



Udayana University  
Press

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# PROCEEDINGS

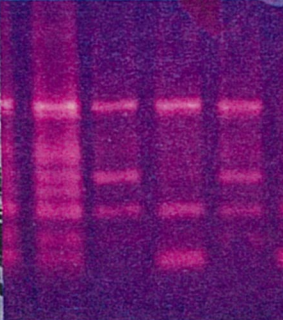
2<sup>nd</sup> International Conference  
on Biosciences and Biotechnology

**PAVE THE WAY TO A BETTER LIFE**

Udayana University, Bali, Indonesia | 23-24 September 2010

## EDITORS:

Yan Ramona (Udayana University)  
Yenni Ciawi (Udayana University)  
Made Pharmawati (Udayana University)  
Anom Sutrisna Wijaya (Udayana University)  
Nyoman Sri Budayanti (Udayana University)  
Wardhana Suryapratama (Soedirman University)  
Edy Kurnianto (Diponegoro University)  
I Nyoman Sutarpa Utama (Udayana University)  
Ida Bagus Wayan Gunam (Udayana University)  
I Made Mastika (Udayana University)  
A.A. Kartini (Udayana University)  
I Nyoman Sumerta Miwada (Udayana University)  
I Gede Suranjaya (Udayana University)  
I Gusti Putu Nugraha Yasa (Udayana University)





## Preface

This proceeding is a compilation of scientific papers presented in the 2<sup>nd</sup> International Seminar on Biosciences and Biotechnology: "Pave the Way to A Better Life" held at the University of Udayana on 23<sup>rd</sup> – 24<sup>th</sup> 2010. It includes papers (for oral and poster presentations) presented by Keynote speakers, Invited speakers, and active participants.

This conference was designed in order to gather scientists, engineers, practitioners, and industries in Biological related disciplines, so that they could discuss and share their expertise in the fields of Biosciences and Biotechnology related issues. From this intense discussion, it was expected that some brilliant ideas to be used to improve the quality of human life could be formulated, so that it was in line with the theme of the conference: "Biosciences and Biotechnology pave the way to a better life".

This 2<sup>nd</sup> International conference was held in relation to the Udayana University Anniversary and is expected to be held yearly, so that this event becomes the icon of the Udayana University in the future. The conference consisted of 8 plenary presentations delivered by keynote and invited speakers with International reputations from Japan, Australia, and Indonesia, covering general aspects of Biosciences and Biotechnology. Besides this plenary sessions, we also had four satellite symposia, covering areas of **health, agricultural technology and food science, agriculture, and biodiversity and environment**. Totally, 175 contribution papers (oral and poster presentation) were presented in this conference and they were distributed according to the areas mentioned above. The efforts of the presenters to prepare their contribution papers for this conference are highly appreciated.

This Conference was financially supported by the Rector of Udayana University through the program of Vice Rector I (Vice Rector for Academic Affair) and some sponsors (Monsanto and Kanisius press). Therefore, in this occasion, on behalf of the committee, I would like to acknowledge their financial support.

My thanks should also go to all people who were involved in the committee of the conference. Without their hard working and efforts, I am afraid would not be able to make this event to happen.

Last but not least, I hope you all enjoyed your time in Bali, not only at the venue of the conference, but also enjoyed the beauty of Bali and the friendliness of the people, so that you all brought home some unforgettable memories about the island of Bali. See you again here next year.

Chairman of the Organizing Committee



Drs. Yan Ramona, M.App.Sc., Ph.D.

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Chairman of the Organizing Committee



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## Forewords-Rector of Udayana University

Dear Distinguished guests, Invited speakers, and all other participants

This second International Conference on Biosciences and Biotechnology with the theme of Bioscience and Biotechnology pave the way to a better life is a continuation of the first International conference successfully held last year, in relation of the Udayana University Anniversary. The main aim of this conference is to gather scientists from all over the world in a venue to share their expertise in Biosciences and Biotechnology and build scientific network, so that they can develop Biosciences and Biotechnology-based methods for improving the quality of human life in the future.

In this opportunity, on behalf of the University, I welcome you all to Bali. Bali is well known as a favorite tourist destination in the world. Recently, it is also a favorite site for holding International events, such as International Conference. When people hear Bali as a site of an International conference, a lot of them will be interested to attend the event. By attending such an event in Bali, they can do two things at once. They can present scientific papers and share their expertise with other scientists known to have International reputation, and at the same time they can also enjoy the beauty of the Bali Island and the culture of Bali which is considered to be unique by foreign tourists.

Here, I would also like to acknowledge the National and International invited speakers for their willingness to come miles away to Bali and present their high standard papers. I understand that you all spend much time for this conference, and therefore I must give high appreciation on all of those effort and dedication.

I hope this International Conference become an annual agenda of Udayana University and become an ideal forum for communication and sharing ideas as well as experience in Biosciences and Biotechnology-related disciplines in the future. I also hope that this forum can serve as a forum for promoting advanced Biosciences and Biotechnology with regard to economic growth and social welfare.

Finally, I wish you most successful conference and hope that it may provide new ideas and strategies for the application of Biosciences and Biotechnology in the industries.

Rector of Udayana University,  
Prof. Dr. dr. I Made Bakta, Sp.Pd (K).



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## EFFECT OF AMYLOSE CONTENT AND TEMPERING TIME ON CHARACTERISTICS OF FRESH RICE FLOUR-BASED SPRING ROLL WRAPPERS

A. Ingani Widjajaseputra\*), Harijono\*\*), Yunianta\*\*), Teti Estiasih\*\*)

\*) Agricultural Technology Faculty - Widya Mandala Catholic University ,

\*\*) Agricultural Technology Faculty – Brawijaya University

### ABSTRACT

The effects of amylose content and tempering time on characteristics of fresh rice flour-based spring roll wrappers were investigated by using added free amylose of cassava to rice flour. The used rice flour in this research was from variety Mentik ( an Indonesian local rice variety ). Amylose content of blended rice flour ranged from 25% up to 40%. The fresh rice flour-based spring roll wrappers were made without frying oil on Teflon frying pan at 72°C during 4 minutes. After heating, the product was tempered for 30, 45 and 60 minutes at 25°C. The product was evaluated for rice starch granules size, moisture content, water activity and elongation at break. Each experiment was conducted by three replications. All of the data were analyzed by analysis of variance ( $\alpha$  5%). Duncan multiple range test ( $\alpha$  5%) was used to determine the significant difference among the treatments. The result showed that free amylose adding to rice flour blends homogenized the swelling of rice starch granules. The increasing of amylose content more than 34% increased water activity. The amylose content from 31 % up to 40% increased the moisture content but tempering time from 30 up to 60 minutes did not affect moisture content and elongation significantly. Increasing amylose content decreased elongation at break.

**Keywords:** *amylose content, tempering time, fresh spring roll, rice flour, characteristics.*

### INTRODUCTION

Tempering time of fresh spring roll wrapper is a given time to the product after heating until it can be removed from the frying-pan at room temperature. In cooling process still occur water vapor evaporation and water migration through the system slowly (Anonymous, 2007). During the process of heating and tempering occur evaporation of water to produce solid material which is a group of polymers of inter-connected polymer chains (Andersen et al., 2000). This change resulted in a drop of temperature and provided the product was in rubbery state and then became the glassy state (Moraru and Kokini, 2003). In these conditions the product will become more cohesive and it could be removed from the frying-pan easily.

Starches with higher amylose content will form stronger gel and will be more difficult to damage. Increasing of amylose content will inhibit the swelling of the granules thus maintained the integrity of the swollen starch granules. Too short tempering time will produce a sticky product which is related to high amount of surface water as a result of insufficient water migration from the surface to interior parts of the product. In contrary long tempering time will dehydrate the product (Anonymous, 2007). Longer time of tempering may increase the alignment of free amylose molecules and starch crystallization which lead to decrease of water binding ability of the system. It resulted in increasing of free water molecules that make increasing Aw (Yao et al., 2003 ). The purpose of this study is to investigate the influence of amylose content and tempering time on the characteristics of fresh rice flour-based spring roll wrappers.

### MATERIALS AND METHODS

**Materials.** Mentik rice from Candi, Nglames, Madiun, obtained from the UD. Eka Jaya rice mill, Surabaya. Rice flour obtained by grinding the rice in dry process (without



soaking) and sifted with a 80 mesh sieve size. Amylose extraction from tapioca used modified method of Takeda et al. (1986) and Patindol et al. (2003). Leghorn chicken eggs obtained from a local shop in Surabaya.

**Methods.** The research design was factorial experiment with randomized completely block design. Various factors is the amylose content consists of six levels, namely: 25%; 28%; 31%; 34% ; 37% and 40% (w / w); while tempering time with three levels of factors (30, 45 and 60 minutes) at 25°C. The observed dependent variables are starch granule size,  $a_w$ , moisture content and elongation at break. The data were processed by analysis of variance, the difference of among treatments were tested by Duncan Multiple Range Test with  $\alpha = 5\%$ . Starch granules size was measured by using Olympus DP 20 Digital Camera Microscope. Water activity was measured with a Rotronic hygrometer AW1 Hygro Palm at 85% RH + / - 1% at temperature of 25 ° C + /-2 ° C. Moisture content was measured by gravimetric method (AOAC, 2000). Elongation at break was measured by Shimadzu Autograph. The batter has been mixed to be homogeneous by placing the mixture on a magnetic stirrer with a speed of 100 rpm for 2 minutes, then placed on a Teflon material frying pan (diameter 10 cm). Heating was held at 72 ° C for 4 minutes.

**Table 1. Formula of Fresh Rice flour-based Spring Roll Wrapper**

Ingredients (g)	Amylose Content (%)					
	25	28	31	34	37	40
Rice Flour	3.00	2.85	2.70	2.55	2.40	2.25
Crude amylose of 85% purity*	0.00	0.15	0.30	0.45	0.60	0.75
White Egg	3.50	3.50	3.50	3.50	3.50	3.50
Water	6.00	6.00	6.00	6.00	6.00	6.00
Tapioca	0.50	0.50	0.50	0.50	0.50	0.50
Total (g)	13.00	13.00	13.00	13.00	13.00	13.00

## RESULTS AND DISCUSSION

### Rice Starch granules size

Data in Table 2. showed a significant difference in the effects of amylose content and there was interaction between two factors to the size of rice starch granules.

**Table 2. Rice Starch Granule Size of Fresh Rice Flour-based Spring Roll Wrappers on Different Levels of Amylose and Tempering Time**

Tempering Time (minutes)	Rice Starch Granule Size ( $\mu\text{m}^2$ )*					
	Amylose Content (%)					
	25	28	31	34	37	40
30	1596.59 h	1531.39 ef	1476.12 d	1408.92 c	1323.34b	1271.57 a
45	1568.19 g	1515.53 e	1470.49 d	1403.02 c	1321.74b	1261.59a
60	1539.75 f	1512.84 e	1468.43 d	1402.06 c	1321.91b	1260.12a
DMRT 5%	18.23 - 20.51					

\*Values in same column with different letter are significantly different based on DMRT test with  $\alpha = 5\%$

It also showed that starch granules size decreased significantly with increasing amylose content on tempering time for 30, 45 and 60 minutes.

### Water activity ( $a_w$ )

Data showed a trend of increasing in  $a_w$  as levels of amylose increasing. This phenomena could be influenced by amylose alignment molecules, the freed water molecules will lead increasing of  $a_w$ .

**Table 3.  $A_w$  of Fresh Rice Flour-based Spring Roll Wrappers on Different Levels of Amylose**

Amylose Content (%)	$a_w$ *
25	0.516 a
28	0.518 a
31	0.521 a
34	0.524 ab
37	0.529 b
40	0.539 c
DMRT 5%	0.0075 – 0.0084

\*Values with different letter are significantly different based on DMRT test with  $\alpha = 5\%$

**Table 4.  $A_w$  of Fresh Rice Flour-based Spring Roll Wrappers on Different Time of Tempering**

Time of Tempering (minutes)	$A_w$ *
30	0.520 a
45	0.526 ab
60	0.529 b

\*Values with different letter are significantly different based on DMRT test with  $\alpha = 5\%$

### Moisture Content

The average moisture content showed a trend of increasing water content as increasing levels of amylose. This phenomenon is caused by the amount of water entrapped in the gel system will be more and more with the increased amylose content. This deals with the role of amylose on gel formation (Gimeno, et al., 2004).

**Table 5. Water Content of Fresh Rice Flour-based Spring Roll Wrappers on Different Levels of Amylose Content**

Amylose content (%)	Water content (%)*
25 %	36.30 a
28 %	36.83 a
31 %	39.25 b
34 %	40.24 b
37 %	41.27 b
40 %	41.29 b
DMRT 5%	2.2834 - 2.5690

\*Values with different letter are significantly different based on DMRT test with  $\alpha = 5\%$

### Elongation

The result in Table 6 showed increasing of amylose content and it affected the distance of molecular components which decreased cohesiveness. In this condition water in the system acted as a plasticizer materials (Chang et al., 2006).



**Table 6. Elongation at Break of Fresh Rice Flour-based Spring Roll Wrappers on Different Levels of Amylose Content**

Amylose Content (%)	Elongation at Break (%)*
25	16.07 e
28	14.52 d
31	14.27 cd
34	13.71 c
37	12.03 b
40	10.96 a
DMRT 5%	0.6835 – 07690

\*Values with different letter are significantly different based on DMRT test with  $\alpha = 5\%$

### CONCLUSION

Based on the study of all the response of depended variables, it can be concluded that the treatment of amylose content of rice flour and long of tempering time influenced the characteristics of fresh rice flour-based spring roll wrappers. Amylose content in the range of 25% to 40% tend to increase the moisture content of product. Tempering is longer than 60 minutes is not recommended in relation to the decrease of elongation.

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