

PAPER • OPEN ACCESS

Peer review declaration

To cite this article: 2021 *IOP Conf. Ser.: Earth Environ. Sci.* **709** 011002

View the [article online](#) for updates and enhancements.

You may also like

- [Peer review declaration](#)

- [Peer review declaration](#)

- [Peer review declaration](#)



245th ECS Meeting • May 26-30, 2024 • San Francisco, CA

[Learn more & submit!](#)

Present your work at the leading electrochemistry & solid-state science conference.

Network with academic, government, and industry influencers!

Submit abstracts by December 1, 2023.



Peer review declaration

All papers published in this volume of IOP Conference Series: Earth and Environmental Science have been peer reviewed through processes administered by the Editors. Reviews were conducted by expert referees to the professional and scientific standards expected of a proceedings journal published by IOP Publishing.

- **Type of peer review:** Open
- **Conference submission management system:** online submission using SAFE-Network website (55%) and Direct submission to the SAFE2019 conference's e-mail (safe2019krabi@gmail.com)
- **Number of submissions received:** 325 submission
- **Number of submissions sent for review:** 302 submission
- **Number of submissions accepted:** 90 submission
- **Acceptance Rate (Number of Submissions Accepted / Number of Submissions Received X 100):** 0.29
- **Average number of reviews per paper:** 2
- **Total number of reviewers involved:** 19
- **Any additional info on review process:**
We distributed between 12-20 manuscript to each reviewer. Average time to complete is 3 months. Pandemic covid-19 situation made all process become slower.
- **Contact person for queries:**
Name : Prof. Novizar Nazir
Affiliation: Andalas University, Indonesia
Email : secretariat@safe-network.org



PAPER • OPEN ACCESS

Preface

To cite this article: 2021 *IOP Conf. Ser.: Earth Environ. Sci.* **709** 011001

View the [article online](#) for updates and enhancements.

You may also like

- [8th International Conference On Sustainable Agriculture, Food and Energy \(SAFE2020\)](#)
- [IF-YITP GR+HEP+Cosmo International Symposium VI](#)
- [A Stellar Activity F-statistic for Exoplanet Surveys \(SAFE\)](#)
Parker H. Holzer, Jessi Cisewski-Kehe, Lily Zhao et al.



ECS 245th ECS Meeting • May 26-30, 2024 • San Francisco, CA

Present your work at the leading electrochemistry & solid-state science conference.

Network with academic, government, and industry influencers!

Submit abstracts by December 1, 2023.

Learn more & submit!

San Francisco

7th International Conference

Sustainable Agriculture, Food, and Energy SAFE2019

October 19-21, 2019

Phuket Rajabhat University, Phuket. Thailand



Preface

We are proud to inform you that the **International Conference on Sustainable Agriculture, Food, and Energy (SAFE2019): Green Agri-food Energy Production for a Better World in a Changing Climate** which will be held from October 18-21, 2019 in Phuket, Thailand. The co-host institution is Chiang Mai University, Thailand, Chiang Mai Rajabht University, THAILAND and ANDALAS University, INDONESIA. This conference is the 7th conference after the 1st International Conference on Sustainable Agriculture, Food, and Energy (SAFE2013) in Padang, Indonesia (12-14 May 2014), the 2nd conference [SAFE2014](#) in Bali, Indonesia (17-19 September 2014). The 3rd conference [SAFE2015](#) in Ho Chi Minh City, Vietnam (17-19 November 2015), 4th conference [SAFE2016](#), Colombo, Sri Lanka (October 20-22, 2016), the 5th conference [SAFE2017](#), Malaysia, August 22-24, 2017. and the 6th conference of [SAFE2018](#), Manila, Philippines [October 19-21, 2018].

The objectives of the conference were:

To provide a forum for international researchers community to exchange and share the experiences, new ideas, sustainability concepts and research results on sustainable agriculture, food, and energy.

To promote collaboration in research on sustainable agriculture, foods, and energy production. To establish a regional networking among participants on sustainable agriculture, food, and energy.

To increase awareness of the importance of living and working in the manner that enhances the economic, environmental and social well-being of our community through research, education, regional partnerships, and community engagement.

The committee accepted 90 papers of over 300 papers which were presented in SAFE2019 conference.

On behalf of SAFE-Network, we would like to convey our appreciation and thanks very much to Chiang Mai University, Chiang Mai Rajabhat University, and the Phuket Rajabhat University, Phuket. Thailand

We would like especially to thank **Prof. Dr. Tafdil Husni**, *Rector of Andalas University* for his strong support to this event, **Dr. Sermkiat Jenjunyong**, *local conference coordinator* and the members of the local organizing committee who helped with all the preparations required to make the conference a success, as well as the session organizers who worked to ensure a high level of science presented at the meeting. Moreover, of course, we thank all honorable speakers and participants who have agreed to attend and discuss your work! Finally, please understand that while every effort was made to publish this proceeding, we know that unavoidable withdrawals and other changes will occur.

Looking forward to welcoming you to the SAFE2020 conference in Jeju, Korea!

Prof. Dr. Novizar Nazir

SAFE-Network Executive Chairman

Editors:

Prof. Dr. Novizar Nazir, Andalas University-INDONESIA Prof. Dr. Nobutaka Ito, Chiang Mai University-THAILAND Dr. Febri Doni, Universiti Malaya-MALAYSIA
Robbi Rahim, Universiti Malaysia Perlis-MALAYSIA Rahmat Hidayat, Politeknik Negeri Padang-INDONESIA

Patron

Prof. Dr. Tafdil Husni, *The Rector of Andalas University. Indonesia.*

Asst.Prof.Dr. Hiran Prasarnkarn, *The President of Phuket Rajabhat University-THAILAND*

Executive Chairman

Prof. Dr. Novizar Nazir–*Andalas University-INDONESIA*

Local Conference Coordinator

Assoc.Prof. Sermkiat Jomjunyong, Ph.D., *Country Coordinator (THAILAND) Faculty of Engineering . Chiang Mai University.*

Conference Secretary

Dr. Worajit Setthapun, *Dean of Asian Development College for Community Economy and Technology (adiCET) Chiang Mai Rajabhat University-THAILAND*

HP:+66 53 885 871. E-mail: worajit@gmail.com

Advisory Committee

Dr. Paul Kristiansen–*University of New England, AUSTRALIA (Co-ordinator)*

Prof. Dr. Hj. Khudzir Bin Hj Ismail, *RECTOR of UiTM, Perlis, MALAYSIA*

Prof.Dr. Nguyen Hay– *President of Nong Lam University Ho Chi Minh City-VIETNAM*

Dr. Yunardi Yusuf–*Syiah Kuala University-INDONESIA*

Prof. dr. Dewa Putu Widjana, DAP&E. Sp.Par.K–*RECTOR of Warmadewa University– INDONESIA*

Prof.Dr. Bohari M Yamin, *Universiti Kebangsaan Malaysia, MALAYSIA* **Prof. Dr. Wan Mohtar Wan**

Yusoff–*Universiti Kebangsaan Malaysia, MALAYSIA* **Prof.Dr. Wan Azizah Hanom Ahmad**, *UiTM, Malaysia*

Steering Committee

Prof.Dr. Helmi– *Andalas University-INDONESIA (Co-ordinator)*

Dr. Norman de Jesus– *SAFE-Network Resident Co-ordinator (Philippines)-Pampanga State Agricultural University- PHILIPPINES*

Assoc. Prof. Dr. Nurul Huda– *SAFE-Network Resident Co-ordinator (Malaysia) Universiti Malaysia Sabah (UMS), MALAYSIA*

Prof. P.M.C.C de Silva, Ph.D., *University of Ruhuna, SAFE-Network Resident Co-ordinator (SRI LANKA)*

Prof. Dr. Fauzan Azima – *Andalas University-INDONESIA.*

Dr. Munzir Busniah– *Andalas University- INDONESIA.*

Prof. Dr. Amitava Basu– *Bidhan Chandra Krishi Vidyalyaya, INDIA*

Prof. Nasser Aliasgharzad-*Department of Soil Science- Faculty of Agriculture. The University of Tabriz- Iran.*

Assoc.Prof. Nguyen Huy Bich, Ph.D.- Nong Lam University Hochiminh City-VIETNAM

Prof. Kohei NAKANO, Ph.D.– *Gifu University-JAPAN*

Prof. Dr. MD MIZANUR RAHMAN BHUIYAN, *Khulna University- BANGLADESH*

Dr. Ir. Ujang Paman Ismail, MSc. *Universitas Islam Riau-INDONESIA*

Prof. Dr. Yuli Witono, *Jember University-INDONESIA*

Organizing Committee**Asst.Prof.Dr. Thawatchai Thoomthong**, *Phuket Rajabhat University-THAILAND (Coordinator)***Asst.Prof. Noppadol Chanrawang**, *Phuket Rajabhat University-THAILAND***Asst.Prof.Dr.Suwicha Wiriyamanuwong**, *Phuket Rajabhat University-THAILAND***Dr. Doungnat Koikitcharoen**, *Phuket Rajabhat University-THAILAND* **Asst.Prof.Dr. Pita****Jarupunphol**, *Phuket Rajabhat University-THAILAND* **Asst.Prof.Dr. Bundit Unyong**, *Phuket Rajabhat University-THAILAND* **Dr.Atipan Saimmai**, *Phuket Rajabhat University-THAILAND***Mrs.Tipaporn Pornpirom**, *Phuket Rajabhat University-THAILAND* **Assoc.Prof.Dr. Komgrit****Leksakul**, *Chiang Mai University-THAILAND* **Asst.Prof.Dr.Choncharoen Sawangrat**, *Chiang Mai University-THAILAND***Dr. Nuttiya Tantranont**, *adiCET-Chiang Mai Rajabhat University-THAILAND***Dr. Surachai Narrat Jansri**, *adiCET-Chiang Mai Rajabhat University-THAILAND***Dr. Chayanon Sawatdeenarunat**, *adiCET-Chiang Mai Rajabhat University-THAILAND***Dr. Hathaithip Sintuya**, *adiCET-Chiang Mai Rajabhat University-THAILAND***Dr. Surapol Dumronggittigule**, *PU-Thailand***Act. SubLt. Dr. Suwattanawong Phanphet**, *Chiang Mai Rajabhat University-THAILAND***Asst.Prof. Sermsuk Buochareon**, *Maejo University-THAILAND***Dr. Nichan Singhaputagun**, *MFU-THAILAND***Dr.Paipan Thanalerdsopit**, *RMUTL-Thailand***Mrs.Nidchanun Kanchana**, *Chiang Mai University-THAILAND*SAFE-Network Regional Secretariat**Dr. Irawati Chaniago**, *Andalas University-INDONESIA***Dr. Helen Martinez**, *PhilMech, The Philippines* **Prof. Georgina Bordado**, *CBSUA, The Philippines* **Dr. Hanilyn Hidalgo**, *CBSUA-The Philippines***Dr. Febri Doni**, *Universiti Malaya. Malaysia***Dr. Wahyudi David** – *Bakrie University-INDONESIA* **Aisman Rasinin**, *MSc–Andalas University-INDONESIA* **Zakaria Azis**, *STES Manna Wassalwa-Indonesia***Rahmat Hidayat**, *ST, M.Sc.IT– State Polytechnic of Padang –INDONESIA***Putri Risa Andriani**, *Warmadewa University. INDONESIA* **Muhammad Iqbal Syuhada**, *Andalas University-INDONESIA* **Nur Selvi Safril**, *Pamulang University-INDONESIA***Dr. Ario Beta Juansilfero**, *M.Eng– Kobe University-JAPAN***Rachel Anja Martinez**, *UPLB Los Banos, Philippines* **Dr. Pavalee Chompoorat**, *Maejo University. Thailand* **Aprialis**, *Andalas University-INDONESIA***Ririn Fatma Nanda**, *Andalas University-INDONESIA* **Arifatulhuda Rifka**, *Andalas University-INDONESIA* **Latifa Aini**, *Andalas University-INDONESIA***Nia Boru Ritonga**, *Andalas University-INDONESIA***Mentari Larashinta**, *Andalas University-INDONESIA*

Scientific Committee

Dr. Ravindra C Joshi. *Country Coordinator for Pacific Islands (Fiji, Samoa, Solomon Islands, Papua New Guinea, Vanuatu)*

Professor Nobutaka Ito, *Chiang Mai University-Thailand* **Dr. Yandra Arkeman,** *Bogor Agricultural University, INDONESIA*

Prof. Dr. Mohd. Bohari Yamin, *Universiti Kebangsaan Malaysia-MALAYSIA*

Prof. Dr. Nurpilihan Bafdal, *Universitas Padjadjaran –INDONESIA*

Roostita L. Balia, *Universitas Padjadjaran –INDONESIA*

Prof. Dr. Yus Aniza Yusof-*Universiti Putra Malaysia, MALAYSIA* **Assoc. Prof. Dr. Azwani Mat**

Lazim-*Universiti Kebangsaan Malaysia, MALAYSIA* **Dr. Saiful Irwan Zubairi-***Universiti Kebangsaan Malaysia, MALAYSIA*

PAPER • OPEN ACCESS

Preface

To cite this article: 2021 *IOP Conf. Ser.: Earth Environ. Sci.* **709** 011001

View the [article online](#) for updates and enhancements.

You may also like

- [8th International Conference On Sustainable Agriculture, Food and Energy \(SAFE2020\)](#)
- [IF-YITP GR+HEP+Cosmo International Symposium VI](#)
- [A Stellar Activity F-statistic for Exoplanet Surveys \(SAFE\)](#)
Parker H. Holzer, Jessi Cisewski-Kehe, Lily Zhao et al.



ECS 245th ECS Meeting • May 26-30, 2024 • San Francisco, CA

Present your work at the leading electrochemistry & solid-state science conference.

Network with academic, government, and industry influencers!

Submit abstracts by December 1, 2023.

Learn more & submit!

San Francisco

7th International Conference

Sustainable Agriculture, Food, and Energy SAFE2019

October 19-21, 2019

Phuket Rajabhat University, Phuket. Thailand



Preface

We are proud to inform you that the **International Conference on Sustainable Agriculture, Food, and Energy (SAFE2019): Green Agri-food Energy Production for a Better World in a Changing Climate**” which will be held from October 18-21, 2019 in Phuket, Thailand. The co-host institution is Chiang Mai University, Thailand, Chiang Mai Rajabht University, THAILAND and ANDALAS University, INDONESIA. This conference is the 7th conference after the 1st International Conference on Sustainable Agriculture, Food, and Energy (SAFE2013) in Padang, Indonesia (12-14 May 2014), the 2nd conference [SAFE2014](#) in Bali, Indonesia (17-19 September 2014). The 3rd conference [SAFE2015](#) in Ho Chi Minh City, Vietnam (17-19 November 2015), 4th conference [SAFE2016](#), Colombo, Sri Lanka (October 20-22, 2016), the 5th conference [SAFE2017](#), Malaysia, August 22-24, 2017. and the 6th conference of [SAFE2018](#), Manila, Philippines [October 19-21, 2018].

The objectives of the conference were:

To provide a forum for international researchers community to exchange and share the experiences, new ideas, sustainability concepts and research results on sustainable agriculture, food, and energy.

To promote collaboration in research on sustainable agriculture, foods, and energy production. To establish a regional networking among participants on sustainable agriculture, food, and energy.

To increase awareness of the importance of living and working in the manner that enhances the economic, environmental and social well-being of our community through research, education, regional partnerships, and community engagement.

The committee accepted 90 papers of over 300 papers which were presented in SAFE2019 conference.

On behalf of SAFE-Network, we would like to convey our appreciation and thanks very much to Chiang Mai University, Chiang Mai Rajabhat University, and the Phuket Rajabhat University, Phuket. Thailand

We would like especially to thank **Prof. Dr. Tafdil Husni**, *Rector of Andalas University* for his strong support to this event, **Dr. Sermkiat Jenjunyong**, *local conference coordinator* and the members of the local organizing committee who helped with all the preparations required to make the conference a success, as well as the session organizers who worked to ensure a high level of science presented at the meeting. Moreover, of course, we thank all honorable speakers and participants who have agreed to attend and discuss your work! Finally, please understand that while every effort was made to publish this proceeding, we know that unavoidable withdrawals and other changes will occur.

Looking forward to welcoming you to the SAFE2020 conference in Jeju, Korea!

Prof. Dr. Novizar Nazir

SAFE-Network Executive Chairman

Editors:

Prof. Dr. Novizar Nazir, Andalas University-INDONESIA Prof. Dr. Nobutaka Ito, Chiang Mai University-THAILAND Dr. Febri Doni, Universiti Malaya-MALAYSIA
Robbi Rahim, Universiti Malaysia Perlis-MALAYSIA Rahmat Hidayat, Politeknik Negeri Padang-INDONESIA

Patron

Prof. Dr. Tafdil Husni, *The Rector of Andalas University. Indonesia.*

Asst.Prof.Dr. Hiran Prasarnkarn, *The President of Phuket Rajabhat University-THAILAND*

Executive Chairman

Prof. Dr. Novizar Nazir–*Andalas University-INDONESIA*

Local Conference Coordinator

Assoc.Prof. Sermkiat Jomjunyong, Ph.D., *Country Coordinator (THAILAND) Faculty of Engineering . Chiang Mai University.*

Conference Secretary

Dr. Worajit Setthapun, *Dean of Asian Development College for Community Economy and Technology (adiCET) Chiang Mai Rajabhat University-THAILAND*

HP:+66 53 885 871. E-mail: worajit@gmail.com

Advisory Committee

Dr. Paul Kristiansen–*University of New England, AUSTRALIA (Co-ordinator)*

Prof. Dr. Hj. Khudzir Bin Hj Ismail, *RECTOR of UiTM, Perlis, MALAYSIA*

Prof.Dr. Nguyen Hay– *President of Nong Lam University Ho Chi Minh City-VIETNAM*

Dr. Yunardi Yusuf–*Syiah Kuala University-INDONESIA*

Prof. dr. Dewa Putu Widjana, DAP&E. Sp.Par.K–*RECTOR of Warmadewa University– INDONESIA*

Prof.Dr. Bohari M Yamin, *Universiti Kebangsaan Malaysia, MALAYSIA* **Prof. Dr. Wan Mohtar Wan**

Yusoff–*Universiti Kebangsaan Malaysia, MALAYSIA* **Prof.Dr. Wan Azizah Hanom Ahmad**, *UiTM, Malaysia*

Steering Committee

Prof.Dr. Helmi– *Andalas University-INDONESIA (Co-ordinator)*

Dr. Norman de Jesus– *SAFE-Network Resident Co-ordinator (Philippines)-Pampanga State Agricultural University- PHILIPPINES*

Assoc. Prof. Dr. Nurul Huda– *SAFE-Network Resident Co-ordinator (Malaysia) Universiti Malaysia Sabah (UMS), MALAYSIA*

Prof. P.M.C.C de Silva, Ph.D., *University of Ruhuna, SAFE-Network Resident Co-ordinator (SRI LANKA)*

Prof. Dr. Fauzan Azima – *Andalas University-INDONESIA.*

Dr. Munzir Busniah– *Andalas University- INDONESIA.*

Prof. Dr. Amitava Basu– *Bidhan Chandra Krishi Vidyalyaya, INDIA*

Prof. Nasser Aliasgharзад-*Department of Soil Science- Faculty of Agriculture. The University of Tabriz- Iran.*

Assoc.Prof. Nguyen Huy Bich, Ph.D.- Nong Lam University Hochiminh City-VIETNAM

Prof. Kohei NAKANO, Ph.D.– *Gifu University-JAPAN*

Prof. Dr. MD MIZANUR RAHMAN BHUIYAN, *Khulna University- BANGLADESH*

Dr. Ir. Ujang Paman Ismail, MSc. *Universitas Islam Riau-INDONESIA*

Prof. Dr. Yuli Witono, *Jember University-INDONESIA*

Organizing Committee

Asst.Prof.Dr. Thawatchai Thoomthong, *Phuket Rajabhat University-THAILAND (Coordinator)*

Asst.Prof. Noppadol Chanrawang, *Phuket Rajabhat University-THAILAND*

Asst.Prof.Dr.Suwicha Wiriyamanuwong, *Phuket Rajabhat University-THAILAND*

Dr. Doungrat Koikitcharoen, *Phuket Rajabhat University-THAILAND* **Asst.Prof.Dr. Pita**

Jarupunphol, *Phuket Rajabhat University-THAILAND* **Asst.Prof.Dr. Bundit Unyong**, *Phuket*

Rajabhat University-THAILAND **Dr.Atipan Saimmai**, *Phuket Rajabhat University-THAILAND*

Mrs.Tipaporn Pornpirom, *Phuket Rajabhat University-THAILAND* **Assoc.Prof.Dr. Komgrit**

Leksakul, *Chiang Mai University-THAILAND* **Asst.Prof.Dr.Choncharoen Sawangrat**, *Chiang*

Mai University-THAILAND

Dr. Nuttiya Tantranont, *adiCET-Chiang Mai Rajabhat University-THAILAND*

Dr. Surachai Narrat Jansri, *adiCET-Chiang Mai Rajabhat University-THAILAND*

Dr. Chayanon Sawatdeenarunat, *adiCET-Chiang Mai Rajabhat University-THAILAND*

Dr. Hathaithip Sintuya, *adiCET-Chiang Mai Rajabhat University-THAILAND*

Dr. Surapol Dumronggittigule, *PU-Thailand*

Act. SubLt. Dr. Suwattanawong Phanphet, *Chiang Mai Rajabhat University-THAILAND*

Asst.Prof. Sermsuk Buochareon, *Maejo University-THAILAND*

Dr. Nichan Singhaputagun, *MFU-THAILAND*

Dr.Paipan Thanalerdsopit, *RMUTL-Thailand*

Mrs.Nidchanun Kanchana, *Chiang Mai University-THAILAND*

SAFE-Network Regional Secretariat

Dr. Irawati Chaniago, *Andalas University-INDONESIA*

Dr. Helen Martinez, *PhilMech, The Philippines* **Prof. Georgina Bordado**, *CBSUA, The*

Philippines **Dr. Hanilyn Hidalgo**, *CBSUA-The Philippines*

Dr. Febri Doni, *Universiti Malaya. Malaysia*

Dr. Wahyudi David – *Bakrie University-INDONESIA* **Aisman Rasinin**, *MSc–Andalas*

University-INDONESIA **Zakaria Azis**, *STES Manna Wassalwa-Indonesia*

Rahmat Hidayat, *ST, M.Sc.IT– State Polytechnic of Padang –INDONESIA*

Putri Risa Andriani, *Warmadewa University. INDONESIA* **Muhammad Iqbal Syuhada**,

Andalas University-INDONESIA **Nur Selvi Safril**, *Pamulang University-INDONESIA*

Dr. Ario Beta Juansilfero, *M.Eng– Kobe University-JAPAN*

Rachel Anja Martinez, *UPLB Los Banos, Philippines* **Dr. Pavalee Chompoorat**, *Maejo*

University. Thailand **Aprialis**, *Andalas University-INDONESIA*

Ririn Fatma Nanda, *Andalas University-INDONESIA* **Arifatulhuda Rifka**, *Andalas University-*

INDONESIA **Latifa Aini**, *Andalas University-INDONESIA*

Nia Boru Ritonga, *Andalas University-INDONESIA*

Mentari Larashinta, *Andalas University-INDONESIA*

Scientific Committee

Dr. Ravindra C Joshi. *Country Coordinator for Pacific Islands (Fiji, Samoa, Solomon Islands, Papua New Guinea, Vanuatu)*

Professor Nobutaka Ito, *Chiang Mai University-Thailand* **Dr. Yandra Arkeman,** *Bogor Agricultural University, INDONESIA*

Prof. Dr. Mohd. Bohari Yamin, *Universiti Kebangsaan Malaysia-MALAYSIA*

Prof. Dr. Nurpilihan Bafdal, *Universitas Padjadjaran –INDONESIA*

Roostita L. Balia, *Universitas Padjadjaran –INDONESIA*

Prof. Dr. Yus Aniza Yusof-*Universiti Putra Malaysia, MALAYSIA* **Assoc. Prof. Dr. Azwani Mat**

Lazim-*Universiti Kebangsaan Malaysia, MALAYSIA* **Dr. Saiful Irwan Zubairi-***Universiti Kebangsaan Malaysia, MALAYSIA*

SAFE
NETW. ARK
The Asia Pacific Network for Sustainable Agriculture, Food, and Energy

**BECOMING
BIGGER
TOGETHER**



SAFE 2019
T H A I L A N D

<http://safe2019.safe-network.org/>

CERTIFICATE

Asia Pacific Network for Sustainable Agriculture, Food and Energy (SAFE-Network)

Chiang Mai University, Thailand

Pukhet Rajabhat University, Thailand

jointly certify

Inanpi Hidayati Sumiasih

PRESENTER

International Conference on Sustainable Agriculture, Food, and Energy (SAFE2019)

Phuket, Thailand. October 19-21, 2019

Green Agri-food Energy Production for a Better World in a Changing Climate

Assoc. Prof. Dr. Sermhidat Jemjunyong
Local Conference Coordinator



Prof. Dr. Novlizar Nazir
SAFE-Network Coordinator

PAPER • OPEN ACCESS

The Design and Concept of Agro-Edutourism Park Using Sustainable Agriculture Principle at Attaqie Farm

To cite this article: IH Sumiasih and AN Ichniarsyah 2021 *IOP Conf. Ser.: Earth Environ. Sci.* **709** 012016

View the [article online](#) for updates and enhancements.

You may also like

- [New Reactions of *N*-Methylated Oxopurines](#)
E S Golovchinskaya
- [Organic Fertilizer from Starfruit Waste Sustainable Agriculture Solution](#)
Mutia Dewi Puspitawati and Inanpi Hidayati Sumiasih
- [Nitrogen use efficiency on dairy farms with different grazing systems in northwestern Germany](#)
Philipp Löw, Yusuf Nadi Karatay and Bernhard Osterburg



ECS 245th ECS Meeting • May 26-30, 2024 • San Francisco, CA

Present your work at the leading electrochemistry & solid-state science conference.

Network with academic, government, and industry influencers!

Submit abstracts by December 1, 2023

Learn more & submit!



The Design and Concept of Agro-Edutourism Park Using Sustainable Agriculture Principle at Attaqie Farm

IH Sumiasih¹, AN Ichniarsyah²

¹Agroecotechnology Program, Faculty of Bioindustry, Trilogi University, Jakarta, Indonesia

²Bogor Agricultural Development Polytechnic, Bogor, Indonesia

E-mail: inanpihs@trilogi.ac.id

Abstract. This study aimed to provide a better understanding of agriculture to the society through the implementation of design and concept of sustainable agriculture in Attaqie Farm agro-edutourism park. The research was conducted in November 2018 – June 2019 at Attaqie Farm, Tuban, East Java, Indonesia. The research procedures were concept formulation, designing, organizing detail drawings and implementation of desired site plan. The result showed that the concept and design prepared by using sustainable agriculture principle successfully to be applied in the agro-edutourism park namely Attaqie Farm. In term of economy, this farm had entrepreneurship activities such as the production of organic fertilizer, fresh star fruit and its derivatives. In term of social, this farm educated visitors about leafy vegetable culture in verticulture method. It was ecofriendly farm because it had recycling activity of the waste of leaf and fruit into organic fertilizer and applied back to the orchard.

1. Introduction

Technological developments and civilization have shown unusual effects in various fields. In field of agriculture, there has been a growing need for understanding agriculture through different perspectives. The emergence of agricultural education through the concept of agrotourism has sprung up both in big cities and developing areas. This concept is proven to improve regional welfare and create better understanding of agriculture.

Agrotourism or even agro-edutourism is not a new phenomenon. In America, this phenomenon has increased since 2002. According to research conducted in Missouri and North Carolina, agro-edutourism is a concept of tourism that includes cultivation, education, entertainment, and of course involving visitors to be directly exposed by agricultural activities [1]. In addition, agro-edutourism is the utilization of agricultural business (agro) as a tourist attraction that aims to expand visitor knowledge in agriculture at the same time to do recreation [2]. The concept of agro-edutourism is very suitable to be used in introducing and developing regional agricultural products. This is because the concept is acceptable in our society. Furthermore, the emergence of agro-edutourism is encouraging farmers to maintain their cultural heritage and also contributing in the economic improvement of local society [3]. As the combination of agricultural, education and tourism, the agro-edutourism allow the transfer of information through non formal education condition so that the visitor could enjoy the tour at the same time with study the agriculture knowledge. This situation made the learning process of agriculture is more fun and attractive than formal concept.

Attaqie Farm is one of emerging agro-edutourism park located in Tuban District, East Java Province, Indonesia. This farm was located in the middle of start fruit orchard with the area for about 17 Ha in total and 2 Ha for the park only. The design and concept of the Attaqie Farm Agro-Tourism is directed to make enjoyable visiting experience and also to let tourists to love and care the environment.



The presence of agro-edutourism make so many benefits in terms of economy, ecology and social. Sustainable agro-edutourism provide a lot of benefits for the surrounding community such as the empowerment of the local society, opening new work opportunities and educating society in general and student from children to university level in particular.

As one of emerging agro-edutourism, Attaqie farm required the development of several spot for visitor attraction, such as garden and greenhouse. This development required suitable design and concept prior to implementation. However, there is a lack of study related to the design and concept in this agro-edutourism park. Thus, this study aimed to implement the design and concept of sustainable agriculture in Attaqie Farm agro-edutourism. Our hope is to provide a better understanding of agriculture to the society that is possible to have a highly profitable agribusiness if they followed sustainable agriculture principle and combined with edutourism activities.

2. Materials and Methods

2.1. Time and Place

This experiment was conducted in November 2018 - June 2019 at Attaqie Farm, Panyuran Village, Palang District, Tuban Regency, East Java Province, Indonesia. The Attaqie Farm was composed of 2 Ha of agro-edutourism park and 15 Ha starfruit orchard. The Attaqie Farm was geographically located at 6°54'22.53 "S-6°54 '26.62"S, 112°05'25.63"E-112°05 '31.21".

2.2. Experimental tools

The tools used in this study included calculator, stationery (pencils, drawing pens, rulers), and surveying tools (global positioning system, roll meter, paper, board, computer and camera. Materials needed include, base map, and working paper.

2.3. Research method

This research was initiated by the preparation of design. The output produced from this study was a design (site plan) of garden which is equipped with detailed drawings (cutting images, perspective drawings, planting plans, and detailed drawings). The design became the basic reference for the implementation step.

2.4. Research stages

This study followed the stages of work proposed by previous study [4], namely the Planning Design Process included several stages, such as analysis, concepts, design construction drawing, implementation, and post-construction and evaluation and maintenance. In detail, this study stages were described below.

2.5. Field observation

Field observation was carried out directly in the Attaqie Farm. This activity aimed to see the general condition of the area. This activity was conducted by interview method to the relevant parties and the obtained information was confirmed by cross-check method directly to the field. Thus, there were 2 data collected, both from interview process and field observation itself.

2.5.1. Analysis

This stage was consisted of several activities such as data collection, inventory, site analysis and synthesis.

2.5.2. Design

The design stage was consisted of several activities such as (1) concept formulation; (2) design production that fitted with the prepared concept and the output was the siteplan; (3) detailed drawing was consisted of cuttings, viem perspectives, planting plan and other specification, so that this drawing served to explain the landscape design in order to be more easily understood.

2.5.3. Implementation

The prepared site plan became the basic reference during the implementation process to realize the site plan to the field

3. Results and Discussion

3.1. Analysis of visitor circulation at Attaqie Farm agro-edutourism Park

The analysis of visitor circulation pattern was intended to be able to connect the space and objects with one another in the entire park to be more effective and efficient. The pattern of visitor circulation especially for specific visitor from institutions or schools with the aim to have agro-edutourism experience was shown in Figure 1. It was initiated by the arrival, parking, entering through the beautiful iconic main gate (one of favorite photo spot), in door short course (rapid introduction of park), coming to garden, greenhouse for ornamental plant and also leafy vegetables that arranged in verticulture method, continued to the production house of organic fertilizer and harvesting the star fruit directly to the orchard. The visitor might rest in cafe and allowed the children to play in playground area or swimming pool. There was also praying room for visitors next to the cafe.

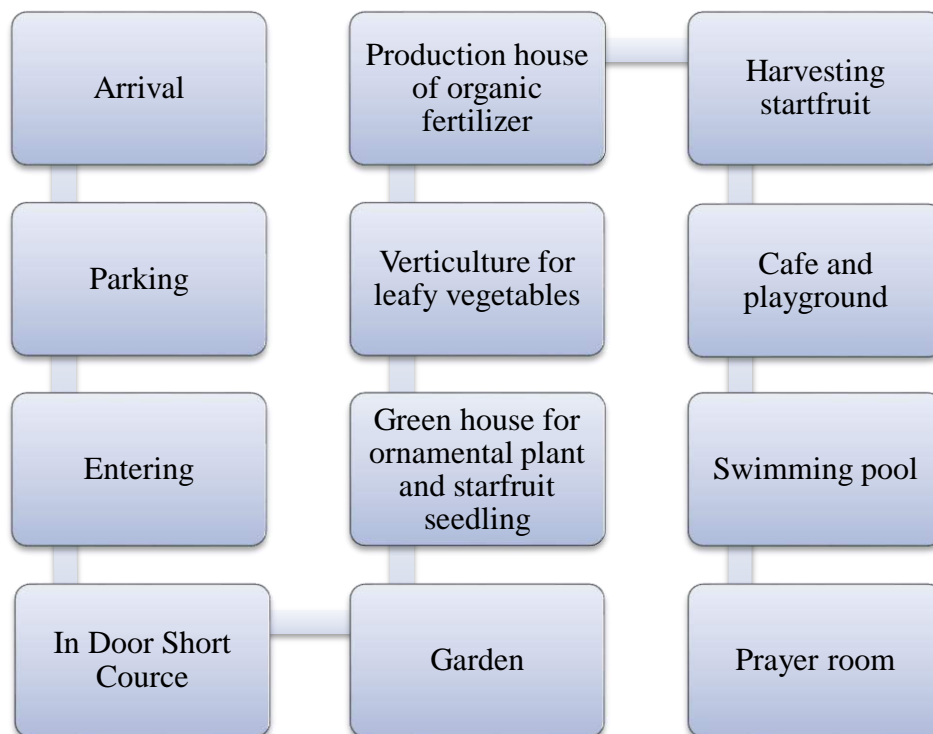


Fig 1. The pattern of visitor circulation in Attaqie Farm agroedutourim park for specific visitor from institution or school

3.2. The object and attractiveness of agro-edutourism park

The attractiveness of an agro-edutourism park was the most important issues that should be monitored by the managerial team so that visitor got good and satisfy experience and they would return in near future. The development of agro-edutourism should pay attention to the social interactions between visitors, workers, and owners [5]. Attaqie Farm showed its own charm and excellence in its management, namely an integrated agro-edutourism park. Interactive education could be the concept of certain attractions such as the training to culture organic vegetable, fruit tree, ornamental and medicinal

plants. The type of tourist who came in this park and their activities during the visiting period and the supporting facilities that they used was shown in Table 1.

Table 1. The type of tourist, their activities and the facilities need

No	Subject	Activities	Facilities
1	General tourists	Relax in the gazebo, enjoy the garden, play in the playground and swimming pool, eat in the cafe	Swimming pools, land recreation facilities, cafe, prayer room, gazebo
2	Specific tourist, for agroeducation and also out bond	In general, it was similar to the general tourist, but there were additional activities such as the introduction to organic vegetable, production of compost and liquid organic fertilizer, plant nurseries in the green house and star fruit picking	Swimming pools, cafe (hawker center), educational park, prayer room, gazebo, playground

3.3. Design

In the field of landscape architecture, landscape design was a process after planning. The design process was a systematic tool for determining the expected initial state and the best way to achieve the expected state [6]. The process of designing an agro-tourism at Attaqie Farm should be in accordance with its objectives. The site plan of Attaqie farm agro-edutourism park was showed in Figure 2. According to [7], when designing an agro-edutourism park, researchers should understand the landscape features that attract visitors and perceptions of visitors who come from various educational backgrounds, gender, and its interest in agriculture after visiting the park. The production of educational garden Attaqie Farm was intended to educate visitors ranging from kindergarten children to the university student. Our hope was to share and let them to love more about sustainable agriculture and to be wise during the handle of waste.



Fig 2. Site plan of Attaqie Farm agro-edutourism park

The design and implementation of an educational park at Attaqie Farm also called as Taman Pintar that consisted of various vegetables medicinal and ornamental plants. Taman Pintar was built to introduce the knowledge and technology of sustainable farming to the community through non formal and fun method. This design concept was in line with the previous study [8] that the garden that was designed by allowing full participation of visitors would increase the visitor experience to the park.

Figure 3 was the design and implementation of the Attaqie Farm agro-edutourism park. The figures number 3a, 3b and 3c showed initial condition of the site that were empty area without any ornamental garden and not so much attractive. The figures number 3d, 3e and 3f were the prepared design for the garden and greenhouse. The figures number 3g, 3h and 3i were the start of the implementations by creating the frame of tunnel, the rack of verticulture, planting ornamental and medicinal plants.

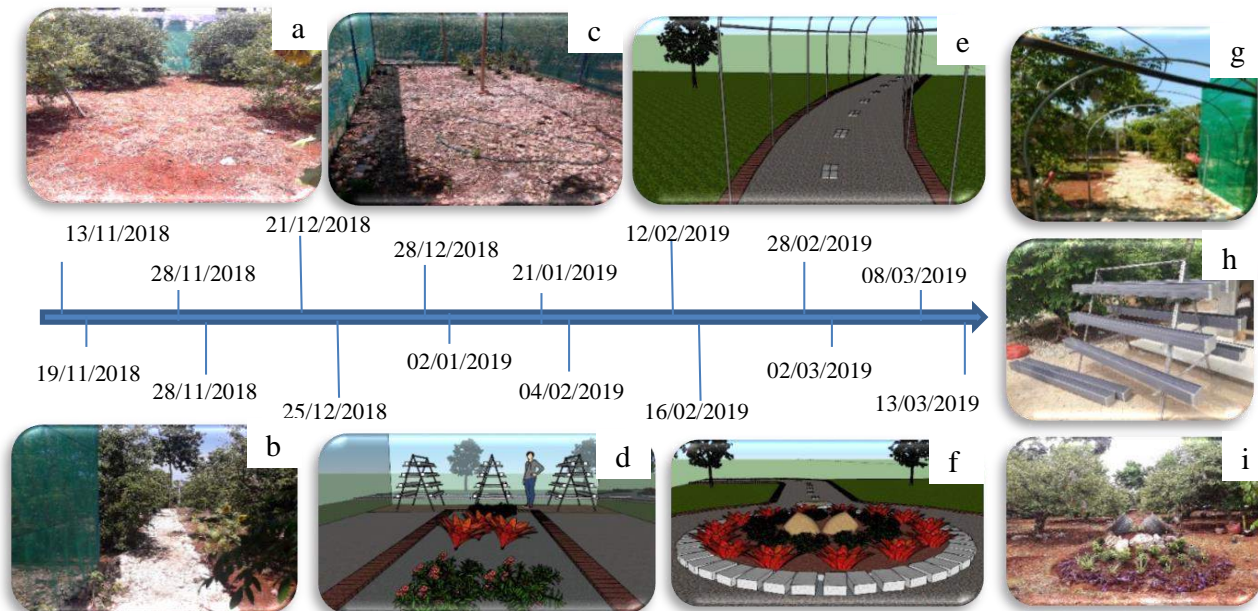


Fig 3. The design and starting action at Attaqie Farm agro-edutourism park

Attaqie Farm agro-edutourism park applied several principles of sustainable agriculture. One of them was the commitment to apply organic inputs, such as liquid organic fertilizer and compost. After pruning season, the pruned leaves collected and then processed to be compost. While the drop fruit was used to produce liquid organic fertilizer. Both of organic fertilized were then applied back to the orchard. One of visitor attraction facilities in Attaqie Farm was a swimming pool. The wastewater from this pool was used for irrigation water and delivered to starfruit orchard.

One of educational site in Attaqie Farm was the combination of garden and verticulture inside the greenhouse. The garden was so beautiful and invited the people to take the picture. The leafy vegetables were planted in verticulture method. This method allowed the presence of multilayer bed for raising vegetable so that was more efficient in term of place. Vegetables and ornamental plants were applied organic fertilizer either compost or liquid organic fertilizer that had been produced. The greenhouse was used for educating visitors, mostly kindergarten children up to college student. The implementation of the design was depicted in Figure 4. Figure 4a showed the greenhouse before the design, while Figure 4d was the greenhouse after design implementation. Figure 4b was an empty area before implementation, while Figure 4f and 4h were the results of the design implementation. Figure 4c showed the documentation of verticulture racks production, while figure 4e and 4f showed the leafy vegetables on the verticulture.



Fig 4. The implementation of design at Attaqie Farm agro-edutourism park

Starfruit was a fruit that was easily damaged so that it had a low shelf life [9]. The innovation offered in this garden was the invitation to the visitors to harvest fruits directly to the orchard so that there was a short cut of product chain from farmer directly to customer. This situation also allowed visitors to select desired fruit so that they know exactly the fruit quality, even started from the plant to the table. The concept of Attaqie Farm agro-edutourism park was depicted in several programs as shown in Figure 5 below.

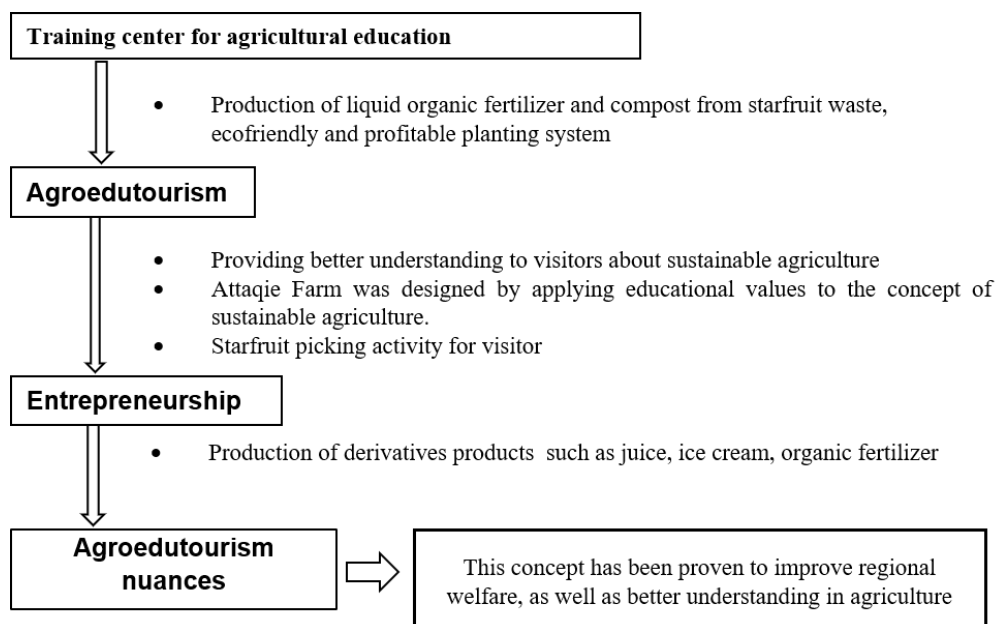


Fig 5. The concept of agro-edutourism at Attaqie Farm

4. Conclusion

The concept and design prepared by using sustainable agriculture principle successfully to be applied in the agro-edutourism park namely Attaqie Farm at Tuban, East Java Province, Indonesia. This farm allowed visitors, starting from kinder garden children up to college student, to have agricultural education experience at the same time with recreational activities. This farm recycled the waste of leaf and fruit into organic fertilizer and applied back to the orchard. This farm educated visitors about leafy vegetable culture in verticulture method and also have entrepreneurship activities in term of production of organic fertilizer, fresh star fruit and its derivates such as juice.

References

- [1] Arroyo CG, Barbieri C and Rich SR 2013 Defining agritourism: A comparative study of stakeholders' perceptions in Missouri and North Carolina *Tourism Management* 37 39-47
- [2] Hidayat 2017 Sorgum village: strategi branding desa berbasis agroeduwisata melalui model quadruple helix di Desa Keyongan, Babat, Lamongan, Jawa Timur. *ISEI Business and Management Review*
- [3] LaPan C and Barbieri C 2014 The role of agritourism in heritage preservation *Current Issues in Tourism* 17 666-673
- [4] Booth 1983 *Basic Elements of Landscape Architectural Design* (New York: Waveland Press Inc)
- [5] Choo H and Petrick JF 2013 Social interactions and intentions to revisit for agritourism service encounters *Tourism Management* 40 372-381
- [6] Simonds JO 1983 *Landscape Architecture: A Manual of Site Planning and Design* (New York: Graw-Hill Book Co)
- [7] Gao J, Barbieri C and Valdivia C 2014 Agricultural landscape preferences: implications for agritourism development. *Journal of Travel Research* 53 366–379
- [8] Thompson M, Prideaux B, McShane C, Dale A, Turnour J and Atkinson M 2016 Tourism development in agricultural landscapes: the case of the Atherton Tablelands, Australia *Journal Landscape Research* 41 730-743
- [9] Sumiasih IH, Octaviani L, Lestari DI and Yunita ER 2016 Studi perubahan kualitas pascapanen buah belimbing dengan beberapa pengemasan dan suhu simpan. *Agrin Jurnal Penelitian Pertanian* 20

Acknowledgement

The authors thank to the managerial farm of Attaqie Farm for the experimental permit. This study was partially supported by the foundation namely Dana Sejahtera Mandiri

7

by Inanpi Hidayati

Submission date: 05-Oct-2023 04:59PM (UTC+0800)

Submission ID: 2186306093

File name: 7_The_Design_and_Concept_of_Agro-Edutourism_Park.docx (8.29M)

Word count: 2445

Character count: 13678

The Design and Concept of Agro-Edutourism Park Using Sustainable Agriculture Principle at Attaqie Farm

IH Sumiasih¹, AN Ichniarsyah²

¹Agroecotechnology Program, Faculty of Bioindustry, Trilogi University, Jakarta, Indonesia

²Bogor Agricultural Development Polytechnic, Bogor, Indonesia
E-mail: inanpihs@trilogi.ac.id

Abstract. This study aimed to provide a better understanding of agriculture to the society through the implementation of design and concept of sustainable agriculture in Attaqie Farm agro-edutourism park. The research was conducted in November 2018 – June 2019 at Attaqie Farm, Tuban, East Java, Indonesia. The research procedures were concept formulation, designing, organizing detail drawings and implementation of desired site plan. The result showed that the concept and design prepared by using sustainable agriculture principle successfully to be applied in the agro-edutourism park namely Attaqie Farm. In term of economy, this farm had entrepreneurship activities such as the production of organic fertilizer, fresh star fruit and its derivatives. In term of social, this farm educated visitors about leafy vegetable culture in verticulture method. It was ecofriendly farm because it had recycling activity of the waste of leaf and fruit into organic fertilizer and applied back to the orchard.

1. Introduction

Technological developments and civilization have shown unusual effects in various fields. In field of agriculture, there has been a growing need for understanding agriculture through different perspectives. The emergence of agricultural education through the concept of agrotourism has sprung up both in big cities and developing areas. This concept is proven to improve regional welfare and create better understanding of agriculture.

Agrotourism or even agro-edutourism is not a new phenomenon. In America, this phenomenon has increased since 2002. According to research conducted in Missouri and North Carolina, agro-edutourism is a concept of tourism that includes cultivation, education, entertainment, and of course involving visitors to be directly exposed by agricultural activities [1]. In addition, agro-edutourism is the utilization of agricultural business (agro) as a tourist attraction that aims to expand visitor knowledge in agriculture at the same time to do recreation [2]. The concept of agro-edutourism is very suitable to be used in introducing and developing regional agricultural products. This is because the concept is acceptable in our society. Furthermore, the emergence of agro-edutourism is encouraging farmers to maintain their cultural heritage and also contributing in the economic improvement of local society [3]. As the combination of agricultural, education and tourism, the agro-edutourism allow the transfer of information through non formal education condition so that the visitor could enjoy the tour at the same time with study the agriculture knowledge. This situation made the learning process of agriculture is more fun and attractive than formal concept.

Attaqie Farm is one of emerging agro-edutourism park located in Tuban District, East Java Province, Indonesia. This farm was located in the middle of start fruit orchard with the area for about 17 Ha in total and 2 Ha for the park only. The design and concept of the Attaqie Farm Agro-Tourism is directed to make enjoyable visiting experience and also to let tourists to love and care the environment.

The presence of agro-education make so many benefits in terms of economy, ecology and social. Sustainable agro-education provide a lot of benefits for the surrounding community such as the empowerment of the local society, opening new work opportunities and educating society in general and student from children to university level in particular.

As one of emerging agro-education, Attaqie farm required the development of several spot for visitor attraction, such as garden and greenhouse. This development required suitable design and concept prior to implementation. However, there is a lack of study related to the design and concept in this agro-education park. Thus, this study aimed to implement the design and concept of sustainable agriculture in Attaqie Farm agro-education. Our hope is to provide a better understanding of agriculture to the society that is possible to have a highly profitable agribusiness if they followed sustainable agriculture principle and combined with education activities.

2. Materials and Methods

2.1. Time and Place

This experiment was conducted in November 2018 - June 2019 at Attaqie Farm, Panyuran Village, Palang District, Tuban Regency, East Java Province, Indonesia. The Attaqie Farm was composed of 2 Ha of agro-education park and 15 Ha starfruit orchard. The Attaqie Farm was geographically located at 6°54'22.53 "S-6°54 '26.62"S, 112°05'25.63"E-112°05 '31.21".

2.2. Experimental tools

The tools used in this study included calculator, stationery (pencils, drawing pens, rulers), and surveying tools (global positioning system, roll meter, paper, board, computer and camera. Materials needed include, base map, and working paper.

2.3. Research method

This research was initiated by the preparation of design. The output produced from this study was a design (site plan) of garden which is equipped with detailed drawings (cutting images, perspective drawings, planting plans, and detailed drawings). The design became the basic reference for the implementation step.

2.4. Research stages

This study followed the stages of work proposed by previous study [4], name the Planning Design Process included several stages, such as analysis, concepts, design construction drawing, implementation, and post-construction and evaluation and maintenance. In detail, this study stages were described below;

2.5. Field observation

Field observation was carried out directly in the Attaqie Farm. This activity aimed to see the general condition of the area. This activity was conducted by interview method to the relevant parties and the obtained information was confirmed by cross-check method directly to the field. Thus, there were 2 data collected, both from interview process and field observation itself.

2.5.1. Analysis

This stage was consisted of several activities such as data collection, inventory, site analysis and synthesis.

2.5.2. Design

The design stage was consisted of several activities such as (1) concept formulation; (2) design production that fitted with the prepared concept and the output was the siteplan; (3) detailed drawing was consisted of cuttings, view perspectives, planting plan and other specification, so that this drawing served to explain the landscape design in order to be more easily understood.

2.5.3. Implementation

The prepared site plan became the basic reference during the implementation process to realize the site plan to the field

3. Results and Discussion

3.1. Analysis of visitor circulation at Attaqie Farm agro-education Park

The analysis of visitor circulation pattern was intended to be able to connect the space and objects with one another in the entire park to be more effective and efficient. The pattern of visitor circulation especially for specific visitor from institutions or schools with the aim to have agro-education experience was shown in Figure 1. It was initiated by the arrival, parking, entering through the beautiful iconic main gate (one of favorite photo spot), in door short course (rapid introduction of park), coming to garden, greenhouse for ornamental plant and also leafy vegetables that arranged in verticulture method, continued to the production house of organic fertilizer and harvesting the star fruit directly to the orchard. The visitor might rest in cafe and allowed the children to play in playground area or swimming pool. There was also praying room for visitors next to the cafe.



Fig 1. The pattern of visitor circulation in Attaqie Farm agroeducation park for specific visitor from institution or school

3.2. The object and attractiveness of agro-education park

The attractiveness of an agro-education park was the most important issues that should be monitored by the managerial team so that visitor got good and satisfy experience and they would return in near future. The development of agro-education should pay attention to the social interactions between visitors, workers, and owners [5]. Attaqie Farm showed its own charm and excellence in its management, namely an integrated agro-education park. Interactive education could be the concept of certain attractions such as the training to culture organic vegetable, fruit tree, ornamental and medicinal.

plants. The type of tourist who came in this park and their activities during the visiting period and the supporting facilities that they used was shown in Table 1.

Table 1. The type of tourist, their activities and the facilities need

No	Subject	Activities	Facilities
1	General tourists	Relax in the gazebo, enjoy the garden, play in the playground and swimming pool, eat in the cafe	Swimming pools, land recreation facilities, cafe, prayer room, gazebo
2	Specific tourist, for agroeducation and also out bond	In general, it was similar to the general tourist, but there were additional activities such as the introduction to organic vegetable, production of compost and liquid organic fertilizer, plant nurseries in the green house and star fruit	Swimming pools, cafe (hawker center), educational park, prayer room, gazebo, playground

3.3. Design

In the field of landscape architecture, landscape design was a process after planning. The design process was a systematic tool for determining the expected initial state and the best way to achieve the expected state [6]. The process of designing an agro-tourism at Attaqie Farm should be in accordance with its objectives. The site plan of Attaqie farm agro-edutourism park was showed in Figure 2. According to [7], when designing an agro-edutourism park, researchers should understand the landscape features that attract visitors and perceptions of visitors who come from various educational backgrounds, gender, and its interest in agriculture after visiting the park. The production of educational garden Attaqie Farm was intended to educate visitors ranging from kindergarten children to the university student. Our hope was to share and let them to love more about sustainable agriculture and to be wise during the handle of waste.



Fig 2. Site plan of Attaqie Farm agro-edutourism park

The design and implementation of an educational park at Attaqie Farm also called as Taman Pintar that consisted of various vegetables medicinal and ornamental plants. Taman Pintar was built to introduce the knowledge and technology of sustainable farming to the community through non formal and fun method. This design concept was in line with the previous study [8] that the garden that was designed by allowing full participation of visitors would increase the visitor experience to the park.

Figure 3 was the design and implementation of the Attaqie Farm agro-edutourism park. The figures number 3a, 3b and 3c showed initial condition of the site that were empty area without any ornamental garden and not so much attractive. The figures number 3d, 3e and 3f were the prepared design for the garden and greenhouse. The figures number 3g, 3h and 3i were the start of the implementations by creating the frame of tunnel, the rack of verticulture, planting ornamental and medicinal plants.

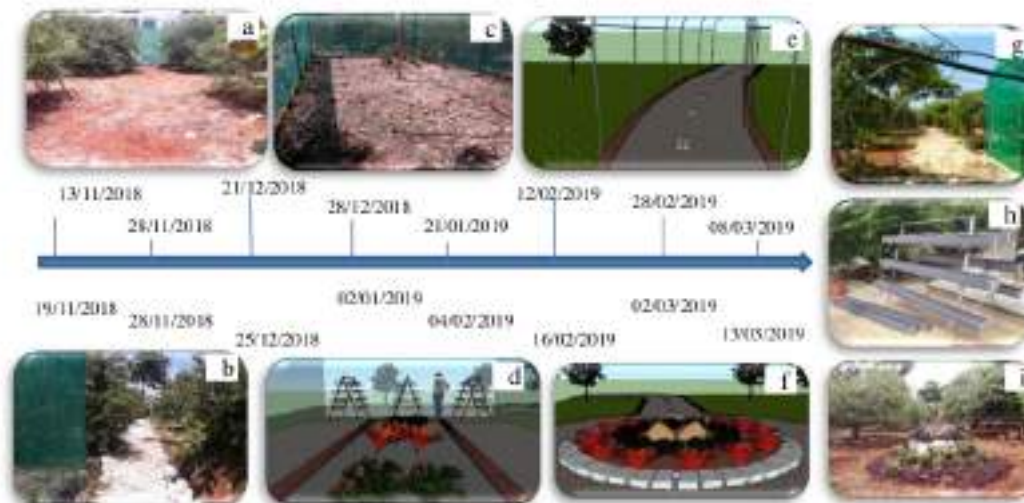


Fig 3. The design and starting action at Attaqie Farm agro-edutourism park.

Attaqie Farm agro-edutourism park applied several principles of sustainable agriculture. One of them was the commitment to apply organic inputs, such as liquid organic fertilizer and compost. After pruning season, the pruned leaves collected and then processed to be compost. While the drop fruit was used to produce liquid organic fertilizer. Both of organic fertilized were then applied back to the orchard. One of visitor attraction facilities in Attaqie Farm was a swimming pool. The wastewater from this pool was used for irrigation water and delivered to starfruit orchard.

One of educational site in Attaqie Farm was the combination of garden and verticulture inside the greenhouse. The garden was so beautiful and invited the people to take the picture. The leafy vegetables were planted in verticulture method. This method allowed the presence of multilayer bed for raising vegetable so that was more efficient in term of place. Vegetables and ornamental plants were applied organic fertilizer either compost or liquid organic fertilizer that had been produced. The greenhouse was used for educating visitors, mostly kindergarten children up to college student. The implementation of the design was depicted in Figure 4. Figure 4a showed the greenhouse before the design, while Figure 4d was the greenhouse after design implementation. Figure 4b was an empty area before implementation, while Figure 4f and 4h were the results of the design implementation. Figure 4c showed the documentation of verticulture racks production, while figure 4e and 4f showed the leafy vegetables on the verticulture.



Fig 4. The implementation of design at Attaqie Farm agro-edutourism park

Starfruit was a fruit that was easily damaged so that it had a low shelf life [9]. The innovation offered in this garden was the invitation to the visitors to harvest fruits directly to the orchard so that there was a short cut of product chain from farmer directly to customer. This situation also allowed visitors to select desired fruit so that they know exactly the fruit quality, even started from the plant to the table. The concept of Attaqie Farm agro-edutourism park was depicted in several programs as shown in Figure 5 below.

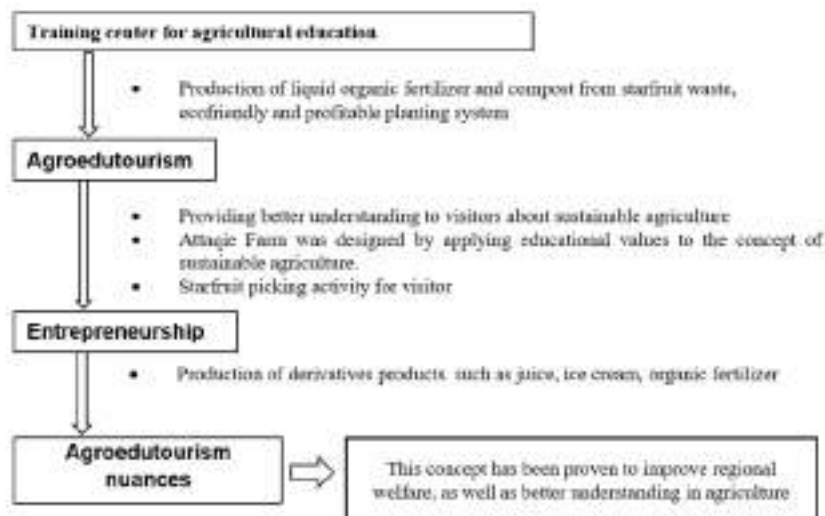


Fig 5. The concept of agro-edutourism at Attaqie Farm

4. Conclusion

The concept and design prepared by using sustainable agriculture principle successfully to be applied in the agro-edutourism park namely Attaqie Farm at Tuban, East Java Province, Indonesia. This farm allowed visitors, starting from kinder garden children up to college student, to have agricultural education experience at the same time with recreational activities. This farm recycled the waste of leaf and fruit into organic fertilizer and applied back to the orchard. This farm educated visitors about leafy vegetable culture in verticulture method and also have entrepreneurship activities in term of production of organic fertilizer, fresh star fruit and its derivates such as juice.

References

- [1] Arroyo CG, Barbieri C and Rich SR 2013 Defining agritourism: A comparative study of stakeholders' perceptions in Missouri and North Carolina *Tourism Management* 37 39-47
- [2] Hidayat 2017 Sorgum village: strategi branding desa berbasis agroeduwisata melalui model quadruple helix di Desa Keyongan, Babat, Lamongan, Jawa Timur. *ISEI Business and Management Review*
- [3] LaPan C and Barbieri C 2014 The role of agritourism in heritage preservation *Current Issues in Tourism* 17 666-673
- [4] Booth 1983 *Basic Elements of Landscape Architectural Design* (New York: Waveland Press Inc)
- [5] Choo H and Petrick JF 2013 Social interactions and intentions to revisit for agritourism service encounters *Tourism Management* 40 372-381
- [6] Simonds JO 1983 *Landscape Architecture: A Manual of Site Planning and Design* (New York: Graw-Hill Book Co)
- [7] Gao J, Barbieri C and Vaidiva C 2014 Agricultural landscape preferences: implications for agritourism development. *Journal of Travel Research* 53 366-379
- [8] Thompson M, Prideaux B, McShane C, Dale A, Tumour J and Atkinson M 2016 Tourism development in agricultural landscapes: the case of the Atherton Tablelands, Australia *Journal Landscape Research* 41 730-743
- [9] Sumiasih IH, Octaviani L, Lestari DI and Yunita ER 2016 Studi perubahan kualitas pascapanen buah belimbing dengan beberapa pengemasan dan suhu simpan. *Agrin Jurnal Penelitian Pertanian* 20

Acknowledgement

The authors thank to the managerial farm of Attaqie Farm for the experimental permit. This study was partially supported by the foundation namely Dana Sejahtera Mandiri

ORIGINALITY REPORT

2%

SIMILARITY INDEX

2%

INTERNET SOURCES

0%

PUBLICATIONS

0%

STUDENT PAPERS

PRIMARY SOURCES

1

academic-accelerator.com

Internet Source

1%

2

repo.unand.ac.id

Internet Source

1%

3

www.scilit.net

Internet Source

<1%

4

M Kamal, D R Anwar. "The coastal design of the Sumur Tiga beach as a coastal tourism destination", IOP Conference Series: Earth and Environmental Science, 2021

Publication

<1%

Exclude quotes On

Exclude matches Off

Exclude bibliography On