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Preface: Proceedings of the 4th International Conference on Bioscience and Biotechnology (4th ICBB 2021), 21st-23rd September 2021.

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Preface: Proceedings of the 4th International Conference on Bioscience and Biotechnology (4th ICBB 2021), 21st-23rd September 2021.

Eka Sunarwidhi Prasedya, S.Si., M.Sc., Ph.D.
Chairman of 4th ICBB 2021

This issue of IOP conference proceedings contains papers presented at the 4th International Conference on Bioscience and Biotechnology (ICBB) 2021. The ICBB is an annual international conference since 2018 that was initiated by Prof Ir H Sunarpi PhD. This year we are lucky to collaborate with Postgraduate-studies (Pascasarjana) University of Mataram thanks to the director Prof. Ir. H Muhamad Sarjan, M.Agr.,C.P. Ph.D and vice director Prof. Ir. Bambang Hari Kusumo, M.Agr.St., Ph.D. This meeting is hosted by Lab of Bioscience and Biotechnology Research, University of Mataram, Indonesia. It is held for three days, from 21 to 23 September 2021 by virtual conference with zoom platform due to COVID-19 pandemic.

Interactive online presentations were arranged through Zoom Video Communications for the participants to present their ideas. The conference was divided into two main sessions: Main session for Keynote speakers and Panel Sessions for participants. A time of 30 minutes was given for Keynote speakers to present their fabulous work. For panel session, 10 minutes were given for participants to share their research and findings. A total of 204 participants (180 presenters and 24 non-presenters) from Universities, Research Institutes and also Government Departments joined the conference. All the selected papers were peer reviewed by expert reviewers in a double blind review system as per the review policy given by IOP Conference Series.

On the first day of the conference (21st September) invited talks were presented by Prof. Julian Heyes, Ph.D. from Massey University New Zealand on "*Deriving value from elite indigenous fruit and vegetable species*", Prof. Bambang Hari Kusumo, M.Agr.St., Ph.D. from University of Mataram on "*Rapid measurement of soil carbon using near infrared technology*"and Prof. Dr. Endang Semiarti, M.S., M.Sc. from Universitas Gadjah Mada Indonesia on "*Biotechnology approach to improve the quality and quantity of orchids as potential agricultural commodities in Indonesia*". The second day of the conference presented talks by Prof. Lim Phaik Eem, Ph.D. from University of Malaya on "*Importance of marine habitat conservation for utilization and discovery of new bioresources of seaweeds*", Prof. Mat Vanderklift, Ph.D. from Indian Ocean Marine Research Centre CSIRO Australia on "*Opportunities for sustainable use of coastal ecosystems*", Assoc.Prof. Dr. Rapeeporn Ruangchuay from Prince of Songkla University Thailand on " *Seaweed resources in Thailand: cultivation and utilization*" and Dr.rer.nat. Andri Frediansyah, M.Sc. from LIPI Indonesia on "*Microbial natural products: a discovery strategy*". The final day of the conference included talks by Prof. Akihiro Hazama, Ph.D. from Fukushima Medical University on "*Investigation of cigarette smoke-induced cell hyperplasia mechanism using Induced Pluripotent Stem Cell (IPSCs)*", Prof. Kato Yasuhiro, Ph.D. from Keio University Japan on "*Water circulation of the earth and life*" and Eka Sunarwidhi Prasedya, Ph.D. from University of Mataram Indonesia on **"***Microbiome implications for bioprospecting of seaweeds".*

Our special gratitude also goes to the Rector of Mataram University for the support given to this conference. Also, we are thankful for the enormous support of IOP conference proceedings for supporting us in every step.

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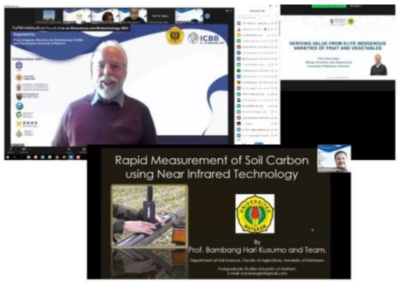
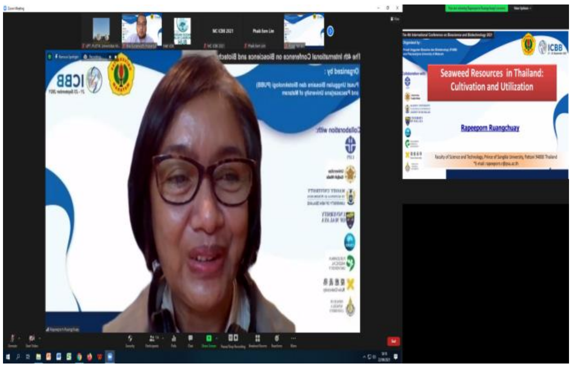
Conference Photograph

Day 1



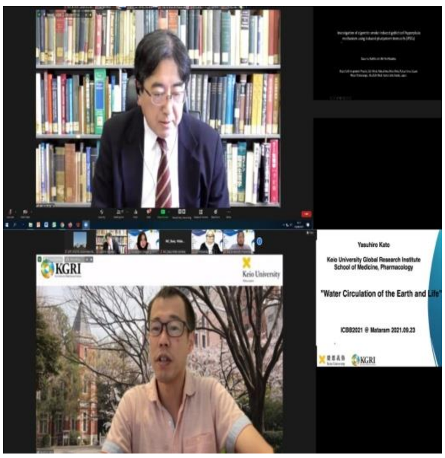


Day 2


Seaweed Resources in Thailand: Cultivation and Utilization
Rapeeporn Ruangchuay

Day 3


KGRI
ICBB


KGRI
"Water Circulation of the Earth and Life"

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IOP Conference Series: Earth and Environmental Science

Analysis of heat energy in the drying process of *Moringa Oleifera leaves* using a greenhouse effect dryer (ERK)

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Analysis of heat energy in the drying process of *Moringa Oleifera leaves* using a greenhouse effect dryer (ERK)

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Abstract. Moringa leaves have a high enough nutrient content so that they are used as a source of natural nutrients. Fresh moringa leaves have a high water content, so they need to be dried to reduce post-harvest loss. This study aims to analyze heat energy in the drying process of moringa leaves using a greenhouse effect type dryer (ERK). The study was an experimental method on drying of moringa leaves using a Greenhouse Effect (ERK) in the field and was analyzed using mass and energy equilibrium approaches. In this study, two different treatments were carried out i.e not crushed and crushed leaves. The result shows that the water content of the uncrushed and crushed leaves were 74.9%wb and 71.4%wb, dried moringa leaf water content was 4.8 %wb and 4.5%wb. Total energy entered by dryers 7415038.8 kJ and 7780575.4 kJ, Total useful energy of 767089.470 kJ and 2171369.143 kJ, total energy discharged through outlet/ventilation and lost through successive walls were is 4148.222 kJ, 5718.912 kJ, 8.924 kJ and 7.194 kJ as well as heat lost from opening consecutive doors of 771246.62 kJ and 2177095.25 kJ. The input masses were 0.75 kg and 1.35 kg, the output mass were 0.180 kg and 0.391 kg, the accumulated mass were 0.570 kg and 0.959 kg. Drying efficiency values were 18.25% and 29.26%.

1. Introduction

Moringa is one of the idols of almost all agricultural products around the world because it has many benefits. *Moringa oleifera* is a plant that contains beneficial chemical compounds in high enough quantities so that it is used to overcome nutritional deficiencies. However, moringa leaves are an agricultural product with high water content so they are easily damaged. Therefore, people use it in dry or powder forms [1]. Drying is one of the oldest methods of food preservatives. With drying, the shelf life of materials can be extended, it is lighter in the transportation process and smaller the storage space [2], [3]. Indonesia, as it is located in the equatorial region, sunlight is available abundantly for drying. Sunlight drying is an inexpensive alternative in drying technology [4], [5], although it has several disadvantages, including being easily contaminated by dust and dirt, insects and other nuisance animals [6].

Moringa has high economic value and an increasing market demand especially for dried moringa [7]. However, the uniform quality of dried moringa powder is the main obstacle of the export [8]. The quality of dried moringa from Lombok is low because they were dried by sun drying. Drying process is a vital and absolute stage of processing and producing moringa flour. Most energy consumption in postharvest handling, about 30%, is for drying [9], [10]. The availability of solar energy in Indonesia is very abundant. Therefore, using a greenhouse effect dryer might increase the quality of the dried moringa leaves [11], [12]. This article aims to determine the efficiency of using solar energy with a greenhouse effect dryer.

2. Materials and Methods

This study was conducted in The laboratory of power and agricultural machinery, Faculty of food and agro industrial Technology University of Mataram. Fresh moringa leaves were collected from Narmada, west Lombok. Initial moisture content of the leaves was measured before experiment. The initial moisture content of fresh leaves was 76%. This experiment was carried out using the greenhouse effect dryer for moringa leaves with treatment being crushed and without crushed.

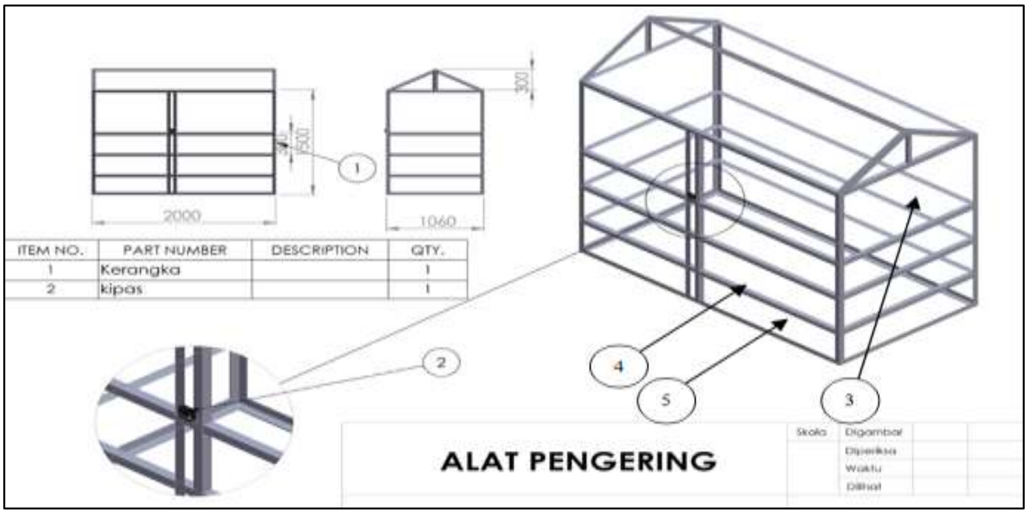
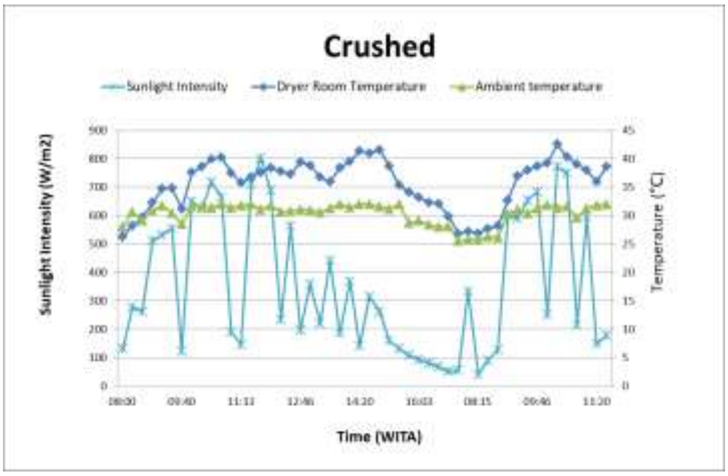


Figure 1. Green House Effect Dryer.

3. Results and Discussion

3.1. Solar Intensity Profile



From the two graphs in Figure 1 and 2, it can be seen that the temperature in the drying chamber is relatively stable compared to the intensity of absorbed sunlight. Likewise, the RH in the drying room is higher than the RH of the environment. The temperature difference between the drying chamber and the environment is caused by short wave radiation from the sun entering the drying chamber and reflected in it turning into long waves. This long wave radiation cannot penetrate the drying transparent wall, resulting in an increase of the temperature in the drying chamber.

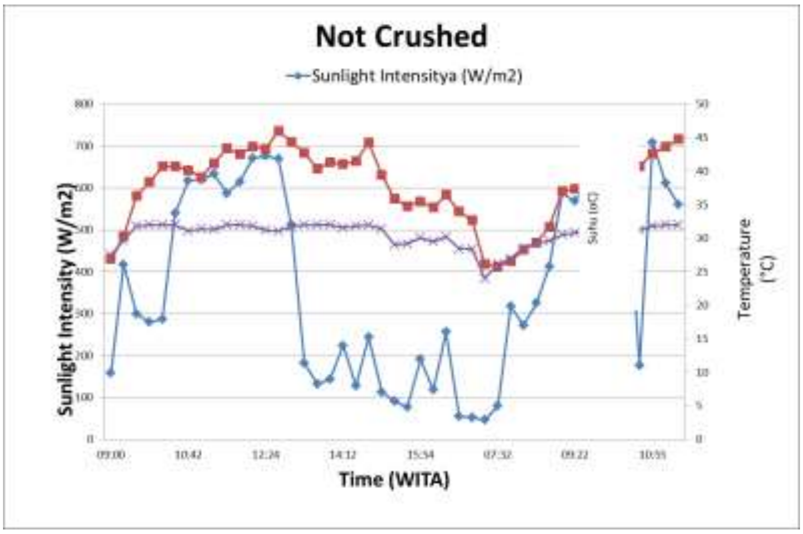


Figure 2. Solar Intensity profile during experiment.

3.2. Water Content During drying process

Figure 3 shows the decreasing water content of moringa leaves during the drying process. Moisture content is one of the physical properties of the material which indicates the amount of water contained in the material. Drying time will also have an effect on reducing the moisture content of the material being dried.

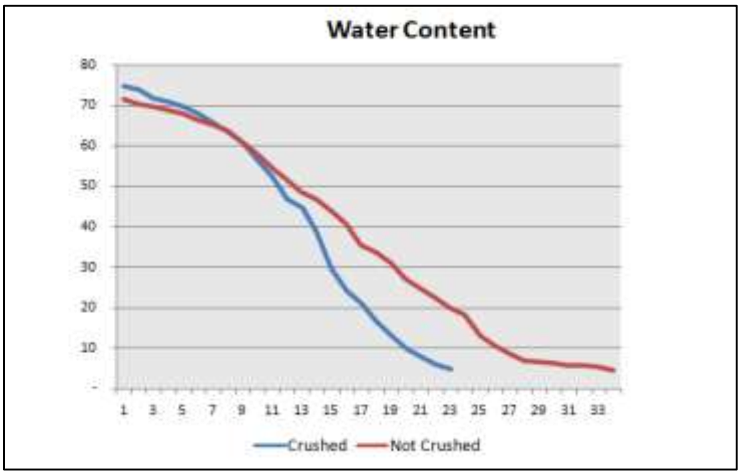


Figure 3. Water content profile.

From Figure 3 can be seen that at the beginning of the process, the water content decreased rapidly. This condition occurs because the water on the surface of the material is evaporated. Further decrease, because water evaporation occurs for water which is moving from the inner part to the surface of the material. The subsequent evaporation process is lower at the end of the process because it is suspected that the water in the material is running out.

3.3. Efficiency of the drying Process

Tabel 1. Solar Intensity Profile.

Treatment	Solar Intensity (W/m^2)		Average Solar Intensity (W/m^2)	Duration (hour)	IR Tot (W/m^2)	Useful solar energy (kJ)
	Min	Max				
Without crushed	45.9	709	374	9	430268.37	6544.80
Crushed	42.1	802	353	9	455666.47	7014.57

Energy efficiency is the comparison of the amount of energy used to evaporate the water from Moringa leaves with the energy entering the drying process in solar energy.

Table 2. Energy Balance.

Treatment	Energy in (kJ)	Useful Energy (kJ)	Energy out (kJ)	Energy loss from walls (kJ)	Energy loss from the window (kJ)
Without crushed	7415038.8	767089.470	4148.222	8.924	771246.62
Crushed	7780575.4	2171369.143	5718.912	7.194	2177095.25

Energy balance means that the amount of energy go in must equal the amount of energy go out. The energy enter the dryer will be used to heat the air inside drying chamber, the material, the material water, and evaporate the material water. The energy that comes out is the energy lost through the walls of the drying chamber and the exhaust fan (outlet). The energy lost is the energy that comes out of the dryer subtracted by the energy that stored in the dryer. Loss of energy can occur when opening the door of drying chamber.

4. Conclusion

Based on the result found, it can be concluded that the useful energy is affected by the mass of moringa leaves that dried, pre-treatment of moringa leaves before dried. The drying efficiencies of this study are 18. 25 and 19.26%.

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