

ISOLATION AND THE B-GALACTOSIDASE ENZYME ACTIVITY TEST OF LACTIC ACID BACTERIA FROM CABBAGE FERMENTATION (*BRASSICA OLERACEA L.*) (ID 262105)

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ABSTRACT

Cabbage is one of the local vegetables that can be used as a source of Lactic Acid Bacteria (LAB) producing the β -Galactosidase enzyme. β -galactosidase enzymes is useful for overcoming digestive problems in people with lactose intolerance. The aim of this study was to obtain several lactic acid bacteria isolates from cabbage fermentation (*Brassica oleracea L.*) which had the ability to produced the enzyme b-galactosidase. The enzyme activity test was carried out by looked the ability of the β -Galactosidase enzyme to decompose lactose into monosaccharide. This study began with isolation of LAB from cabbage fermentation, then characterization of LAB macroscopically and microscopically. The selected LAB isolates was measured their enzyme activity used the visible spectrophotometer with o-nitrophenyl- β -D-galactopyranoside (ONPG) substrate followed by the protein content test with Bradford's method. The isolation results got six isolates of LAB which were selected based on macroscopic and microscopic characterization and had the activity of β -galactosidase enzyme. K32 isolate had the highest activity of 0.2567 U / ml with a protein content of 0.7827 mg / ml. from the result can be concluded that lactic acid bacteria in cabbage can produced β -galactosidase enzyme.

INTRODUCTION

β -galaktosidase or also known as lactase is an enzyme that breaks lactose into simple sugars, namely glucose and galactose. The β -galactosidase enzyme is commercially used in the production of milk or lactose-free milk products so that it is very useful in the health sector, especially for patients with lactose intolerance [7] β -galactosidase enzymes are widely can be obtained from several sources including microorganisms, plants, and animals [6]. Enzymes isolated from microorganisms are more easily separated and purified after being secreted into microorganism growth media compared with plant and animal sources [16]. One of the microorganisms that can produce the β -galactosidase enzyme is lactic acid bacteria.

Lactic acid bacteria can be found in raw food and fermented foods such as dairy products and salted vegetables [4]. Vegetable is a food that can be fermented naturally because vegetables contain sugar and nutrients needed for the growth of lactic acid bacteria [3]. One source of vegetables that can be used to isolate lactic acid bacteria is cabbage (*Brassica oleracea L.*).Based on research by Misgiyarta and Widowati (2006), as many as eleven isolates of lactic acid bacteria were found in cabbage. Some microorganisms, especially *Leuconostoc* and *Lactobacillus* species can grow fast in the presence of salt. Salt and acids produced during fermentation can inhibit the growth of pathogenic microorganisms and delay softening of cabbage tissue [3].

RESULT AND DISCUSSION

The lactic acid bacterial isolation is conducted using a multilevel dilution method from dilution 10^{-1} to dilution 10^{-7} . This study results in six selected isolates: K31, K32, K33, K34, K35, and K36. The isolation result of lactic acid bacteria may be seen in Figure 1 below

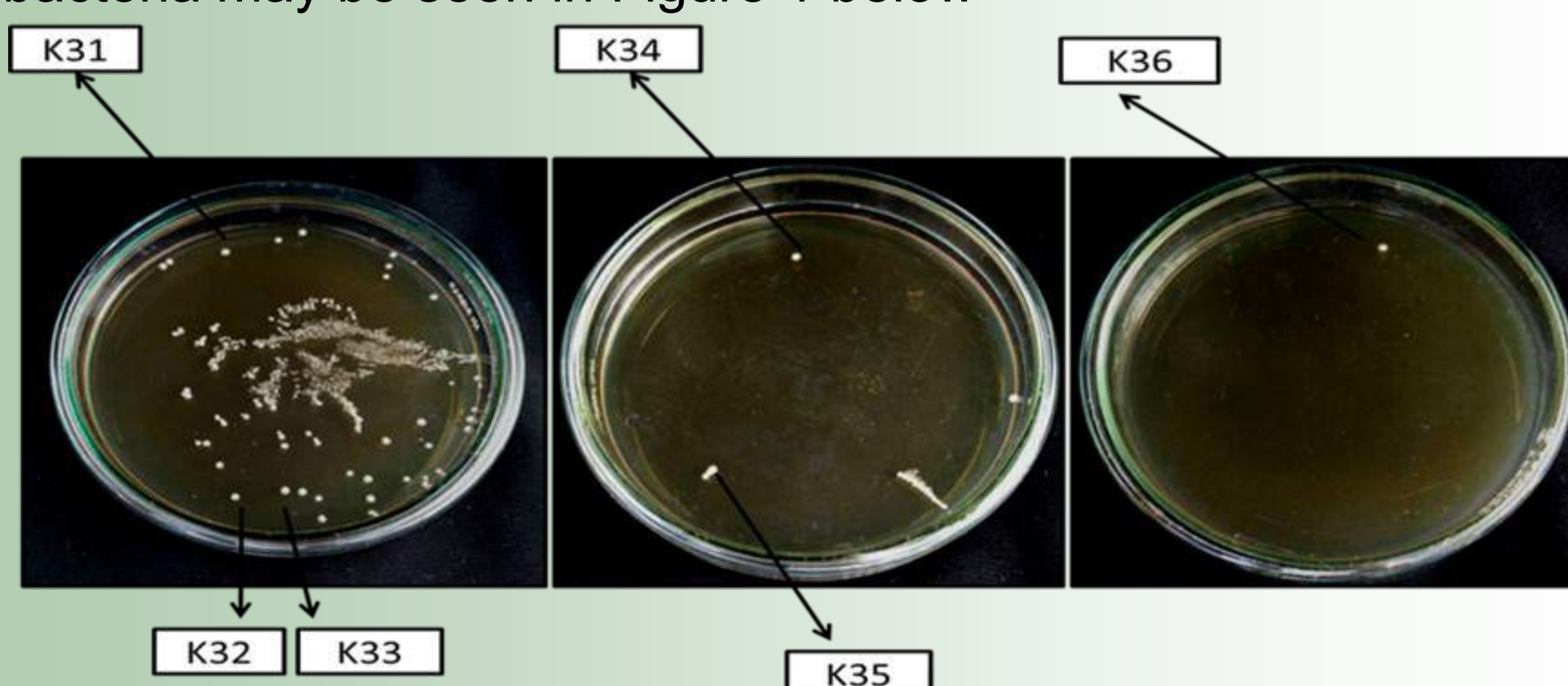


Figure 1. Isolation result of Lactic Acid Bacteria derived from the Cabbage Fermentation: a. Dilution 10^{-5} , b. dilution 10^{-6} , c. dilution 10^{-7}

Table 1. Calculation of β -Galactosidase Enzyme Activity Test

Kode Isolat	Rerata Aktivitas Enzim (U/ml)
LP	0,7470 \pm 0,0020
K31	0,2556 \pm 0,0005
K32	0,2567 \pm 0,0006
K33	0,2236 \pm 0,0000
K34	0,2168 \pm 0,0005
K35	0,2021 \pm 0,0010
K36	0,2035 \pm 0,0006

Based on the data in Table 1 it can be seen that K32 isolates was higher β -galactosidase enzyme activity than other isolates, which was 0.2567 U / ml. The enzyme activity of β -galactosidase in *Lactobacillus plantarum* had activity of β -galactosidase higher than the isolates of lactic acid bacteria, which was equal to 0.747 U / ml. In this study, the results of the activity were not too large caused by several factors, which were the influence of temperature and pH were not optimal.

METHODS

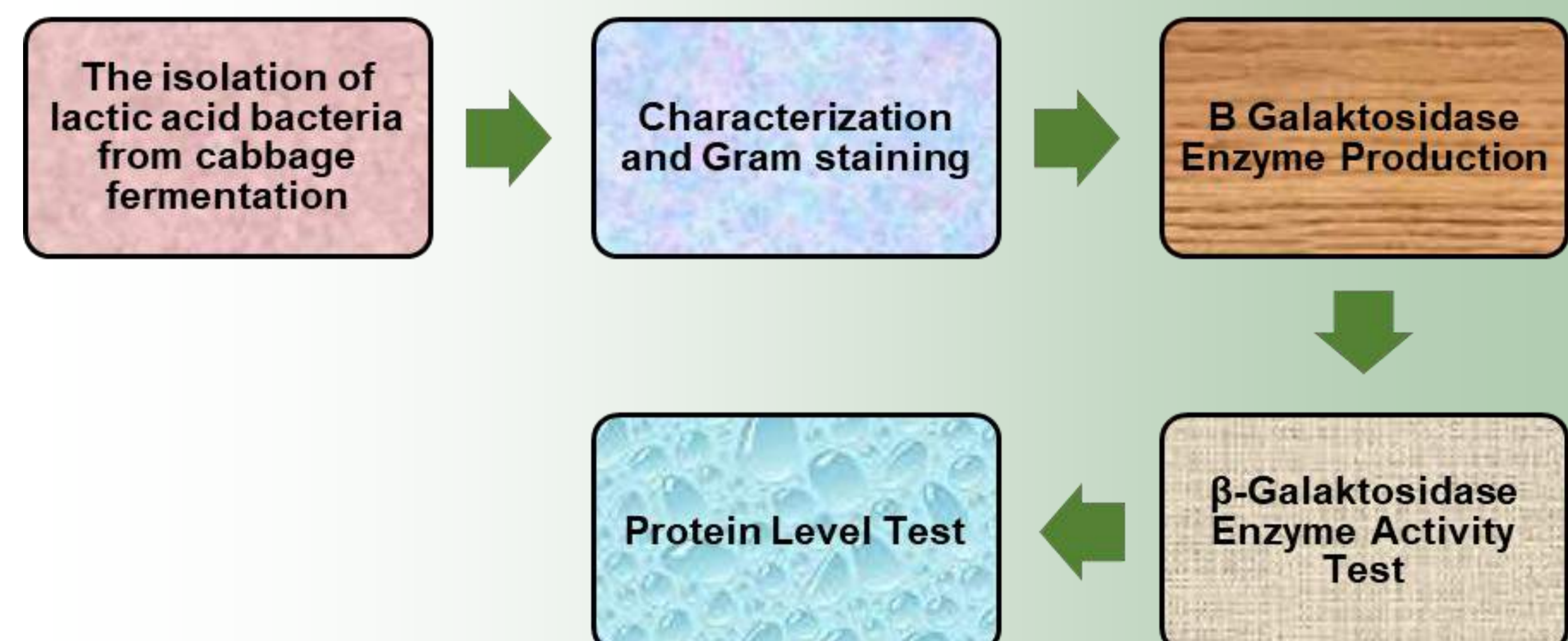


Table 2. Results of Calculations of β -Galactosidase Enzyme Protein Levels

Kode Isolat	Rerata Kadar Protein (mg/ml)
LP	1,9160 \pm 0,005
K31	0,7527 \pm 0,007
K32	0,7827 \pm 0,005
K33	0,7068 \pm 0,003
K34	0,6985 \pm 0,004
K35	0,6577 \pm 0,005
K36	0,6693 \pm 0,003

Based on Table 2 from six isolates of lactic acid bacteria and *Lactobacillus plantarum* bacteria showed that the highest protein content in *Lactobacillus plantarum* bacteria was 1,9160 mg / ml, While the lactic acid bacteria isolate that produced the highest protein was K32 isolate with a protein content value of 0.7827 mg / ml.

CONCLUSION

Based on testing the enzyme activity of β -galactosidase in the six isolates of lactic acid bacteria obtained from cabbage fermentation, it is known that K32 isolate has the highest β -galactosidase activity of 0.2567 U / ml with a protein content value of 0.7827 mg / ml.

REFERENCES

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Centennial Commemoration of ITB and Indonesian Higher education in Engineering

Bandung International Conference and Expo on Food and Health

Bandung, 26 – 28 September 2019

TABLE OF CONTENT

WORDS AND GREETINGS

PREFACE

GOALS

SCIENTIFIC PROGRAM

SPEAKERS

CONFERENCE DETAIL

RUNDOWN

THE EXPO

BUDGET

COMMITTEE

SPONSORSHIP



WORDS AND GREETINGS



Prof. Dr. Ir. Kadarsah Suryadi, DEA (Rector of ITB)

The study program in science and technology on food and health is one of the 3 study programs that became the forerunner of ITB. At present, the field has grown rapidly with the growth of the related products industry. The effect of food on health is enormous. The type of food will determine the level of human health. Efforts to get high quality food can help maintain health, prevent disease and even help treat illness. The quality of public health is a leading indicator for all countries and goals that must be achieved in various ways by successful countries.

Finally, I hope that ITB can play more significant role in improving the quality of food and health products which in turn can contribute to achieve high public health indicators



Prof. Boy Kombaitan (Chairman P-100 ITB & PTTI)

The main strategy for improving public health status, aside from efforts to treat existing diseases, is to improve the quality of health to minimize disease outbreaks. In addition to the use of pharmaceutical products, food plays a major role in determining the quality of public health.

Recent developments in science and technology have broadened our knowledge pertaining to the correlation between the food we consume, our physiological functions, and food-borne illnesses

With this consideration, the discussion was chosen as one of our International conference's theme in road to one hundred years of ITB as Indonesian Higher Education in Engineering.

Dr. Elfahmi, S.Si., M.Si. (OC Chairman)



As part of the centennial commemoration of Indonesian Higher Education in Engineering, Bandung Institute of Technology under the coordination of Research Center of Biosciences and Biotechnology will held International Conference and Expo on Food and Health in Bandung, 26 – 28 September 2019.

The International Conference will present as one of the multi-disciplinary platform in the world of Food and Health science. The conference will offers an excellent opportunity incorporating the agenda into academic research and policy making, as well as communicating its problems and potential solutions in a scholarly and practically relevant discussion.

We invite you to review this sponsorship proposal and wide range of sponsorship opportunities. Your participation will not only enable you to reach an international audience of key stakeholders, but it will also contribute to advancing the scientific and research knowledge in the field as well as promoting better access to integrate research and policy making.





PREFACE

The science and technology in the field of food and health is developing rapidly reviewed from various aspects. This advancement is due to the development on various Food and Health produced by related Industry. The influence of food on health is enormous. The type of food will greatly determine the level of human health. The efforts to get high quality food could help maintain good health, prevent disease and even help treat illness. The quality of public health is a key indicator for all countries and a goal that must be achieved in various ways by successful countries.

The main strategy to improve community health status, aside from efforts to treat existing diseases, is by improving health quality to minimize outbreaks of disease. In addition to the use of pharmaceutical products, food plays a major role in determining the quality of public health.

The relation between food, physiological function and disease is increasingly understandable scientifically through the recent development of knowledge and technology.

Currently food is not only consumed as a source of nutrients and energy but also to provide health benefits. Foods providing health benefits are known as nutraceutical. The health benefits of nutraceutical products need to be scientifically proven through quality researches. The global nutritional market significant and has promising value. The global economic value for nutraceutical products is increasing with growth rates ranging from 7-14%. The economic value earned in 1999 was 38.2 billion US dollars has rose to US \$ 205.39 in 2016 and is expected to grow to US \$ 294.79 in 2022 The economic value is spread across the world with the largest number available in Asia Pacific countries followed by countries in North America and Europe. (Figures 1 and 2). Although the growth of the nutraceutical industry has notable increase, this improvement is still considered new and still in the early stages, with the sense that it is still growing rapidly.



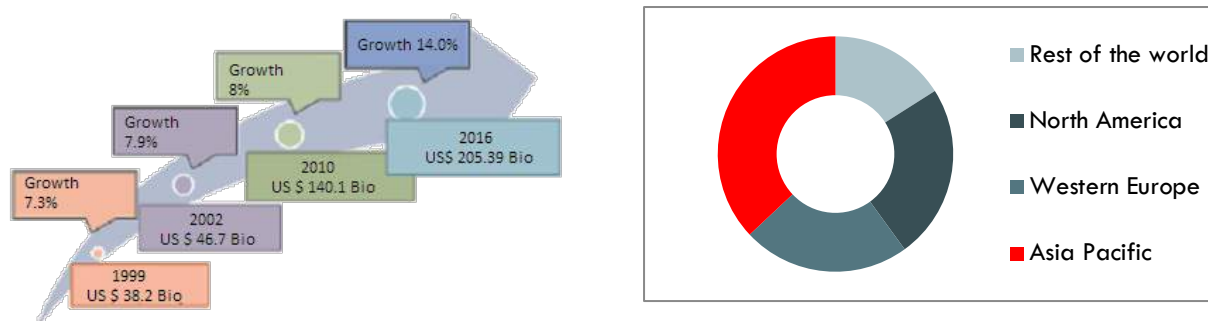


Figure 1. Growth and value of the global market economy of nutraceutical products (left) and regional contribution (right) (Frost & Sullivan, Chauvan, et.al, 2014)

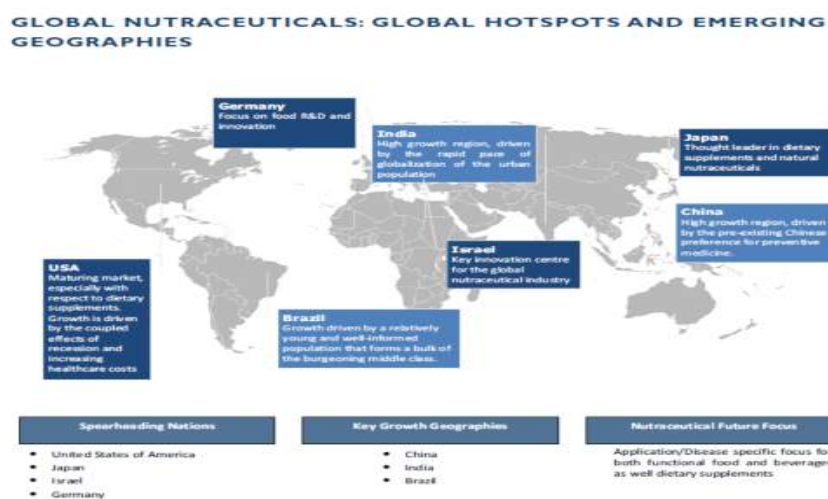


Figure 2. Distribution and growth of nutraceutical products in the world (Frost & Sullivan)

Indonesia is an important market for nutritional food marked by the large number of food and nutraceutical products in the national market derived from imported products and local products. Research that supports the development of nutraceutical products in Indonesia has also started to develop, while raw materials for nutraceutical products are abundant in Indonesia in addition to the raw materials obtained from the development of biotechnology products. Various developments in the knowledge and technology of food and health sector will be the main topic in Bandung Food and Health Conferences and Expo 2019 (BFHC & Expo 2019). This event will be held by Bandung Institute of Technology under the coordination of Research Center of Biosciences and Biotechnology, in commemoration of 100 Years ITB.

BFHC & Expo 2019 includes scientific activities in the form of conferences with speakers from Indonesia and abroad as well as exhibitions from food and health industries and other related businesses.





1. To be a tool for researchers, government and industry from Indonesia and abroad to share information on logging, research, regulation, food and health products
2. To build and strengthen networks between research, government, industry and society in producing quality food and health products.
3. To promote the national and international Food and Health industries through expo involving the participants in a large group.
4. To update research and food and health development by researchers from various academic, research and industry.



The conference will be held for 3 days consisting of morning and afternoon sessions. The program consists of presentations by keynote lecturers, plenary lectures, invited speakers sessions, oral presentation and poster presentations. The topics included in this seminar are various topics related to Food and Health such as:

1. Nutraceutical
2. Food safety
3. Natural sources of food
4. Pharmacy
5. Health
6. Food industries and manufactures
7. Biotechnology
8. Nanotechnology
9. Biology
10. Chemistry
11. Others





Keynote Speakers



Nila F. Moeloek, Sp.M
Indonesia Ministry of Health



Ir. Airlangga Hartarto, MBA,
MMT
Indonesian Ministry of Health



Dr. Ir. Peny F. Lukito, MCP
Head of NADFC (BPOM
RI)

Plenary and Invited Lectures

1. Kepala BPOM RI
2. Dirjem Kemenkes
3. Direktur Utama PT Kalbe Farma
4. Prof. Mario Enrico Pe, Scuola Superiore Sant Anna
5. Dr. Marwan Diapari, Canada
6. Dr. Beben Benyamin, Australia
7. Dr. Mario Rosario Guarracino
8. Prof. H. Sunny Sun, Ph.D.
9. Prof. Oliver Kayser (Germany)
10. Prof. Maike Pettersen (Germany)
11. Prof. Robert Verpoorte (The Netherlands)
12. Prof. Ikuro Abe (Japan)
13. Prof. Masahiro Toyota (Japan)
14. Prof. Wang Tao (China)
15. Dr. Pulok Mukherjee (India)
16. Prof. Abdul Ghani (Bangladesh)
17. Prof. Takashi Yamakawa (Japan)
18. Prof. Jong Hoon Ryu (Korea)
19. Prof. Chun-Tao Che, Ph.D. (USA)
20. Prof. Dr. Asep Gana Suganda (Indonesia)
21. Prof. Dr. Elin Yulinah (Indonesia)
22. Prof. Michael Heinrich (England)
23. Dr. Tim Bugni (USA)
24. Direktur Nutrifood

*Note : *and other foreign speakers are awaiting confirmation*



Abstract Submission

The participants are invited to submit abstract for oral or poster presentation on-line via our website <http://www.bicfh2019.com>. The deadline for abstract submission is June 2019. Accepted papers by the Scientific committee will be available on the website and included in the conference CD and abstract book once registration fees have been received.

Language

The official language of the Seminar is English

Registration

Participants should make on-line registration on: <http://www.bicfh2019.com> before 10 July 2019

Registration Fee

Categories		Early Bird (by August 10 th , 2019)	Regular	On site
International	Presenter	225 USD	250 USD	275 USD
	Participant : <ul style="list-style-type: none">Private organization/companyAcademic Faculty	400 USD	600 USD	750 USD
			250 USD	300 USD
	Student	125 USD	150 USD	175 USD
National	Presenter	1,500,000 IDR	2,000,000 IDR	2,500,000 IDR
	Participant : <ul style="list-style-type: none">Private organization/companyAcademic Faculty	2,500,000 IDR	3,000,000 IDR	3,500,000 IDR
			1,200,000 IDR	1,500,000 IDR
	Student	350,000 IDR	500,000 IDR	600,000 IDR

For further information please contact:

Dr. Elfahmi at +62-22-2504852, +62-81386475894, elfahmi@fa.itb.ac.id





Rundown (tentative)

Day/date	Time	Activities			
Thu, 28 Sept 2019	07.30 – 08.30	Registration			
	Opening Ceremony				
	08.30 – 08.35	Indonesian Anthem : Indonesia Raya			
	08.35 – 08.45	Report of Organizing Committee (Dr. Elfahmi)			
	08.45 – 09.00	Rector speech for 100 years of ITB (Prof. Dr. Ir. Kadarsah Suryadi, DEA)			
	09.00 – 09.15	Opening speech (Ministry of Health, RI)			
	09.15 – 10.00	Keynote lecture (Ministry of Health, RI)			
	10.00 – 10.30	Coffee Break			
	10.30 – 11.15	Plenary lecture 1 (Dr. Ir. Peny F. Lukito, MCP, Head of NADFC /BPOM RI)			
	11.15 – 12.00	Plenary lecture 2 (Ministry of Industry, RI)			
	12.00 – 13.30	Lunch break and Posters			
	Parallel Invited Speakers				
	West Hall		East Hall		
		Room 1	Room 2	Room 3	Room 4
	15.30 – 15.45	Oral presentation 1	Oral presentation 7	Oral presentation 13	Oral presentation 19
	15.45 – 16.00	Oral presentation 2	Oral presentation 8	Oral presentation 14	Oral presentation 20
	16.00 – 16.15	Oral presentation 3	Oral presentation 9	Oral presentation 15	Oral presentation 21
	16.15 – 16.30	Oral presentation 4	Oral presentation 10	Oral presentation 16	Oral presentation 22
	16.30 – 16.45	Oral presentation 5	Oral presentation 11	Oral presentation 17	Oral presentation 23
16.45 – 17.00	Oral presentation 6	Oral presentation 12	Oral presentation 18	Oral presentation 24	
Friday 27 Sept 2019	09.00 – 09.45	Plenary Lecture 3 (Prof. Wim Quax)			
	09.45 – 10.30	Plenary Lecture 4 (Prof. Shizuo Yamada, Ph.D)			
	10.30 – 11.15	Plenary Lecture 5 (Pres,Dir of Indofood)			
	11.15 – 13.00	Lunch break and Friday Prayer			
	13.00 – 15.00	Poster Presentation			
	15.00 – 15.30	Coffee break			

Day/date	Time	Activities			
Friday 27 Sept 2019		Parallel Invited Speakers			
		West Hall		East Hall	
		Room 1	Room 2	Room 3	Room 4
	15.30 – 15.45	Oral presentation 25	Oral presentation 31	Oral presentation 37	Oral presentation 43
	15.45 – 16.00	Oral presentation 26	Oral presentation 32	Oral presentation 38	Oral presentation 44
	16.00 – 16.15	Oral presentation 27	Oral presentation 33	Oral presentation 39	Oral presentation 45
	16.15 – 16.30	Oral presentation 28	Oral presentation 34	Oral presentation 40	Oral presentation 46
	16.30 – 16.45	Oral presentation 29	Oral presentation 35	Oral presentation 41	Oral presentation 47
	16.45 – 17.00	Oral presentation 30	Oral presentation 36	Oral presentation 42	Oral presentation 48
Saturday 28 Sept 2019	09.00 – 09.45	Plenary Lecture 6			
	09.45 – 10.30	Plenary Lecture 7			
	10.30 – 11.15	Plenary Lecture 8			
	11.15 – 12.00	Plenary Lecture 9			
	12.00 – 13.00	Lunch break			
		Parallel Invited Lectures			
		West Hall		East Hall	
	13.00 – 13.30	Invited Lecture 7		Oral presentation 55	Oral presentation 59
	13.30 – 14.00	Oral presentation 49	Oral presentation 52	Oral presentation 56	Oral presentation 60
	14.00 – 14.30	Oral presentation 50	Oral presentation 53	Oral presentation 57	Oral presentation 61
	14.30 – 15.00	Oral presentation 51	Oral presentation 54	Oral presentation 58	Oral presentation 62
	15.00 – 15.30	Coffee break			
	15.30 – 16.00	Oral and Poster Awarding			
16.00 – 16.30	Closing Ceremony				





Expo will be conducted for 3 days parallel with the conference. The Expo focuses on showcasing a range of related industry contribution towards Indonesian development from various educational institutions, research institutes, government, and food and health industry In Indonesia and abroad.

Exhibitors will receive the opportunity to :

- Exhibit the organization's contribution and innovations toward Indonesian Food and Health development at a selective international conference exhibition.
- Network with other related organization in Food and Health related fields, professionals, paper presenters, professors, and conference participants from various national and international universities and
- Be in the running for an exclusive chance to exhibit and participate in the peak event of the centennial commemoration of Indonesian higher education in engineering in 2020.

Location

Campus of Bandung Institute of Technology

Jl. Ganesha no 10. Bandung. Indonesia



Visitor Profile

- Regional government
- Public
- Students and Academics
- Target : 5,000 – 7,000 pax

Exhibitor Profile

- Companies of Food and Health Industry
- Member of The Indonesian Food and Beverage Association
- Member of International Pharmaceutical Manufacturer Group
- Member of National Meat Processors Association
- Ministry of Industry
- Ministry of Health
- National Agency of Drug and Food Control





BUDGET

No	Description	Amount	Unit Price (mio Rp.)	Total (mio Rp.)
1	Speakers (Noble prize winners)	2	250,-	500,-
2	Invited Speakers	20	40,-	800,-
3	Meal	2000	0.2,-	400,-
4	Secretariat	1 set	50,-	50,-
5	Expo		1.000,-	1.000,-
6	Socializing the program through out the country	5	100,-	500,-
7	Stationaries and supporting facilities	1 set	200,-	200,-
Total				3.450,-





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- Space for brand/ logo on Digital Ad (FB Ads, Instagram Ads) – Main size
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- Space logo on Billboard (2 spots) – Main Size

Press Conference

- Space logo on backdrop – Main Size
- Adlips

Event

- Space logo backdrop and sponsor board – Main Size
- Company banner (20 pc)
- Booth on prime area
- Space logo on Outdoor Collateral banner – Main Size
- Space logo on Welcome Banner – Main Size
- Displaying logo on screen at break time
- Displaying Company's add clip (3 minutes period)
- Free seminar invitation (15 pax)





SPONSORSHIP OPPORTUNITY

Benefit	DIAMOND 1 BILLION IDR	EMERALD 500 MIO IDR	PLATINUM 300 MIO IDR
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• Space logo on Billboard (2 spots)	XXL	XL	L
Press Conference			
• Space logo on backdrop	XXL	XL	L
• Adlips	Y	Y	Y
Event			
• Space logo backdrop and sponsor board	XXL	XL	L
• Company banner	XXL	XL	L
• Booth	Y	Y	
• Space logo on Outdoor Collateral banner	XXL	XL	L
• Space logo on Welcome Banner	XXL	XL	L
• Displaying logo on screen at break time	Y	Y	Y
• Displaying Company's add clip	2 min	1 min	30 sec
• Free seminar invitation	12 pax	10 pax	8 pax





SPONSORSHIP OPPORTUNITY

Benefit	GOLD 200 mio IDR	SILVER 100 mio IDR	BRONZE 50 mio IDR
Event			
• Space logo backdrop and sponsor board	M	S	SS
• Company banner	M	S	SS
• Booth	Y	Y	Y
• Space logo on Outdoor Collateral banner	M	S	SS
• Space logo on Welcome Banner	M	S	SS
• Displaying logo on screen at break time	Y	Y	Y
• Displaying Company's add clip	15 sec	-	-
• Free seminar invitation	6 pax	4 pax	2 pax





SPONSORSHIP CONFIRMATION

I, undersigned below:

Company :

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Position title :

Confirming that our company would like to support the Bandung Food and Health International Conference and Expo 219, by making the following contribution :

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_____, ___/___/_____
(place, dd/m/y)

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