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Theme : Advancing Science and Technology Innovation on post-disaster resilience : challenges and opportunities for a better world

The aim objective of "ICST 2021" is to bring together leading academicians, researchers, scholars and administrators from all over the world to exchange and share their experience and research about all aspects of Basic Science, Engineering and Technology and discuss the practical challenges encountered and solution.

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Universitas Diponegoro
Semarang - Indonesia

Prof. Biswajeed Pardhan
Centre for Advanced Modelling and Geospatial Information Systems (CAMGIS)
University Of Technology Sydney

Prof. Marlia Mohd. Hanafiah
Centre for Climate Change System
Universiti Kebangsaan Malaysia

Rizki Mardian, Ph.D
University Of Edinburgh
Scotland - United Kingdom

Important Date

Due date of Abstract submission
Open: Februari 20, 2021
Close: May 20, 2021
Notification of Abstract acceptance: June 11, 2021
Full Paper Submission: August 20, 2021
Notification of Full Paper Acceptance: September 1, 2021
Camera Ready Paper: September 10, 2021
Conference Date: October 27-28, 2021

ICST TOPIC

- Science and Engineering physics
- Mathematics and Statistics
- Electrical and Electronics
- Computer Science
- Control and Robotics
- Smart City and Internet of Things
- Architecture and Environment
- Biological and Environmental Physics
- Geophysics, Geology and Mining
- Chemistry and Chemical Engineering
- Biomedics and Biometrics
- Mechanical Engineering
- Industrial Engineering, Civil Engineering

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Preface

International Conference on Science and Technology (ICST) is a scientific forum to discuss the development and latest research on exact science, engineering and technology. The following topics of thid conference are Physical Sciences and Chemistry, Mathematics and Statistics, Informatics and Computer Science, Aerospace Engineering, Biomedical Engineering, Chemical Engineering, Civil Engineering, Computer Engineering, Electrical Engineering and Electronics, Power and Energy Engineering, Environmental Engineering, Geological and Geophysical Engineering, Industrial Engineering, Manufacturing and Mechanical Engineering, Engineering Physics and Materials Engineering, Mining and Petroleum Engineering. Technology-based applications such as learning media for education can also be accepted at this Conference.

This Conference will be conduct in the form of scientific seminars, both oral and poster presentations. The conference will be held with a panel plenary activity consisting of keynote speakers and invited speakers. The speakers presented included elements of education (academics), scientific (researchers)) both from within the country and from abroad as well as industry/private sector. After the invited speaker's session, it was a parallel oral presentations and poster presentations from the seminar participants were then held.

Selected papers that have been through the peer review will be published in E3S Web of Science. We respectfully request that you join us to ICST 2021. We look forward to welcoming you to Ternate. In 2021, ICST is focusing on **Science and Technology Innovation on Post-Disaster Resiliences: Challenges and Opportunities for a Better Word"**.

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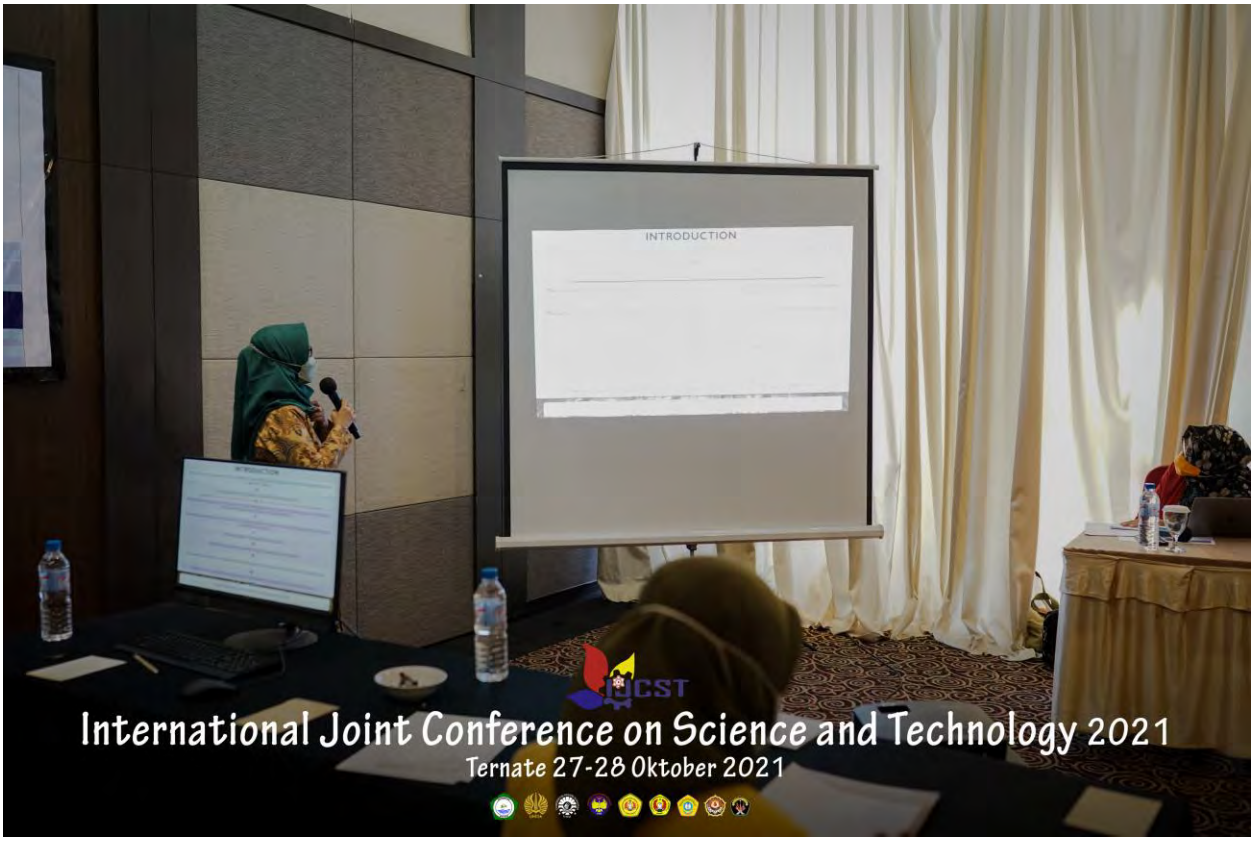
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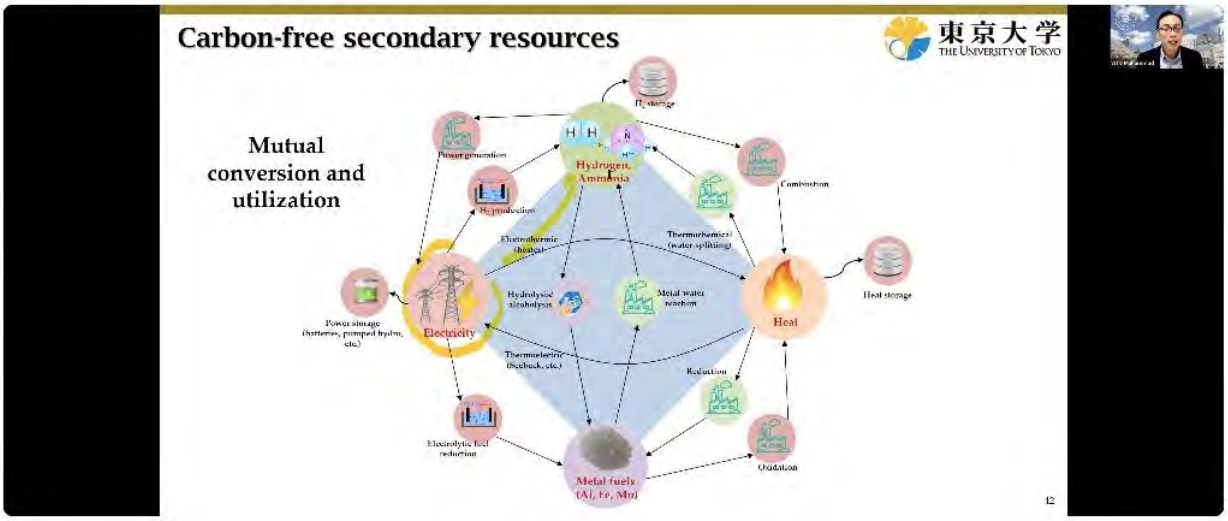

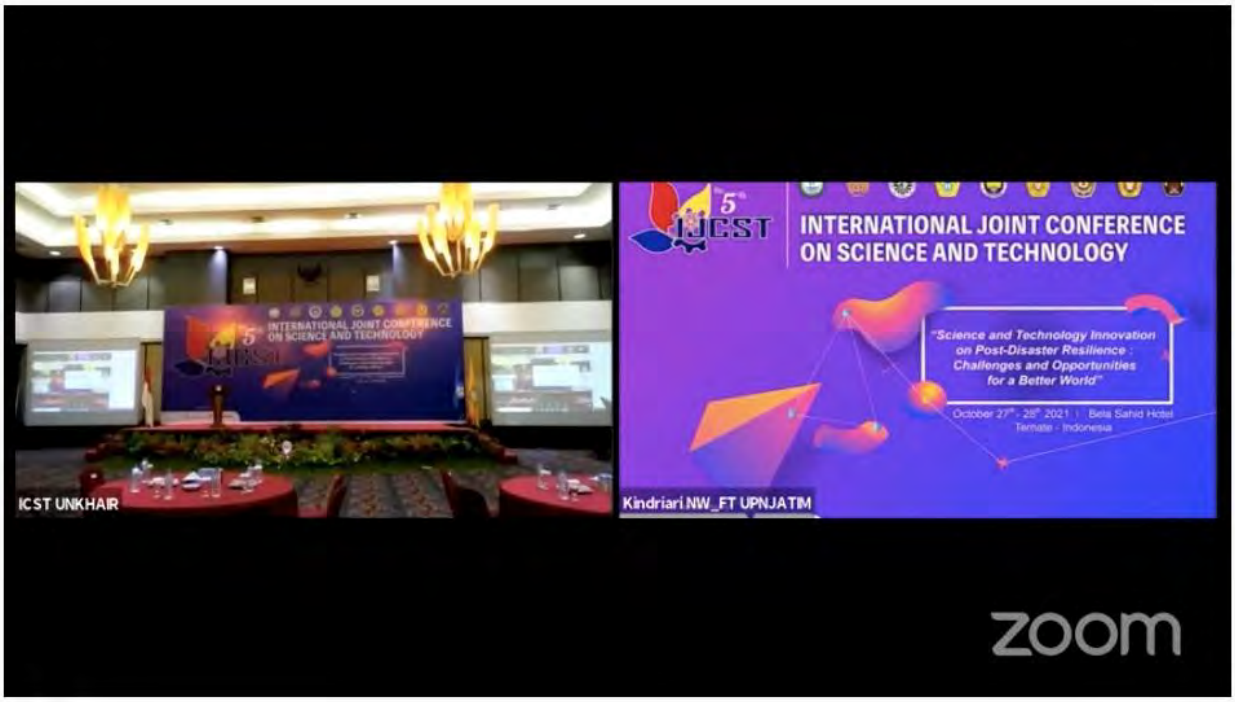


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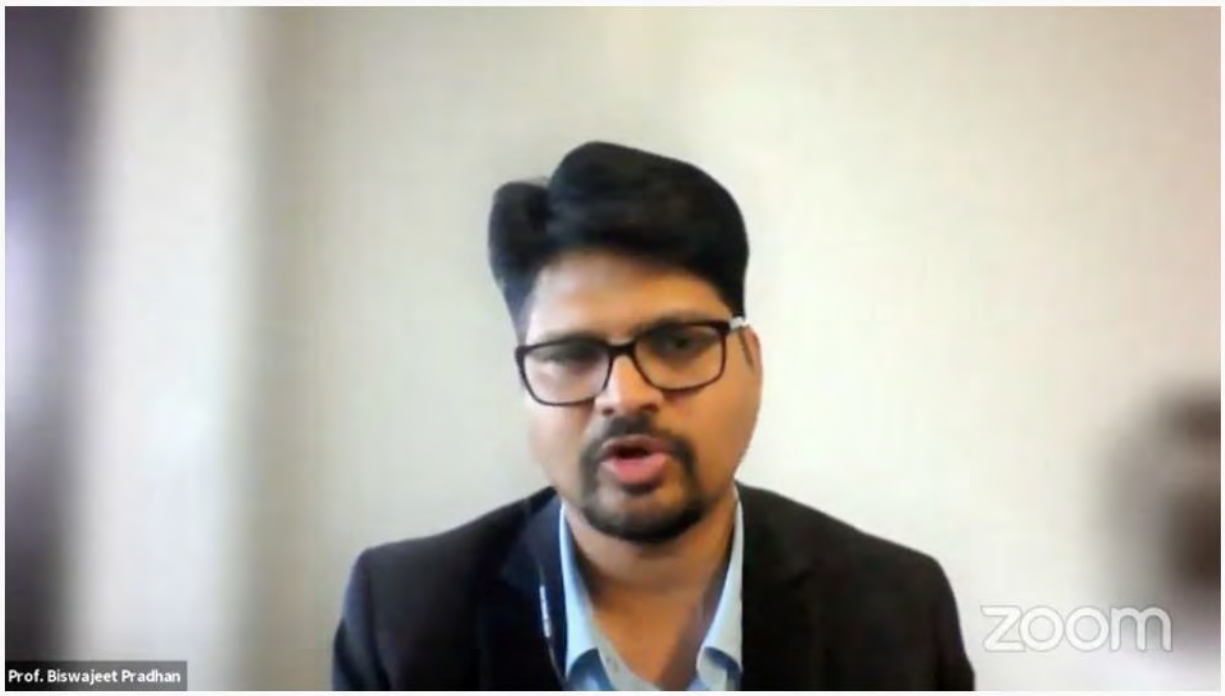
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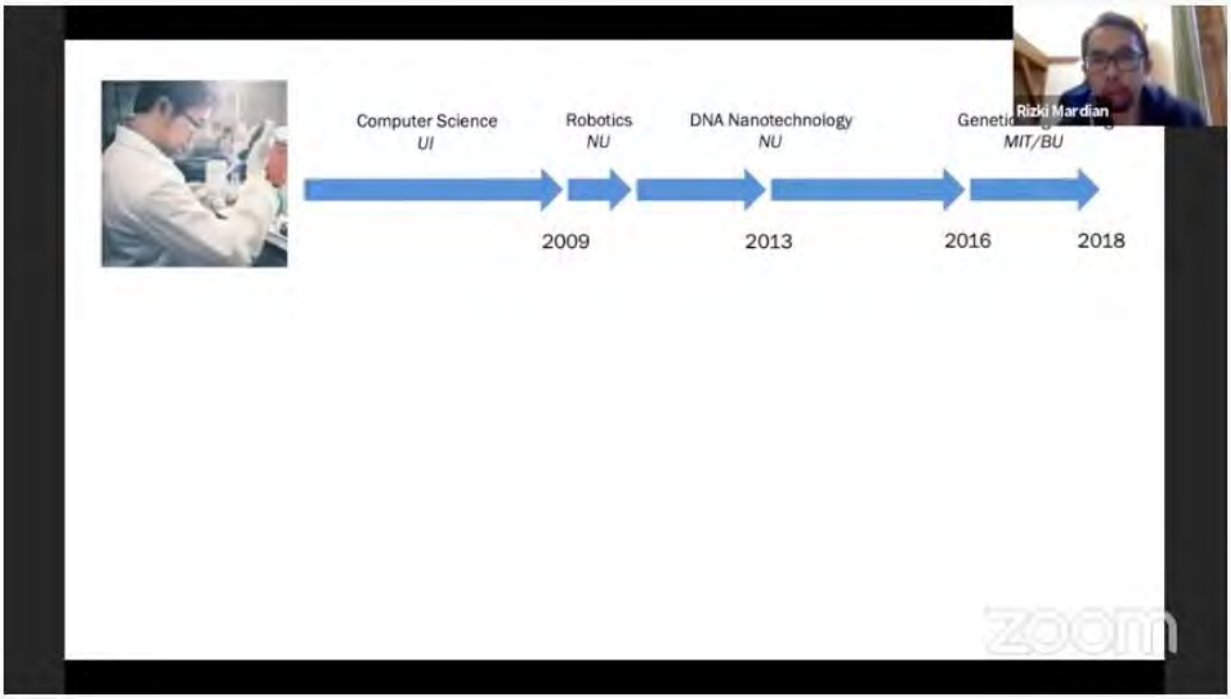
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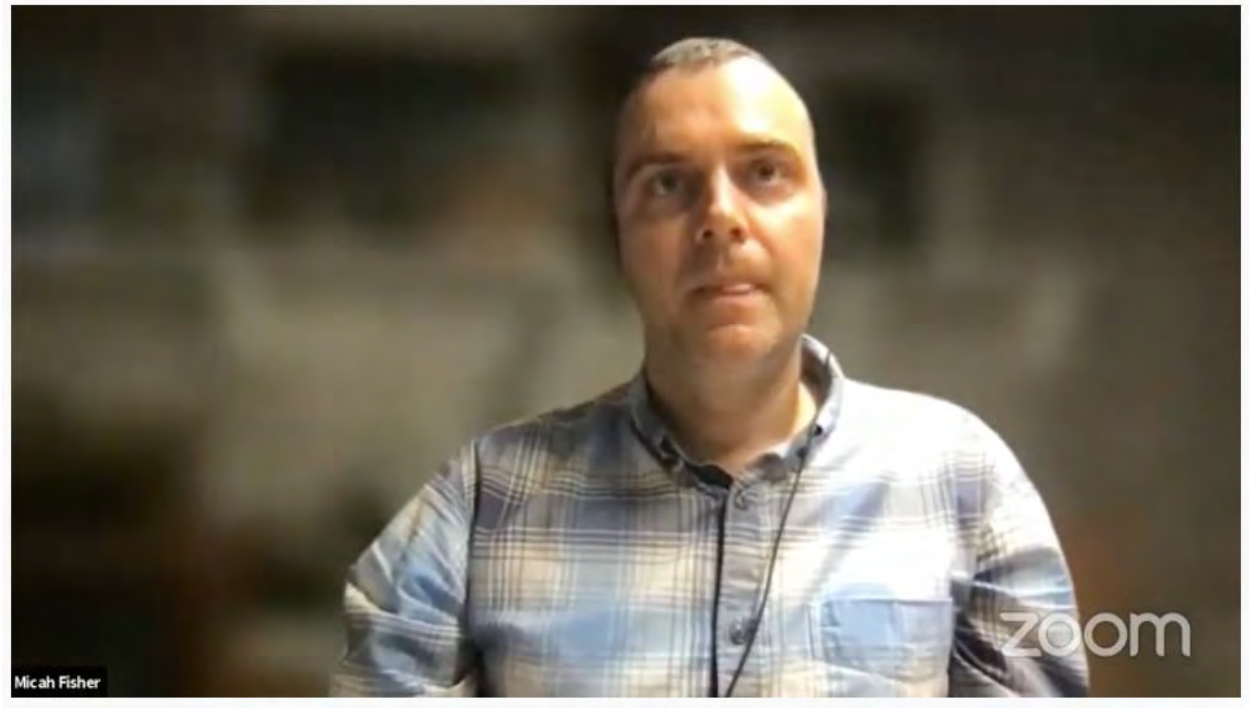
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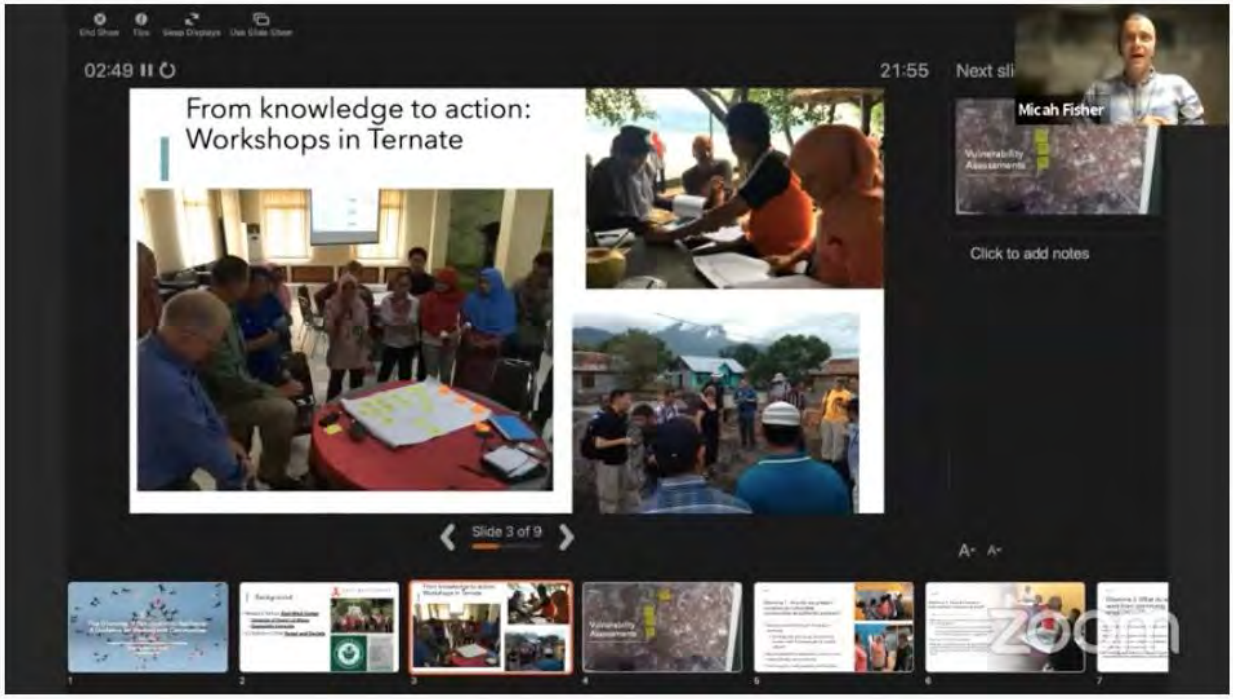
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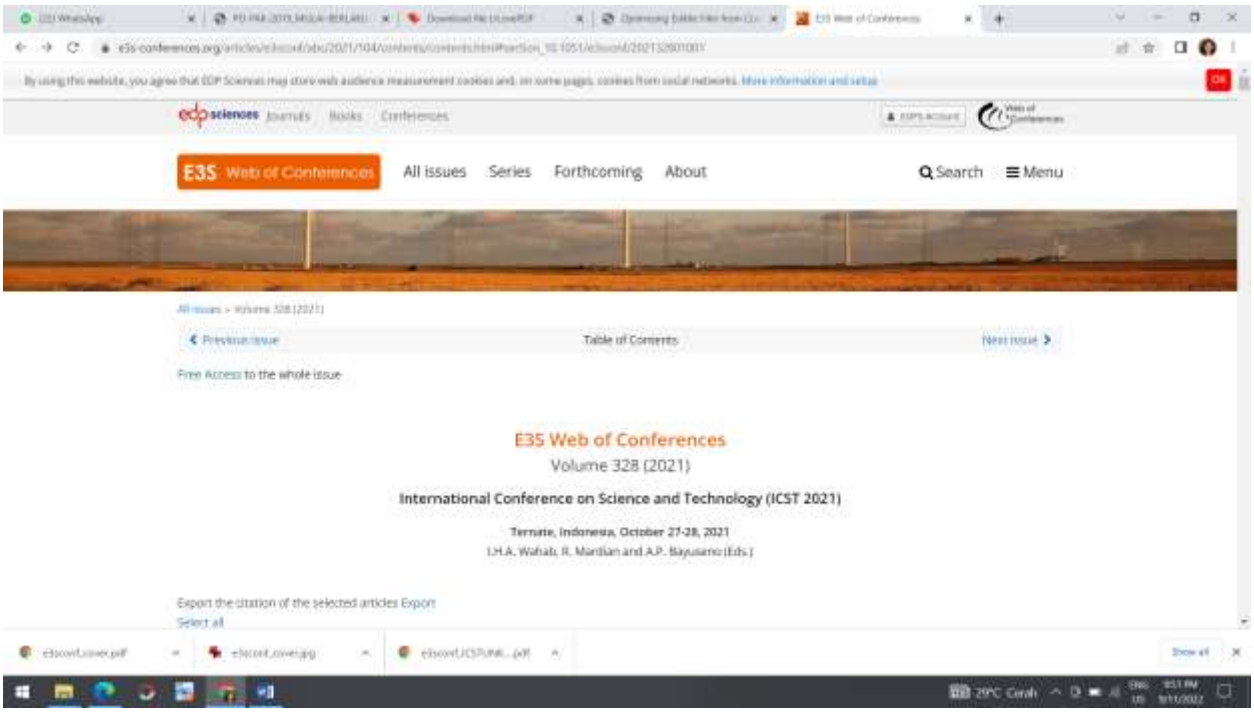

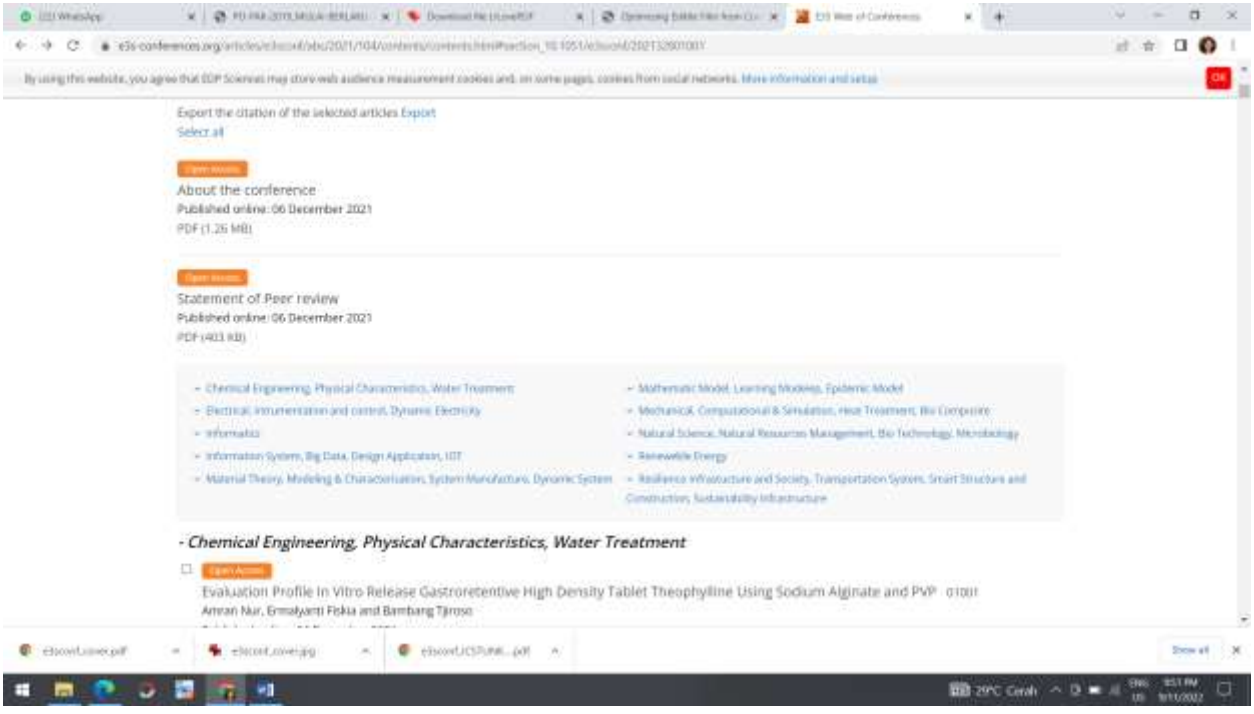

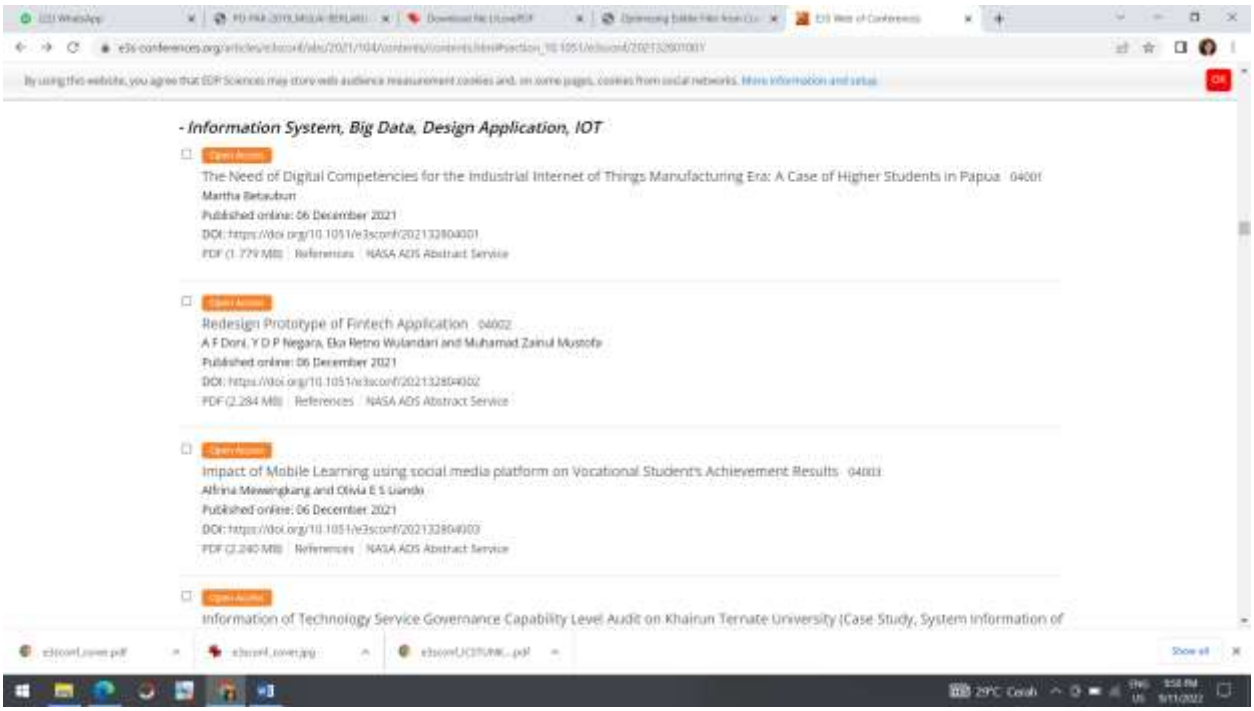

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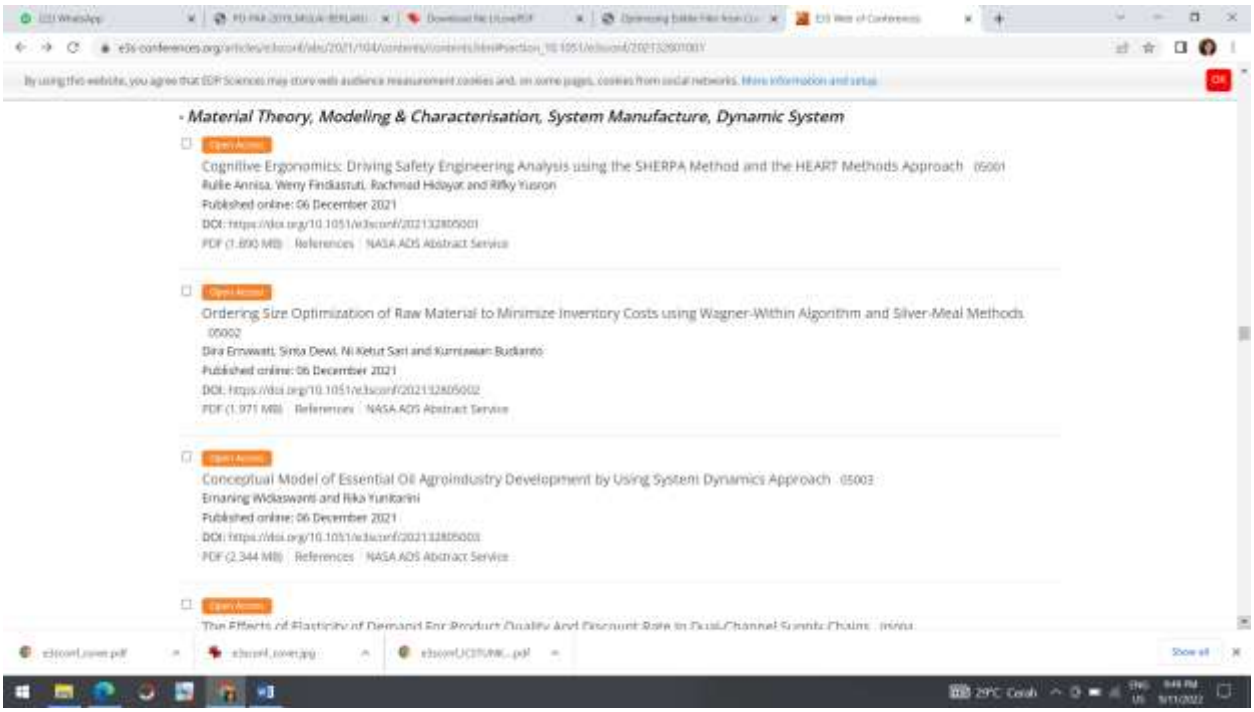

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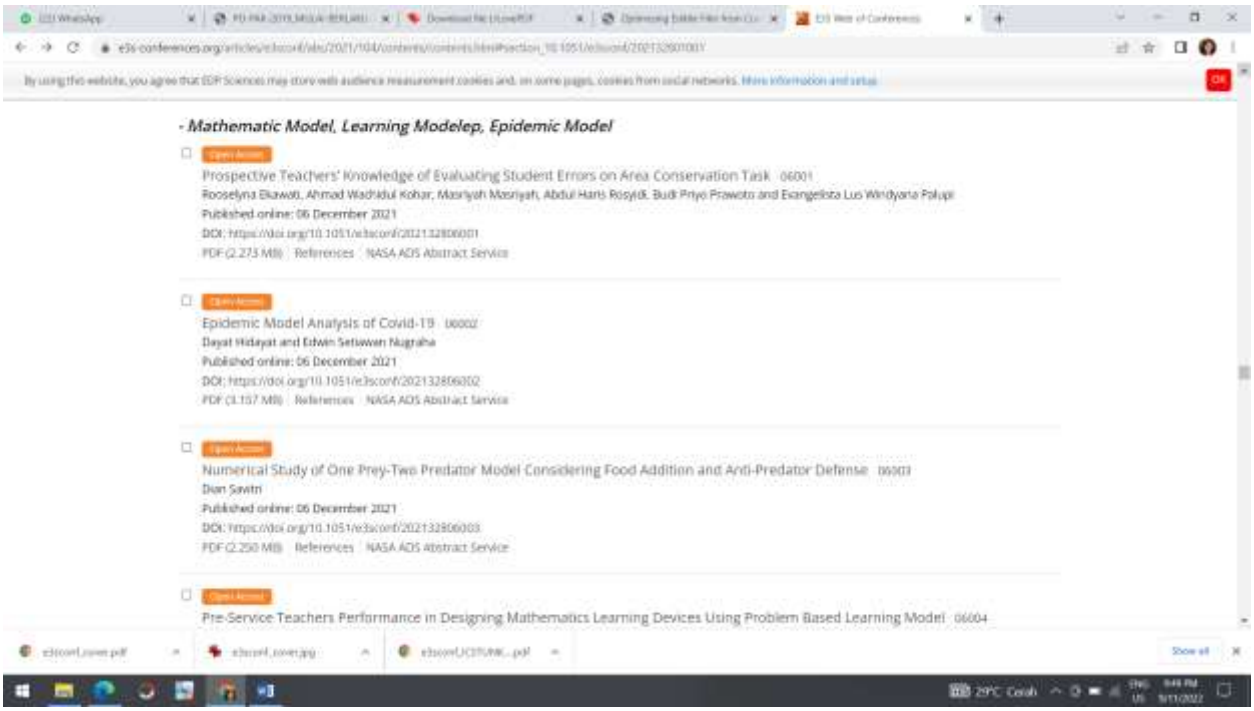

- *Mathematic Model, Learning Modelep, Epidemic Model*

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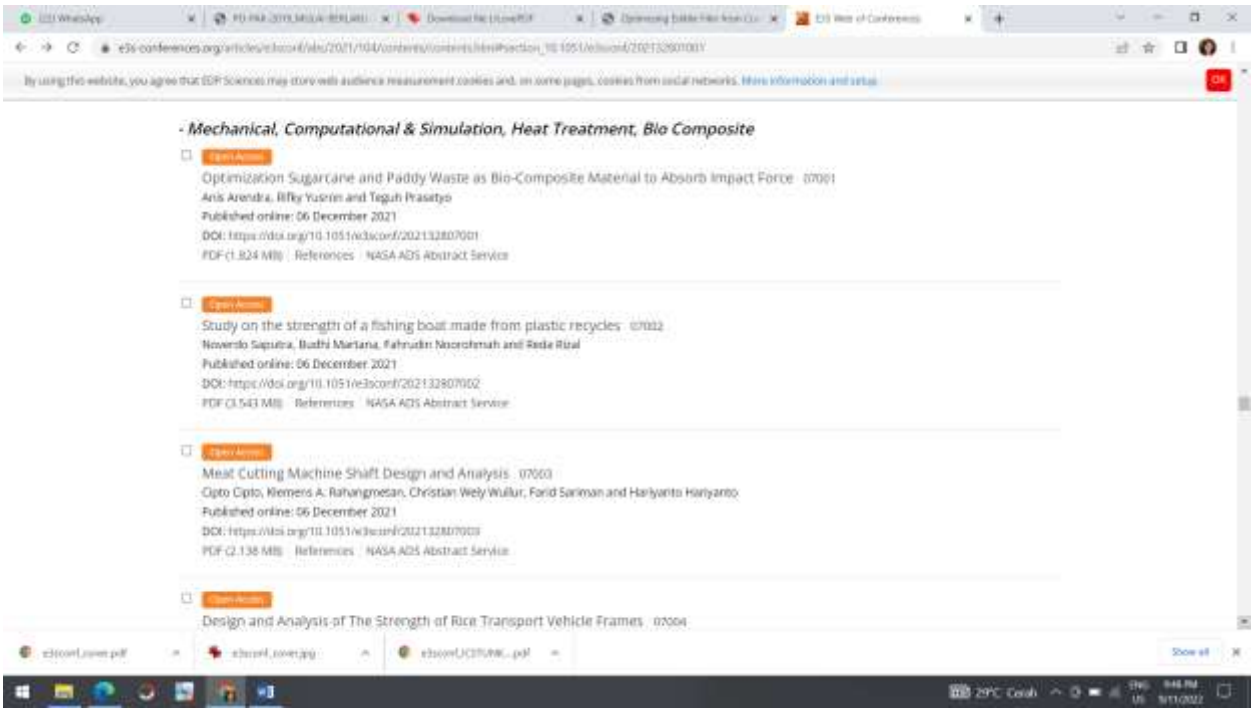

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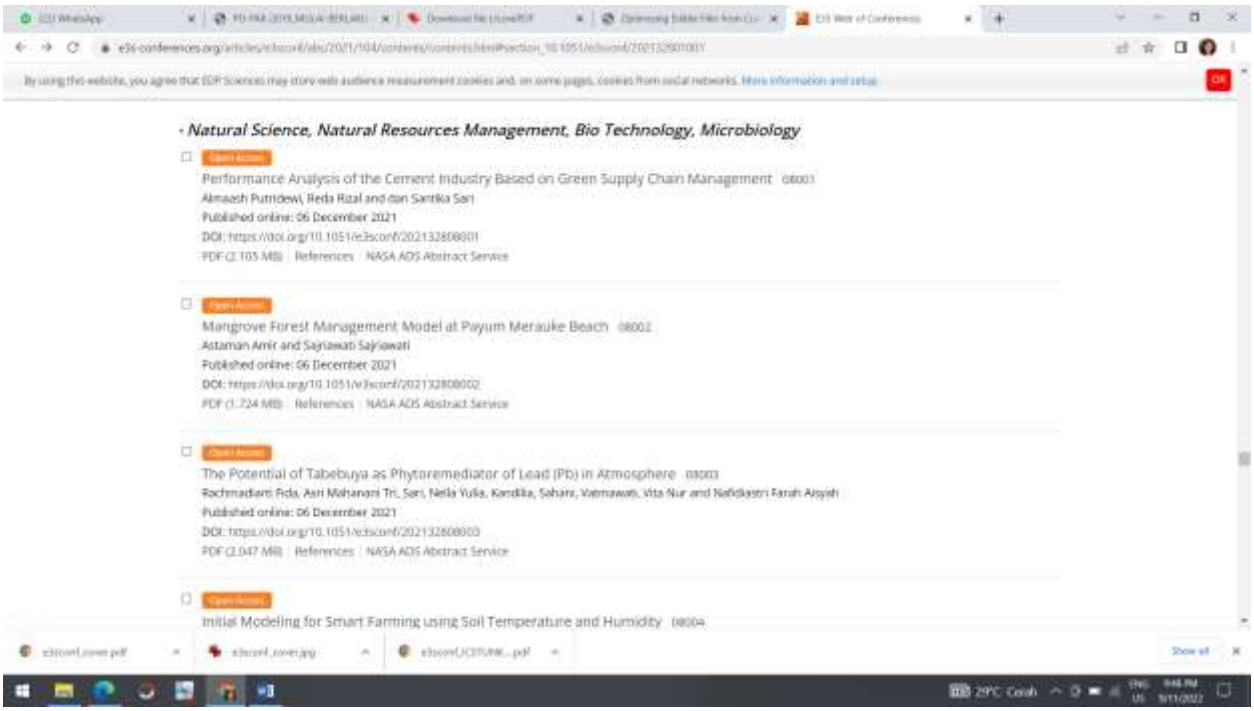

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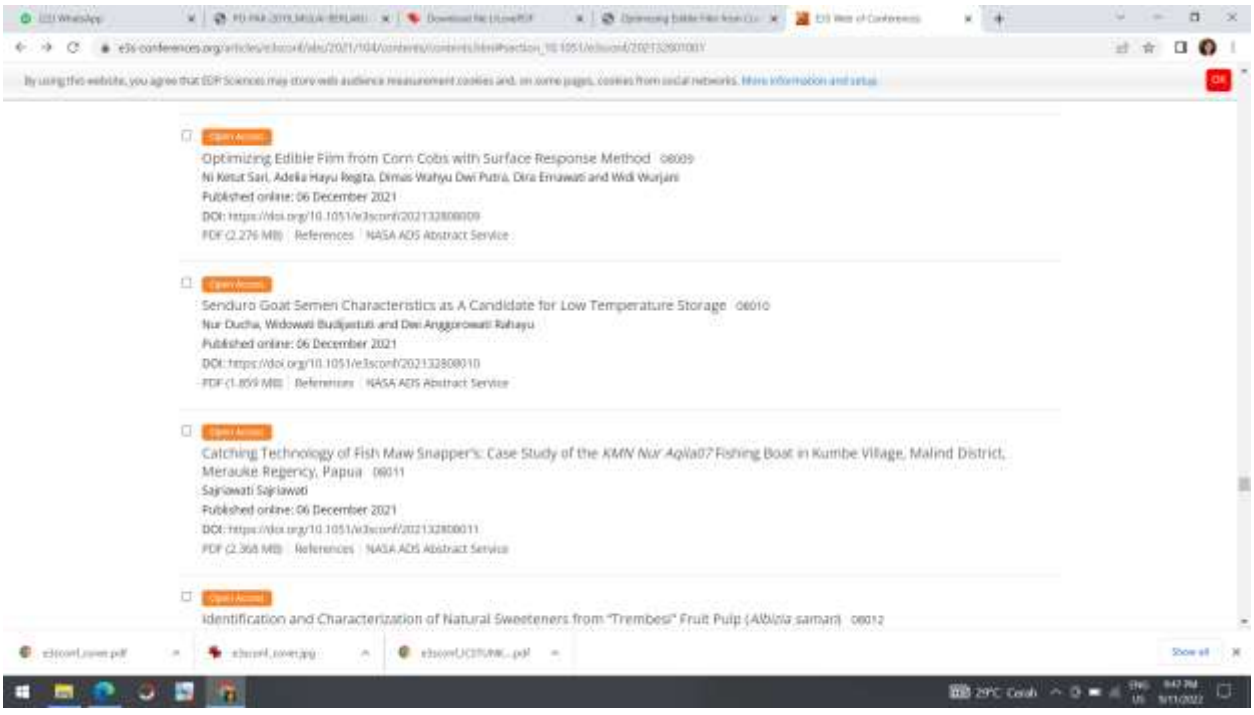

Optimizing Edible Film from Corn Cobs with Surface Response Method 08009
Ni Ketut Sari, Adelia Hayu Regita, Dimas Wahyu Dwi Putra, Dira Ernawati and Widi Wurjani
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Wednesday, September 8, 2021

Dear Ni Ketut Sari

May God bless you with good health.

Congratulations. On behalf of the committee, we are pleased to inform that your full papers is **ACCEPTED** to be presented at the 4th International Joint Conference on Science And Technology (IJCST) 2021, scheduled on October 27th -28th, 2021 at Bela Sahid Hotel, Ternate, Maluku Utara.

Paper ID : ICST-2021-057
Paper Title : **Optimizing Edible Film from Corn Cobs with Surface Response Method**

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Optimizing Edible Film from Corn Cobs with Surface Response Method

Author(s)
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Author's signature

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4 November 2021

UNIVERSITAS KHAIRUN
INTERNATIONAL JOINT CONFERENCE ON SCIENCE AND TECHNOLOGY
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Perihal : **Undangan**

Yth. Peserta International Joint Conference On Science And Technology
Fakultas Ilmu Komputer (Terlampir)
Universitas Pembangunan Nasional Veteran Jawa Timur
Di-
Tempat

Dengan hormat,
Kami mengundang Bapak/Ibu Peserta untuk menghadiri kegiatan "**International Joint Conference On Science and Technology 2021"** yang akan diselenggarakan pada :

1. Pembukaan IJCST 2021
   Hari/Tanggal :Rabu, 27 Oktober 2021
   Waktu :13:30 - Selesai WIT
   Link Zoom :https://us02web.zoom.us/j/84937848469?pwd=UUJnLzlXZFJZcHR2NFYwcExmWHpCdz09
   Meeting ID : 849 3784 8469
   Passcode : ijcst2021
2. Parallel Session
   Hari/Tanggal : Kamis, 28 Oktober 2021
   Waktu : 10:00 – 13:00
   Link Zoom :
   a. ICST :https://us02web.zoom.us/j/89336693385?pwd=MFpqNm9adFlyQ3E4NXlxOFd4N04zUT09
      Meeting ID: 893 3669 3385
      Passcode : 553342
   b. ICSS :https://us02web.zoom.us/j/83040963225?pwd=bFRJbWUvYmxUWGFJN3o1T0Jub1RsQT09
      Meeting ID: 830 4096 3225
      Passcode : 568058

Diharapkan agar bisa mengikuti kegiatan parallel session, acara pembukaan dan plenary session sampai dengan selesai. Demikian undangan ini kami sampaikan, atas kehadiran dan partisipasinya kami ucapkan terima kasih.

Head of Conference Organizer,

Ir. Lita Asyriati Latif,S.T.,M.TM.
NIP 196903281995122001

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NO	ID PAPER	NAMA PESERTA	FAKULTAS	PERGURUAN TINGGI
1	055	Yulia Puspaninggrum	ILMU KOMPUTER	UPNV JATIM
2	056	Basuki Rahmat	ILMU KOMPUTER	UPNV JATIM
3	057	Ni Ketut Sari	ILMU KOMPUTER	UPNV JATIM
4	058	Widiwurjani	ILMU KOMPUTER	UPNV JATIM
5	053	Eristya Maya Safitrih	ILMU KOMPUTER	UPNV JATIM

International Joint Conference

On Science and Technology

IJCST 2021

October 27, 2021 (ICST)

8:00am - 8:45am	Registration with refreshments	Organizing Committee
9:00am - 11:15pm	ICST SESSION (Offline Session)	
	1 Panel Session (Room 1)	loderator: Mohammad Ridwan Lessy
	2 Panel Session (Room 2)	Moderator: Wahyu Budi Setiawan
	3 Panel Session (Room 3)	Moderator: Mardiani Sidayat
11:30am - 12:30pm	**Keynote Speaker SESSION ICST** **Prof. Aziz Muhammad** **(The University Of Tokyo)**	Moderator: **Maulana Ibrahim**
12:30am - 13:30pm	Lunch provided in the Grand Ballroom	
13:30pm - 14:20pm	Opening IJCST 2021	
	1. Speech from Mrs. Lita Asyriati Latif as the head of the committee 2. Speech from Rector Universitas Khairun, Mr. M. Ridha Ajam 3. Speech from Head of Dirctorat Jenendral of Higher Education, Culture, Riset & Technology	MC
14:20pm - 15:30pm	**Main Speaker SESSION ICST** Prof. A.P. Bayuseno	Moderator: **Maulana Ibrahim**
15:45pm - 18:15pm	**Keynote Speaker SESSION** **Remote Participant via Zoom** 1. Prof. Biswajeed Pradhan (University. Of Technology Sydney) 2. Rizky Mardian, Ph. D (University of Edinburgh)	Moderator: **Maulana Ibrahim**
18:15pm - 18:30pm	Closing Day, 1	

Time Zone : East Indonesia Zone Time (WIT)

International Joint Conference

On Science and Technology

IJCST 2021

October 28, 2021

10:00am - 13:00pm	ICST SESSION (Online Zoom)	
	1. Parallel Session (Room 1)	Moderator: Silvia Anggraeni, Ph.D
	2. Parallel Session (Room 2)	Moderator: Eristya Maya Safitrih
	3. Parallel Session (Room 3)	Moderator: Ichsan Rauf
	4. Parallel Session (Room 4)	Moderator: Dr. Eng. M. Alif Razi
	5. Parallel Session (Room 5)	Moderator: Farida Pulansari
	6. Parallel Session (Room 6)	Moderator: Dr. Ir. Lily Ishak, M.Natres
	7. Parallel Session (Room 7)	Moderator : Sandi Rais
	8. Parallel Session (Room 8)	Moderator : F Adi Saputro
	9. Parallel Session (Room 9)	Moderator : Yulia Puspaninggrum
13:00pm - 13:30pm	Conference Closing	

Schedule Of Parallel Session Online

Schedule Of Parallel Session
Online Session ICST 2021
Room Zoom Meeting 1
Moderator : Silvia Anggraeni, Ph.D

(October 28, 2021) Time : 10:00 – 13:00 WIT

No	Presenter	Tittle
1	Wiwin Sulistyawati	Hydrodynamic Analysis in Redesigning a Monohull Passenger Ship into a Catamaran
2	Noorohmah	Study on the strength of a fishing boat made from plastic recycles
3	Mohammad Rusdy Hatuwe	Redesigning Generator Landing Craft Tank 1500 DWT by Considering Technical and Economic Factors
4	Biatma Syanjayanta	Evaluation Accessibility Musamus University Lecture Building The Architecture Department To The Building Standard
5	Astaman Amir	Mangrove Forest Management Model at Payum Merauke Beach
6	Johana Anike Mendes	Effectiveness Test of Piper methysticum Extract Against Crocidolomia pavonana larvae
7	Nurcholis	Reproductive Behavior's: Audiovisual detection of oestrus after synchronization using Prostaglandin F2 Alpha (PGF2α)
8	Sajriawati Sajriawati	Catching Technology of Fish Maw Snapper's: Case Study of the KMN Nur Aqila07 Fishing Boat in Kumbe Village, Malind District, Merauke Regency, Papua
9	Sunarni Sunarni	Reproductive Snakehead fish (Channa striata Bloch, 1793) in swamps waters
10	Siswanto	Charcoal fuel from the mixture of coconut shell waste and coal: effect of carbonization temperature and the amount of coal mass in the mixture
11	Sri Winarti	Identification and Characterization of Natural Sweeteners from "Trembesi" Fruit Pulp (Albizia saman)
12	Srie Muljani	CO2 Capture using Sodium Silicate Solution in a Packed Bed Column
13	Sutiyono	Analysis of temperature effect on struvite scales controlling in a vertical reactor

Schedule Of Parallel Session

Online Session ICST 2021

Room Zoom Meeting 2

Moderator : Eristya Maya Safitrih

(October 28, 2021) Time : 10:00 – 13:00 WIT

No	Presenter	Tittle
1	Laily Rosdiana	Analysis of Problem Solving on the Argumentation Ability of Students Under the Topic of Dynamic Electricity
2	Rahmad Agus Prasetio	Molecular Identification of Pathogenic Bacteria in Kantong Semar Plants (Nepenthes Gracillis) Based on Mitochondrial 16S rRNA Gene
3	Bambang Sudjasta	Utilization of Solar Energy on 10 GT Fishing Vessels as Alternative Electricity Facilities at PPI Cituis Tangerang Regency
4	Adik Putra Andika	Design of Automatic Chili and Tomato Sprinklers Based on Arduino Mega 2560
5	Roberto Corputy	Web Planning Tower Base Transceiver Station Collective Mobile Telecommunications in Merauke City Based on Geographic Information Systems Using Mapinfo for The Next 10 Years
6	Dian Neipa Purnamasari	Initial Modeling for Smart Farming using Soil Temperature and Humidity
7	Miftachul Ulum	Propagation Measurement on 2.5 mm NYAF Cable Using Load Matching and TDA
8	Adi Kurniawan Saputro	Electrical Power Consumption Monitoring on Filament 3D Printer Using Web Based
9	Deni Tri Laksono	Spiral Antenna Design and Analysis As a Tool to Measure Partial Discharge in High Voltage Equipment
10	Dian Neipa Purnamasari	Digital Moving Average Filter Application for Echo Signals and Temperature
11	A F Doni	Redesign Prototype of Fintech Application
12	Hanifudin Sukri	Ultrasonic Signal Implementation in Arduino-Based Obstacle Robot Control System
13	Miftachul Ulum	Comparison Of Voltage Measurements on DC Gearbox Motor and PWM Voltage Based On Arduino Uno
14	Kunto Aji Wibisono	Development Of Circular Polarization 5.5 Ghz Microstrip Antenna E-Shaped For Synthetic Aperture Radar Communication
15	Achmad Fiqhi I	Waste Collector Roboboat Using Neural Network Method Based on Tensorflow Framework
16	Eristya Maya Safitri	An Analysis of Physical and Environmental Security in Communication and Information Department Mojokerto

Schedule Of Parallel Session
Online Session ICST 2021
Room Zoom Meeting 3
Moderator : Ichsan Rauf

(October 28, 2021) Time : 10:00 – 13:00 WIT

No	Presenter	Tittle
1	Sasmita	Analysis Of Quality Control Of Avtur Fuel In The Storage Tank At PT. XYZ On The Value Of Electrical Conductivity During Covid-19
2	M Sulistyani	Design Of Sales Application Models Using Quality Function Deployment Method And System Development Life Cycle: Case Study At Giriloyo Batik Tulis Center
3	Almaash Putridewi	Performance Analysis of the Cement Industry Based on Green Supply Chain Management
4	Reda Rizal	Design and Build Models of Banana Stem as Material Substitution for Sustainable Manufacturing
5	Almaash Putridewi	Performance Analysis of the Cement Industry Based on Green Supply Chain Management
6	Sabarudin Ahmad	Raw Material Analysis control of SMBE Slipper Producer using Economic Order Quantity
7	Rachmad Hidayat	The Influence of Oil Raw Materials on The Quality of Finished Soap Products in The Laboratory Division at PT. Solar Wings Corps
8	Rachmad Hidayat	Line Balancing Analysis of Hollow Dakota 1730 Manufacturing Process in PT XYZ
9	Shofi fitrotis Salimah	Evaluation of The Facility layout on The Fried Onion Production Process
10	Nizar Amir	Analysis and comparison of different dewatering methods on salt quality
11	Kukuh Winarso	Minimization Risk Product Quality of Stolephorus Sp. Fish in Supply Chain Activities
12	Rullie Annisa	Cognitive Ergonomics: Driving Safety Engineering Analysis using the SHERPA Method and the HEART Methods Approach
13	Ernaning Widiaswanti	Conceptual Model of Essential Oil Agroindustry Development by Using System Dynamics Approach
14	Dira Ernawati	Ordering Size Optimization of Raw Material to Minimize Inventory Costs using Wagner-Within Algorithm and Silver-Meal Methods
15	Dyah Suci Perwitasari	Study of Struvite Crystal Growth with The Addition of Tartaric Acid
16	Euis Nurul Hidayah	Modelling of Fat Oil and Grease (FOG) and Total Suspended Solid (TSS) Removal Rate On Dissolved Air Flotation Process Using Multiple Linear Regression

Schedule Of Parallel Session

Online Session ICST 2021

Room Zoom Meeting 4

Moderator : 2. Dr. Eng. M. Alif Razi

(October 28, 2021) Time : 10:00 – 13:00 WIT

No	Presenter	Tittle
1	L Sumaryanti	Aplication of Hybrid Method for Superior cattle selection using Decision Support System
2	Marsujitullah	Geographical Information System for Mapping and Analysis of Agricultural Areas in Merauke Regency
3	Syaiful Nugraha	Feature Optimization on Dual Leap Motion Controller for Indonesian Sign Languange
4	Suwarjono	Cryptography Implementation for electronic voting security
5	Widiwurjani	Potential Of Various Types Of Media For Breeding Oyster Mushroom F2
6	Izak Habel Wayangkau	Decision Support System of Student Study Service Program Group Distribution Applying Process Hierarchy Analitic Method: A Case Study Lppm of Musamus Universitye
7	Annastya Bagas Dewantara	Design and Modeling of IoT-based Sterilization Box using UV-C Radiation
8	Stanly Hence Dolfi Loppies	Web-Base Information System of Rice Milling Places In Malind District
9	Fransiskus Xaverius	Decision support systems suitability in agarwood tree planting using simple additive weighting method (saw) in merauke district
10	Reza Zubaedah	Automation system spraying desinfectant at Universitas Musamus
11	Nasra Pratama Putra	Utilization of RFID Technology in the Employee Mobility System of the Inspectorate Office of Merauke Regency
12	Martha Betaubun	The Need of Digital Competencies for the Industrial Internet of Things Manufacturing Era: A Case of Higher Students in Papua
13	Arief Assaf	Benefits and Risks of Cloud Computing in E-Government Tasks: A Systematic Review
14	Wahyu Dwi Lestari	Investigation The Effect of Clearance and Body Weight on The Contact Pressure of Metal on PCU Hip Prosthesis using Finite Element Method

Schedule Of Parallel Session

Online Session ICST 2021

Room Zoom Meeting 5

Moderator : Farida Pulansari

(October 28, 2021) Time : 10:00 – 13:00 WIT

No	Presenter	Tittle
1	Yudha Dwi Putra Negara	Development of a boarding house search information system using the waterfall model
2	Fifin Ayu Mufarroha	PlantBot: Intelligent Plant Application based on ADDIE Model of Instructional Design
3	Sigit Putro	Development of a Web-Based “Let's Donate” Fundraising Information System
4	Jauhari	Implementation of User Centered Design in User Experience Architecture for Geo-COVID mobile Applications
5	Fifin Ayu Mufarroha	Web-Based Smart Market Applications as a Preference Transition during COVID-19 Pandemic
6	Yudha Dwi Putra Negara	Application of the Waterfall Method on a Web-Based Job Training Management Information System at Trunojoyo University Madura
7	Sigit Putro,	Web-Based E-Teylor Sales Indormation System Design
8	Ach Khozaimi	Web-Based Urban Village Information System Development
9	Rika Yunitarini	Design of Integrated Computer Aided Process Planning and Bill of Material in Industry 4.0 Environment
10	Basuki Rahmat	ELM-Based Indonesia Vehicle License Plate Recognition System
11	Ni Ketut Sari	Optimizing Edible Film from Corn Cobs with Surface Response Method
12	Farida Pulansari	The effects of elasticity of demand for product quality and discount rate in dual-channel supply chains
13	Minto Waluyo	Relationship of Exogen Variables for Customer Use and Satisfaction of Delivery Services
14	Sumiati	Implementation of Value Engineering in Heat Treatment Process to Cooling Media Steel ST 41 at PT. XY

Schedule Of Parallel Session
Online Session ICST 2021
Room Zoom Meeting 6
Moderator : Lily Ishak

(October 28, 2021) Time : 10:00 – 13:00 WIT

No	Presenter	Tittle
1	Titik Taufikurohmah	Benefits of Nanogold Injections to Treat Rheumatism Arthritis Complaints: A Case Study on Covid19 Clinical Test Volunteers
2	Prima Retno Wikandari	Potential of Fermented Leek (*Allium porrum* L.) Cultured by *Lactobacillus plantarum* B1765 to Deliver Probiotics
3	Rusmini Rusmini	Profile of Argumentation Ability of Undergraduate Students In Chemistry Education Based On Non-Routine Problems
4	Lydia Rohmawati	Prototype Profile of Supercapactors with Activated Carbon/Fe_3O_4 Electrodes Natural Materials and Celgard Li-Ion Battery Separators
5	John Yoro Parlindungan	Strong Acid Effects for Characterization Clay from District Tanah Miring, Merauke Regency
6	Deasy Liestianty	Identification and Characterization of Maitara Island Clay, North Maluku
7	Khadijah	Total Phenol Content and Activities of Antioxidant Extracts Methanol Limes *(Citrus Aurentifolia)* By Uv-Vis Spectrophotometry
8	Jariyah	Detection of Pork Gelatin in Jelly Candy Using Fourier Transform Infrared (FTIR) and Polymerase Chain Reaction (PCR)
9	Kindriari Nurma Wahyusi	Application of chitosan from *Corbula faba* Hinds shells as a bio-coagulant for river water treatment
10	Mohamad Mirwa	Utilization of Pine Fruit and Peanut Shell Wastes into Briquettes as an Alternative Fuel
11	Novel Karaman	Effect of Cow Dung Concentration and Microbial Count on The Formation of Biogas in A Horizontal Digester
12	Novirina Hendrasarie	Restaurant wastewater treatment with a two-chamber septic tank and a sequencing batch reactor
13	Ratna Yulistiani	Bacteria contamination and Cadmium heavy metal content of blood coockle (*Anadara granosa* Linn) satay on street vendors in Surabaya, Indonesia
14	S. Susilowati	Use Of Natural Gas Become A Petrochemical With Zeolite Catalyst
15	Sintha Soraya Santi	Potensiometric of Struvite ($MgNH_4PO_4.6H_2O$) Formation System from Biogas Waste in Electrolysis Cells

Schedule Of Parallel Session

Online Session ICST 2021

Room Zoom Meeting 7

Moderator : Sandi Rais

(October 28, 2021) Time : 10:00 – 13:00 WIT

No	Presenter	Tittle
1	Mohammad Galbi	Feasibility of Mechanical Properties of Lamina Hybrid Composite Ramie Fiber-Coconut Fiber-Fiberglass as an Alternative Hull Substitution of Material Structure Under 25M-V Type
2	Cipto Cipto	Meat cutting machine shaft design and analysis
3	Daniel Parenden	Design and analysis of the strength of rice transport vehicle frames
4	Klemens A Rahangmetan	Utilization of bus tree wood (Melaleuca sp) as environmentally friendly fuel for household industrial scale Aluminum smelting stoves in Merauke, Papua
5	Hariyanto Hariyanto	Dye-Sensitized Solar Cell performance measurement analysis using Arduino Board
6	Ivory Giyan Mitari	Hydrodynamic Analysis in Redesigning a Monohull Passenger Ship into a Catamaran
7	Ivan Guntur Perdana	Redesigning Generator of Landing Craft Tank 1500 DWT by Considering Technical and Economic Factors
8	Rifky Yusron1	Analysis of Wettability and Surface-Roughness of Titanium Grade 2 in Milling Process
9	Jauhari	Design and Implementation of Travel Agent in the Face of The COVID-19 pandemic
10	Anis Arendra	Optimization Sugarcane and Paddy Waste as Bio-Composite Material to Absorb Impact Force
11	Nizar Amir1	The effects of dry and wet grinding processes on the salt quality
12	Mahrus Khoirul Umami	Test Equipment Adding Electric Supercharger on Injection Machine for Biofuel Optimization
13	Mukhlis M	The Effect of Treatment of Coconut Fiber with Liquid Smoke on Mechanical Properties of Composite
14	Noorohmah	Study on the strength of a fishing boat made from plastic recycles
15	Sari Farah Dina	Design of solar water heater using collector cylindric parabolic and coil heater as absorber at focus point

Schedule Of Parallel Session

Online Session ICST 2021

Room Zoom Meeting 8

Moderator : Erwan Adi Saputro

(October 28, 2021) Time : 10:00 – 13:00 WIT

No	Presenter	Tittle
1	Tarzan Purnomo	Analysis of Carrying Capacity of Blekok Beach and Kerapu Beach Situbondo as Conservation Areas for Mangrove, Blekok Bird (*Ardidae*) and Grouper Fish Cultivation (*Epinephelus*)
2	Wineke Angesti	Fabrication and Characterization of Polysulfone Membrane Based On GO-SiO_2 Composite using Phase Inversion Method
3	Endang Susantini	Developing an Assessment-Link Mobile Application: A Catalyst for Pre-service Biology Teachers to Analyse Cognitive Test
4	Rooselyna Ekawati	Prospective Teachers' Knowledge of Evaluating Student Errors on Area Conservation Task
5	Dayat Hidayat	**Epidemic Model Analysis of Covid-19**
6	Mukhayyarotin Niswati Rodliyatul Jauhariyah	Research trend on erbium-doped tellurite glasses based on scopus database
7	Rian Ade Pratama	The Dynamics and Harvesting Effect Population One Prey Two Predator with Schooling Behavior
8	Nixon J. Sindua	Community Respond to Waste Treatment Base on 3R (Reduce, Reuse and Recycle) in The Settlement Environment of Moronge Village, Moronge District, Talaud Islam Regency
9	Koko Joni	Design and Build a Smart Door Lock Using the Deep Learning Convolutional Neural Network Method
10	Diana Rahmawati	Tobacco Farming Mapping To Determine The Number Of Plants Using Contour Detection Method
11	Achmad Ubaidillah	Enhancement of Computer Network Performance with VLAN
12	Witono Hardi	The Effect of Angle Variation in the Model V Blade on theSavonius-Type Vertical Axis Wind Turbine's Performance
13	Witono Hardi	Effect of Lap Joint Width to the Shear and Peel Stress Distribution of Bi-Adhesive
14	Sugeng Prayitno	A Design Of Centrifugal Pumps With 250 Liters / Second Capacity For Water Supply At Boarding School In Cibubur, Jakarta Timur
15	Erwan Adi Saputro	Physical Characteristics of Edible Film from Breadfruit Peel using Xylitol as Plasticizer

Schedule Of Parallel Session

Online Session ICST 2021

Room Zoom Meeting 9

Moderator : Eva Yulia Puspaningrum

(October 28, 2021) Time : 10:00 – 13:00 WIT

No	Presenter	Tittle
1	Muh Akbar	Analysis Of Satisfaction and Priority Levels Of Jaya Makmur Road Development In Supporting Kurik District As A Rice Surplus Area
2	Eva Y Puspaningrum	Implementation Of K-Nearest Neighbor - Certainty Factor for Expert System Detection of Idiopathic Thrombocytopenic Purpura
3	Chitra Utary	Planning of the Clean Water Distribution System Pipeline at Griya Arwana Lestari Housing, Merauke Regency
4	Eko Budianto	Analysis of Unconfined Compressive Strength in Clay Mixed with Sand
5	Theresia Widi Asih Cahyanti	Correlation of the Increase in the Transportation Infrastructure Development Budget with a production surplus
6	Hairulla Hairulla	Slope Reinforcement Study Using Geotextile
7	Daud Andang Pasalli	Experimental Study of Compressive Strength of Lightweight Concrete Using Wood Charcoal
8	Risval Tribudianto	An Analysis The Impact Of Modern Gamalama Plaza Contraction To The Traffic Movement
9	Bustamin S Marsaoly	The Sensitifity and Elastisity Model Approch to The Probality of Wooden Boat Route Selection in Archipelago Area
10	Dian Purnamawati Solin	Investigation of relationship between cone penetration test and unit weight in cohesive soil (Study case: Gunung Anyar District)
11	Fithri Estikhamah	Correlation Between Cone Resistance Values and Cohesion Values in Cohesive Soils (Case Study in Gunung Anyar District)
12	Fajar Romadhon	Increasing the Stability of Asphalt Concrete Mixture Using Crumb Rubber
13	Faiz Muhammad Azhari	Accelerate the Implementation Time of Kadiri University Clinic Constructions Projects Using Critical Path Method (CPM)
14	Denny Maliangkay	An Evaluation The Impact of Garbage Conservation at Coastal Environment of Kora Kora Tourism, Kapataran Village, East Lembean District
15	Helena Sri Sulastriningsih	Analysis of Morphometric Changes in Tondano Lake Based on Bathymetric Maps
16	Joyce C Kumaat	Hydro-Oceanographic and Bathymetric Survey in Tanjung Merah as a Basis for Modelling Coastal Spatial Plans of Bitung City

INTERNATIONAL JOIN CONFERENCE ON SCIENCE AND TECHNOLOGY (IJCST) 2021

OPTIMIZING EDIBLE FILM FROM CORN COBS WITH SURFACE RESPONSE METHOD

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INDONESIA
2021

INTRODUCTION

- The resulting edible films have different characteristics depending on the variation of the plasticizer ratio between glycerol and sorbitol and the amount of starch.

- These characteristics include the value of tensile, the elongation, thickness and water vapor permeability

- Where some are in accordance with the Japanese Industrial Standard (JIS) and existing theories.

RESPONSE SURFACE METHODOLOGY METHOD

The relationship between the Y response and the X-free variable

$$Y = f(X_1, X_{2,}, X_k) + \varepsilon$$

First-order models (first-order models)

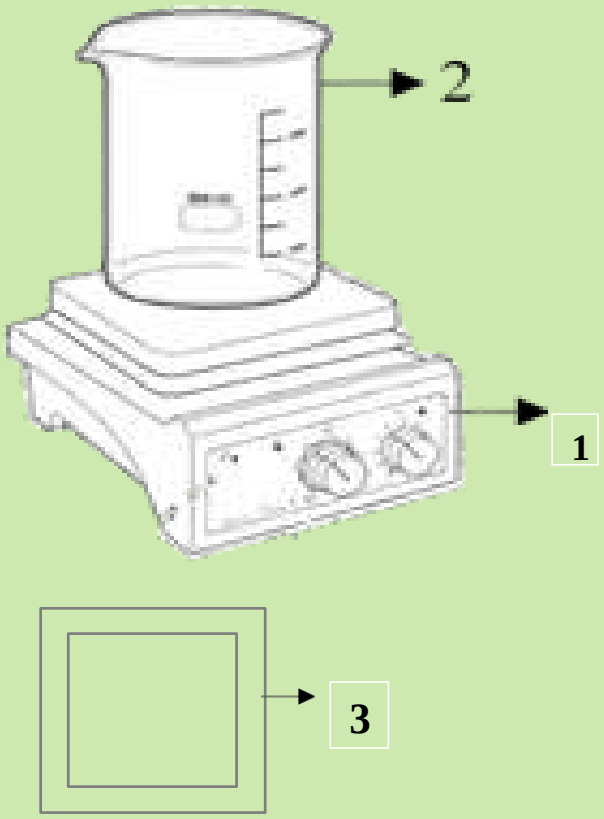
$$Y = \beta_o + \sum_{i=1}^{k} \beta_o X_i$$

Second-order whose squared functions are:

$$Y = \beta_o + \sum_{i=1}^{k} \beta_o X_i + \sum_{i=1}^{k} \beta_u X_i^{\,2} + \sum_{i=1,j=2}^{k-1,k} \beta_{i,j} X_i X_j + \varepsilon$$

Equations and optimization results are obtained using Minitab software.

RESEARCH METHODS



Caption:
1 Magnetic stirrer
2. Baeker glass
3. Mold Size 15x15 cm with a thickness of 0.25 mm

Fig. 1. Research tools edible film from corn cobs

2.1 Starch making

- Starch from corn cobs is done by into small pieces
- Soaked in 1% NaOH for 12 hours to remove the lignin content.
- The corncobs were washed with water and ground, the pulp was squeezed out with a filter cloth, the filtrate was allowed to stand for one day to produce starch deposits.
- The starch precipitate was dried in the oven to remove the moisture content,
- Drying the starch was ground with a mortar until smooth, the size was homogeneous.

2.2 Edible film making

- Starch from corn cobs 5gr, 6gr, and 7 grams.
- Glycerol and sorbitol in a ratio of 2:8, 3:7, 5:5, 7:3, 8:2
- Added with distilled water until the solution reached 100 ml in a beaker glass.
- The mixture was stirred with a magnetic stirrer with a rotation of 400 rpm, heated to a temperature of ± 70°C and stirred for 20 minutes.
- The edible film solution is still stirred while it is cooled to room temperature in order to prevent air bubbles from forming during printing.
- The edible film solution was printed on a glass plate and then dried at 60 °C for 7 hours. After drying, the film was cooled to room temperature.

RESULTS AND DISCUSSION

Table 1. Value of tensile strength, elongation, thickness and permeability

Starch weight (grams)	Ratio Glycerol to Sorbitol				
	2:8	3:7	5:5	7:3	8:2
Tensile strength (MPa)					
5	0.066	0.128	0.104	0.1	0.09
6	0.317	0.283	0.24	0.166	0.14
7	0.536	0.528	0.491	0.318	0.213
Elongation (%)					
5	10.2	14.6	15.1	19.7	21.4
6	5.1	5.8	6.9	7.9	7.5
7	4.1	4.6	6.1	6.5	6.5
Thickness (mm)					
5	0.12	0.15	0.16	0.16	0.15
6	0.18	0.19	0.19	0.19	0.17
7	0.26	0.23	0.2	0.19	0.16
Permeability (gram/m^2 .day)					
5	11.83	11.66	11.66	11.39	11.55
6	11.33	11.21	10.66	10.67	10.47
7	10.39	9.99	9.84	10.23	8.86

Tensile strength = $- 0{,}059 - 0{,}107 X_1 + 0{,}198 X_2 + 0{,}028 X_1^2 + 0{,}0059 X_2^2 - 0{,}04486 X_1X_2$

Elongation = $178{,}2 - 54{,}58 X_1 + 9{,}62 X_2 + 4{,}240 X_1^2 - 0{,}542 X_2^2 - 1{,}013 X_1X_2$

Thickness = $- 0{,}332 + 0{,}123 X_1 + 0{,}08 X_2 - 0{,}006 X_1^2 - 0{,}0018 X_2^2 - 0{,}01327 X_1X_2$

Permeability = $10{,}72 + 0{,}84 X_1 + 0{,}499 X_2 - 0{,}128 X_1^2 + 0{,}0017 X_2^2 - 0{,}1164 X_1X_2$

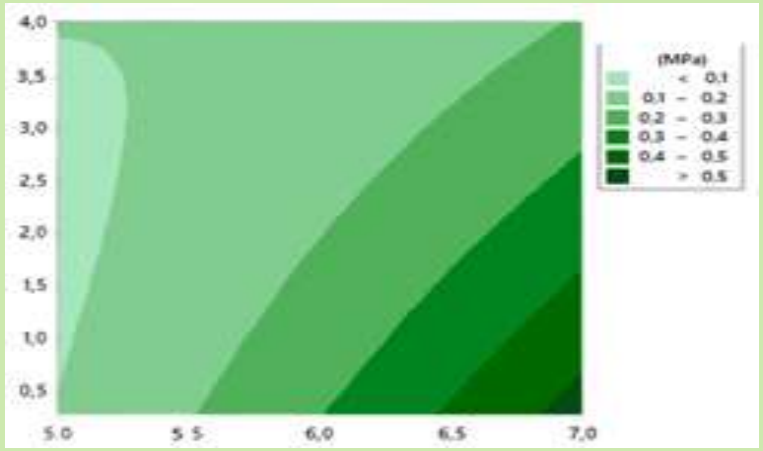
Note:

X_1 = weight of starch

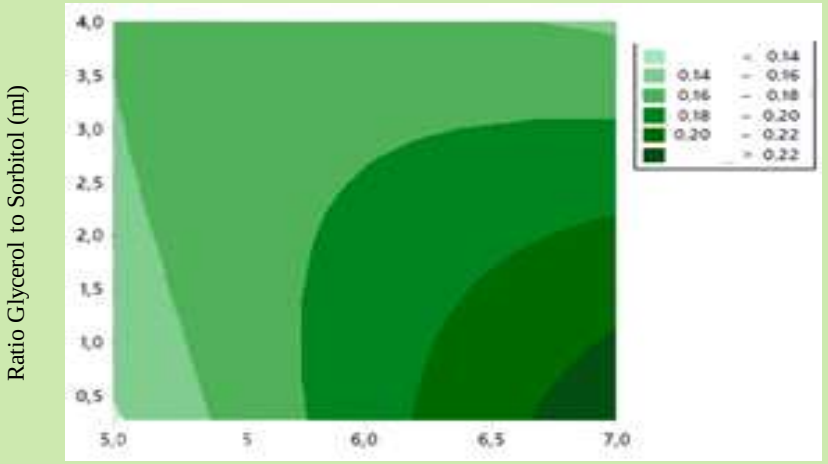
X_2 = Ratio Glycerol to Sorbitol

RESULTS AND DISCUSSION

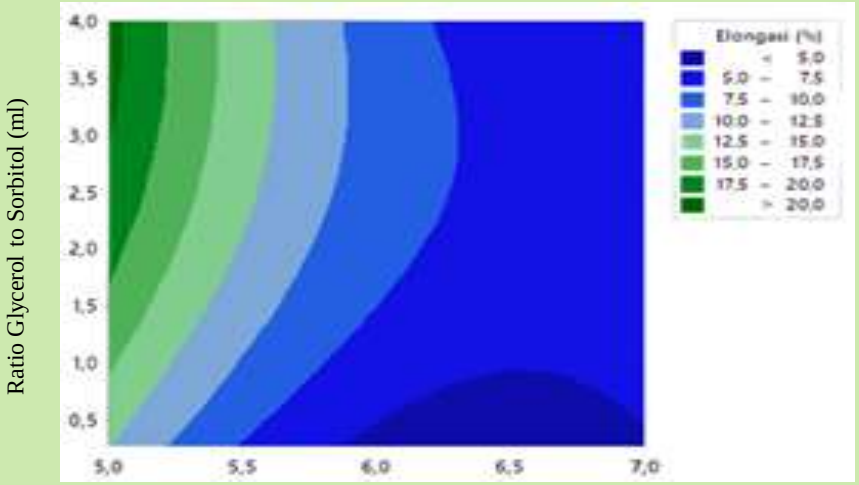
Contour plot of tensile strength versus ratio Glycerol to Sorbitol and starch weight



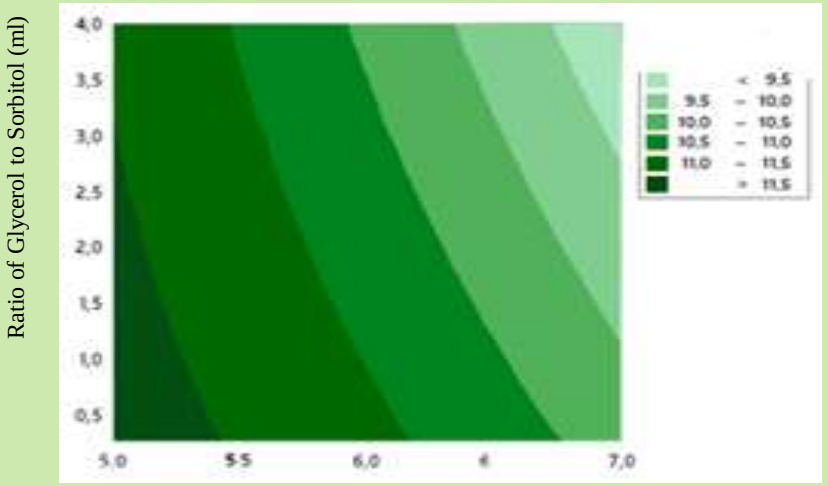
Contour plot of thickness versus ratio Glycerol to Sorbitol and starch weight



Contour plot of elongation versus ratio Glycerol to Sorbitol and starch weight

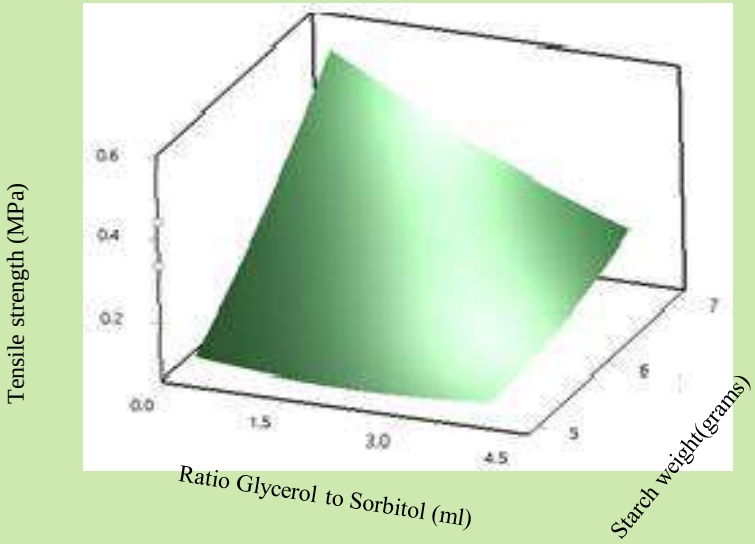


Contour plot of permeability versus ratio Glycerol to Sorbitol and starch weight

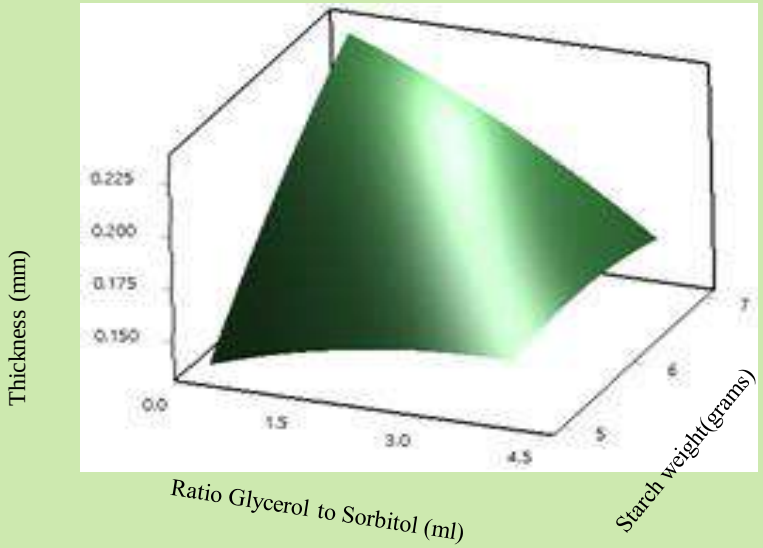


RESULTS AND DISCUSSION

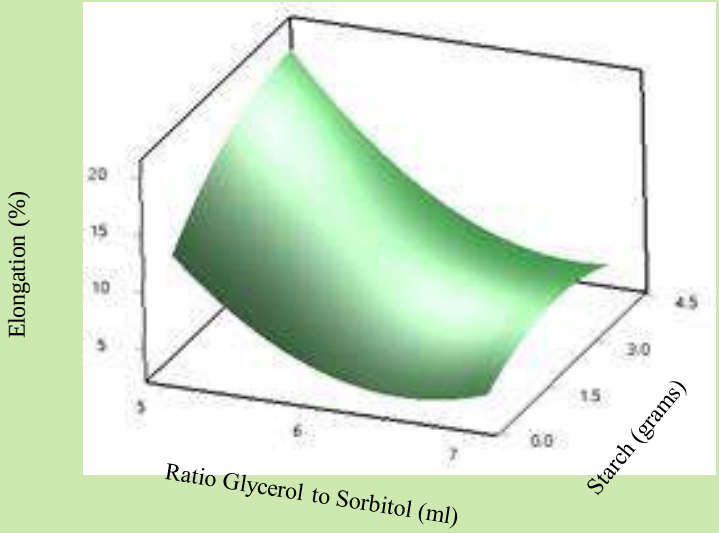
Surface plot of tensile strength versus ratio Glycerol to Sorbitol and starch



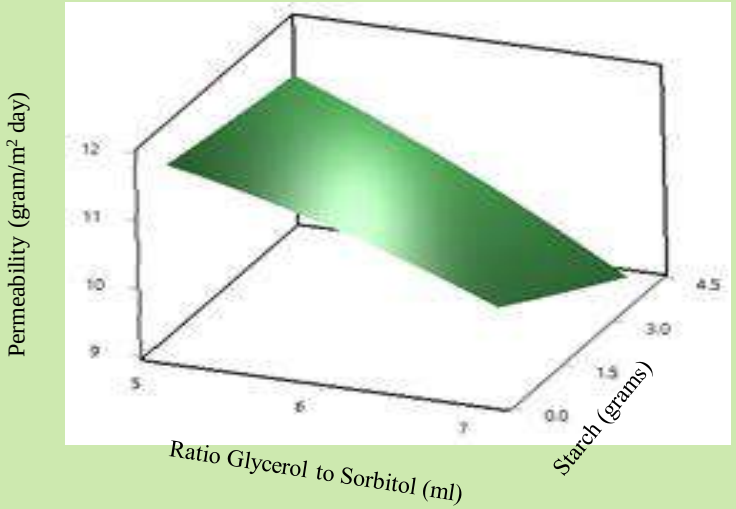
Surface plot of thickness versus ratio Glycerol to Sorbitol and starch



Surface plot of elongation versus ratio Glycerol to Sorbitol and starch



Surface plot of permeability versus ratio Glycerol to Sorbitol and starch



CONCLUSION

- These characteristics include the value of tensile strength with the largest value of 0.536 MPa and the smallest of 0.066 MPa, the elongation value with the largest value of 21.4% and the smallest of 4.1%, thickness with the largest value of 0.26 mm and the smallest of 0.12 mm, and water vapor permeability with the largest value 11.83 gram/m^2 day and the smallest 8.86 gram/m^2 day.

- The optimum results were in the composition ratio of glycerol to sorbitol 5:5 with the amount of corncob starch of 7 grams.

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thank YOU

Ni Ketut Sari
Intan Purbasari Y.

Optimizing Edible Film from Corn Cobs with Surface Response Method

by Ni Ketut Sari

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Optimizing Edible Film from Corn Cobs with Surface Response Method

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Abstrak. The increase in plastic production worldwide has created quite a serious environmental problem. Edible film is an alternative packaging that can decompose naturally, one of the materials that can be used to make edible films is starch. This study aims to determine the composition of corn cob starch and plasticizer that can produce edible films with the best properties. The starch used is derived from corn cobs and the plasticizers used are glycerol and sorbitol. The edible film in this study was made by the casting method by dispersing the raw materials, heating the mixture, printing the edible film and drying the edible film. This research was conducted with variations in the corncob of 5, 6 and 7 in grams and the variation of the ratio of glycerol to sorbitol plasticizer is 2:8; 3:7; 5:5; 7:3; 8:2 (ml). The more starch content increases the thickness of the edible film and tensile strength, but the elongation and water vapor permeability decreases, the best edible film is obtained at the glycerol-sorbitol composition ratio of 5:5 with the amount of corncob starch of 7 grams.
Keyword: corn cobs, edible film, optimization, surface response method

1 Introduction

The increasing production of plastic around the world is causing serious problems for the environment. This is because plastic is difficult to decompose in nature. Edible film is an alternative packaging that can decompose naturally. Edible film is defined as a thin polymer layer that serves as a barrier to gas and moisture that can be consumed. The components that are often used to make edible films are divided into three categories, namely hydrocolloids, lipids, and composites. A non-volatile plasticizer was added to the hydrocolloid film formation as a solution to renew the flexibility of the edible film. Plasticizers that are often used are: glycerol, sorbitol, polyethylene glycol and oligosaccharides. Glycerol is known as a hydrophilic plasticizer, so it is suitable to be added to hydrophobic film-forming materials such as starch, pectin, gel, and protein. Glycerol acts as a plasticizer to increase the flexibility of the film [1]. Starch, a polymer that is often used as a raw material in the manufacture of edible films, is often used in the food industry as a biodegradable film that aims to replace plastic polymers because it is economical, renewable, and provides good physical characteristics [2]. The use of a single material in the manufacture of edible films still has several shortcomings, including brittle and rigid properties, it is necessary to add additional materials, namely plasticizers [3]. Plasticizer is known as an additive in the manufacture of edible films which serves to increase the elastic properties [4].

Edible film has optimum conditions, namely when the composition of the mixture can produce physical and mechanical test values according to the standard, the more starch concentration used, the better the edible film properties obtained. Corn starch with the best composition obtained was 3% corn starch concentration and 7% black turmeric juice, with the characteristics of the edible film being water vapor transmission 0.50 gram/m².hour, thickness 0.17 mm, tensile strength 7.90 N/cm², and elongation. concentration of plasticizer, the type of plasticizer used also greatly affects the characteristics of the edible film. The raw material of kolang kaling with plasticizer is glycerol, sorbitol, and polyethylene glycol [5]. The best treatment obtained is the use of sorbitol with a concentration of 3% with the resulting parameter values are 0.12 mm thick, water vapor transmission rate 4.34 gram/m² hour, tensile strength 2.83 N/cm² and percent elongation 44.65%. edible films such as tensile strength, percent increase in length of edible film and water vapor permeability [6]. Starch is a material that is often used by the food industry as a biodegradable film that functions to replace plastic polymers because it is economical, renewable, and provides good physical characteristics [6].

Corn cobs are the largest part of corn waste. The content contained in corn cobs is cellulose as much as 40-60%, hemicellulose as much as 20-30% and lignin as much as 25-30%. The starch content in corn cobs is 27.1% [7]. The nature of starch is suitable for edible films because it can form a fairly strong film. Starch-based edible films have weaknesses, namely low water resistance and low moisture barrier because the hydrophilic nature of starch can affect its stability and mechanical properties [29].

Sorbitol which acts as a plasticizer in the formation of edible films can reduce the permeability of the film to oxygen, reduce the brittleness of the film so that the elasticity of the film increases. Sorbitol is also commonly used as an additive in edible films as an artificial sweetener [9]. Hydrothermal modification of physical

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properties in making edible film from red bean starch [10], use of sweetener food additives [11].

1.1 Characteristic Standard Edible Film

Based on the Japanese Industrial Standard (JIS), edible films have a maximum standard thickness of 0.25 mm, a maximum tensile strength of 0.392 MPa, a maximum water vapor transmission rate of 10 g/m2 day, and elongation has a minimum standard of 10% [12]. Factors that need to be considered in the manufacture of edible films are temperature, plasticizer and material concentration. Heating is carried out during mixing. This is done with the aim of achieving perfect starch gelatinization, in the manufacture of edible films a temperature of ±70°C is used [1]. Plasticizing agents are needed as additional ingredients in the manufacture of edible films with the aim of overcoming the brittleness of edible films caused by intermolecular forces. Plasticizers increase the mobility of the polymer chains, thereby increasing the flexibility of edible films [13]. The concentration of raw materials is very influential, especially on the physical properties of edible films. The more concentration of raw materials added, the thicker and greater the tensile strength [14]. In the manufacture of this edible film, starch from corn cobs is used as raw material. Starch from corn cobs is very safe for human consumption because it does not endanger health. The plasticizers used are glycerol and sorbitol. According to the regulation of the POM RI No. 5 of 2013 concerning the maximum limit for the use of humectant food additives and No. 4 of 2014 concerning the maximum limit for the use of sweetener food additives, the limit on the use of glycerol and sorbitol for edible packaging, which is in accordance with CPPB. The maximum CPPB limit is the amount of BTP that is allowed to be present in food in sufficient quantities needed to produce the desired effect and its use should not be excessive [15].

1.2 Result Optimization

Response Surface Methodology (RSM) is a collection of mathematical and statistical methods used in modeling and analysis, which aims to see the effect of several quantitative variables on a response variable and to optimize the response variable. The relationship between response Y and the independent variable X:

$$Y = f(X_1, X_2, ..X_k) + \varepsilon \qquad (1)$$

Where:
Y = response variable
X = independent variable/factor
ε = error

The first step of RSM is to find the relationship between the response and the independent variable through the appropriate approach, between the response and the independent variable is a linear function, the function approach is called the first-order model, as shown in the following equation.

$$Y = \beta o + \sum_{i=1}^{k} \beta o\, Xi \qquad (2)$$

If the form of the relationship is a quadratic, then for the function approach, a higher degree polynomial is used, namely the second-order model

$$Y = \beta_o + \sum_{i=1}^{k} \beta_o X_i + \sum_{i=1}^{k} \beta_u X_i^2 + \sum_{i=1,j=2}^{k-1,k} \beta_{i,j} X_i X_j + \varepsilon \qquad (3)$$

After obtaining the most suitable form of relationship, the next step is to optimize the relationship. Equations and optimization results are obtained using Minitab software. To check the significance of the model, we can see the p-value of Regression. If the p-value is smaller than the degree of significance (α = 5%), it can be said that these variables make a significant contribution to the model [16].

From previous research on edible films, in this study using starch from corncob waste weighing 5,6 and 7 as materials, using glycerol and sorbitol as plasticizers. Edible film is made by casting method by dispersing the raw material, heating the mixture, printing the edible film and drying the edible film.

2 Methodology

The materials used in this study were corn cobs, aquadest, carrageenan, 1% NaOH, glycerol and sorbitol.

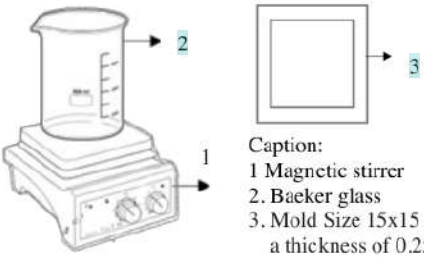

Fig. 1. Research tools edible film from corn cobs

2.1 Starch making

Making starch from corn cobs is done by cutting the corn cobs into small pieces, soaked in 1% NaOH for 12 hours to remove the lignin content. The corncobs were washed with water and ground, the pulp was squeezed out with a filter cloth the filtrate was allowed to stand for one day to produce starch deposits. The starch precipitate was dried in the oven to remove the moisture content, after drying the starch was ground with a mortar until smooth, then sifted so that the size was homogeneous.

2.2 Edible film making

Starch from corn cobs was weighed with a weight of 5gr, 6gr, and 7 grams. Starch from corn cobs was added with a mixture of glycerol and sorbitol in a ratio of 2:8, 3:7, 5:5, 7:3, 8:2 and then added with distilled water until the solution reached 100 ml in a beaker glass. The mixture was stirred with a magnetic stirrer with a rotation of 400 rpm, heated to a temperature of ± 70°C and stirred for 20 minutes. The edible film solution is still stirred while it is cooled to room temperature in order to prevent air bubbles

from forming during printing. The edible film solution was printed on a glass plate and then dried at 60 °C for 7 hours. After drying, the film was cooled to room temperature.

3 Result and Discussion

After obtaining the results of the analysis and calculation of the mechanical and physical properties of edible films, optimization of the results was carried out to determine the optimum results of edible films with the Surface Response Method using the Minitab software application which was carried out according to the theoretical basis reference regarding Result Optimization. The optimization results from Minitab software show that the overall data is second order. The optimization results will show the function of the response equation to the modified conditions such as the glycerol-sorbitol ratio and starch weight.

Table 1. Value of tensile strength, elongation, thickness and permeability

Starch weight (grams)	Ratio Glycerol to Sorbitol				
	2:8	3:7	5:5	7:3	8:2
Tensile strength (MPa)					
5	0.066	0.128	0.104	0.1	0.09
6	0.317	0.283	0.24	0.166	0.14
7	0.536	0.528	0.491	0.318	0.213
Elongation (%)					
5	10.2	14.6	15.1	19.7	21.4
6	5.1	5.8	6.9	7.9	7.5
7	4.1	4.6	6.1	6.5	6.5
Thickness (mm)					
5	0.12	0.15	0.16	0.16	0.15
6	0.18	0.19	0.19	0.19	0.17
7	0.26	0.23	0.2	0.19	0.16
Permeability (gram/m^2 .day)					
5	11.83	11.66	11.66	11.39	11.55
6	11.33	11.21	10.66	10.67	10.47
7	10.39	9.99	9.84	10.23	8.86

$$\text{Tensile strength} = -0{,}059 - 0{,}107\,X_1 + 0{,}198\,X_2 + 0{,}028\,X_1^2 + 0{,}0059\,X_2^2 - 0{,}04486\,X_1X_2$$

$$\text{Elongation} = 178{,}2 - 54{,}58\,X_1 + 9{,}62\,X_2 + 4{,}240\,X_1^2 - 0{,}542\,X_2^2 - 1{,}013\,X_1X_2$$

$$\text{Thickness} = -0{,}332 + 0{,}123\,X_1 + 0{,}08\,X_2 - 0{,}006\,X_1^2 - 0{,}0018\,X_2^2 - 0{,}01327\,X_1X_2$$

$$\text{Permeability} = 10{,}72 + 0{,}84\,X_1 + 0{,}499\,X_2 - 0{,}128\,X_1^2 + 0{,}0017\,X_2^2 - 0{,}1164\,X_1X_2$$

Note:
X_1 = weight of starch
X_2 = Ratio Glycerol to Sorbitol

Figure 2 shows the best tensile strength results have the darkest green color contour at a ratio of glycerol to sorbitol 2:8 and starch weight of 7 grams, this is due to the low ability of sorbitol to bind water thus limiting its ability to reduce hydrogen bonding of polymer chains compared to glycerol so that the strength The tensile strength of the film with sorbitol plasticizer is better than using glycerol plasticizer. The lowest results were shown in the ratio of glycerol to sorbitol 2:8 and starch weight of 5 grams, the small value of tensile strength was influenced by the small thickness of the edible film.

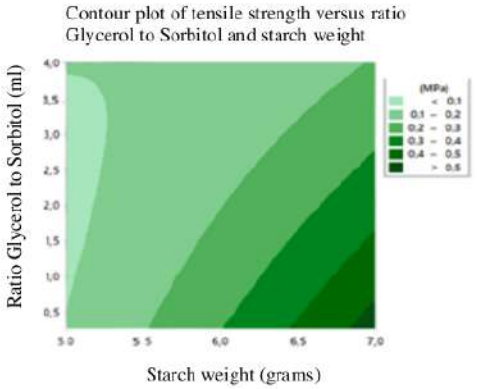

Fig. 2. Contour Plot Responses between Glycerol-Sorbitol Ratio and Starch Weight to Tensile Strength

Based on Figure 3, the best elongation results have a dark green color contour at a glycerol to sorbitol ratio of 8:2 and a starch weight of 5 grams. The lowest results were shown in the ratio of glycerol to sorbitol 2:8 and starch weight of 7 grams. This is because the increase in glycerol will decrease the intermolecular forces, as a result, the mobility between the molecular chains increases. The increase in glycerol will reduce the cohesive bonds between polymers which form a more elastic film.

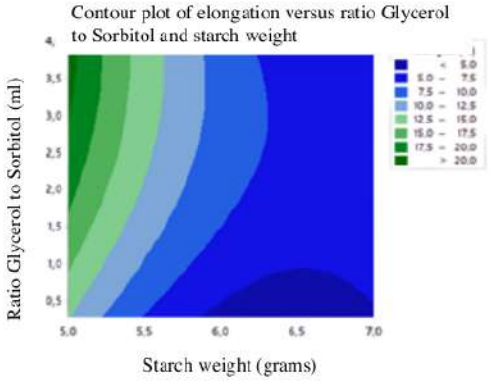

Fig. 3. Contour Plot Responses between Glycerol-Sorbitol Ratio and Starch Weight to Elongation

Based on Figure 4, the best water solubility results have a dark green color contour at a ratio of glycerol to sorbitol 2:8 and a starch weight of 7 grams. The lowest results were shown in the ratio of glycerol to sorbitol 2:8 and starch weight of 5 grams. The increase in the concentration of the material in the suspension of the

edible film causes the total amount of solids contained in the edible film to increase, so that after the suspension of the edible film is dried, the edible film obtained is thicker.

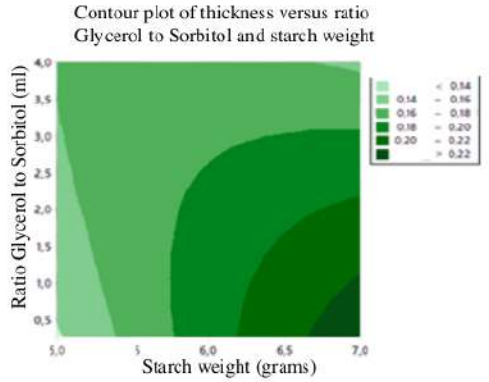

Fig. 4. Contour Plot Responses between Glycerol-Sorbitol Ratio and Starch Weight to Thickness

Based on Figure 5 the results of the best water solubility have the darkest color contour at the ratio of glycerol to sorbitol 2:8 and starch weight of 5 grams. The lowest results were shown in the ratio of glycerol to sorbitol 8:2 and starch weight of 7 grams. The effect of starch weight on the water vapor permeability of edible films can be seen that the more starch, the smaller the value of the water vapor permeability of the edible film. The high concentration of corncob starch will increase the amount of film-forming polymer. Increasing the amount of polymer will reduce the voids in the gel formed on the film. The thicker and denser the film matrix formed can reduce the rate of permeability because it is difficult for water vapor to penetrate.

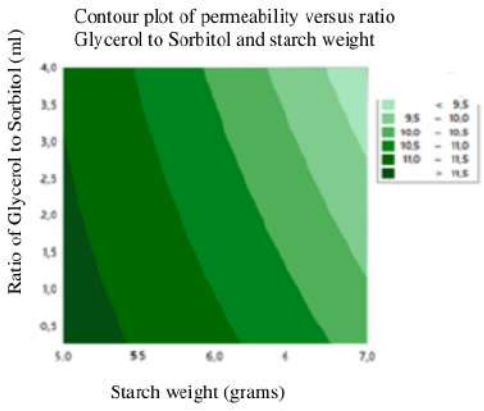

Fig. 5. Contour Plot Responses between Glycerol-Sorbitol Ratio and Starch Weight to Permeability

Based on Figure 6 shows the surface plot between the ratio of glycerol to sorbitol and starch to tensile strength. The best condition in Figure 6 is shown at the top point of the graph which shows the point of the glycerol to sorbitol ratio of 2:8 with a starch weight of 7 grams which produces a tensile strength of 0.536 MPa. While on the lowest surface showed the lowest results at the ratio of glycerol: sorbitol 2:8 with a starch weight of 5grams.

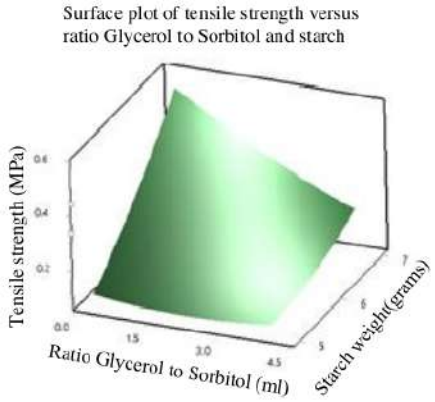

Fig. 6. Surface Characteristics Responses between Glycerol-Sorbitol Ratio and Starch Weight to Tensile Strength

Based on Figure 7 shows the surface plot between the ratio of glycerol to sorbitol and starch weight to elongation. The best condition in Figure 7 is shown at the top point of the graph which shows the point of the glycerol to sorbitol ratio of 8:2 with a starch weight of 5 grams which produces an elongation of 21.4 %. Meanwhile, on the lowest surface, the lowest yield was at the ratio of glycerol to sorbitol 2:8 with a starch weight of 7 grams.

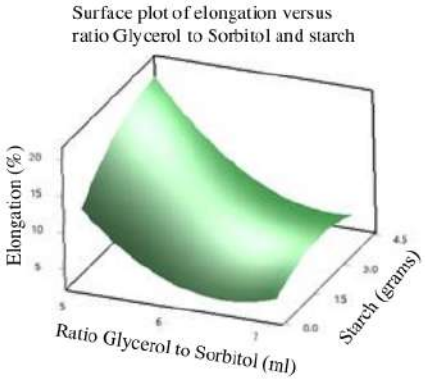

Fig. 7. Surface Characteristics Responses between Glycerol-Sorbitol Ratio and Starch Weight to Elongation

Based on Figure 8 shows the surface plot between the ratio of glycerol to sorbitol and starch weight to thickness. The best condition in Figure 8 is shown at the top point of the graph which shows the point of the ratio of glycerol to sorbitol 2:8 with a starch weight of 7 grams which produces a thickness of 0.26mm. While the lowest surface showed the lowest yield and the ratio of glycerol to sorbitol was 8:2 with a starch weight of 5 grams.

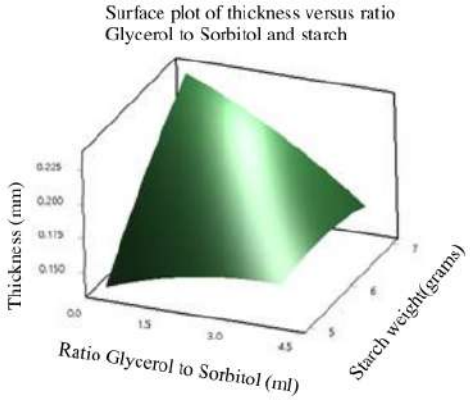

Fig. 8. Surface Characteristics Responses between Glycerol-Sorbitol Ratio and Starch Weight to Thickness

Based on Figure 9 shows the surface plot between the ratio of glycerol to sorbitol and starch weight to water vapor permeability. The best condition in Figure 9 is shown at the top point of the graph, which shows the ratio of glycerol to sorbitol 2:8 with a starch weight of 5 grams which results in a permeability of 11.83g/m2day. While on the lowest surface, the lowest yield was at the ratio of glycerol to sorbitol 8:2 with a starch weight of 7 grams.

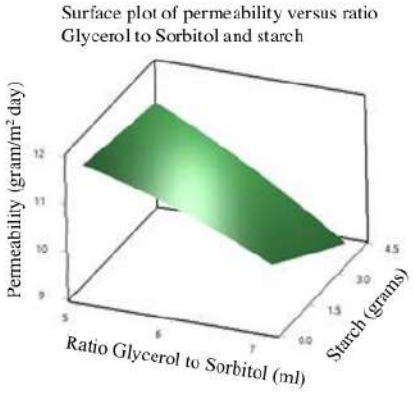

Fig. 9. Surface Characteristics Responses between Glycerol-Sorbitol Ratio and Starch Weight to Permeability

Based on Figure 10 shows treatment with the depiction of contour plots and surface plots with optimization using the Surface Response Method in the Minitab 18 software application, an optimization of the desired results with certain parameters can be carried out. The parameters of the optimization results are set to produce optimum edible film properties. The optimization results using the Surface Response Method resulted in optimum conditions at a glycerol-sorbitol ratio of 1.4242 or 5.875:4.125 with a 17 of starch 7 g with edible film properties including tensile strength of 0.4230 MPa, elongation of 6.6478%, vapor permeability water is 9.9168 gr/m2day, and the thickness is 0.2148 mm. The values of these properties are mostly in accordance with the Japanese Industrial Standard (JIS), but for elongation it is still not suitable. Then it is taken from conditions that are close to the optimum results, namely the glycerol-sorbitol ratio of 1 or 5:5 and the amount of starch is 7 grams.

Response optimization : tensile strength, elongation, thickness, and permeability

Parameters

Response	Goal	Lower	Target	Upper	Weight	Importance
permeabilitas	Minimum		8.8617	10.00	1	1
Ketebalan	Minimum		0.1200	0.26	1	1
Elongasi	Maximum	4.1	21.4000		1	1
Kuat Tarik	Maximum	0.4	0.5360		1	1

Solution

Solution	Pati	Ratio G:S	permeabilitas Fit	Ketebalan Fit	Elongasi Fit	Kuat Tarik Fit	Composite Desirability
1	7	1.42424	9.91677	0.214814	6.64779	0.422978	0.155666

Multiple Response Prediction

Variable	Setting
Pati	7
Ratio G:S	1.42424

Response	Fit	SE Fit	95% CI	95% PI
permeabilitas	9.917	0.162	(9.551, 10.283)	(9.167, 10.666)
Ketebalan	0.21481	0.00873	(0.19506, 0.23457)	(0.17482, 0.25591)
Elongasi	6.648	0.842	(4.744, 8.552)	(2.745, 10.550)
Kuat Tarik	0.4230	0.0131	(0.3933, 0.4526)	(0.3622, 0.4837)

Fig. 10. Output Optimization Results with Minitab Software

4 Conclusion

The resulting edible films have different characteristics depending on the variation of the plasticizer ratio between glycerol and sorbitol 26 and the amount of starch. These characteristics include the value of tensile strength with the largest value of 0.536 MPa and the smallest of 0.066 MPa, the elongation value with the largest value of 21.4% and the smallest of 4.1%, thickness with the largest value of 0.26 mm and the smallest of 0.12 mm, and water vapor permeability with the largest value 11.83 gram/m^2 day and the smallest 8.86 gram/m^2 day. Where some are in accordance with the Japanese Industrial Standard (JIS) and existing theories. The optimum results were in the composition ratio of glycerol to sorbitol 5:5 with the amount of corncob starch of 7 grams.

Acknowledgment

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