

**SFRN** 2019

Security in  
food,  
renewable  
resources,  
and  
natural  
medicines



# PROCEEDING

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**3rd INTERNATIONAL CONFER-  
ENCE ON SECURITY IN FOOD,  
RENEWABLE RESOURCES, AND  
NATURAL MEDICINES 2019  
(SFRN 2019)**

Convention Hall Politeknik Pertanian Negeri Payakumbuh  
INDONESIA



hosted by,  
Politeknik Pertanian  
Negeri Payakumbuh



co-Hosted by,  
Universitas Andalas  
(UNAND)

## **QUANTUM-LEAP OF AGRI-FOOD SYSTEM 4.0 AND DELIVERY OF SUSTAINABLE DE- VELOPMENTS GOALS (SDGS)**

September 25-26, 2019



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**FOOD, RENEWABLE RESOURCES, AND NATURAL**  
**MEDICINES 2019 (SFRN 2019)**

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**Convention Hall Politeknik Pertanian Negeri Payakumbuh**  
**INDONESIA**

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*Theme:*  
**“QUANTUM-LEAP OF AGRI-FOOD SYSTEM 4.0 AND DELIVERY OF  
SUSTAINABLE DEVELOPMENTS GOALS (SDGS)”**

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**Welcome Message**  
**Executive Chairman of The 3rd International Conference on Security in Food,  
Renewable resources, and Natural Medicines (SFRN) 2019**



Dear Honorable ladies and gentlemen,

Good Morning and Assalamu'alaikum wr.wb

On behalf of the SFRN 2019 organizing committee, I am really honoured and delighted to welcome all of you to the 3rd International Conference on Security in Food, Renewable resources, and Natural Medicines (SFRN) 2019 at the State Polytechnic of Agriculture Payakumbuh, West Sumatra Indonesia

Our technical program is rich and varied with 8 keynote speeches and 4 invited talks and more than 170 technical papers split between 8 parallel oral sessions and 1 poster sessions. The speakers and participants came from 8 different countries, consist of Academicians, Scientists, Researchers, Practitioners, Professionals, and Government Officials in multidiscipline branch of knowledge, who gathered here today to share and discuss new findings and applications of innovations for promoting Food Security, Renewable Energy, Sustainable Resources and HealthCare Free for All, in particular for those who in needs. As the chairman of conference 2019 SFRN, I know that the success of the conference depends ultimately on the how many people who have worked in planning and organizing both the technical program and supporting social arrangements. This year, the conference is jointly organized by the Payakumbuh State Agricultural Polytechnic and Andalas University. We also thank to the steering committee for their wise and brilliant advice on organizing the technical program; and also to the the Program Committee, both from the Payakumbuh State Agricultural Polytechnic and Andalas University , for their thorough and timely reviewing of the papers and to the Director of Payakumbuh State Agricultural Polytechnic and the rector of Andalas University, and the Head of the Institute for Research and Community Service of Andalas University, and Payakumbuh State Agricultural Polytechnic. Our recognition should go to the Organizing Committee members who have all worked really hard for the details of the important aspects of the conference programs and social activities, and then we extend our gratitude to our students who bore the arduous burden for preparing this event.

We hope this event is also a good step in gaining strengthened cooperation between our universities as we know that the State Agricultural Polytechnic of Payakumbuh is part of the Andalas University previously, of course the psychological relationship between the State Agricultural Polytechnic and the Andalas University is really close.

Finally on behalf of the committee, we apologize profusely for all the shortcomings and everything that is not properly in organizing this event and hopefully AES-Network contributes significantly to the research and technology for the good of humanity.

Thank you

**Fithra Herdian, S.TP, MP**

**Message from Afro-Eurasia Scientific (AES) Network  
3<sup>rd</sup> International Conference on Security in Food, Renewable resources, and  
Natural Medicines (SFRN) 2019**



Dear Honorable and Distinguished guests,  
Ladies and gentlemen,

Assalamu'alaikum Warahmatullahi Wabarakatuh and Good Morning

On behalf of the AES Network, I am honored and delighted to welcome you to the 3<sup>rd</sup> International Conference on Security in Food, Renewable resources, and Natural Medicines (SFRN) 2019 at the Agricultural State Poly Technique of Payakumbuh, Indonesia. I believe we have chosen a venue that guarantees a successful technical conference amid the culture, delicacy and scenery of Payakumbuh, the city of “Rendang”.

The AES-Network aims to Promote Livelihood Through Food Security, Promote Future Smart and Green Mobility by Using Renewable Energy, Promote Prosperity by Equally Managing and Distributing the Sustainable Resources and Promoting Enjoyable Long-Life by using Natural Medicines With Free Health Care For All. The AES-Network was established in 2018 and already have memberships from 12 countries. Our members consist of Academicians, Scientists, Researchers, practitioners, professionals, and government officials from multidiscipline branch of knowledge, who gathered and contributed their expertise to share and discuss new findings and applications of innovations for promoting Food Security, Renewable Energy, Sustainable Resources and Free Health Care for All. In particular, the network aims to alleviate the condition of those who in dire needs. In the future, we also expect to provide technical demonstrations, and numerous opportunities for informal networking for Promoting Food Security, Renewable Energy, Sustainable Resources and Free Health Care for All. In this opportunity, we invited you to become our members and join our efforts for a better life to all of mankind.

As a team, we acknowledge the existence of mutual interest among university and college educators, researchers, activists, business sector, entrepreneurs, policy

makers, and all society members. We must promote the need to strengthen cooperation for establishing Security in Food, Renewable Resources, and Natural Medicines in Africa, Europe, and Asia.

The AES-Network believe, a firm foundation for mutual collaboration with the spirit of equality and partnership and thereby contribute towards sustainable development in these three regions.

Therefore, through networking, friendships, and joint efforts, the capacity of our network can be enhanced to address major challenges in securing the Food, Renewable Resources, and Natural Medicines in Africa, Europa, and Asia. Our Network goals are to increase the awareness of educators, researchers, scientific community, business sector, entrepreneurs, and policy makers in Africa, Europa, and Asia, that the future of a better world, lies within their responsibilities, and to improve the networking, mobility and mutual collaboration of scientific community, business sector, entrepreneurs, and policy makers in Africa, Europe, and Asia to energize the delivery of Sustainable Development Goals.

Finally, I hope that, by registering our network, you will be provided a common platform and support the exchange of knowledge, while at the same time, we offer constructive dialogue across and within the various interest and stakeholder groups, including the intended beneficiaries, and arrived at the best solutions to our terminal goal, Promoting Food Security, Renewable Energy, Sustainable Resources and Free Health Care based on scientific evidence in Africa, Europa, and Asian region.

Thank You for Joining us!

**President**

**Assoc. Prof. Dr. Eng. Muhammad Makky**



**Welcome Message**  
**Head of Institute for Research and Community Service**  
**Universitas Andalas**



Dear Honorable and Distinguished guests,  
Ladies and gentlemen,

Assalamu'alaikum Warahmatullahi Wabarakatuh and Good Morning

It is with great pleasure that I welcome the participants of the SFRN 2019 in Payakumbuh, the city of “Rendang”, the prime of Indonesian delicacy.

In this esteem event, we share the knowledges, and imparted it to the people. The quest for knowledge has been from the beginning of time but knowledge only becomes valuable when it is disseminated and applied to benefit humankind. It is hoped that this conference will become a platform to gather and disseminate the latest knowledge which can be adopted for securing the food, resources, and health for mankind, in Asian, European and African region.

Academics, Scientists, Researchers and practitioners from multidiscipline branch of knowledge who gathered here today will be able to share and discuss new findings and applications of innovations for ensuring food security, in particular for those who reside in developing countries. It is envisaged that the intellectual discourse will result in future collaborations between universities, research institutions and industry both locally and internationally. In particular it is expected that focus will be given to issues on environmental and sustainability. Therefore, we urge to all participants, to establish a scientific network that will voice the needs

Researchers in the multi sectoral aspects related to the benefit of mankind have been progressing worldwide. Food is a basic right, while energy drive the world. Human need a lot of resources so the civilization can be flourished. But human is not immune, and thus, ones need to take care of their health regularly. Modern Agri-food systems is the foundations of a decent life, a sound education and the achievement of

the Sustainable Development Goals. Over the past decade, we have witnessed a chain reaction that threatens the very foundations of life for millions of the world's people. Rising energy prices drove up the cost of food and ate away the savings that people otherwise would have spent on health care or education. Unsustainable plantation management induced forest fire and posed haze hazard to the whole Sumatra island and our neighboring countries.

The human cost of the food and energy crisis has been enormous. Millions of families have been pushed into poverty and hunger. Thousands more suffering from the collateral effects. Over the past year, food insecurity led to political unrest in some 30 countries. Yet because the underlying problems persist, we will continue to experience such crises, again and again -- unless we act now. That is why we are here today.

We must make significant changes to feed ourselves, and most especially, to safeguard the poorest and most vulnerable. We must ensure safety nets for those who cannot afford food, or energy, nor even a health service. We must transform agricultural development, markets and how resources is distributed. We must do so based on a thorough understanding of the issues. That is the only possible way we can meet the Goals of Sustainable Development.

Thank You,

**Assoc. Prof. Dr.-Ing. Uyung Gatot S. Dinata,MT.**

**Opening Ceremony  
Rector of Andalas University**



Dear Honorable and Distinguished guests,  
Ladies and gentlemen,

Assalamu'alaikum Warahmatullahi Wabarakatuh and Good Morning

I welcome the opportunity to address you at this important event.

It gives me great pleasure in welcoming you to this 3<sup>rd</sup> Conference on "Security in Food, Renewable resources, and Natural Medicines (SFRN)" 2019. I am delighted that so many have accepted our invitation. I am particularly happy that we have in this room, dedicated individuals from so many stakeholder groups — including our most respected and distinguished guest “The ministry of Agriculture of the Republic of Indonesia”. We also welcome the mayor of Payakumbuh and the Regent of Lima Puluh Kota. We extend our welcome to the civil society, the private sector, international organizations; the science community; and others dedicated to help create an environment in which people can escape food insecurity. Imagine what we can do together if we make the security for all as an our top priority, and pull in the same direction. We can make a difference in the lives of millions.

Food is a basic right. Food security are the foundations of a decent life, a sound education and the achievement of the Sustainable Development Goals Access to medicines - a fundamental element of the right to health. Health is a fundamental human right, indispensable for the exercise of many other rights in particular the right to development, and necessary for living a life in dignity. Moreover, human rights principles and language are being used to support resource access claims as rights-based approaches empower individuals and groups to gain or maintain access to natural resources

Much progress has been made during the last decades but much more needs to be done. Millions of people are Insecure worldwide, meaning that they either starve or they do not know from where their next meal, health care or resources will come.

Much of the progress on security has occurred at the expense of our environment. With business as usual, we foresee that the production improvements during the next decade will be less than the last one, while the environmental degradation will continue, and health will deteriorate significantly. Without available resources to seek, mankind will become endanger species in a very short time.

Solutions to the security problems need to be designed and implemented within a new and rapidly changing environment. Globalization and sweeping technological changes offer new opportunities for solving these problems. A number driving forces or trends must be taken into account in developing appropriate action. Some of the action needed, such as appropriate technology for small farms, is not new but it must be cast in the new and changing global and national environment, taking into account new opportunities and risks. I hope that by providing a forum for knowledge exchange, this conference will help identify the action to be taken. Furthermore, this conference will help to provide constructive dialogue across and within the various interest and stakeholder groups, including the intended beneficiaries, and arrive at the best solutions.

In conclusion, even if those responsible give high priority to achieving sustainable security for all and back it up with action, the world may not achieve the goal by 2030. But we will be much closer than with business as usual. I urge all of us to provide the strongest support for this event, to enable securing the food for all in the closest time possible. It is my sincere optimism that through the accomplishment of the objectives of this event, we will come to an important step nearer to secure the food for all.

Finally, I would like to thank the organizing committee who have spent their utmost efforts to prepare and manage this event successfully. Let me conclude my remarks by wishing our guests happiness, good luck and great success in the conference.

May I announce now the opening of the “3<sup>rd</sup> International Conference on Security in Food, Renewable resources, and Natural Medicines (SFRN) 2019” in Payakumbuh.

Thank you.

**Rector,**  
**Prof. Tafdil Husni, SE, MBA, PhD**

**Welcome Message**  
**Director of Politeknik Pertanian Negeri Payakumbuh**



Dear Honorable ladies and gentlemen,

Good Morning and Assalamu'alaikumwr.wb

I congratulate to all participants on the invitation and participate at our beloved campus Payakumbuh State Agricultural Polytechnic. I feel really honoured to welcome all of you at our event, the 3rd International Conference on Security in Food, Renewable Resources, and Natural Medicines (SFRN) 2019 at the Payakumbuh State Agricultural Polytechnic, Indonesia.

Food security is a very important aspect in a country's sovereignty. Food also determines the future direction of a nation. Many social and political fluctuation can also occur if food security is disrupted. Food availability that is smaller than its needs can create economic instability. This critical food condition can even endanger economic and national stability. In the current situation, there are many challenges in exteriorize food security, such as climate change, population, limited natural resources and other challenges both locally, regionally and globally.

Renewable resources are also our starting point to start sustainable development. Research on renewable resources is also very important as the solution in meeting the principles of sustainable development. As we know that Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Sustainability is the foundation for today's leading global framework for international cooperation - the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs)

The discovery of treatment based on local culture also contributes greatly to the good of humanity. Unfortunately, there are still many treatments that have not been carried out by scientific research. So, through this conference we hope it can be a trigger to increase in traditional plant-based treatments that not go through complex

chemical processes, so that the effectiveness of the pillars can be further suppressed and also contribute to the community's economy.

Finally, I would like to express my gratitude to all people who involved in organizing this event and to all of stakeholders who have helped to make this event go on successfully. Please accept my apologize for any shortage, Assalamu'alaikumwr.wb.

Thank you

**Ir. Elvin Hasman, MP**

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## Nutrient Contents of Parboiled Rice as Affected by Palm Oil Addition

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**Abstract.** This study aims to evaluate the nutrient contents of rice after the partially boiled process and the addition of various concentrations of palm oil. The result showed that modification of palm oil and parboiled process on paddy was not significantly increased water, protein, and carbohydrate, but increase its ash and fat content in 20% oil addition substantially. The increase in fat content is indicated to increase the complexity of the ingredient and has the potential to have a low glycemic index.

**Keywords:** concentration, nutrients, palm oil, parboiled, rice.

### INTRODUCTION

The number of people with Diabetes Mellitus (DM) in Indonesia is estimated at 10 million and ranks seventh in the world for the highest prevalence of DM sufferers. This number tends to increase every year. Considering that DM will have a significant impact on the quality of human resources and rising health costs. Various efforts have been made to prevent and prevent DM from one of them through the selection of appropriate foods. Rice, as the primary food ingredient for Indonesian people, influences the increased risk of DM disease.

The majority of Indonesian people like to consume fluffier rice. The mentioned rice is not recommended for people with DM because it is hyperglycemic (low amylose and high IG). Therefore, it needs rice processing technology to produce rice with high RS and low IG. Parboiled rice is produced from unhulled rice, which has a lower GI than ground rice (Foster-Powell *et al.* 2002). Besides, the study of Farooq *et al.* (2017) found that the addition of palm oil to the process of cooking rice increases resistant starch and decreases the digestibility of starch *in vitro*. However, it is necessary to know in advance how the nutrient content of parboiled rice is due to the pre-cooking process and the addition of palm oil.

This study aims to evaluate changes in the nutritional quality of rice that has been modified by the parboiling process and the addition of several concentrations of palm oil in the pre-cooking process compared to ordinary rice without the parboiling process and palm oil addition.

## MATERIAL AND METHODS

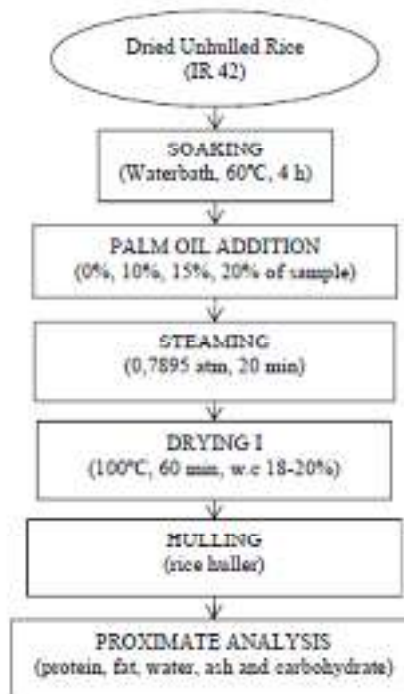
### A. Material

The research material includes a high-amylose variety of rice seeds (IR42), which were obtained from Limo Kaum Village, Tanah Datar District, West Sumatra. Modified parboiled rice is obtained by adding Sania palm cooking oil in different concentrations (i.e., 0%, 10%, 15%, and 20% of the total grain) in the parboiling process. Analytical grade chemicals for rice nutrition quality analysis.

The tools used in research, tools for making parboiled rice include water baths, presto, hullers, and tools for analyzing the quality of rice nutrition.

### B. Methods

The parboiling process refers to the practice carried out by Widowati with some modifications (Figure 1).



### C. Statistical Analysis

The researchers conducted all experiments in triplicates, and describe the data as mean  $\pm$  standard deviation (S.D). One-way analysis of variance (ANOVA) and Duncan's multiple range test was carried out to determine the significant difference ( $p < 0.05$ ) between the means by Statistical Packages for Social Sciences (SPSS version 12.0).

## RESULT AND DISCUSSION

### A. Water Content

Water content resulted in this study ranged from 14.38 to 16.36% each treatment, and after the treatment process of treatment A (15.53%), B (15.75%), C

(16.36%), and D (14.38%) in table 1. Different test results between each treatment did not show any significant difference ( $p > 0.05$ ). Water is an essential component in food because it affects the texture, appearance, and taste of food. Low water content in food can affect the shelf life. It happens because microbes are challenging to grow in dry conditions. It also can prevent chemical and biochemical changes in rice. Data for measuring water content using the gravimetric method (Association of Official Analytical. 2006). is showed in the following Tabel I.

Table 1. Water Content

<b>Treatments</b>	<b>Water Content (%) <math>\pm</math> SD</b>
D (20% oil addition)	14.38 $\pm$ 0.38 a
A (0% oil addition)	15.53 $\pm$ 1.45 a
B (10% oil addition)	15.75 $\pm$ 3.17 a
C (15% oil addition)	16.36 $\pm$ 0.31 a

\*) Mean value in each column with the same letter are not significantly different by DMRT ( $p=5\%$ )

#### B. Ash Content

All treatments carried out increased ash content. The ash content can roughly reflect the mineral content contained in rice. The mineral is in the form of oxide, sulfate, phosphate, nitrate, and chloride salts. The increase in ash content in each treatment is also likely to come from the component added material, namely palm oil. From the data produced, ash parboiled rice showed no significant difference ( $p > 0.05$ ). According to Hasbullah et al. (2012), the parboiling process can increase ash content by 0.32 to 0.33%, which is caused by minerals contained in palm oil absorbed into parboiled rice.

Table 2. ash content

<b>Treatments</b>	<b>Water Content (%) <math>\pm</math> SD</b>
A (0% oil addition)	1.01 $\pm$ 0.09 a
B (10% oil addition)	1.02 $\pm$ 0.08 a
C (15% oil addition)	1.21 $\pm$ 0.09 a
D(20% oil addition)	1.63 $\pm$ 0.08 b

\*) Mean value in each column with the same letter are not significantly different by DMRT ( $p=5\%$ )

#### C. Protein Content

The protein content of parboiled rice in each treatment ranged from 7.60-9.10%. In each treatment, protein levels decreased. According to Akhyar (2019), the protein content of parboiled rice is lower than that of hulled rice due to the presence of heat, which can damage the protein (degraded and coagulated), thereby reducing the protein content (Muchtadi, D. 2001). The main fractions of protein in cereals are promalin and globulin. Proteins that contain lots of polar amino acid residues (e.g., albumin and globulin) will be more soluble in water (Kusnandar, Feri. 2010). The parboiling process can decrease protein caused by protein dissolved in water during

the parboiling process (Widowati, S. *et al* 2009). The results in each treatment showed that the protein content was not significantly different ( $p > 0.05$ ). Protein content using the Kjeldahl method (Association of Official Analytical. 2006), the following results were obtained in Table 3.

Table 3. Protein Content

<b>Treatments</b>	<b>Water Content (%) <math>\pm</math> SD</b>
D (20% oil addition)	7.60 $\pm$ 0.40a
B (10% oil addition)	7.97 $\pm$ 1.33a
A (0% oil addition)	8.69 $\pm$ 0.84a
C (15% oil addition)	9.10 $\pm$ 1.32a

\*) Mean value in each column which the same letter are not significantly different by DMRT ( $p=5\%$ )

#### D. Fat Content

Fat content in parboiled rice with the addition of palm oil ranged from 2.43-4.12%. For each treatment, the fat content has increased. This increase in fat content is due to the addition of palm oil. During the parboiling process, gelatinization of starch occurs and the formation of amylose and lipid complex crystals whose levels are affected by temperature and water content (Derycke, V *et al* 2005). Test results on treatments C and D showed significantly different ( $p < 0.05$ ). Fat content using the soxhlet method (Association of Official Analytical. 2006) is shown in Table 4 below.

Table 4. Fat Content

<b>Treatments</b>	<b>Water Content (%) <math>\pm</math> SD</b>
A (0% oil addition)	2.43 $\pm$ 0.33 a
B (10% oil addition)	2.64 $\pm$ 0.06 a
C (15% oil addition)	2.77 $\pm$ 0.01 ab
D (20% oil addition)	4.12 $\pm$ 0.93 b

\*) Mean value in each column with the same letter are not significantly different by DMRT ( $p=5\%$ )

High-fat content in parboiled rice can also reduce the value of the glycemic index because high fat and protein tend to slow the rate of gastric emptying so that it can delay the digestion process. It happens because the glycemic index value decreases (Rimbawan dan A. Siagian. 2004).

#### E. Carbohydrate Content

The researchers calculated the carbohydrate content using different methods. Carbohydrate content in parboiled rice ranges from 70.59 to 72.62% for each treatment. The test results for each treatment did not show significant differences ( $p > 0.05$ ). Carbohydrate content using the different methods (Association of Official Analytical. 2006), the following results are obtained in Table 5.

Table 5. Carbohydrate Content

Treatments	Water Content (%) $\pm$ SD
C (15% oil addition)	70.59 $\pm$ 1.20 a
D (20% oil addition)	72.28 $\pm$ 2.93 a
A (0% oil addition)	72.35 $\pm$ 4.10 a
B (10% oil addition)	72.62 $\pm$ 0.01 a

\*) Mean value in each column with the same letter are not significantly different by DMRT (p=5%)

## CONCLUSIONS

The result of this study showed that parboiled rice with the addition of oil was not significantly different on water, protein, and carbohydrate content. The addition of oil has a very significant effect on ash content and fat content on 20% oil addition. The increase in fat content indicated that the rise in the complexity of the ingredient and decrease the glycemic index.

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## REFERENCES

- Akhyar. 2009. Pengaruh Proses Pratanak Terhadap Mutu Gizi dan Indeks Glikemik Berbagai Varietas Beras Indonesia [tesis]. Bogor (ID): Institut Pertanian Bogor.
- AOAC (Association of Official Analytical). 2006. Official Methods of Analytical of The Association of Official Analytical Chemists. Washington, DC: AOAC.
- Derycke, V., Vandeputte G.E., Vermey R., De Man W., Godens B., Koch M.H.J., Delcour J.A. 2005. Starch Gelatinization and Amylose-Lipid Interactions During Rice Parboiling Investigated by Temperature Resolved Wide Angle X-Ray Scattering and Differential Scanning Calorimetry. *J Cer Sci* 42: 334-343
- Farooq, A.M., Dhital, S., Li, C., Zhang, B., Huang, Q. 2017. Effects of Palm Oil on Structural and In Vitro Digestion Properties of Cooked Rice Starches. *International Journal of Biological Macromolecules* (xxx): xx-xx <https://doi.org/10.1016/j.ijbiomac.2017.09.089>
- Foster-Powell, K.F., Holt, S.H.A., and Miller, J.C.B., 2002. International Table of Glycemic Index and Glycemic Load Values. *The American Journal of Clinical Nutrition* 76: 5-56.



- Hasbullah, R., Septiani, Shafwati, R.A. 2012. Pengaruh Lama Pengukusan Terhadap Mutu Beras Pratanak pada Gabah Varietas Situbagendit. *Prosiding Seminar Nasional PERTETA* Malang Jawa Timur.
- Kusnandar, Feri. 2010. Kimia pangan Komponen Makro. PT. Dian Rakyat. Jakarta
- Muchtadi, D. 2001. Sayuran Sebagai Sumber serat Pangan Untuk Mencegah Timbulnya Penyakit Degeneratif. *J. Teknologi dan Industri Pangan*, 12: 61-71.
- Rimbawan dan A. Siagian. 2004. *Indeks Glikemik Pangan*. Jakarta: Penebar Swadaya.
- Widowati, S., Susila, Santosa B.A., Astawan M., Akhyar. 2009. Penurunan Indeks Glikemik Berbagai Varietas Beras Melalui Proses Pratanak. *J Pascapanen* 6(1):1-9.