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by Rini Hustiany

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Rini Hustiany

Program Studi Teknologi Industri Pertanian, FakultasPertanian,
Universitas Lambung Mangkurat, Banjarbaru
Jl. A. Yani KM 32 Banjarbaru, Kalimantan Selatan
Email :hustiany@yahoo.com

Abstract

Sweet potato is a functional food as a prebiotic, producer of sugar and oligosaccharides such as raffinose, glucose, and fructose. This study aimed to observe the effect of the type of solvent on the content of raffinose, glucose and fructose in extracts of sweet potato Nagara white. Sweet potato stored at chilling temperature (± 5°C) in one month. Sweet potato grinded and extracted with different types of solvents, namely ethanol 100%, acetonitrile100%, ethanol: acetonitrile 50:50, ethanol: water 70:30, acetonitrile: water 70:30, ethanol: water 30:70, and acetonitrile: water 30:70 at room temperature, stirring speed of 150 rpm for 2 and 3 days. The amount of raffinose, glucose and fructose determined by HPLC RID (Refractive Index Detector). The content of raffinose, glucose, and fructose in sweet potato were high if sweet potato extracted using ethanol: water 30:70 and 70:30 with extraction 2 days. The content of raffinose is 1.11 to 1.69% (w / v), glucose is 3.52 to 4.14% (w / v), and fructose is 3.80 to 5.46% (w / v). Based on our finding that it is suggested to produce raffinose, glucose, and fructose is high, the sweet potato extracted using ethanol:water 70:30 or 30:70 for 2 days.

Keyword : sweet potato, raffinose, glucose, fructose, extraction

1. Introduction

South Borneo is producer of sweet potatoes such as sweet potato Nagara. Sweet potatoes Nagara are founded in the North and South Daha, district of Hulu Sungai Selatan. The sweet potato Nagara is native plant in the area. There are several types of sweet potatoes Nagara, one of which is a sweet potato Nagara white. The sweet potato Nagara white is sweet potato with white flesh.

The sweet potato can produce sugars and oligosaccharides, such as glucose, frutose, and raffinose. The sugar provides sweet and enhance consumer acceptance. The oligosaccharide is a functional food and a ingredient food can not be digested. Hustiany (2012) states that the sweet potato Nagara white in a fresh condition containing glucose, fructose, sucrose and maltose, and raffinose. When the sweet potato Nagara white is stored at room temperature for one month, it has decreased the amount of glucose and fructose than in fresh condition and will increase the amount of sucrose, maltose and raffinose. If stored at chilling temperature for one month, the sweet potato Nagara white containing sucrose, maltose and raffinose.

The materials contain sugars and oligosaccharides can be isolated with a polar solvent, such as acetonitril:water (65:35, v/v) dan ethanol (Muzquiz *et al*. 1999); ethanol 8-10% (French *et al*. 1959); acetonitril:water (85:15, v/v) (Da Costa Leite *et al*. 2000); acetonitril:water and water (Park *et al*. 2001), and water (Kennedy *et al*., 1989).

The purpose of this study was to determine the effect of solvent type on the content of raffinose, glucose, and fructose in extracts of sweet potato Nagara white.

2. Methods

The first,the sweet potato Nagara white stored at chilling temperature (± 5 ° C) for one month. The sweet potato Nagara white is dried, crushed, and extracted with different types of solvents, namely ethanol 100%, acetonitrile100%, ethanol: acetonitrile 50:50, ethanol: water 70:30, acetonitrile: water 70:30, ethanol: water 30:70, and acetonitrile: water 30:70 at room temperature, stirring speed of 150 rpm for 2 and 3 days. The sample used for extraction is 50 g/150 ml solvent. After 2 and 3 days, and the extracts filtered through cotton and Whatman No. 40. The solvent was evaporated and the filtrate was diluted to 10 ml, so the concentration being 0.033 g/ml.

The amount of raffinose, glucose and fructose determined by HPLC RID (Refractive Index Detector). The column used was Metacarb Ca Plus with a length of 30 cm and a diameter of 1 cm. Column temperature used was 85°C. The samples injected 10 µl with the mobile phase is H_2O. The flow rate of mobile phase is 1 ml / min. The method used was isocratic. The standard was also injected, namely glucose, fructose, and raffinose.

3. Results and Discussions

The content of raffinose, glucose and fructose found in the extract of sweet potato Nagara white with various solvents (Table 1).

Table 1. The content of raffinose, glucose and fructose in the extract of sweet potato Nagara white with various solvents

Type of Solvent	Extraction (Days)	Consentrations (% w/v)		
		Raffinose	Glucose	Fructose
Ethanol 100%	2	not detection	0.19	0.28
Ethanol 100%	3	0.31	0.16	0.24
Acetonitrile 100%	2	not detection	0.02	0.05
Acetonitrile 100%	3	not detection	0.02	0.05
Ethanol : Acetonitrile 50:50	2	not detection	0.40	0.55
Ethanol : Acetonitrile 50:50	3	not detection	0.31	0.37
Ethanol : Water 70:30	2	1.69	3.52	3.80
Ethanol : Water 70:30	3	1.40	1.06	1.03
Acetonitrile : Water 70:30	2	0.10	0.68	0.70
Acetonitrile : Water 70:30	3	not detection	0.79	0.94

Ethanol : Water 30:70	2	1.11	4.14	5.46
Ethanol : Water 30:70	3	not detection	1.71	1.29
Acetonitrile : Water 30:70	2	0.79	0.90	0.75
Acetonitrile : Water 30:70	3	0.99	0.90	0.78

The use of ethanol, acetonitrile and water itself is already widely used to isolation raffinose, glucose, and fructose as Park *et al*. (2001); Da Costa Leite *et al*. (2000); Murquiz*et al*. (1999); Kennedy *et al*. (1989); and French *et al*. (1959).The extract of sweet potato Nagara white with different types of solvent containing glucose and fructose at different concentrations (Table 1). But not the whole extract of sweet potato Nagara white containing raffinose.

The content of raffinose, glucose and fructose found in many sweet potato extract using ethanol: water, either 70:30 or 30:70 ratio were extracted for 2 days. The raffinose, fructose, and glucose is better to use a higher polarity solvents, such as water and ethanol, though acetonitrile also including the polar solvent. However, if the solvent used is 100% ethanol or acetonitril 100% are not good extract of sweet potato to produce raffinose, glucose and fructose. Neither the ethanol:acetonitrile 50:50 is also not good extract of sweet potato to produce raffinose, glucose and fructose.

The extraction using ethanol:water - either with a lot of ethanol content and a lot of water content - can produce raffinose, glucose and fructose were significant. As for the 100% ethanol is not good for extracting raffinose, glucose and fructose found in sweet potatoes. So, apparently there is an interaction between ethanol and water to be able to bind to raffinose, glucose and fructose in sweet potatoes with good. So, to isolation raffinose, glucose and fructose in sweet potato is better to use ethanol: water.

The extraction for two days showed better results than the extraction for three days. Whereas the hypothesis, the longer the extraction process, the more the raffinose, glucose and fructose were extracted. But instead, the extraction for two days resulted raffinose, glucose and fructose were extracted more than three days. It is thought, on raffinose, glucose and fructose degradated becomes smaller molecules again, such as organic acids and ethanol. The possibility of this degradation occurs are the extraction is done at room temperature and the organic solvent is water and ethanol.

The different things happen when extraction using acetonitrile: water – either with a lot of acetonitril content or a lot of water content - the extraction for 3 days produces more raffinose, glucose and fructose compared to extraction for 2 days. It is thought, asetonitril:water can prevent contamination from microorganisms during extraction at room temperature. As a result the raffinose, glucose, and fructose are not degradated becomes smaller molecules in acetonitrile:water.

4. Conclusions

Based on our finding that it is suggested to produce raffinose, glucose, and fructose is high, the sweet potato extracted using ethanol: water70:30 or 30:70 for 2 days.

References

Da Costa Leite, J.M., L.C. Trugo, L.S.M. Costa, L.M.C. Quinteiro, O.M. Barth, V.M.L. Dutra, dan C.A.B. De Maria. 2000. Determination of oligosaccharides in Brazilian honeys of different botanical origin. Food Chem. 70:93-98.

French, D., R.W. Youngquist, dan A. Lee. 1959. Isolation and Crystallization from Mint Seeds. Archieves of Biochem. And Biophys. 85:471-473.

Hustiany, R. 2012. IdentifikasiGuladanOligosakaridapadaUbiJalarKhas Kalimantan Selatan selamaPenyimpanan. Seminar Nasional : Peran Teknologi Industri Pertanian dalam Pembangunan Agroindustri yang Berkelanjutan di Indonesia. Denpasar, 2-3 Nopember 2012.

Kennedy, J.F., D.L. Stevenson, dan C.A. White. 1989. The chromatographic behaviour of a series of fructooligosaccharides derived from levan produced by the fermentation of sucrose by *Zymomonasmobilis*. Carbohydrate Polymers. 10:103-113.

Muzquiz, M., C. Burbano, M.M. Pedrosa, W. Folkman, dan K. Gulewicz. 1999. Lupins as a potential source of raffinose family oligosaccharides. Preparative method for their isolation and purification. Ind. Crops dan Prod. 19:183-188.

Park, J-P., T-K. Oh, dan J-W. Yun. 2001. Purification and characterization of a novel transfructosylating enzyme from *Bacillus macerans* EG-6. Process Biochem. 37:471-476.

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