. (2000). Sweetpotato flour: Nutritional evaluation and premix production. *Proc. National Food Technoloyg Seminar,* Oct. 2000, K.L. p. 110–2. Serdang: MARDI

Salma, O. and Siti Meriam, A. (2004). Development of sweetpotato-based cakes, muffins, cookies and noodles. *Proc. National Food Technoloyg Seminar,* Sept. 2004, Kota Kinabalu, Sabah. p. 195–8. Serdang: MARDI

Tecator (1978). Application note AN 01/78 Tecator 1978.03.15. Fibre procedure according to the Weende method with Fibertech system. Tecator

Tee, E.S., Mohd. Ismail, N., Mohd. Nasir, A. and Khatijah, I. (1997). *Nutrient composition of Malaysian Foods.* 4th ed. Kuala Lumpur: Institute for Medical Research

Tee, E.S., Rajan, K., Young, S.I., Khor, S.C. and Zakiah, O. (1996). *Laboratory procedures in nutrient analysis of foods.* Kuala Lumpur: Institute for Medical Research

Walter, W.M. and Purcell, A.E. (1974). Lipid autoxidation in precooked dehydrated sweetpotato flakes stored in air. *J. Agric. Food Chem. 22(2):* 298–302

Woolfe, J. (1992). *Sweetpotato an untapped food resource.* 643 p. City: Cambridge University Press

Zainun, C.A. (1992). Processing of banana powder from Mas banana and its utilization. *Proc. National IRPA Seminar (Agriculture Sector), 11:* 389–90

Zainun, C.A. and Zahara, C.H. (1996). Development of ready-to-cook pumpkin-based traditional cakes mix. *Proc. National on Food Technology,* Sept. 1996, K.L. p. 36–9. Serdang: MARDI

Abstrak

Ubi keledek merupakan makanan sampingan dan dimakan dalam berbagai-bagai cara seperti direbus, digoreng, dibakar atau dikukus sama ada dengan atau tanpa campuran bahan-bahan lain. Penggunaan ubi keledek sebagai ramuan utama dalam pembuatan kuih tradisional, pembasuh mulut dan puding yang lazat adalah agak popular di Malaysia. Ubi keledek daripada beberapa varieti telah digunakan untuk menghasilkan tepung keledek bagi penyediaan kuih tradisional berasaskan keledek untuk memenuhi permintaan hasilan konvenien. Tepung ini mempunyai jangka simpan yang baik kerana kandungan lembapannya rendah. Pulangan hasilnya antara 20–30% (berdasarkan ubi keledek segar) dan bergantung kepada varieti dan saiz ubi keledek. Tepung keledek digunakan dalam penyediaan sembilan jenis kuih tradisional berasaskan keledek yang terpilih dan disukai ramai. Kuih-kuih yang dihasilkan memang disukai ramai walaupun tepung keledek digunakan sebagai pengganti ubi segar dalam formulasi hasil. Tepung keledek tidak mempunyai sebarang pengaruh yang ketara terhadap ciri-ciri rasa yang dinilai.

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