BORANG FRGS – P3(R)

FINAL REPORT
FUNDAMENTAL RESEARCH GRANT SCHEME (FRGS)

Laporan Akhir Skim Geran Penyelidikan Asas (FRGS) IPT
Pindaan 1/2010

A

RESEARCH TITLE : **Investigation on the chemical ,antioxidant activity and staling of peeled and unpeeled banana (Musa paradisiaca var Awak) flour in bread**
Tajuk Penyelidikan

PROJECT LEADER : **Prof. Madya Dr Noor Aziah Abdul Aziz**
Ketua Projek

PROJECT MEMBERS : 1. Dr. Cheng Lai Hoong
(including GRA) 2 Dr. Rosma Ahmad
3. Haslinda Wan Hamat , 4.Chong Li Choo 5. Zuwariah Ishak
Ahli Projek

PROJECT ACHIEVEMENT *(Prestasi Projek)*

B

ACHIEVEMENT PERCENTAGE			
Project progress according to milestones achieved up to this period	**0 - 50%**	**51 - 75% ,**	**76 - 100%**
Percentage			92%

RESEARCH OUTPUT

	Indexed Journal	*Non-Indexed Journal*
Number of articles/ manuscripts/ books *(Please attach the First Page of Publication)*	1. **International Journal of Food Sciences and Nutrition,September 2009; 60(S4): 232_239, Chemical composition and physicochemical properties of green banana (Musa acuminata_balbisiana Colla cv. Awak) flour** 2. **CyTA - Journal of Food , Properties of polyphenol oxidase obtained from Musa acuminata x balbisiana Colla cv.'Pisang Awak (will be published in May, 2011** 3. Journal of Agricultural and Food Chemistry: Effect of free blanching treatment on the functional properties of plantain starch (submitted to journal Agricultural and food chemistry.) 4 Nutritional and physical properties of bread incorporated with peeled and unpeeled banana flour.(*To be submitted to Journal of food science*) 5.Mineral and trace element concentration in peeled and unpeeled banana (Musa paradisiaca var Awak) flour. (*To be submitted to Food Researh International)*	**1.J. Trop. Agric. and Fd. Sc.37(1)(2009):33-42. Physicochemical properties of wheat bread substituted with banana flour and modified banana flour.**

	International	*National*
Conference Proceeding *(Please attach the First Page of Publication)*		Zuwariah, I. and Noor Aziah , A.A **2007**. Chemical and physical characteristics of banana flour and modified banana flour prepared from Musa paradisiaca sapientum var. Awak. Proceeding 10th Asean Food Conference, **2007**, Kuala Lumpur, Malaysia, 21-23rd August
Intellectual Property *(Please specify)*		

HUMAN CAPITAL DEVELOPMENT

Human Capital	**Number**				**Others** (please specify)
	On-going		**Graduated**		
Citizen	Malaysian	Non Malaysian	Malaysian	Non Malaysian	
PhD Student	1				Chong Li Choo
Master Student			2		Zuwariah Ishak Chong Li Choo
Undergraduate Student			1		Goh Chia Wei
Total	1		3		

EXPENDITURE *(Perbelanjaan)*

C

Budget Approved *(Peruntukan diluluskan)* : **RM 39,000**
Amount Spent *(Jumlah Perbelanjaan)* : **RM 38,671.21**

Balance *(Baki)* : **RM328.79**
Percentage of Amount Spent : **% 99.16**
(Peratusan Belanja)

ADDITIONAL RESEARCH ACTIVITIES THAT CONTRIBUTE TOWARDS DEVELOPING SOFT AND HARD SKILLS
(Aktiviti Penyelidikan Sampingan yang menyumbang kepada pembangunan kemahiran insaniah)

D

International		
Activity	Date (Month, Year)	Organizer
(e.g : Course/ Seminar/ Symposium/ Conference/ Workshop/ Site Visit)		

RESEARCH ABSTRACT – Not More Than 200 Words (*Abstrak Penyelidikan – Tidak Melebihi 200 patah perkataan*)

G	(e.g : Course/ Seminar/ Symposium/ Conference/ Workshop/ Site Visit)		

PROBLEMS / CONSTRAINTS IF ANY (*Masalah/ Kekangan sekiranya ada*)

E	

RECOMMENDATION (*Cadangan Penambahbaikan*)

F	

RESEARCH ABSTRACT – Not More Than 200 Words (*Abstrak Penyelidikan – Tidak Melebihi 200 patah perkataan*)

G	(e.g : Course/ Seminar/ Symposium/ Conference/ Workshop/ Site Visit)		

PROBLEMS / CONSTRAINTS IF ANY (*Masalah/ Kekangan sekiranya ada*)

E	

RECOMMENDATION (*Cadangan Penambahbaikan*)

F	

Date : 11/2/2011
Tarikh

Project Leader's Signature: N. Omm
Tandatangan Ketua Projek

COMMENTS, IF ANY/ ENDORSEMENT BY RESEARCH MANAGEMENT CENTER (RMC)
(Komen, sekiranya ada/ Pengesahan oleh Pusat Pengurusan Penyelidikan)

H .....

.....

.....

Name:
Nama:

Signature:
Tandatangan:

Date:
Tarikh:

Chemical composition and physicochemical properties of green banana (*Musa acuminata*× *balbisiana Colla* cv. *Awak*) flour

Authors: W. H. Haslinda [a]; L. H. Cheng [a]; L. C. Chong [a]; A. A. Noor Aziah [a]
Affiliation: [a] Food Technology Division, School of Industrial Technology, Universiti Sains Malaysia, Penang, Malaysia
DOI: 10.1080/09637480902915525
Publication Frequency: 8 issues per year
Published in: International Journal of Food Sciences and Nutrition
First Published on: 17 May 2009
Subjects: Food Chemistry: Nutrition; Bioscience: Nutrition;
Formats available: HTML (English) : PDF (English)

Abstract

Flour was prepared from peeled and unpeeled banana *Awak* ABB. Samples prepared were subjected to analysis for determination of chemical composition, mineral, dietary fibre, starch and total phenolics content, antioxidant activity and pasting properties. In general, flour prepared from unpeeled banana was found to show enhanced nutrition values with higher contents of mineral, dietary fibre and total phenolics. Hence, flour fortified with peel showed relatively higher antioxidant activity. On the other hand, better pasting properties were shown when banana flour was blended with peel. It was found that a relatively lower pasting temperature, peak viscosity, breakdown, final viscosity and setback were evident in a sample blended with peel.

Keywords: Proximate chemical composition; dietary fibre; antioxidant activity; pasting properties: banana

Fw: Proof of acceptance

Thu, December 9, 2010 10:49:47 PM

From: Noor Aziah Abdul Aziz <naziah_usm@yahoo.co... Add to Contacts
To: lcchong@hotmail.my

2 Files Download All
TCYT_2010_Leaflet.pdf (449KB); TCYT_Library_recommendation.pdf (159KB)

----- Forwarded Message ----
From: Manuel Vazquez Vazquez <manuel.vazquez@usc.es>
To: Noor Aziah Abdul Aziz <naziah_usm@yahoo.com>
Sent: Thu, December 9, 2010 5:12:04 PM
Subject: Re: Proof of acceptance

Dear Dr Aziah,

My apologizes for the delay in the publication. Your paper will be in published in May 2011.
We have a big queue of accepted papers. To publish quicker, we are thinking in increasing the issues per year, but for this we need more subscribers. Please if your institution is not subscriber to CyTA-Journal of Food, please recommended it. I have attached a brochure and a letter of recommendation.

Best wishes

Dr. Manuel Vazquez Vazquez
Editor
Journal CyTA - Journal of Food (formerly Ciencia y Tecnología Alimentaria)

El 08/12/2010, a las 08:14, Noor Aziah Abdul Aziz escribió:

Dear Dr Vazquez,

With reference to the above I would like to know whether the above paper has been published in J of Foods.
Please inform me as soon as possible cos it has been quite awhile.

thanks.

Dr. Noor Aziah Abdul Aziz.

----- Forwarded Message ----
From: lichoo chong <lcchong@hotmail.my>
To: Dr Noor Aziah <naziah.usm@gmail.com>; Dr Noor Aziah <naziah_usm@yahoo.com>
Sent: Wed, December 8, 2010 9:54:30 AM
Subject: Proof of acceptance

Dear Dr Aziah,

Here i attached the proff of acceptance. I think we can write to the editor to ask about this.

Dr Vázquez Vázquez
Editor in Chief, CyTA - Journal of Food
manuel.vazquez@usc.es

manuscript ID : TCYT-2009-0068.R2

Title :Properties of polyphenol oxidase obtained from Musa acuminata x balbisiana Colla cv.'Pisang Awak'

<accepted paper JF.pdf>

FW: CyTA - Journal of Food - Decision on Manuscript ID TCYT-2009-0068
Thu, October 22, 2009 2:18:13 PM
From: Li Choooooo.. <piyakchoo@hotmail.com>
Add to Contacts
To: Dr Noor Aziah <naziah.usm@gmail.com>; Dr Noor Aziah <naziah_usm@yahoo.com>

3 Files Download All
- Reviewer comments for CyTA.pdf (48KB); tcyt.pdf (151KB); J.of Food 2.pdf (205KB)

Dr,

Below here is the email, they sent back to me. The manuscript and proof of submission have been attached. please check.

Thanks.

LiChoo.

> Date: Sat, 17 Oct 2009 17:14:11 -0400
> From: manuel.vazquez@usc.es
> To: piyakchoo@hotmail.com
> Subject: CyTA - Journal of Food - Decision on Manuscript ID TCYT-2009-0068
>
> 17-Oct-2009
>
> Dear Miss Chong:
>
> Your manuscript entitled "Properties of polyphenol oxidase obtained from Musa acuminata x balbisiana Colla cv.'Pisang Awak'", which you submitted to CyTA - Journal of Food, has been reviewed. The reviewer comments are included at the bottom of this letter, along with those of the editor who coordinated the review of your paper.
>
> The reviews are in general favourable and suggest that, subject to minor revisions, your paper could be suitable for publication. Please consider these suggestions, and I look forward to receiving your revision.
>
> When you revise your manuscript please highlight the changes you make in the manuscript by using the track changes mode in MS Word or by using bold or coloured text.
>
> To submit the revision, log into http://mc.manuscriptcentral.com/tcyt and enter your

Author Center, where you will find your manuscript title listed under "Manuscripts with Decisions." Under "Actions," click on "Create a Revision." Your manuscript number has been appended to denote a revision. Please enter your responses to the comments made by the reviewer(s) in the space provided. You can use this space to document any changes you made to the original manuscript. Please be as specific as possible in your response to the reviewer(s).
>
> IMPORTANT: Your original files are available to you when you upload your revised manuscript. Please delete any redundant files before completing the submission.
>
> Because we are trying to facilitate timely publication of manuscripts submitted to CyTA - Journal of Food, your revised manuscript should be uploaded as soon as possible. If it is not possible for you to submit your revision in a reasonable amount of time, we may have to consider your paper as a new submission.
>
> Once again, thank you for submitting your manuscript to CyTA - Journal of Food and I look forward to receiving your revision.
>
> Sincerely,
> Dr Vázquez Vázquez
> Editor in Chief, CyTA - Journal of Food
> manuel.vazquez@usc.es
>
>
> Reviewer(s)' Comments to Author:
>
> Reviewer: 1
> Comments to the Author
> Abstract>page 1>line 35-36 [effective for PPO in? (inhibition/inactivation)]
> Page2>11-12> [The banana used for ...(delete 'is')]
> Page2>36> PPO also known as [tyrosinase] (correct spelling)
> Pge2>38> PPO [catalyses] not catalysed the hydroxylation....
> Page2>42> to form brown pigments (melanins). [please cite a reference]
> Page3> 2.1 Materials> Please indicate if the plant material used in this study was authenticated by any means.
> page3>2.2 Prepartion of crude Enzyme extract> was this procedure based on a previously published method if so. provide citation.
> page3>2.3 Assay> Define (unit of enzyme activity) Enzyme relative activity (%)
> page3> 2.6> Enzyme kinetics, provide citation for the method of Lineweaver and Burk.
> page6>line 58>range of 12-114 min and 7.8-25.2 (not 377) min. resp.
> page7> line 32> followed by ascorbic acid and sodium metabisulphite (reverse order).
>
> Reviewer: 2
> Comments to the Author
> This manuscript attempts to study the biphenolase activity of crude polyphenol oxidase (PPO) from plantain peel and pulp in terms of pH and thermal stability of the PPO and

the influence of temperature, pH and inhibitors. This subject is of interest and important, and the result obtained in the study provides a preliminary basis for understanding and use of this enzyme. Thus the work is suitable to publish in the journal after making necessary corrections, including English grammar, spelling and expression.
> Reading and correcting the paper by a scientist, familiar with the scientific problems studied. who is a native speaker of English, is advised. The English grammar should be checked carefully in the paper before publishing.
> Some Specific comments are in attached file.
>
>
>> > Editor's Comments to Author:
>
> Associate Editor
> Comments to the Author:
> - Check the style of the reference in this journal:
> http://www.tandf.co.uk/journals/journal.asp?issn=1135-8122&[illegible]=44
> - Put a space between values and units.
> - Do not frame the figures.
> - Table 2. Since k, t1/2 and D are related, it is enough to give the values of one of them. Let D and delete k and t1/2.

J. Trop. Agric. and Fd. Sc. 37(1)(2009): 33–42

Physicochemical properties of wheat breads substituted with banana flour and modified banana flour

(Ciri-ciri fizikokimia roti gandum yang diganti dengan tepung pisang dan tepung pisang terubah suai)

I. Zuwariah* and A.A. Noor Aziah**

Key words: banana (*Musa paradisiaca sapientum*), bread, resistant starch, phenolic content, nutritional composition

Abstract

Substitution of banana flour (BF) and modified banana flour (MBF) to wheat flour at 10% and 20% levels were carried out to test the effects on physicochemical properties of the supplemented bread. Various parameters such as resistant starch and total phenolic content were determined. Substitution of 10% BF to wheat flour produced highest loaf volume. However, substitution of 20% MBF to wheat flour produced lowest loaf volume, but gave highest score in overall acceptability. The crumb of control bread was lighter than BF and MBF bread at 10% and 20% levels. L* values continued to decrease with increasing levels of BF and MBF incorporated. Texture profile analysis indicated that increasing level of BF and MBF at 10–20% increased the hardness and resulted more compact bread. Increasing the level of substitution from 10% to 20% of BF and MBF increased significantly (p <0.05) the resistant starch content and total phenolic content. Resistant starch content was higher in modified banana flour than banana flour but lower in total phenolic content. It may be concluded that supplementation of banana flour to wheat flour will help in increasing resistant starch and phenolic content of wheat breads.

Introduction

Wheat (*Triticum aestivum*) is the world's most important cereal crop in terms of production and consumption (Shewry and Tatham 1994). Bread is widely consumed in Malaysia, and is produced by more than 1,000 bakeries throughout the country. Most of these bakeries are small, and manufacture cakes and pastries as well as bread (Senic 2002).

Apart from being a good source of calories and other nutrients, wheat is considered nutritionally deficient and poor in fibre, resistant starch and mineral content. Therefore, supplementation of wheat flour with banana flour will help in improving the nutritional quality of wheat products (Sharma et al. 1999). The use of banana flour for production of baked goods if feasible would help to lessen our total dependence on imported wheat.

Processing of bananas (*Musa paradisiaca sapientum*) into flour provides a new application of bananas as an ingredient

*Food Technology Research Centre, MARDI Headquarters, Serdang, P.O. Box 12301, 50774 Kuala Lumpur, Malaysia.

**Food Technology Division, School of Industrial Technology, Universiti Sains Malaysia, 11800 USM, Pulau Pinang, Malaysia

Authors' full names: Zuwariah Ishak and Noor Aziah Abdul Aziz

E-mail: zuwariah@mardi.gov.my

PHYSICO-CHEMICAL AND ORGANOLEPTIC EVALUATION OF BREAD SUBSTITUTED WITH DIFFERENT PERCENTAGE OF BANANA FLOUR (PULP AND PEEL)

by

GOH CHIA WEI

A dissertation submitted in partial fulfilment of the requirements for the degree of Bachelor of Technology (B. Tech.) in the field of Food Technology

School of Industrial Technology

Universiti Sains Malaysia

March 2010

the influence of temperature, pH and inhibitors. This subject is of interest and important, and the result obtained in the study provides a preliminary basis for understanding and use of this enzyme. Thus the work is suitable to publish in the journal after making necessary corrections, including English grammar, spelling and expression.
> Reading and correcting the paper by a scientist, familiar with the scientific problems studied. who is a native speaker of English, is advised. The English grammar should be checked carefully in the paper before publishing.
> Some Specific comments are in attached file.
>
>
>> > Editor's Comments to Author:
>
> Associate Editor
> Comments to the Author:
> - Check the style of the reference in this journal:
> http://www.tandf.co.uk/journals/journal.asp?issn=1135-8122&linktype=44
> - Put a space between values and units.
> - Do not frame the figures.
> - Table 2. Since k, t1/2 and D are related, it is enough to give the values of one of them. Let D and delete k and t1/2.

This report is to be submitted to the *Food Research International*

Mineral and trace element concentrations in peeled and unpeeled banana (*Musa paradisiaca* var Awak) flour

(Kepekatan mineral dan elemen surih dalam tepung pisang (*Musa paradisiaca* var Awak) tanpa kulit dan dengan kulit.

Noor Aziah A.A. Haslinda W. H.,, Iman , A. H. Cheng, L. H. and Rosma A

Department of Food Technology, School of Industrial Technology, Universiti Sains Malaysia, 11800 Minden, Penang, Malaysia

Authors full name: Noor Aziah Abdul Aziz ,Haslinda, Iman Abdull Halim, Cheng Lai Hoong, Rajeev Bhat

Properties of polyphenol oxidase obtained from *Musa acuminata x balbisiana* Colla cv.'*Pisang Awak*' pulp and peel

L. C. Chong, L. H. Cheng, and Noor Aziah Abdul Aziz*

Food Technology Division, School of Industrial Technology,

University Science Malaysia, 11800 Minden, Penang, Malaysia.

ABSTRACT

Crude polyphenol oxidase (PPO) was extracted from the peel and pulp of the plantain *Awak* (Musa acuminata x balbisiana). The characteristics of PPO were investigated to provide useful information on the plantain during processing operations. The optimum pH – activity of PPO for the peel and pulp is 5.5 and 6.5, respectively. Optimum temperature – activity for the peel and pulp was 30°C. The K_m and V_{max} of the PPO peel were 4.92mM and 0.702Abs/min, respectively, while the K_m and V_{max} for the PPO pulp were 3.77mM and 0.513Abs/min. respectively. PPO from both peel and pulp exhibited similar trends in thermostability. *Awak* PPO from peel and pulp was indicated to be 100% inhibited by 1mM of L-cysteine, ascorbic acid, and sodium metabisulphite. Citric acid was found to be moderately effective for PPO in, and NaCl was demonstrated to be a weak inhibitor.

Keywords: enzyme; polyphenol oxidase; plantain; inactivation; inhibitors

* Corresponding author. Noor Aziah Abdul Aziz; School of Industrial Technology, Food Division, Universiti Sains Malaysia, 11800, Penang Malaysia. Tel: +604-6533888; Fax: 604-6573678; e-mail: naziah_usm@yahoo.com

Nutritional and Physical Properties of Breads Incorporated with Peeled and Unpeeled Banana Flour

W. H. Haslinda , L.H., Cheng. and Rosma ,A and A. A. Noor Aziah*
Food Technology Division, School of Industrial Technology,
Universiti Sains Malaysia. 11800 Minden, Penang, Malaysia.

Abstract

Substitutions of peeled banana flour (PBF) and unpeeled banana flour (UBF) to wheat flour at 20% level were carried out. The effects on nutritional compositions and physical attributes of the substituted bread were examined. Oat bran (OB) also added into bread formulations at 5% level for fibre enrichment and the OB added bread also tested for nutritional and physical properties. Results showed that UBF contained significantly higher ($P<0.05$) in moisture, crude fibre, ash, fat and dietary fibre (IDF, SDF, TDF) content as compared to PBF. The PBF and UBF incorporated bread were found to contain significantly high ($P<0.05$) in ash, crude fibre, dietary fibre (IDF, SDF, TDF) and resistant starch (RS) content than control. The UBF bread contained significantly higher ($P<0.05$) in ash, crude fibre, IDF, SDF and TDF than PBF bread. The addition of OB also resulted in increasing IDF, SDF and TDF content of the bread. The substitution of wheat flour with banana flour (PBF and UBF) and addition of oat bran increased the hardness value and decreased the loaf volume of bread. The hardness value of control bread was the lowest (3.10N), while the UBF + OB bread was the highest (7.03N). Specific volume of control bread was 4.98 ml/g which was the highest value and UBF + OB bread was 3.97 ml/g the lowest in value. The results from this study indicated that incorporation of banana flour (PBF and UBF) and addition of OB into bread would be an effective way to increase the nutritional quality of bread with acceptable physical characteristics.

Keywords: Peeled banana flour; unpeeled banana flour; oat bran; bread; nutritional composition; physical characteristics

*Corresponding author. Tel.: +604-6533888 ext: 2223; Fax: 604-6573678
E-mail address: naziah@usm.my (Noor Aziah, A. A)

[illegible] PADA [illegible] FEBRUARI 2010

AMA PROJEK :
IVESTIGATION ON THE CHEMICAL, ANTIOXIDANT ACTIVITY AND STAILING OF
EELED AND UNPEELED BANANA (MUSA PARADISIACA) [illegible] FLOUR IN
READ
EMPOH : [illegible] 2007 - [illegible] 2010
ETUA PROJEK: PROFESOR MADYA NOOR AZIAH ABDUL AZIZ
ENYELIDIK BERSAMA: ROSMA AHMAD, CHENG LAI HOONG
USAT PENGAJIAN TEKNOLOGI INDUSTRI

AKAUN	PTJ	PROJEK	DONOR	PERUNTUKAN PROJEK	PERBELANJAAN TERKUMPUL SEHINGGA THN LALU	PERUNTUKAN THN SEMASA	TANGGUNGAN	BAYARAN THN SEMASA	BELANJA THN SEMASA	BAKI PROJEK
111	PTEKIND	871069		13,500.00	1,115.50	12,[illegible]	[illegible]	0.00	0.00	12,[illegible]
221	PTEKIND	871069		4,500.00	[illegible],187.00	(4,[illegible])	1,[illegible]	0.00	1,371.00	(6,[illegible])
222	PTEKIND	871069		1,000.00	0.00	1,000.00	[illegible]	0.00	0.00	1,000.00
223	PTEKIND	871069		150.00	0.00	150.00	[illegible]	0.00	0.00	150.00
226	PTEKIND	871069		1,300.00	0.00	[illegible]	0.00	0.00	0.00	1,[illegible]
227	PTEKIND	871069		[illegible]	[illegible]	[illegible]	[illegible]	1,114.00	1,114.00	(5,[illegible])
228	PTEKIND	871069		1,000.00	0.00	[illegible]	[illegible]	0.00	0.00	1,000.00
229	PTEKIND	871069		5,150.00	2,832.00	2,[illegible]	[illegible]	0.00	0.00	2,[illegible]
335	PTEKIND	871069		0.00	6,715.00	(6,[illegible])	[illegible]	0.00	0.00	(6,[illegible])
				[illegible]	[illegible].21	2,[illegible]	[illegible]	1,114.00	2,485.00	[illegible]

SENARAI JUMLAH-JUMLAH KECIL :

		PERUNTUKAN PROJEK	PERBELANJAAN TERKUMPUL SEHINGGA THN LALU	PERUNTUKAN THN SEMASA	TANGGUNGAN	BAYARAN THN SEMASA	BELANJA THN SEMASA	BAKI PROJEK
110	EMOLUMEN	13,500.00	1,115.00	12,[illegible]	0.00	0.00	0.00	[illegible]
[illegible]	PERKHIDMATAN DAN BEKALAN	25,500.00	28,597.74	(3,[illegible])	1,371.00	1,114.00	2,485.00	[illegible]
[illegible]	ASET	0.00	6,[illegible]	([illegible])	[illegible]	0.00	0.00	[illegible]
		[illegible]	36,[illegible]	[illegible]	[illegible]	1,114.00	[illegible]	[illegible]