ICTAFF 2018

International Conference on Tropical Agrifood, Feed, and Fuel

Sustainability of Food, Feed, and Fuel Tropical Resources for Quality Future

PROCEEDING

Samarinda, 13-14 November 2018
MESRA Bussines Hotel

PROCEEDING

INTERNATIONAL CONFERENCE ON TROPICAL AGRIFOOD, FEED, AND FUEL (ICTAFF) : SUSTAINABILITY OF FOOD, FEED, AND FUEL TROPICAL RESOURCES FOR QUALITY FUTURE

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Department of Agricultural Products Technology
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PREFACE

The greatest regards should be expressed only to God the Almighty, Allah SWT. We have finished the Proceeding book of International Conference on Tropical Agrifood, Feed, and Fuel (ICTAFF) after the conference which was held on 13-14 November 2018 in Mesra bussines Hotel Samarinda.

The conference takes "Sustainability of Tropical Food, Feed, and Fuel Tropical Resources for Quality Future" as the main theme.This international conference is aimed at resolving problems and bringing together scientists, researchers, professionals, and students from multidisciplinary agriculture-related fields to share the latest findings or ongoing research activities.

There are 6 sub themes emphasized in the ICTAFF 2018, including halal, safe, and healthy food, improving quality food and nutrition, security and sustainability food and agriculture, innovation in feed technology to increase animal production, sustainable and renewable fuels based on tropical resources, and empowering of agribusiness based on community.

We would like to thank all keynote speakers for their contributions to the Conference, they are Asst. Prof. Dr. Somsak Maneepong from Walailak University Thailand, Prof. Xuming Huang from South China Agricultural University, Prof. Irwandi Jaswir from International Islamic University Malaysia (IIUM), Prof. Ali Agus from Gadjah Mada University, Dr. Dadan Rohdiana from Research Institute of Tea and Cinchona Indonesia, and Widi Sunaryo, Ph.D from Mulawarman University Indonesia.

Finally, we would like to thanks all of the proceeding team who have dedicated their constant supports and countless time to bring these scratches into a book. The ICTAFF 2018 proceeding is a credit to a large group of people, and everyone should be proud of the outcome.

Editors

Welcome Speech

Welcome Note From ICTAFF 2018 Committee

Assalamu'alaikum Warahmatullah Wabarakatuh

I would like to express the greatest regard to the Almighty God, Allah Subhanallahi Wa Ta'ala, for the Successful of International Conference of Food, Feed and Fuel 2018. I also would like to welcome all the audiences to Samarinda Kota Tepian.

Food security is very important to strengthen and support sustainable development in agriculture. Food, not only from plant but also from animal, should be available for all resident of Indonesia. It is urgent to provide quality feed to support food animal development to fulfill people needs of nutrition.

We would like to report that about sixty participants are attending the conference. Researcher and lecturer from some universities and research institutions will disseminate their research in this conference.This number is beyond our expectation when we were arranging the conference.

This conference will present international speakers from Wailailak University, Associate Professor Somsak Maneepong, Prof. Irwandi Jaswir from International Islamic University of Malaysia, Prof Xuming Huang from South China Agricultural University, Prof Ali Agus from Gadjah Mada University, Dr. Dadan Rohdiana from Research Institute of Tea and Cinchona Indonesia, and last but not least, Widi Sunaryo, Ph.D from Mulawarman University.

The morning session is designed to keynote speeches and the afternoon session is for parallel sessions. The parallel sessions will be focused into six topics: Halal, safe and healthy food; Security and sustainability of food and agriculture; Innovation in feed technology to increase animal production; Sustainable and Renewable fuel based on tropical resources; and Empowering of agribusiness based on community.

Faculty of Agriculture as conference organizer would like to thank Agrivita, the Journal of Agricultural Science on an agreement for publication of the selected papers from ICTAFF participants, and special thank Dr. Haviludin for helping our communication to the agreement. I also would like to thank to STIPER Kutai Timur, especially Prof. Juraemi, for cooperation in organizing and special thanks to PT. Kaltim Prima Coal and PT. Pupuk Kaltim for strong support to this conference.

We hope you will enjoy the tropical climate as long as staying in Samarinda. Thank you

Wassalamu'alaikum Warahmatullah Wabarakatuh

Committee,

Aswita Emmawati
Chairman

CONTENTS

EFFECT OF EXTRACTION TIME ON CHARACTERISTIC OF PECTIN DERIVED FROM KAPAS BANANA (*Musa Sp.*) PEELS

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ABSTRACT

Kapas banana (*Musa* Sp.) is one of the local banana varieties from East Kalimantan, which are usually processed into crackers or fried banana. However, the peels of this banana are still not used. Peel banana is rich in pectin, and its characteristic depends on its sources besides its extraction method. In the food industry, pectin is used as thickening agent, stabilizer and emulsifier. This research aimed to determine the effect of extraction time (70, 80 and 90 min.) in chloric acid solution on a characteristic of pectin from Kapas banana peels. A completely randomized design was applied in this experiment, and each treatment was repeated three times. Data were analyzed by ANOVA continued by Tukey test at α of 5% for treatment, which showed a significant difference. The results showed that extraction time in a chloric acid solution of pH 2.0 at 60^{o}C affected insignificantly on water content and viscosity of the pectin. However, it affected significantly on yield, ash content, equivalent weight, methoxyl content and degree of esterification. Pectin extracted from Kapas banana peels by this method belongs to low methoxyl (3.86-6.34%), which has low esterification degree (5.14-5.87%).

Keywords: low methoxyl pectin, low esterification degree pectin, thickening agent, emulsifier

INTRODUCTION

In the food industry, pectin is used as a thickening agent, stabilizer and emulsifier (May 1999). Commercial pectin is galacturonoglycans, i.e. poly (β-D-galactopyranosyl uronic acids), with various contents of methyl ester. Native pectins are more complex molecules found in cell walls and intercellular layers of all land plants. Commercial pectins are obtained by acid extraction of citrus peel (contain 20-30% pectin) and apple pomace (contain 10-15% pectin), both by-products of juice manufacturing. For pectin production, citrus peel is extracted with water of pH 1.5-3.0 at 60-100^{o}C. The extract is filtered, and pectin is precipitated by addition of isopropanol. Properties of pectin vary with the source, the processes used for handling and drying of the peel, the type of extraction, and subsequent treatment (Whistler & BeMiller, 1999).

Kapas banana (*Musa Sp*.) is one of the local banana varieties from East Kalimantan, which are usually processed into crackers or fried banana. The banana peels from this process are still not used. Meanwhile, banana peels contain pectin as shown by (Yuliani, Simbolon, & Murdianto, 2017) using Mauli banana and Castillo-Israel et al. (2015) using Saba banana. They used different pectin extraction method to yield the optimum mass of pectin from each type of banana peels. This research was aimed to determine the effective extraction method of pectin from Kapas banana peels.

MATERIAL AND METHODS

Materials

A physiological ripped kapas banana fruit showed by the green color with 10 % of yellow color the peels (Srimuliyati, 2005) was used as raw material. The banana was collected from Loa Kulu sub-district, Kutai Kartanegara district, Indonesia. HCl, NaOH, Red phenol and phenolphthalein purchased from Merck (Germany), ethanol 95% from PT. Jayamas Medica Industry (Indonesia) and commercial pectin from CV Nura Jaya (Surabaya, Indonesia).

Experimental Design

The completely randomized design was applied in this single factor experiment (extraction time in HCl pH 2.00), with three levels of treatment (70, 80 and 90 min), each repeated for three times. Data were analyzed by ANOVA continued by Tukey test at α of 5% for treatment, which showed a significant difference.

Pectin Extraction

Kapas banana peels were prepared by blanching (steaming) the banana. After 10 min. The banana was peeled following cooled at room temperature. The blanched banana peels dried by

the oven at 70°C for 12 h and powdered by blender (Phillip, Indonesia).

Pectin extraction was prepared by the method as described by (Yuliani et al., 2017) with light modification. The pH of HCl used in this research was developed by the preliminary study. Extraction at 80°C for 80 min in HCl solution of a series pH (1.00-2.00) affected insignificantly on the yield, and water content of Kapas banana peels pectin.

Fifty grams of dried banana peels were macerated in 200 mL HCl pH 2.00 solution at 60oC for 70, 80 and 90 min in water bath (Techne Cole Palmer, USA). After maceration, the filtrate was collected and added by ethanol 95% (1:1 v/v) to precipitate the raw pectin. The pectin was then washed by ethanol 95% followed by aquadest, each once. The washed pectin then was dried in an oven (Sanyo model MOV-212F, Japan) at 40°C for 10 h and powdered by blender (Phillip, Indonesia).

Assays

The yield, water content, and viscosity were determined as described by (Cahyadi, 2008), Sudarmadji, Haryono, & Suhardi (2010), and Yazid (2007), respectively. The equivalent weight, methoxyl content and degree of esterification were determined using the method as described by (Ismail, Ramli, Hani, & Meon, 2012).

RESULT AND DISCUSSION

Extraction time (70 to 90 min) in HCl solution pH 2.00 at 60°C affected significantly ($p<0.05$) on yield, equivalent weight, methoxyl content and degree of esterification of pectin from Kapas banana peels. However, it affects insignificantly on the water content and viscosity of the pectin (Table 1.)

Table 1. Effect of extraction time on yield and characteristic of pectin from Kapas banana peels.

Yield and pectin characteristics	Extraction time (min.)		
	70	80	90
Yield (%)	3.65±0.37 a	2.67±0.39 b	2.74±0.37 b
Water content (%)	15.13±0.81	14.99±0.20	14.8±1.03
Equivalent weight (mg)	854.21±1.68 a	765.30±1.78 b	695.42±3.49 c
Methoxyl content (%)	3.86±0.02 c	5.08±0.01 b	6.34±0.01 a
Degree of sterification (%)	5.14±0.02 c	5.56±0.01 b	5.87±0.01 a
Viscosity (cP)	2.28±0.18	1.85±0.31	2.07±0.17

Note: Data ($\bar{x}$±sd) were calculated from 3 replications. Data were analysed by Anova continued by Tukey test. Data within the same row followed by a different letter are significantly different ($p<0.05$).

The pectin yield decrease along with the increasing of the extraction time. More extraction time in acid solution can increase the hydrolysis the methyl ester group (de-esterification) (El-Nawawi & Heikal, 1995). This makes the decreasing of the pectin yield and also decreasing the equivalent weight (Ismail et al., 2012).

On the other hand, the methoxyl content and degree of esterification of the pectin increase. It means that the length of extraction time increase the quality of the pectin produced even it decrease the yield. The pectin from Kapas banana peels belongs to low-methoxy (LM) pectin (BeMiller & Huber, 2008). It is suitable for dietetic and pharmaceutical products, e.g. cosmetic product, dietary fiber enrichment and emulsion stabilization (Herstreith & Fox, 2012), and some processed food like low-sugar jams, jellies and marmalades (BeMiller & Huber, 2008).

CONCLUSIONS

Extraction time (70, 80, and 90 min.) in a chloric acid solution of pH 2.0 at 60°C affected insignificantly on water content and viscosity of the pectin. However, it affected significantly on yield, ash content, equivalent weight, methoxyl content and degree of esterification. Pectin extracted from kapas banana peels by this method belongs to low methoxyl (3.86-6.34%), which has low esterification degree (5.14 -5.87%).

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