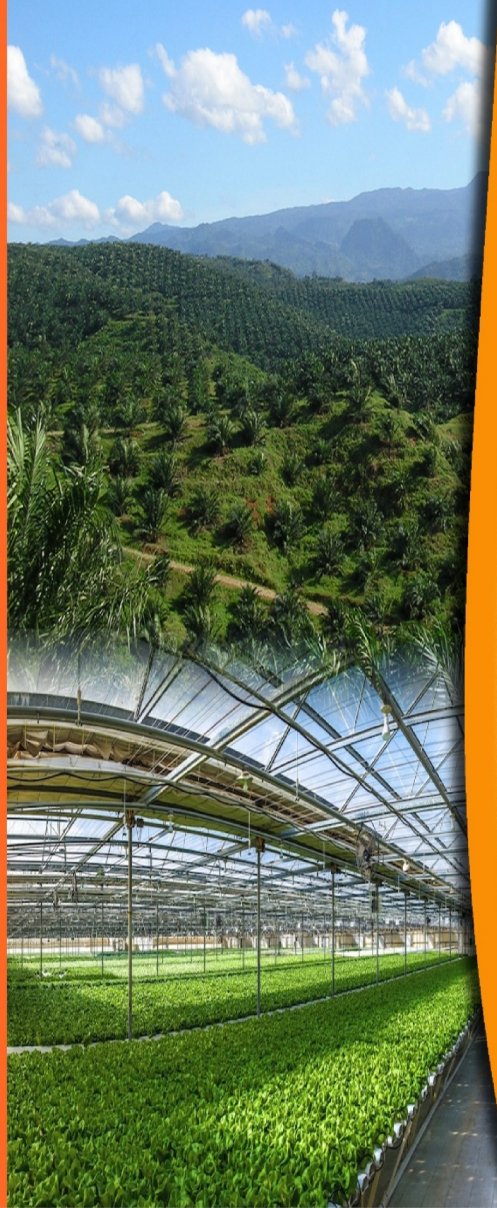

GREEN DEVELOPMENT INTERNATIONAL CONFERENCE

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GDIC 2016

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The First Green Development International Conference

The Indonesian international conference bringing together a local and world community of scientists and engineers interested in recent developments on green energy and Technology

October, 25-26, 2016

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Welcome Message

Governor of Jambi's Welcome Address

Excellences Rector of University of Jambi, in this occasion represented by Vice Rector of International Collaboration.

Honorable guests, keynote speakers, presenters and audience, Welcome to the first conference of The 1st International Conference on Green Development (GDIC 2016)

It gives me great pleasure to welcome you all to this conference. This conference is organized by the biggest University in Jambi, it is University of Jambi.

Dear Audience

At this moment, As Governor of Jambi, firstly I would like to introduce you about Jambi, specifically in relation with interesting think to be known and visited. Jambi is dominated by Malay race and nominated by Chinese, Indian and Arabic descent. But we have other minorities who are living in the middle of forest in Sarolangun Regency, they are called Suku Anak Dalam or Orang Rimba. Though Some Orang Rimba have decided to merge with locals and leave their old customs. The Anak Dalam (Children of the Forest) or more appealingly Orang Rimba (People of the Forest), some still maintain their age old belief--animism and maintain no contact with the outsiders.

Jambi has wonderful tourism area to be visited, such as Muaro Jambi Temple, the old temple heritage from the Buddha Kingdom in Sriwijaya Kingdom Era is around 26 km from central town of Jambi. The most interesting tourism Area in Jambi is Kerinci, it is 430km from this town. If you have time for visiting it, you will have a great pleasure hiking up volcano Kerinci, the highest active volcano in Indonesia. There is also Gunung Tujuh Lake, it's reputation as the highest volcanic Lake in South East Asia make the trekking/hiking to this place was so special. You find others interesting places in this area, Khayangan Park and Tapan Hill, Kerinci Lake, some Hot Springs, some waterfalls and others interesting cultural attraction in. In Jambi town it's self you can enjoy traditional food like Tempoyak, Pempek and local fruits such duku, duren and others kind of delicious fruits.

Distinguish guests, ladies and gentlemen

In relation with this even, since the conference raises ‘green development theme’, that is why that the theme of this conference links and matches with Jambi province program to develop all sectors of development, they are economics, education, science and technology, society and culture based on local wisdom and need. I expected this conference benefits scientists, policy makers and practitioners to design and develop all sector based on concept of ‘green development’. And more, as it serves to foster communication among scientist, policy maker and practitioners working in those topics, we hope to have chances for mutual cooperation among the participants.

Finally I would like to use this opportunity to thank to Rector University of Jambi, Steering Committee, and International Committee and General Committee member for bringing Jambi name to global world through this conference.

I would like to thank you to all parties who have been working and collaborating to make this conference happen. Last but not least, I would like to express my appreciation and thanks to keynote speakers, presenters, and participants for your participation in this conference.

I wish you all the best for this conference. God bless us.

Governor of Jambi

Zumi Zola

Rector's Welcome Address

Ladies and Gentlemen

I welcome you warmly to the University of Jambi to participate The 1st International Conference on Green Development (GDIC 2016). With over 30,000 students and 1,600 employees in research, teaching and administration, the University of Jambi, which was founded in 1963, is currently the largest one in Sumatra. Our range of studies in 14 faculties which six of them are new faculties that officially established in these two years. The faculties are defined by great variety and scope. Currently, students can choose between more than 88 bachelor's, master's, diploma and doctoral programmes.

Dear Audience

As the biggest University in Jambi province, the University of Jambi has play an important role as a key-player in both Human and Natural resources Development in Jambi Province. We have successful develop cooperation in all sector of development in Jambi province. We have contributed in term of research, community service, consultancies, training services and providing some expert to speed the development of Jambi province. Today, the University of Jambi consistently seeks innovative methods to collaborate more strongly on an inter-discipline for the aim of conducting shared research relating to green development in all area of knowledge and sciences.

Ladies and gentlemen

In this opportunity, I would like to express that we are very fortunate to have you at the GDIC 2016. Particularly, this conference is organized by the Research and Community Service center or LPPM University of Jambi.

In this conference, we are very proud to have Ali Sophian Ph.D from International Islamic University of Malaysia, Meine van Noordwijk, Ph.D from World Aroforestry Center, Rachel Carmenta, Ph.D from Center For International Forestry Research, Prof. Dr. Supyan Hussin from Faculty of Social Sciences and Humanities, Universiti Kebangsaan Malaysia, Dr. Jesus C Fernandez from Deputy Director for Program SEAMEO BIOTROP for coming to our city.

I would like to thank all parties, especially the Lontar papyrus L.td, PetroChina Ltd., and BPJS Kesehatan for their contribution in the conference. I wish you all enjoyable sessions in the conference.

Rector of Jambi University

Prof. Johni Najwan, M.Hum, Ph.D

Chairman of Committee's Welcome Message

Distinguished guests, respected colleagues, and ladies and gentlemen. Firstly, I want to thank our god that has given us this opportunity to gather in this conference. It is the time successfully to wrap up a year's work. Considering just how busy you all must be, thank you very much for taking your precious time to participate in the 1st Green Development International Conference.

In particular, I would like to extend my gratitude to distinguished guests from abroad. First of all, please allow me to express my sincere appreciation for: Ali Sophian Ph.D from International Islamic University of Malaysia, Meine van Noordwijk, Ph.D from World Aroforestry Center, Rachel Carmenta, Ph.D from Center For International Forestry Research, Prof. Dr. Supyan Hussin from Faculty of Social Sciences and Humanities, Universiti Kebangsaan Malaysia, Dr. Jesus C Fernandez from Deputy Director for Program SEAMEO BIOTROP for coming to our city.

The approximate 120 abstracts received cover most topical aspects of the green devolepment with four core topics: sustainable agricultere, green growth, green energy and technology, green course, Green Course redesign with technology. Leading plenary, keynote speakers, and oral presenters will present the latest advances in a variety of subjects ranging from instructional design to climate change. I welcome all of you and hope that today's event will serve as a catalyst for strengthening international cooperation on the transfer of green development.

In addition, I am most thankful for the ceaseless efforts of the head and staff members of the Institution for reseach and comunity services, and especially for all the members of comitee that come from all faculty in University of Jambi. This conference, also supported by some instution, so I would like to say thank you to: WKS, Lontar Papyrus, Setara Institute, two Center of Excelent from University of Jambi; Wahyd and Rekla, and two reseach centre from University of Jambi; Energy and nano material Research Centre, Public Health Research Centre.

Once again, I am most grateful for your participation and support. Thank you very much.

Chairman of Committee

Nazarudin

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Method of Extraction Affects Pasting Properties of Dioscorea alata's Starch

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Abstract— ***The tuber of Dioscorea alata contains considerable amount of starch which can be used for human and industrial consumption. This research was conducted to investigate the effect of type of cultivar and treatment on the tuber before starch extraction on its pasting properties. There were two type of cultivars used in this experiment: yellow and purple tubers. Three different treatments were applied to the tuber prior to the starch extraction: control, steam blanching, and drying. "Control" means soaking the sliced tubers in water for 15 minutes, "steam blanching" means steaming the whole peeled tuber at 100^{o}C for 5 minutes, and "drying" means heating the slices of tuber at 60^{o}C for 20 hours followed by 12 hours soaking in water. The starches were examined for their pasting properties using RVA. The result showed that type of cultivar did not affect the final viscosity and setback of the starch while treatment significantly affected all pasting parameters of the starch paste ($p<0.05$). Final viscosity and setback in both cultivars decreased significantly with steam blanching. On the other hand, drying was found to increase pasting temperature of the starch from purple tuber.***

Keywords—Dioscorea alata; Extraction; Pasting Properties

I. INTRODUCTION

Dioscorea alata is potential starch source for human and industrial consumption. It contains 80% starch (dw)[1] and some protein including polyphenoloxidase and peroxidase enzymes [2]. These enzymes may interfere with starch during the extraction leading to unexpected darker colour. Several treatments may be applied to inactivate the enzymes which cause the colour change [3], [4], [5]. This research was conducted to compare pasting properties of starch extracted from purple tuber and yellow tuber of Dioscorea alata and to determine the the effect of treatment on the tuber before starch extraction on the pasting properties of *Dioscorea alata's* starch.

II. MATERIALS AND METHODS

A. Material

The fresh *Dioscorea alata's* purple tubers were harvested at District of Sungai Lumpur, Bangko whereas yellow tubers were harvested from Desa Trimulya, District of Rantau Rasau, East Tanjung Jabung. The exact harvesting age of both cultivars were unknown.

B. Methods

There were 3 treatments applied before starch extraction: control, steam blanching and drying. The method of starch extractions were done following method described by Nadia, et al. [6] with some modification depend on the treatments applied. In short, the extraction which insert control treatment was as follow: the tuber was cleaned from soil, washed, peeled, rewashed, and sliced into 2mm to 3 mm slices and soaked in water for 15 minutes. To remove mucus the slices were soaked in 15% table salt for 30 minutes and rewashed for 3 times. The tuber slices were smoothed using commercial blender and the slurries were passed through 170 mesh filter. The suspension obtained were precipitated for 6 hours. The presipitate was dissolved in water again to purify the starch. The wet starch was dried in air-oven at 50^{o}C for 6 hours. The dry starch was sieved using 60 mesh filter and sealed packaged and kept at room temperature until further used. The extraction procedure which insert steam blanching treatment was as follow: the tuber was cleaned from soil, washed, peeled, rewashed, steamed at 100^{o}C for 5 minutes and sliced into 2mm to 3 mm slices. The tuber slices were then treated similar to control treatment. The procedures for starch extraction which insert drying treatment was similar to procedure for control treatment with exception on the step soaking. The soaking step in procedure for control treatment was replaced by drying at 60^{o}C for 20 hours followed by soaking in water for 12 hours.

Starches were analysed for their pasting temperature, final viscosity, breakdown and setback using Rapid Visco Analyzer. The suspensions of 7% (db) were made using 25 ml of distilled water. Each suspension was kept at 50^{o}C for 1 minute and heated up to 95^{o}C at 6^{o}C/min and held constant at this temperature for 5 minutes. The paste was then cooled down to 50^{o}C at 5^{o}C/min and kept constant at this temperature for 2 minutes. Data for pasting temperature, peak viscosity, through viscosity, and final viscosity were collected and breakdown and setback were calculated.

C. Statistical Analysis

Analysis of variance was conducted to determine the effect of type of cultivar and treatment before extraction on the

pasting properties of the starch. Duncan test was used to determine the mean difference between type of cultivar and among treatments. Data analysis was performed using SPSSv 16.

III. Result and Discussion

A. Pasting Profile

The pasting profiles of starches from purple tubers were different from that of yellow tubers (Fig. 1 and Fig. 2). Starches from purple tuber underwent significant decrease in viscosity after peak viscosity which did not occur for starches from yellow tubers. Similar properties among starches from purple and yellow tuber are also seen at their peak viscosities where starches from drying and steam blanching treatments showed lower peak viscosities consecutively. This peak viscosities reflect the ability of their starch granules to swell maximum before they finally undergo physical breakdown. The similar result showed in corn starch which underwent drying and heat moisture treatment [7], proso millet starch which underwent dry heat treatment [8] and rice starch which underwent heat and moisture treatment [9]. Lower viscosity indicates lower swelling power which denotes stronger intra and intermoleculer bonds inside granules which inhibits water to penetrate the granules [10].

B. Pasting Temperature

Pasting temperature is defined as the temperature at which paste viscosity increase rapidly. Type of cultivar had significant effect ($p<0.01$) on pasting temperature of starch. Yellow tuber of *Dioscorea* alata produced starch with higher pasting temperature than starch from purple tuber. However, this must not been seen as the effect of type of cultivar only since the harvesting age of both type of cultivars were unknown. The best way comparing these type of cultivar is by using the same harvesting age because pasting temperature is known to increase during growth [11]. The value for pasting temperature in this study were very high compared to other study (76.8^{o}C) [12]. Pasting temperature of starch from yellow tuber from this study were lower than the one obtained by Nadia (83.95^{o}C) [6]. Similar to this is the pasting temperature of starch from purple tuber were comparable to dark purple tuber only (81.95^{o}C)[6]

The treatments before starch extraction applied in this experiment showed to influence the pasting temperature of the starch (Table 1). Drying the tuber before extraction significantly increased pasting temperature of starch from purple tuber. Bond strengthening may have been promoted in starch from drying treated-purple tuber leading to a higher temperature to gelatinise the starch. Similar result also reported in corn starch [7] and rice [9]. However, the treatment of tuber with steam blanching produced no increase in pasting temperature which indicates that 5 minutes of steam blanching at 100^{o}C was not enough to supply energy to rearrange granule structure. The length of heating for 50 minutes at 100^{o}C in the present of water (heat moisture treatment) might be appropriate to induce the structure rearrangement as seen in corn [7] or 16 hours at 100^{o}C in rice [9].

C. Final Viscosity

Final viscosity was measured at the end of pasting procedure. It represents the tend of starch molecules to rebonding to each other. The actual cool viscosity may not be seen in final viscosity value since it was measured only about 2 or 3 minutes after reaching 50^{o}C. Overall, calculating the effect of type of cultivar on the pasting properties, showed that type of cultivar gave highly significant effect on pasting temperature and breakdown ($p<0.01$) but no effect on final viscosity and setback ($p>0.05$). Steam blanching and drying both affected final viscosity of starch from purple tuber but did not affect final viscosity starch from yellow tuber (Table 1). Previously reported study in millet starch showed an increase in final viscosity of the starch after dry heat treatment for 2 hours at 130^{o}C [8]

D. Breakdown

Breakdown represents the stability of starch paste during cooking/heating period. It was calculated as the difference between peak viscosity and the viscosity after constant heating. Peak viscosity is the highest viscosity achieved during cooking/heating period. Starches from purple tuber showed higher decrease of viscosity during constant heating compared to starches from yellow tuber leading to higher values of breakdown. Treatments before starch extraction affected the degree of breakdown in starch from both purple and yellow tubers. Steam blanching and drying increased the degree of breakdown of starch from purple tuber while in contrast starch from yellow tuber experienced a decrease (Table 1). The latter is more common occurs in starch treated with heating with or without the present of moisture [13]. The decrease in breakdown of starch from yellow tuber was also accompanied by the decrease in peak viscosity. The phenomenom seen in starch from yellow tuber was similar to previously reported study in millet starch which showed a decrease in breakdown of the starch after 2 hours heating at 130^{o}C [8] and corn starch which underwent heating at 100^{o}C for 50 minutes and heat moisture treatment at the same temp and length of heating and several moisture contents [7]

E. Setback

Stability of starch during cooling is measured as setback which calculated as the difference between final viscosity and the viscosity at the end of constant heating. The higher setback means the more intens retrogradation occurred in the paste. Treatment before starch extraction affected setback of starch from purple tuber only. Steam blanching decreased setback while in contrast drying increased setback of starch from purple tuber (Table 1). The effect of steam blanching is easily understood as the final viscosity was also decreased significantly.

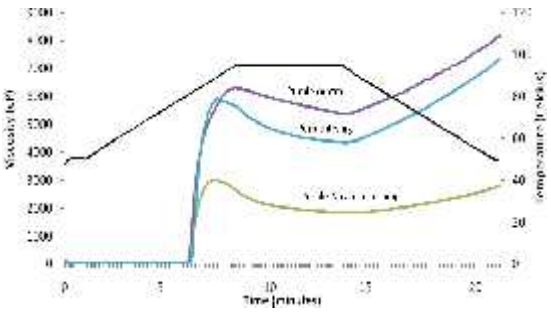

Fig.1. Pasting profile of purple tuber of Dioscorea alata's starch

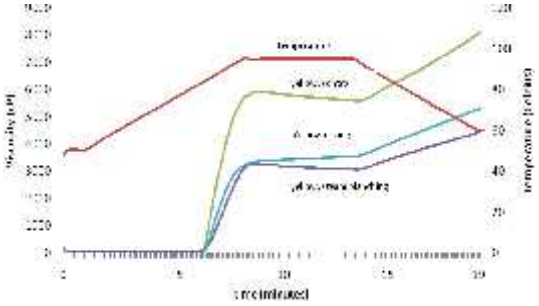

Figure 2. Pasting profile of yellow tuber of Dioscorea alata's starch

TABLE I
THE AVERAGE OF PASTING PROPERTIES AND INITIAL WATER CONTENT (%WB) OF *Dioscorea alata's* STARCHES

Properties	Purple Tuber			Yellow Tuber		
	Control	Steam blanching	Drying	Control	Steam blanching	drying
Pasting Temperature (^oC)	80.53±0.04[a]	80.70±0.28[a]	81.33±0.04[b]	82.90±0.00[a]	83.05±0.35[a]	83.53±0.25[a]
Final Viscosity (cP)	8132±29[c]	3154±1[a]	7782±103[b]	8171±18[a]	5206±117[a]	6255±1659[a]
Breakdown (cP)	927±24[c]	1195±52[a]	1573±4[b]	645±33[c]	425±37[b]	-8±0[a]
Setback(cP)	2777±78[c]	1316±0[a]	3431±75[b]	2581±151[a]	2147±39[a]	2705±785[a]
Water content (%)	11.75±0.46 [a]	11.30±0.96[a]	11.79±0.19[a]	11.46±1.79[a]	8.80±0.67[a]	11.44±2.49[a]

Numbers presented are the average of two readings and the deviations
For each tuber colour, means with the same superscript in the same row were not significantly different (p>0.05)

IV. CONCLUSION

Type of cultivar gave highly significant effect on pasting temperature and breakdown but no effect on final viscosity and setback. Unlike many treatment on starch, drying and steam blanching purple *Dioscorea alata* tuber before starch extraction decreased pasting stability. Steam blanching and drying yellow *Dioscorea alata* tuber in contrast increased stability, with drying gave the most intens impact.

Acknowledgment

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