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**V-MIEX**

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**2022**

VIRTUAL-MELAKA INTERNATIONAL INTELLECTUAL EXPOSITION

ROAD TO COMMERCIALISATION

**V-MIEX BOOK**



# V - MIIEX BOOK

## 'ROAD TO COMMERCIALISATION'

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# FOREWORD

ASSOC. PROF TS. DR MOHD RASDI ZAINI  
Rector  
Universiti Teknologi MARA (UiTM) Cawangan Melaka



Welcome to Virtual-Melaka International Intellectual Exposition 2022 (V-MIIEEX 2022). It is an honour for me on behalf of UiTM Melaka Branch to thank all of you for joining the programme and we are proud to inform you that this is the 12th year consecutively, UiTM Melaka Branch is organizing this exposition.

V-MIIEEX 2022 is a platform to improve the commercialization collaboration among industries and communities and at the same time, we also give the opportunity to academicians and students to share ideas and increase their potential innovation products with the industries and communities through their projects. This exposition also serves as a platform to cultivate and upload the nation's innovation culture by presenting new ideas and research by young people, especially from academia, universities, college, high schools, and primary school students.

The economy and development of the country faced a challenging phase in 2021 due to the Covid-19 pandemic. We faced changes in business, education, society, and lifestyle. However, the pandemic proved to be a blessing in disguise as it somehow gave people ideas which would be beneficial to improve their lifestyle and solve problems that might occur in the future. Besides, the new digital landscape also inspires more innovation and new ideas that contribute to various activities such as business and industries. As a university that encourages the "Research, Innovation and Commercialization", this exhibition is organized to encourage more commercialization of products that are beneficial to scholars, industries, and communities to tackle such issues to improve our present and future life.

Since 2009, UiTM Melaka Branch has successfully become the organizer for this innovation exposition. We are not only successful in organizing the exposition, but I would proudly say that we have also successfully embarked on commercialized products. With the number of participants for this year's exhibition, we believe that more commercialized products will be produced in line with the theme for this year, "Road to Commercialisation".

This exposition would never happen without dedication, teamwork, and commitment. A round of applause should be given to the committee teams as the backbone of this exposition. Their hard work, effort, and time made this exposition possible.

Finally, I would like to conclude this brief remark by thanking all the participants and stakeholders for joining the exposition, we hope that this collaboration never ends here.

Thank you.



**DR. NUR HAYATI BINTI ABD RAHMAN**  
Deputy Rector Research & Industrial Linkages  
Universiti Teknologi MARA (UiTM) Cawangan Melaka

It is a great pleasure to welcome all the participants and presenters to the Virtual Melaka International Intellectual Exposition (VMIIEX 22). I am delighted that through this periodic event, we managed to bring together scholars and professionals from various fields to engage through this virtual platform where ideas and breakthrough are discovered and leveraged for commercialization potential.

Since 2009 UiTM Cawangan Melaka has held twelve Invention and Innovation Design competitions and this year we are very honoured to have the second year of VMIIEX organized in digital platform. This has proven that despite the global challenges due to the recent pandemic, it is never an issue for UiTM Melaka to continuously organize this yearly prestigious event and to support the ministry's aspiration in leveraging creativity and innovation in the new norm.

VMIIEX 22 is organized with no sole objectives of accomplishing the University's KPI but instead we are determined to make this programme as the place to help heighten commercialization collaboration in research and innovation with the industry and community through joint exhibitions from various external organizations.

Our aspiration is to also provide exposure and opportunities to academic staff as well as students from public and private universities to engage in direct excellent scholarly activities with the industry and community through activities that can be measured and assessed. As for the Research and Industrial Linkages Office of UiTM Melaka, this exhibition is seen as the platform that can encourage active collaboration and knowledge transfer with industries; objectively to support various activities that will benefit all stakeholders from the various government agencies, local and international universities, industries and communities.

Through the theme of "Road to Commercialization" this year, V-MIIEX 22 is committed to have this event as a boulevard to inspire and cultivate creativity and innovation to the numerous levels of inventors through exposure on latest technologies, astonishing ideas and creative designs with great potential to be commercialized. For this year, we proudly introduce a special category which is the "Endemic Challenge" as the provision to the government of Malaysia's goal of moving towards the endemic.

To ensure that the competing products in this exhibition is not exclusively for the purpose of competition, V-MIIEX 22 is dedicated for the commercialization of highly potential innovation products, which is attained through its active collaboration with tailored needs industries. The commercialization effort was not for income generation purpose only but it aimed to spearhead the development of quality products in line with industrial needs and community benefit.

Therefore, it is a great honour for me on behalf of the Research and Industrial Linkages Office as well as the organizing committee to have all participants in this competition and I would like to express my highest gratitude especially to the Rector of UiTM Melaka and all strategic partners and sponsors for supporting the event.

To finish, I sincerely wish VMIIEX 22 a remarkable success. I believe that this will not be the only collaboration between UiTM Melaka and the respective partners and linkages, but a beginning of a long and fruitful cooperation in future.

Thank you very much.

*road to commercialisation...*

**WAN HASMAT WAN HASAN**  
Project Director V-MIIEEX 2022  
Universiti Teknologi MARA (UiTM) Cawangan Melaka



Assalamualaikum and Warmest Greetings.

It gives me an enormous pleasure, on behalf of the organizing committee to welcome all participants and presenters to the Virtual -Melaka International Intellectual Exposition 2022 (VMIIEX '22) with the theme "Road to Commercialisation". We are honoured and glad to welcome all participants to this biennial event.

This is the second time that we have organized this biennial event virtually. V-MIIEEX 22 is an innovation competition, in which, innovation products, ideas and systems related to various science and technological fields are exhibited as a solution for the presented problems.

V-MIIEEX22 expectantly will be a platform that gathers experts from academies, scientists, and researchers, locally and internationally, to contribute towards the growth of scientific and technological knowledge in each participant's specialisation and expertise.

The competition also serves as a platform to give fresh exposure to the various level of inventors, as well as to encourage the culture of innovation design focused on latest technologies and related to new norms technologies and inventions due to COVID-19.

V-MIIEEX 22 is also hoped to be an avenue for gathering and disseminating the latest knowledge on ideas and acquisition of innovation among the participants. It is hoped that the competition will be able to open the mind of the participants towards latest technologies and design. It is also in line with the government's aspiration to encourage innovation activities in Malaysia.

As a final note, I would like to congratulate my fellow committee members for their tremendous effort, which have been critical to the event's success. In addition, I would like to thank our co-organizer, event sponsors and supporters. Optimistically, we wish that all new knowledge that is discovered, invented, or innovated will drive towards our future sustainability.

Thank you.

# ABOUT V-MIIEEX

The world after COVID-19 is unlikely to return to the world that was. Despite the challenging pace during the pandemic, the strong rebound is expecting in this exciting year 2022. Malaysia is welcoming the great prospects ahead with positive impact on the country's economy and development. Hence, the hope for greater opportunities motivates for more creative thinkers to come up with innovative ideas that can be put forward to be harnessed to overcome similar problems in the future. V-MIIEEx 2022 is one of these platforms which contribute relevant ideas that could help communities of all walks of life cope with this pandemic.

UiTM has identified research, innovation, and commercialization to be among the core components and strategic effort towards becoming a well-known and prominent university. Aside from realizing this goal, with these components and efforts, fostering the development of knowledge, generating financial stability of the university, and producing knowledgeable academicians are also potentially achievable.

By having invention and innovation competition yearly, UiTM Cawangan Melaka is confident that it could further enhance creative and innovative abilities among staff and students. In support of the government notion which upholds the importance of innovation, UiTM Cawangan Melaka has taken the initiative of organising the Virtual Melaka International Intellectual Exposition (V-MIIEEx).

In instigating and nurturing the continuous culture of inventing and innovating, this event is an ideal platform for lecturers, administrative staff, students, and the public to showcase and commercialize their products or prototypes as well as novel ideas. The first IID which was held nationally in UiTM Cawangan Melaka in 2009, has successfully gathered and displayed more than 37 inventions and innovations. Accordingly, to continue this strong passion towards inventing and innovating, the IID competition should be continued and celebrated.

With that, the Division of Research and Industrial Linkages will be organising its 12th IID competition, the Virtual - Melaka International Intellectual Exposition (V-MIIEEx 2022) with the theme, 'Road To Commercialisation'. V-MIIEEx 2022 hopes to welcome 200 competing products to be showcased and commercialized, at the same time, attract attention of related and matching industry.

## Objectives

1. Encourage and instill passion towards inventing and innovating among UiTM Cawangan Melaka staff, students and academicians of local and international higher education institutions;
2. Highlight distinguished talents of skillful inventors and exhibit intellectual products, inventions and innovations among local and private tertiary institutions, government and private agencies, including international participants;
3. Become an effective Business Matching platform for participating research products, matching industries and partnering government agencies;
4. Recognise, inspire and promote invention and innovation products to be patented and commercialized;
5. Increase passion towards inventing and innovating through research and boost interests of government and non-government agencies to obtain consultancy services from a line up experts of higher education institutions and UiTM Cawangan Melaka.

# **Lentinula edodes extract as the source of $\beta$ -glucans and its potential as lip balm's additive**

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## **Abstract**

*Lentinula edodes* has been acknowledged as a well-known cultivated edible and medicinal fungi due to its nutritional and therapeutic characteristics such as good antioxidant properties. However, it is susceptible to postharvest problems such as gill browning, fruiting body softening, and lentinan degradation that will reduce its nutrition availability. This study was conducted to extract  $\beta$ -glucans from *Lentinula edodes*, examined the antioxidant activity as well as its potential as lip balm's additive. In this study, the  $\beta$ -glucans from *Lentinula edodes* was extracted using Soxhlet extraction and further characterized by using FTIR and phytochemical screening analysis. Based on the FTIR result, the predominant functional groups in the extracted *Lentinula edodes* were at  $879\text{ cm}^{-1}$  for C-H  $\beta$ -glycosidic linkage and  $1196\text{ cm}^{-1}$  for C-O (ether) of glycosidic linkage which are comparable with the functional group of  $\beta$ -glucans stated in the previous study. The preliminary phytochemical study findings are consistent with the published studies of extracted *Lentinula edodes* which contained alkaloid, phytosterol, gum, mucilage, flavonoid and tannins. Besides,  $\beta$ -glucans extracted from *Lentinula edodes* was found to possess good antioxidant activity ( $27.9962\text{ }\mu\text{g/mL}$ ). The prepared lip balm, demonstrates consistent spreadability under a variety of settings and has a pH of 6.5, making it safe to be used on the lips. The results of this study inferred that *Lentinula edodes* has great potential to be used as a polymeric excipient for health supplement, food additives with antioxidant as well as suitable to be commercialized in cosmeceutical industry, which can contribute to enhance health and beauty.

Keywords: *Lentinula edodes*,  $\beta$ -glucans, lip balm, antioxidant

## **1. INTRODUCTION**

*Lentinula edodes*, known as shiitake mushroom is an edible fungus that is frequently consumed around the world. It has been used as herbal remedies to treat sickness or encourage health and wellbeing. In addition, scientific tests have shown that this mushroom contains several bioactive compounds that can help to mitigate the risk of diseases like cancer, cardiovascular and cerebrovascular diseases (Khan *et al.*, 2018). Shiitake mushroom has been acknowledged as a natural heritage for the manufacturing of pharmaceuticals and health supplements due to its biomolecules which possess nutritional and therapeutic characteristics (Alves *et al.*, 2012). According to Taofiq *et al.* (2016a), the shiitake mushroom contains various bioactive chemicals, including L-ergothioneine and lentinan ( $\beta$ -glucans) which is a linear unbranched polysaccharide.

Polysaccharides, which can be defined as "many sugars," can have either natural or polymeric origin and are a highlight compound in cosmetic formulations. They provide various benefits to the skin such as wound healing capability (Eleroui *et al.*, 2021), function as hydrogels, emulsifiers, film formers and moisturizers that help in promoting skin protection and treatment (Arora *et al.*, 2021). According to Hu *et al.* (2006), polysaccharides, polysaccharopeptides, and polysaccharide-protein complexes, are among other bioactive compounds that can be found in this species.

On the other hand, antioxidant-active extracts or bioactive metabolites appears to be one of the most essential factors in the development of cosmeceutical formulations. These added formulations can scavenge Reactive Oxygen Species (ROS) and they can also block enzymes tyrosinase and matrix metalloproteinase, which promote hyperpigmentation and collagen breakdown, respectively (Masaki, 2010). Furthermore, a study by Taofiq *et al.* (2016a) indicates that L-ergothioneine and lentinan in *Lentinula edodes* has strong antioxidant properties. Thus, this species can be considered beneficial in the design of cosmeceutical formulations.

## **2. OBJECTIVE**

This study is mainly to examine the antioxidant activity of extracted *Lentinula edodes* and its potential as lip balm's additive. The objectives of this study are to determine the phytochemical compounds and  $\beta$ -glucans in *Lentinula edodes* extracts using Phytochemical Screening and Fourier Transform Infrared (FTIR) analysis, to evaluate the antioxidant activity of *Lentinula edodes* extracts using DPPH method and to prepare and analyse the formulated lip balm of *Lentinula edodes* extracts in terms of the stability, organoleptic, spreadability, pH, greasiness and irritation tests.

## **3. NOVELTY & INVENTIVENESS**

The formulated lip balm has been prepared by using natural ingredients such as beeswax, shea butter, vitamin E from Virgin Coconut oil as well as the extracted  $\beta$ -glucans presence in *Lentinula edodes*. This organic lip balms are cruelty-free and eco-friendly, and contain fewer ingredients, which is good for both body and the environment. The addition of Vitamin E and  $\beta$ -glucans as antioxidant agent will make the lips feel softer and improve the lips' health by providing extra nourishment. Meanwhile, addition of beeswax as antibacterial agent can prevent the growth of infection-causing bacteria. Currently, there are no known lip balm in the market that contain  $\beta$ -glucans extracted from *Lentinula edodes*.

## **4. PRACTICALITY & USEFULLNESS**

Consuming *Lentinula edodes* provide a variety of health advantages such as increasing vital energy, maintaining a healthy weight, improving longevity, and delaying premature ageing. The usage of cosmetic that contains this potent antioxidant and anti-inflammatory properties can help to solve the problems of fine lines, wrinkles, uneven skin tone, and texture. Natural cosmetic products that have been formulated by adding *Lentinula edodes*, are highly preferred because it is safer, less toxic and low-cost.

As a consequence, interest in developing efficient biotechnological procedures for the production of novel natural compounds is growing. The outcome of this study demonstrates



the antioxidant qualities of *Lentinula edodes* and the possibility for natural lip balm production. This will mark a turning point in Malaysians' awareness of natural resources such as *Lentinula edodes* and the beneficial polysaccharides produced from them.

## 5. CONCLUSION

In conclusion, *Lentinula edodes* has a great potential to be used as a natural source of antioxidant agent.  $\beta$ -glucans has been successfully extracted from *Lentinula edodes* by using Soxhlet extraction using ethanolic solvent. Based on the FTIR result, the extract of *Lentinula edodes* shows the prominent functional groups comparable with functional groups for  $\beta$ -glucans. From phytochemical analysis of ethanolic extracts revealed that *Lentinula edodes* contained alkaloid, phytosterol, gum, mucilage, flavonoid and tannins. Additionally, an antioxidant test using 2,2-diphenyl picrylhydrazyl (DPPH) was conducted. Moreover, *Lentinula edodes* exhibits good antioxidant capacity (27.9962  $\mu\text{g/mL}$ ) compared to ascorbic acid (12.9158  $\mu\text{g/mL}$ ). Besides, several natural lip balms with different formulation that contain *Lentinula edodes* extracts has been successfully prepared in this study. These lip balms were then evaluated for its physicochemical features. Hence, the best formulation was found which is the mixture of 0.2 g of *Lentinula edodes* powder, 0.85 g beeswax, 0.75 g Virgin Coconut oil (VCO) and 2 g of shea butter. The link between inputs (ingredients) and outputs (physicochemical characteristics) have been studied. It showed that each of the ingredients affects the physicochemical properties of the lip balm. Additionally, a two-week stability study was undertaken on the best formulations to discover any changes to the lip balm. During the testing, formulations using *Lentinula edodes* extracts as a natural antioxidant maintained their colour, flavour, texture, as well as resulting in a homogenous structure. Besides, it was discovered that the prepared organic lip balm may be a more effective therapeutic choice for a variety of lip's problems, safer, and environmentally friendly.