

## Tentative Schedule

### 12<sup>th</sup> International Seminar of Indonesian Society for Microbiology (12<sup>th</sup> ISISM)

Saturday, October 22<sup>nd</sup>, 2022

08.00 – 08.35	Confirmation of the presence of the conference participants, and Registration
	<b>Conference Grand Opening</b>
08.35 – 08.45	Welcome speech from Chairman of the 12th ISISM: Dr. Anto Budiharjo, M.Biotech
08.45 – 08.55	Welcome speech from Chair of Indonesian Society for Microbiology: Dr. Iman Rusmana
	Zoom Photo Session For Documentation
09.00 – 09.45	Keynote speakers 1: <b>Prof. dr. Titik Nuryastuti, M.Si., Ph.D., Sp.MK(K), Faculty of Medicine, Public Health, and Nursing - Universitas Gajah Mada, Indonesia</b>  Title: <b>Recalcitrance Of Microbial Biofilms In Clinical Setting</b> Moderator: <a href="#">Niar Gusnaniar, Ph. D.</a>
09.45 – 10.30	Keynote speakers 2: <b>Prof. Dr. Apichat Boontawan School of Biotechnology – Institute of Agricultural Technology, Suranaree University of Technology – Thailand</b>  Title: <b>Microbial lipids production from organic agro-industrial residues (OAIR) for sustainable biofuel and oleochemical industry.</b> Moderator: <a href="#">Dr. Eng. Ario Betha Juansilferro</a>
10.30 – 10.35	Transition time
10.35 – 12.00	<b>Parallel Session I</b>
12.00 – 13.00	Lunch/Praying Break
13.00 – 14.00	<b>Parallel Session II</b>
14.00 – 14.45	Keynote speakers 3: <b>Prof. Dr. Clemens Karl Peterbauer Department of Food Science and Technology - Universität für Bodenkultur Wien (BOKU)</b>  Title: <b>Auxiliarx Activities Family 3 in Bacterial Lignocellulose Degradation</b> Moderator: <a href="#">Karina Bianca Lewerissa, STP, MSc, PhD</a>
14.45 – 14.50	Transition time
13.50 – 16.00	<b>Parallel Session III</b>
16.00	Closing

#### Keynote Speaker:

1. Prof. dr. Titik Nuryastuti, M.Si., Ph.D., Sp.MK(K), Faculty of Medicine, Public Health, and Nursing - Universitas Gajah Mada, Indonesia
2. Prof. Dr. Apichat Boontawan, School of Biotechnology – Institute of Agricultural Technology, Suranaree University of Technology – Thailand
3. Prof. Dr. Clemens Karl Peterbauer Department of Food Science and Technology - Universität für Bodenkultur Wien (BOKU)

**Topic 1 & 2 : Biosecurity and Biosafety/ Bioenergy and Bioeconomy****Zoom Link :****Parallel Session I**

<b>(Moderator) Anindyajati, M.Si</b>			
<b>No</b>	<b>Time</b>	<b>Name of Author</b>	<b>Article title</b>
1	10.40 - 10.50	Ismaya Krisdawati	Rapid Detection of Foodborne Pathogen Bacteria <i>Vibrio parahaemolyticus</i> in Seafood Using Gene <i>ToxR</i> with Real-Time Polymerase Chain Reaction Method
2	10.50 -11.00	Gladys Indira Putri S	Determination of Optimal Annealing Temperature <i>Vibrio alginolyticus</i> <i>tdh</i> Gene Primers Using Polymerase Chain Reaction Method
3	11.00 -11.10	Sugiyono Saputra	Enterobacteriaceae Isolated from Captive Asian Palm Civet ( <i>Paradoxurus hermaphroditus</i> ) and Their Phenotypic Resistance to Antimicrobials
4	11.10 -11.20	Catur Sriherwanto	Mutation of Lipase-Producing Bacteria from The Screening of Palm Oil Effluent for Fat Hydrolysis Process on Palm Oil Mill Effluent (POME)
5	11.20 -11.30	Ida Bagus Wayan Gunam	Effect of Cellulase Enzyme Concentration and Fermentation Temperature on Bioethanol Levels from Crude Cellulose of Corn Stover
6	11.30 -11.40	Nining Betawati	Protein Content of Two Cyanobacteria Genera Isolated from Indonesia ( <i>Leptolyngbia</i> HS-16 and <i>Mastigocladus</i> HS-46) Grown on Artificial NPK Medium
7	11.40 – 11.50	Muhammad Evy Prastiyanto	Antibacterial Activity of Yellow Pigment from Gib 18 Isolates of <i>Porites</i> sp. Coral Bacterial Symbionts against Multi-Drug Resistant (MDR) Bacteria that Cause Wound Infections

**Topic 3 : Molecular and Medical Biotechnology**

Zoom Link :

**Parallel Session I**

<b>(Moderator) Dr. Catur Riani</b>			
<b>No</b>	<b>Time</b>	<b>Name of Author</b>	<b>Article title</b>
1	10.40-10.50	Muhammad Iskandar Zulkarnain	Molecular Identification of <i>Chlorella sorokiniana</i> using ITS Markers and 18S rDNA and Production of Carotenoids by Light Treatment
2	10.50-11.00	Cliff Clarence Haliman	Multidrug Resistance and Extensively Drug-Resistance in <i>Staphylococcus aureus</i> , <i>Staphylococcus epidermidis</i> , and <i>Staphylococcus haemolyticus</i>
3	11.00-11.10	Muhammad Evy Prastiyanto	Anti-MDR bacterial activity of wound isolates from bacteria associated with sponge of <i>Amphimedon sp.</i> from Karimunjawa Island, Central Java, Indonesia
4	11.10-11.20	Nuki Bambang Nugroho	Isolation of active compound that inhibit Plasmodium falciparum dihydroorotate dehydrogenase derived from an Indonesian endophytic fungus, <i>Talaromyces veruculosus</i> BioMCC-f.EP.2165, as antimalarial
5	11.20-11.30	Marlina	Hair Tonic Formulation with Secretome from Synovial Membrane-Mesenchymal Stem Cells
6	11.30-11.40	Ni Nengah Dwi Fatmawati	A Combination of Antibigram and Random Amplified Polymorphism DNA Polymerase Chain Reaction (RAPD-PCR) of <i>Klebsiella pneumoniae</i> Isolates as An Early Detection of a Potential Outbreak in Local Hospital Setting
7	11.40-11.50	Debie Rizqoh	Potential of Phyllosphere Bacteria as Producers of Bioactive Compounds

**Topic 3 : Molecular and Medical Biotechnology**

Zoom Link :

**Parallel Session II & III**

<b>(Moderator) Dr. Tjahjani Mirawati Sudiro</b>			
<b>No</b>	<b>Time</b>	<b>Name of Author</b>	<b>Article title</b>
9	13.00 -13.10	Desi Sagita	Keratolytic activity of <i>Bacillus velezensis</i> 's recombinant protease
10	13.10 -13.20	Rati Sarina Passoe	Antibacterial Potency of Sandalwood's Leave and Bark ( <i>Santalum album</i> ) against <i>Propionibacterium acnes</i> Bacteria
11	13.20 -13.30	Mukriani	Isolation and Identification of L-Asparaginase Producing Bacteria from Macroalga Symbionts <i>Eucheuma spinosum</i> by Using 16S RNA Analysis
12	13.30 -13.40	Rifdah Hanifah	Phylogenetic Analysis of Amphotericin B Resistant <i>Candida haemulonii</i> from the National Referral Hospital ICU Environment
13	13.40 -13.50	Zaki Mubarak	Molecular Identification of Pathogenic Bacteria Periodontitis <i>Porphyromonas gingivalis</i> in Diabetic and Non-Diabetic Patients from Banda Aceh
14	13.50 -14.00	Sartini	Modulation of Amoxicillin Susceptibility using Green Tea and Roselle Calyx Aqueous Extract in Extended Spectrum $\beta$ -Lactamase(ESBL)-producing <i>Escherichia coli</i>

	14.00 – 14.45	Keynote speakers 3: <b>Prof. Dr. Clemens Karl Peterbauer</b>	
<b>(Moderator) Dr. drh. Erida Wydiamala, M.</b>			
<b>Parallel Session III</b>			
<b>No</b>	<b>Time</b>	<b>Name of Author</b>	<b>Article title</b>
15	14.50 -15.10	Lia Yulia Budiarti	Antimicrobial Activity of Leaf and Bark Extract of <i>Xylocarpus granatum</i> J.Koeing Against Several Species of Bacteria and <i>Candida albicans</i>
16	15.10 -15.20	Anand Reyna Maulana	Bioprospection of Isolates of Eunapius Freshwater Sponge Symbiont Bacteria as Producers of Cellulase and Protease Enzymes
17	15.20 -15.30	Salsabilla Ananda Rachmansyah	Gene Encoding Polyketide Synthase (PKSs) Detecting and Identification Bioactive Compound of <i>Bacillus velezensis</i> EC43
18	15.30 -15.40	Ghina Salsabila	In vitro Test of Phenol Coefficient Combination of <i>Citrus hystrix</i> Leaf and Peel Extract as Antiseptic Candidate
19	15.40 -15.50	Desi Purwaningsih	Fibrinolytic Test Isolate Bacteria From Congot Beach Waters
20	15.50 -16.00	Sipriyadi	Antimicrobial Activities of Endophytic Bacteria from Elephant Foot Yam Plant ( <i>Amorphophallus paeoniifolius</i> (Dennst.) Nicolson) Against Several Human Pathogens

**Topic 4 : Environmental Biotechnology****Zoom Link :****Parallel Session I**

<b>(Moderator) <a href="#">Dr. rer.nat. Zahra Noviana</a></b>			
<b>No</b>	<b>Time</b>	<b>Name of Author</b>	<b>Article title</b>
1	10.40-10.50	Muhammad Azri	Development and Determination of Air Quality Using The Gaussian-Plume Mathematics Model Approach For The Prediction of Air Microbial Distribution in Health Laboratory Building Environment
2	10.50-11.00	Diah Radini Noerdjito	Essential effect of copper addition on the growth of marine microalgae <i>Nannochloropsis oceanica</i>
3	11.00-11.10	Lenni Fitri	Decrease of COD and BOD Level in Palm Oil Wastewater by Thermophilic Bacteria
4	11.10-11.20	Khudrotul Nisa Indriyasari	Abundance and Characteristics of Microplastics in Coastal Sediment and Seawater Collected from Surabaya and Tulungagung
5	11.20-11.30	Dr. Surono	In vitro test of supporting of dark septate endophytic fungi ( <i>Leptodontidium orchidicola</i> , <i>Podospora glutinans</i> , and <i>Zopfiella latipes</i> ) on tomato and rice plant growth under low pH and Aluminum stress conditions
6	11.30-11.40	Dian Hendrayanti	The Removal Efficiency of Phytoremediation Agent <i>Azolla</i> sp. for Laundry Wastewater
7	11.40-11.50	Felina Pranata Irawan	Bioprospecting, Molecular Identification, and Detection of NRPS Gene of Sea Cucumber <i>Stichopus monotuberculatus</i> Symbiotic Bacteria against Fish Pathogens <i>Aeromonas hydrophila</i> and <i>Vibrio parahaemolyticus</i>
8	11.50-12.00	Siti Khotimah	Detoxification of Chrom (VI) to Chrom (III) by Chromate Reductase In Bacteria LKS-08 Isolated from Tanning Waste

**Topic 5 : Agricultural Biotechnology**

Zoom Link :

**Parallel Session I**

<b>(Moderator) Dyah Wulandari, Ph.D</b>			
<b>No</b>	<b>Time</b>	<b>Name of Author</b>	<b>Article title</b>
1	10.40-10.50	Betty Natalie Fitriatin	Screening of Halotolerant Phosphate Solubilizing Bacteria and its Effect on the Growth of Rice Seedlings on Salinity Media
2	10.50-11.00	Ahdiat Agriansyah	Assembly And Mapping Resistance Gene Against Powdery Mildew Using Characterized Amplified Sequence Region Marker On Melon ( <i>Cucumis Melo L.</i> ) Cultivar Tacapa
3	11.00-11.10	Dwi Umi Siswanti	Effect of Slow-Release Organic Fertilizers on Growth of Chili ( <i>Capsicum sp.</i> )
4	11.10-11.20	Pratiwi Hamzah	Study of Putative Pathogenesis-Associated Genes of <i>Rhizoctonia solani</i> AG1-IA Causal Agent of Rice Sheath Blight
5	11.20-11.30	I Putu Suparthana	Study on Callus Formation of Endanger Medicinal Plant Purnajiwa which Play an Important Role of Their Conservation and The Potential as a Source of Bioactive Compounds
6	11.30-11.40	Ariya Putra	Potential Philospheral Bacteria Origin of Broccoli ( <i>Brassica Oleracea</i> Var. <i>Italica</i> ) As Biocontrol Of Phytopathogens <i>Ralstonia solanacearum</i> as Well as Plant Growth Promoting Bacteria
7	11.40-11.50	Yuli Lestari	Nitrogen fixation ability and indole acetic acid (IAA) production of endophytic bacteria and its effect on rice growth
8	11.50-12.00	Muhammad Faishal Fauzaan	Isolation and Identification of Endospore-forming Rhizobacteria from Broccoli ( <i>Brassica oleracea</i> var. <i>Italica</i> ) and Its Capabilities as a Biocontrol Agent of <i>Ralstonia solanacearum</i> and Biofertilizer

**Topic 5 : Agricultural Biotechnology****Parallel Session II & III**

<b>(Moderator) Yoga Dwi Jatmiko, PhD</b>			
<b>No</b>	<b>Time</b>	<b>Name of Author</b>	<b>Article title</b>
9	13.00 -13.10	Farkhatun Nisa	Potential Endospore-forming Rhizobacteria From Cherry Tomato Plants ( <i>Solanum lycopersicum</i> var. <i>cerasiforme</i> ) as PGPR and Phytopathogenic Biocontrol of <i>Ralstonia solanacearum</i> and its Molecular Identification
10	13.10 -13.20	Ni'matuzahroh	Exploration of phosphate solubilizing bacteria from the rhizosphere soil of the De Durian Park Wonosalam Jombang
11	13.20 -13.30	Sulastri	The effective formulation of consortium phosphate solubilizing endophytic bacteria with diazotrophic and ACC-deaminase producing bacteria as bioagent for improving maize growth under saline stress
12	13.30 -13.40	Dela Dwi Alawiyah	Screening, Production, and Characterization of Bacterial Phosphatase Enzyme isolated from Tuban Mangrove Soil, East Java, Indonesia
13	13.40 -13.50	Aurora Awalia	Isolation and Morphological Characterization of

		Kirana Putri	Philospheric Bacteria from Japanese Spinach ( <i>Spinacia oleracea</i> L.) Potential as Plant Growth Promoting Bacteria
14	13.50 -14.00	Rizky Nurcahyo	Diversity and Multiple Barcodes Molecular Identification of Entomopathogenic Fungi from Penggaron Forest Ungaran – Central Java
	14.00 – 14.45	Keynote speakers 3: <b>Prof. Dr. Clemens Karl Peterbauer</b>	
<b>(Moderator) Dr. Nurlaili</b>			
<b>Parallel Session III</b>			
<b>No</b>	<b>Time</b>	<b>Name of Author</b>	<b>Article title</b>
15	14.50 -15.10	Desak Ketut Tristiana Sukmadewi	The Potential of Coffee Husk as a Carrier Material in Biofertilizer and Its Effect on Arabica Coffee Seeds
16	15.10 -15.20	Risky Hadi Wibowo	Isolation and Characterization of Mercury Resistant Bacteria on Gold Origin, Lebong District
17	15.20 -15.30	Munti Yuhana	The spread of antibiotic resistance in bacteria in aquaculture and its control based on the One-Health concept
18	15.30 -15.40	Muhammad Hamzah Solim	Agronomic Evaluation and Yield Stability Analysis of Promising Mutant Rice Lines ( <i>Oryza sativa</i> L.) over Different Environments in Indonesia
19	15.40 - 15.50	Merry Meryam Martgrita	Phenolic Compounds Scale Up Production from Styra Leaf And Extract Purification using Ion Exchange Chromatography
20	15.50 - 16.00	Dini Ryandini	Screening of Pectinase-Producing Bacteria Isolated from Logending Mangrove Ecosystem

**Topic 6 : Food Biotechnology and Fermentation****Zoom Link :****Parallel Session I**

<b>(Moderator) Dr. Siti Nur Jannah, S.Si., M</b>			
<b>No</b>	<b>Time</b>	<b>Name of Author</b>	<b>Article title</b>
1	10.40-10.50	Dewi Peti Virgianti	<i>Weissella confusa</i> as Associated Lactic Acid Bacteria in <i>Tetragonula laeviceps</i> Honey
2	10.50-11.00	Laksmi Hartajanie,	Quantification of Bioactive Components of Fermented Bitter melon ( <i>Momordica charantia</i> L.) Juice
3	11.00-11.10	Jayen Aris Kriswantoro	Effect of Different Roasting Degrees on the Flavour Characteristics of Fermented Arabica Green Bean Coffee Using Controlled-Second Fermentation
4	11.10-11.20	I Nengah Sujaya	Development of Specific Method for Enumeration of Probiotic <i>Weissella confusa</i> F213 in Human Feces
5	11.20-11.30	Yoga Dwi Jatmiko,	Characterization of lytic bacteriophage for Salmonella Typhimurium from Fermented Shrimp Paste (Terasi)
6	11.30-11.40	Lindayani	Quantification of Bioactive Components Of Freeze-Drying Application on Fermented Bitter Melon ( <i>Momordica charantia</i> L.) Juice Extract Using <i>Lactobacillus fermentum</i> LLB3
7	11.40-11.50	Ririn Puspawati	Effect of Addition of Glucose on The Exopolysaccharide Produced by <i>Lactobacillus plantarum</i> with Different Fermentation Temperatures
8	11.50-12.00	Esti Widowati	Combination Pectinase, Cellulase, and Amylase Enzymes on Pacitan Sweet Orange ( <i>Citrus sinensis</i> ) Juice Clarification
9	12.00 -12.10	Fifi Afiati	Effect of Fermentation Using Lactic Acid Bacteria on the Aging Process of Single Clove Garlic ( <i>Allium sativum</i> L.) Towards the Profile of Anti-Oxidant Activity of Black Single clove Garlic



# Quantification of Bioactive Components Of Freeze-Drying Application on Fermented Bitter Melon (*Momordica charantia* L.) Juice Extract Using *Lactobacillus fermentum* LLB<sub>3</sub>







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# INTRODUCTION: Bitter Melon



Source: Personal documentation

-  Widely consumed as **Food** or **Traditional Medicine**
-  Rich in **Bioactive Compounds**
-  High **Antioxidant** Activities
-  Extensive range of beneficial **Health Effects**

(Tan *et al.*, 2016)





# Bioactive Compounds

Contained in  
Bitter Melon

(Tan *et al.*, 2016; Tan *et al.*, 2014)

Phenolic

Flavonoid

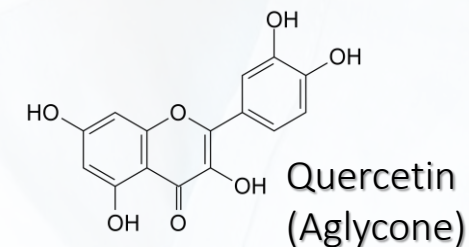
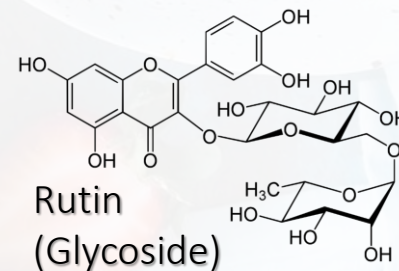
Saponin

## Gallic Acid

- Bitter melon **fruit**: good source
- High **antioxidant** activities
- Positive therapeutical reaction to cardiovascular diseases
- Inhibitor of **thrombin** (in cellular stage)

## Rutin & Quercetin

- Quercetin: has potential antiviral activities



## Charantin

- Most eminent curcubitane-type titerpenoid
- An anti-hyperglycemic agent
  - ✓ could control blood glucose levels.
- **$\beta$ -sitosterol +  $\beta$ -stigmasterol (1:1).**





# Lactic Acid Fermentation on Bitter Melon Juice

Previous study by: Hartajanie *et al.* (2018)

*Lactobacillus fermentum*

Antioxidant Activities  
+15%

$\beta$ -glucosidase enzyme

Hartajanie *et al.*  
(2018)

**Antioxidant activities** ↗:  
Presumed to be related  
with  
**bioactive components** ↗



*Source: Personal documentation*

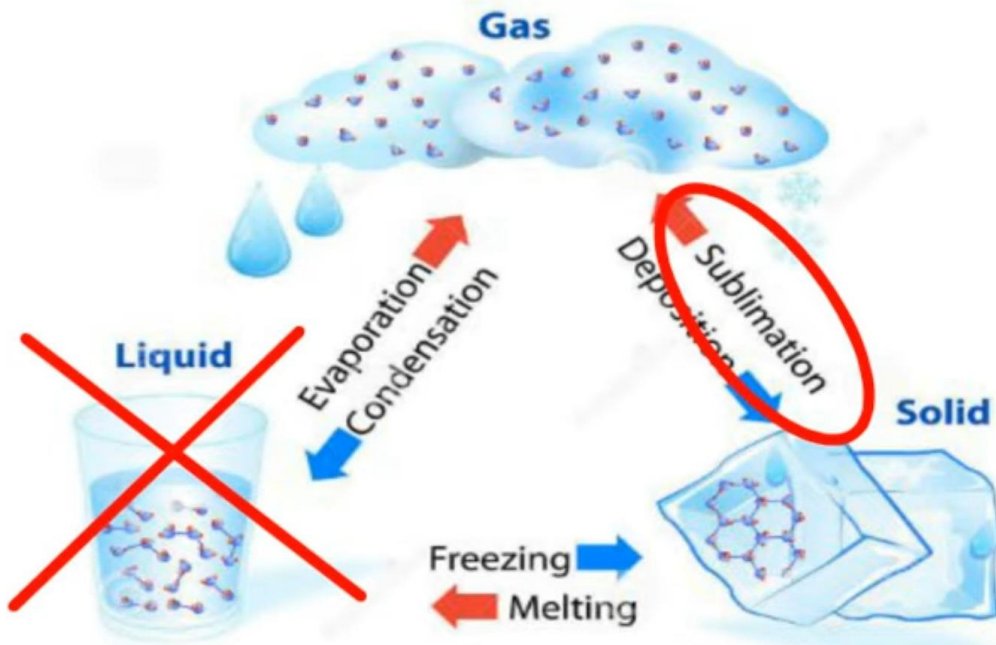
However,  
the increase in the **number of  
bioactive compounds** contained in  
fermented bitter melon has not been  
studied further.



# Freeze-drying

- ✓ A dehydrating technique which involves the **sublimation** of water in a product.
- ✓ The product is frozen before being exposed to **vacuum pressure** → causes the water to sublimate and desorb.

## Principle



Source: <https://youtu.be/G9QXxkPDJjo>



Decrease in the product's volume and weight



Uses low temperature → maintain the food qualities

(Karam *et al.*, 2016; Silva-Espinoza *et al.*, 2020)

# The aim of research:



1

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To determine **the bioactive contents changes** in fermented bitter melon juice extract.

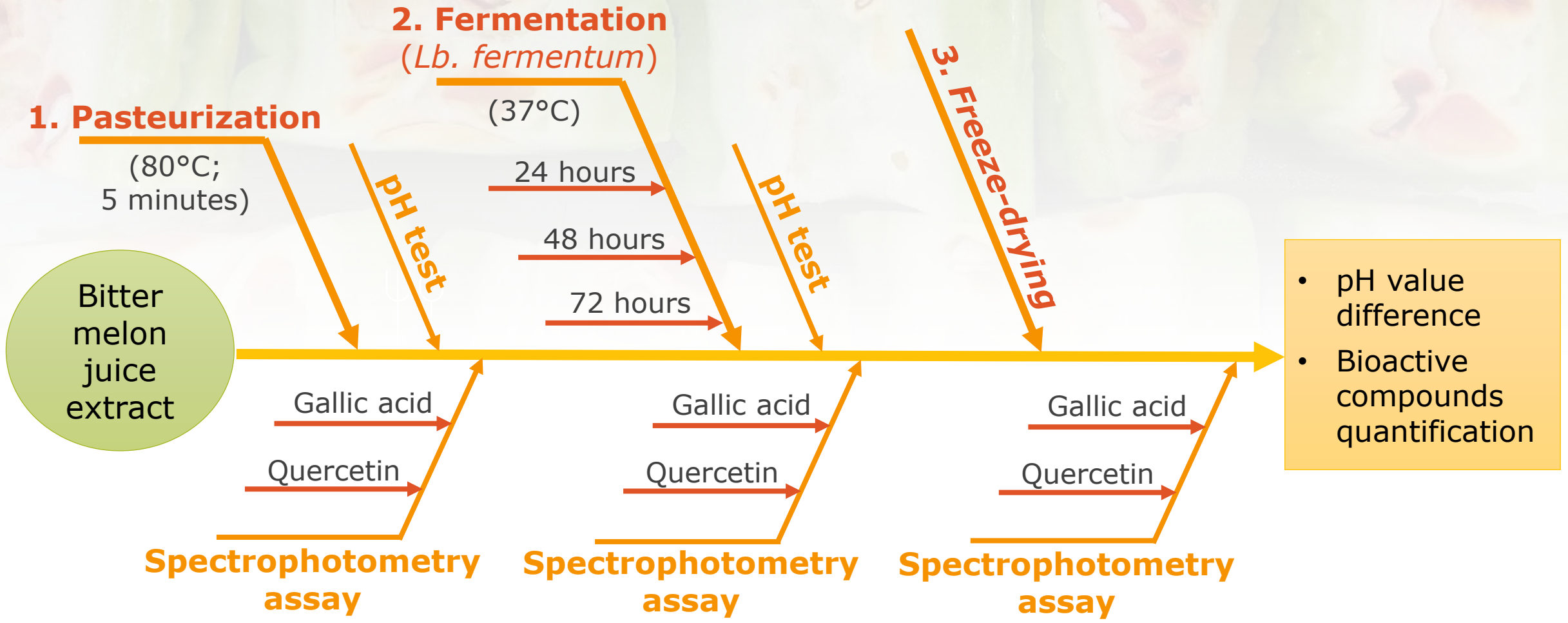
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To determine **the bioactive contents changes** in fermented bitter melon juice extract, which may occur during the freeze-drying process.



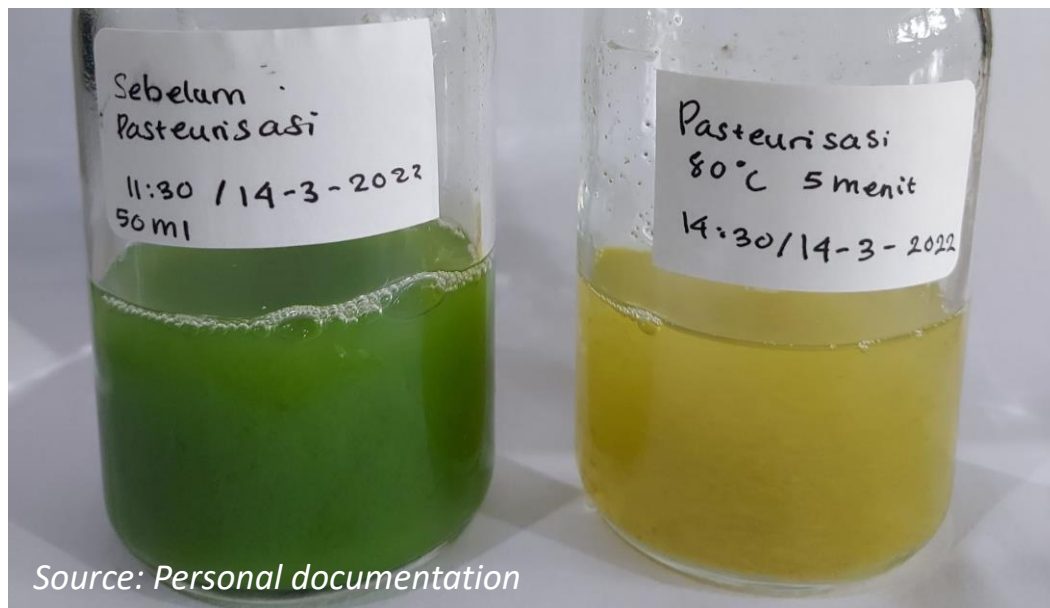
# Research Methods



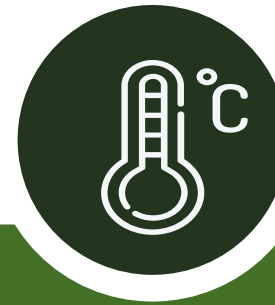


**Table 2. Total Phenolic (GAE) and Total Flavonoid (QE) Contents in Fresh and Pasteurized Bitter Melon Juice Extract.**

Component	Treatment	
	Fresh	Pasteurized
Total Phenolic (GAE in ppm)	220,63 ± 8,38 <sup>a</sup>	339,27 ± 43,76 <sup>b</sup>
Total Flavonoid (QE in ppm)	5,09 ± 2,29 <sup>a</sup>	24,38 ± 2,68 <sup>b</sup>



Source: Personal documentation



## RESULTS & DISCUSSION

### Pasteurization on Bitter Melon Juice

Thermal processing can increase bioactive components in plant materials (Hsieh *et al.*, 2021):

- Breakdown of the phenolic/flavonoid-containing macromolecules (Chiu *et al.*, 2015; Ríos-Ríos *et al.*, 2019)
- Cell rupture (Juániz *et al.*, 2016)
- Non-enzymatic conversion between precursors (Gan *et al.*, 2017)

\*note: additional temperature or thermal treatment duration might affect in the decrease of such compounds

# Fermentation on Bitter Melon Juice

Consistent to Hartajanie *et al.* (2018):  
Result obtained from this work performed a **significant decrease in pH value** of the samples over the fermentation periods.

- ✓ Refers to the production of **organic acids**.
- Indicates the occurrence of fermentation process in bitter melon juice.

**Table 1. Experimental pH Value Test Results on Fresh, Pasteurized, and Fermented Bitter Juice Melon Extract.**

Fresh	Pasteurized	Fermented		
		24 hours	48 hours	72 hours
5.5 ± 0.15 <sup>a</sup>	4.76 ± 0.03 <sup>b,p</sup>	4.45 ± 0.02 <sup>q,x</sup>	4.33 ± 0.04 <sup>q,y</sup>	4.26 ± 0.02 <sup>q,z</sup>



# Fermentation on Bitter Melon Juice

Source: Personal documentation

**Table 3. Total Phenolic (GAE) and Total Flavonoid (QE) Contents in Pasteurized and Fermented Bitter Melon Juice Extract.**

Component	Pasteurized	Fermented		
		24 hours	48 hours	72 hours
Total Phenolic (GAE in ppm)	339,27 ± 43,76 <sup>a</sup>	231,38 ± 18,76 <sup>b,p</sup>	214,00 ± 7,70 <sup>b,p</sup>	199,03 ± 25,11 <sup>b,p</sup>
Total Flavonoid (QE in ppm)	24,38 ± 2,68 <sup>a</sup>	18,08 ± 5,29 <sup>b,q</sup>	6,70 ± 1,65 <sup>b,p</sup>	3,07 ± 4,38 <sup>b,p</sup>

# Fermentation by *Lactobacillus fermentum*

Yan *et al.* (2022):

- Confirmed a decrease in phenolic (GAE) and flavonoid (RE) contents on fermented Shenheling extract using *Lb. fermentum* (grx08).
- Reported an **increase in antioxidant activity**



Hartajanie *et al.* (2018):

- Reported an **increase in antioxidant activity** by 15% in fermented bitter melon juice using *Lb. fermentum* LLB3



The improved antioxidant activity could be due to an increase in **other bioactive compounds** or the production of **new organic acids** that have **radical scavenging abilities** (Yan *et al.*, 2022).



# Effect of Freeze-Drying on Bioactive Components in Fermented Bitter Melon Juice

- ✓ Flavonoids → non-significant
- ❖ Phenolics → significantly higher

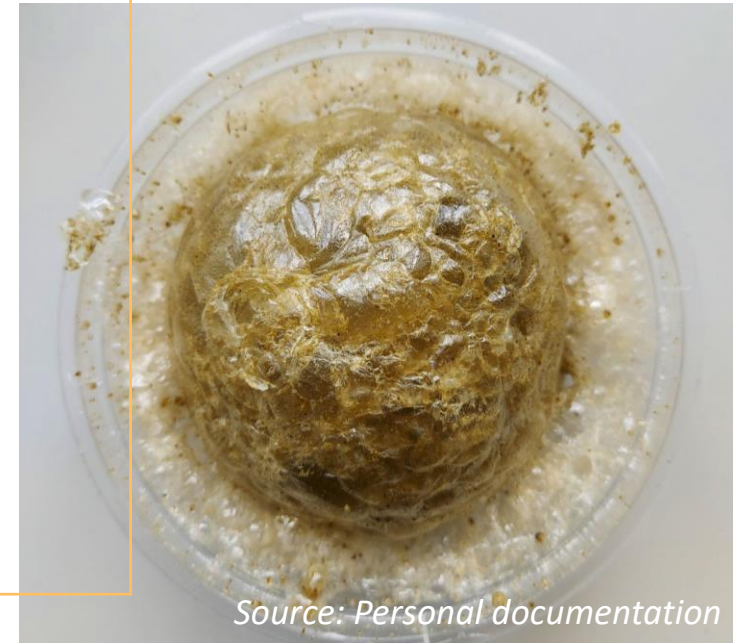
**Table 4. Total Phenolic (GAE) and Total Flavonoid (QE) Contents in Fermented and Freeze-Dried Fermented Bitter Melon Juice Extract.**

Component	Fermented			Fermented & Freeze-Dried		
	24 hours	48 hours	72 hours	24 hours	48 hours	72 hours
Total Phenolic (GAE in ppm)	231,38 ± 18,76 <sup>p,x</sup>	214,00 ± 7,70 <sup>p,x</sup>	199,03 ± 25,11 <sup>p,x</sup>	306,99 ± 29,54 <sup>x</sup>	295,08 ± 22,34 <sup>y</sup>	261,92 ± 6,74 <sup>x</sup>
Total Flavonoid (QE in ppm)	18,08 ± 5,29 <sup>q,x</sup>	6,70 ± 1,65 <sup>p,x</sup>	3,07 ± 4,38 <sup>p,x</sup>	9,95 ± 0,45 <sup>x</sup>	6,58 ± 0,47 <sup>x</sup>	2,88 ± 2,06 <sup>x</sup>

- Karam *et al.* (2016): Freeze-drying did not provide a significant decrease in the bioactive content → low temperature used
- **Higher total phenolic** → possibly affected by extraction method

\*Gallic acid: **POLAR** → strongly bound to water fraction

Hewavitharana *et al.*, (2020): the use of **organic solvent** such as ethanol could be **inefficient**



Source: Personal documentation

1

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Lactic acid fermentation of bitter melon juice extract performed a **decrease** in both total phenolics and total flavonoids of the samples.

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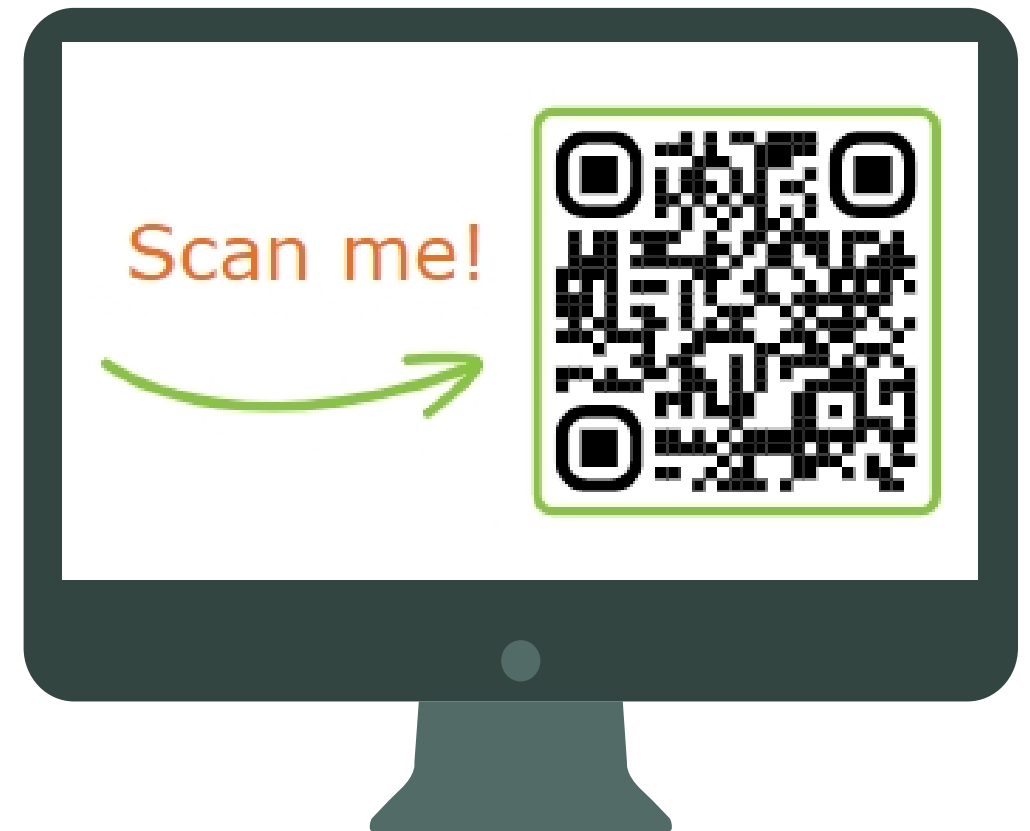
Freeze-drying process **did not give significant effect** in flavonoid contents, but **higher values of phenolic contents** were obtained.

## Conclusion

## Main Reference

Hartajanie, L., Lindayani, L., Novita, A., Sutanto, T. E., & Sundoro, A. A. (2018). *Lactobacillus fermentum* LLB3 improves antioxidant activity of bitter melon (*Momordica charantia*). *Microbiology Indonesia*, 12(2), 65–68. <https://doi.org/10.5454/mi.12.2.5>

## Other References





## Research Team

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Dr. Dra. Laksmi Hartajanie, MP.



Dr. Ir. Lindayani, MP.



Michael Sean



Sherlina Audrey M.

