

## Keiki induction by cytokinin on *Phalaenopsis* spp.

Popy Hartatie Hardjo<sup>1\*</sup>, Ida Bagus Made Artadana<sup>1</sup>, Sulistyono Emantoko Dwi Putra<sup>1</sup>, and Asad Jan<sup>2</sup>

<sup>1</sup>Department of Faculty of Biotechnology, University of Surabaya, Raya Kalirungkut, Surabaya 60293, East Java, Indonesia

<sup>2</sup>Institute of Biotechnology and Genetic Engineering, University of Agriculture Peshawar, 25130 Peshawar, Khyber Pakhtunkhwa, Pakistan

**Abstract.** A Keiki is the product of asexual propagation which naturally develop at the node of a flower stalk or cane. *Phalaenopsis* produce Keiki along the middle to end nodes on the flower stalk. Although keikis are an inefficient way to propagate orchids on a commercial scale, it is interesting to study the cytokinin hormone Benzyl Aminopurine (BAP) effect to stimulate keikis on a node along the flower stalk. Two nodes of each flower stalk were used in this experiment. Cytokinin hormone (0 mg L<sup>-1</sup>, 2 000 mg L<sup>-1</sup>, 4 000 mg L<sup>-1</sup>, 6 000 mg L<sup>-1</sup> BAP) was only applied once to the second, third, fourth, and fifth nodes of the flower stalk base. The Keiki raised from the second and third nodes of the flower stalk while the flower spike raised from the fourth to sixth basal. BAP stimulated bud break on the node of the flower stalk and could produce either flower spike or keikis depending on node position from the basal node of the flower stalk.

**Keywords:** Asexual propagation, hormone, important and economic orchid, Indonesian native orchid

### 1 Introduction

*Phalaenopsis* spp. is one of the important orchids and has high economic value in Indonesia and *Phalaenopsis amabilis* L. Blume is an Indonesian native orchid [1]. These orchids dominate the orchid agribusiness in the local market as well as for export purposes. Market demand continues to increase, but development constraints related to the provision of quality seeds are still the problem.

*Phalaenopsis* spp. generally propagated through the separation of tillers and cuttings, induction of axillary shoots, and Keiki. Keikis are common on *Phalaenopsis* and *Dendrobium moniliforme* L. orchids. On a *Phalaenopsis*, a Keiki is a small plant growing from one node along the flower stalk. The growth of Keiki may be stimulated by prolonged exposure to high temperatures during the final phase of spike growth [2]. Naturally, keikis can occur when the mother plant is struggling. Phytohormones such as cytokinin can be applied to a node on the flower stalk to stimulate the Keiki which identical clone of the

---

\*Corresponding author: [poppy\\_hardjo@staff.ubaya.ac.id](mailto:poppy_hardjo@staff.ubaya.ac.id)

mother plant. This method aims to produce orchid seedlings that flower quickly even though the number of propagations is less than compared to tissue culture propagation.

*Phalaenopsis* orchids generally bloom once a year under regular fertilizing and watering, provided that ambient temperature and light intensity are suitable. *Phalaenopsis* are tropical plants that grow well under temperatures ranging from 28 °C to 35 °C during the day and 20 °C to 24 °C at night [2]. Cytokinin such as Benzyl Aminopurine (BAP) has been used for *ex vitro* and *in vitro* propagation to promote flower bud formation on *Dendrobium* hybrid [3], *Phalaenopsis* orchid plant [4], to increase the number of spikes and flower [5], to increase the number of leaves per plant on *Phalaenopsis* hybrid cv. Fuller's sunset [6]. Moreover, Hardjo [7] reported that BAP also can use to induce calli formed somatic embryos during 30 d for *in vitro* propagation of *Vanda tricolor* Lindl. var. pallida at ½ Murashige and Skoog Medium with NAA 0.01 mg.L<sup>-1</sup> and BAP 0.05 mg.L<sup>-1</sup>, also with addition of 1 % sucrose [8].

This study aimed to obtain *Phalaenopsis* orchid seedlings (Keiki) that flower quickly because they came from mature parent plants that are already flowering, by giving the treatment of BAP cytokinin growth regulators on the nodes of the flower stalk.

## 2 Materials and methods

*Phalaenopsis* flowering plants were obtained from Simanis Orchids Nursery (Lawang, East Java, Indonesia). The technical BAP grade was used. All experiments were carried out in the shade net greenhouse at PPAU (*Pusat Pembibitan Anggrek Ubaya – Ubaya Orchid Nursery Center*) IOC (Integrated Outdoor Campus), at an altitude ± 1 000 m above sea level in Trawas, East Java. Greenhouse ambient temperature was ± 30 °C/24 °C day/night.

From each plant, two nodes were selected from the base of the flower stalk to be smeared only once with BAP suspension. The sheath of the node from the *Phalaenopsis* flower stalk was carefully opened. Using the sterile toothpicks spread BAP suspension to various node positions from the base of the orchid flower stalk. There were 16 treatments in which a combination of BAP concentration (0 mg L<sup>-1</sup>, 2 000 mg L<sup>-1</sup>, 4 000 mg L<sup>-1</sup>, 6 000 mg L<sup>-1</sup>) and the position of nodes from flower stalk basal (2, 3, 4, and 5). Experiments were organized according to a completely randomized design with five replication per treatment. The observed variables were the percentage of keikis, percentage of the flower spike, Keiki length, flower spike length, and first bud emergence. The data of all variables were not a normal distribution, so analyzed statistically using Kruskal Wallis Test. Differences between treatments were identified by Mann Whitney U Test at the 5 % significance level.

## 3 Results and discussions

### 3.1 Effect of BAP to stimulate Keiki break or flower spike

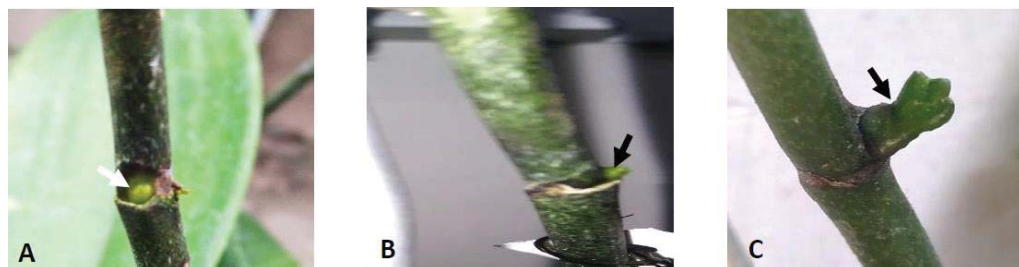
The node (2<sup>nd</sup> and 3<sup>rd</sup> node) that was closest to the base of the orchid flower stalk would result in Keikis shown in Table 1). A combination of BAP treatment (6 000 mg L<sup>-1</sup>) and the position of a node from the flower stalk base (2<sup>nd</sup> node) was effective in increasing the percentage and growth of Keiki, and so it was also with a flower spike. Maximum Keiki length or spike length was observed in BAP treatment (6 000 mg L<sup>-1</sup>). BAP concentrations can significantly stimulate early first Keiki or flower spike, and the highest concentration of BAP (6 000 mg L<sup>-1</sup>) was the fastest to stimulate bud break and growth of Keiki (Figure 1A, 1B, 1C). These results were in line with those of other workers, indicating the efficiency of BAP for bud break or flower spikes on orchid plants. BAP treatments increased the growth

of both Keiki and flower spike (Table 1). A similar response was observed in *Phalaenopsis* when orchids seedlings were treated with BAP at low temperature (30 °C/18 °C) [4] and *Phalaenopsis* hybrid cv. Fuller's Sunset [6]. The authors found BAP cytokinin was essential for bud break on nodes of the flower stalk, and it increased the growth of both Keiki and flower spike. BAP also can use for *in vitro* propagation, such as shoot multiplication of *Pogostemon cablin* Benth. var. Sidikalang at concentration 0.2 mg L<sup>-1</sup> with addition of 0.2 mg L<sup>-1</sup> Kinetin on Murashige and Skoog (MS) medium [9]. Applying cytokinin to the node which contained meristem tissue caused the meristem to grow to form bud. Keiki formation was caused accumulation of growth hormones at a node of the flower stalk. BAP cytokinin specifically promotes cell division, shoot multiplication, and axillary bud proliferation both for *ex vitro* and *in vitro* propagation. A similar trend of results was found by Farag [10] on *Chrysanthemum indicum* L. plants. Agustina [11] stated BAP induced faster shoot emergence from micrografting of mangosteen *in vitro*. Suryaningsih [12] reported that coconut water (containing cytokinin) did not affect Keiki formation and vegetative growth of *Dendrobium*, but significantly affect generative growth.

**Table 1.** Effect of various BAP and node of flower spike after 90 d of treatments

Combination of Treatment		Variables				
Concentration of BAP (mg L <sup>-1</sup> )	Nodes of Flower Spike	% Keiki	% flower spike	Keiki length (cm)	Flower spike length (cm)	First bud emergence (d)
0	2	0	0	0.00±0.000 <sup>c</sup>	0.00±0.000 <sup>c</sup>	0.00±0.000 <sup>h</sup>
2 000	2	20 (1/5)	0	6.6±3.130 <sup>d</sup>	0.00±0.000 <sup>c</sup>	9.2±0.837 <sup>ef</sup>
4 000	2	40 (2/5)	0	13.8±2.775 <sup>b</sup>	0.00±0.000 <sup>c</sup>	7.2±0.837 <sup>fg</sup>
6 000	2	80 (4/5)	0	27.6±2.302 <sup>a</sup>	0.00±0.000 <sup>c</sup>	5.6±1.342 <sup>g</sup>
0	3	0	0	0.00±0.000 <sup>c</sup>	0.00±0.000 <sup>c</sup>	0.00±0.000 <sup>h</sup>
2 000	3	20 (1/5)	0	8.60±2.191 <sup>cd</sup>	0.00±0.000 <sup>c</sup>	13.4±2.302 <sup>cd</sup>
4 000	3	20 (1/5)	0	11.6±1.517 <sup>bc</sup>	0.00±0.000 <sup>c</sup>	10.4±1.14 <sup>dc</sup>
6 000	3	40 (2/5)	0	25.02±6.76 <sup>a</sup>	0.00±0.000 <sup>c</sup>	5.2±0.837 <sup>g</sup>
0	4	0	0	0.00±0.000 <sup>c</sup>	0.00±0.000 <sup>c</sup>	0.00±0.000 <sup>h</sup>
2 000	4	0	20 (1/5)	0.00±0.000 <sup>c</sup>	19.4±4.669 <sup>cd</sup>	20.4±2.702 <sup>a</sup>
4 000	4	0	20 (1/5)	0.00±0.000 <sup>c</sup>	26.0±9.618 <sup>c</sup>	20.2±1.483 <sup>a</sup>
6 000	4	0	20 (1/5)	0.00±0.000 <sup>c</sup>	70.6±8.473 <sup>a</sup>	8.2±0.837 <sup>efg</sup>
0	5	0	0	0.00±0.000 <sup>c</sup>	0.00±0.000 <sup>c</sup>	0.00±0.000 <sup>h</sup>
2 000	5	0	20 (1/5)	0.00±0.000 <sup>c</sup>	11.4±6.107 <sup>d</sup>	18.6±1.673 <sup>ab</sup>
4 000	5	0	40 (2/5)	0.00±0.000 <sup>c</sup>	25.4±3.647 <sup>c</sup>	16.2±1.304 <sup>bc</sup>
6 000	5	0	80 (4/5)	0.00±0.000 <sup>c</sup>	40.0±7.906 <sup>b</sup>	6.8±1.924 <sup>fg</sup>

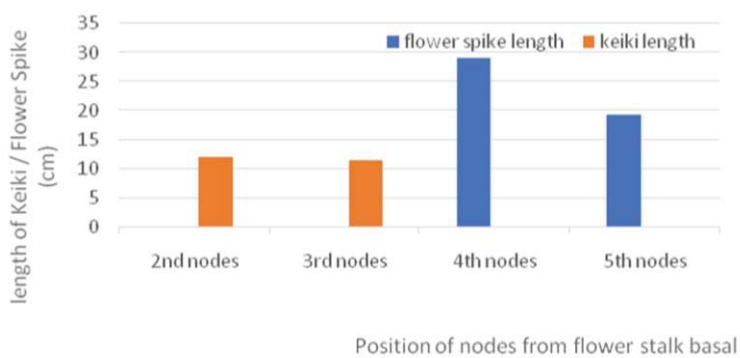
Note: Means followed by the same letters within a column are not significantly different from each other at  $P > 0.05$  after testing Mann Whitney U Test at  $\alpha = 5\%$



**Fig. 1.** Development of Keiki growth on 2<sup>nd</sup> node of basal flower stalk on *Phalaenopsis* spp.  
 A. 5 d (earliest bud emergence); B. 14 d; C. 21 d after being treated with 6 000 mg L<sup>-1</sup> BAP

### 3.2 Effect of the position of the node from basal flower stalk to form Keiki or flower spike

The lower nodes of the flower stalk had a higher chance of giving Keiki, and the higher nodes were more likely to give a secondary spike (Figure 2). Naturally, the cytokinin content in the base of the stem is greater than at the tip. It caused the node closest to the base of the flower stalk to have a greater chance of generating Keiki than the flower spike. This condition was also supported by ambient temperature. Greenhouse ambient temperature was  $\pm 30\text{ }^{\circ}\text{C}/24\text{ }^{\circ}\text{C}$  day/night. Under an appropriate environment, bud primordia at the node could grow to form Keiki or flower spike. According to Blanchard [13] flower initiation on *Phalaenopsis* usually was inhibited at air temperature  $\geq 28\text{ }^{\circ}\text{C}$ .



**Fig. 2.** Effect of nodes position from flower stalk basal on Keiki or flower spike length

Secondary keikis were obtained from basal flower spikes that emergence resulted from the 5<sup>th</sup> node of the flower stalk (Figure 3A). In this case, the spike raised and grew at the 5<sup>th</sup> node of the flower stalk, and then without applying BAP, the Keiki raised from the base and 1<sup>st</sup> node of the secondary spike. Application of BAP to the 5<sup>th</sup> node of the flower stalk had been shown to have an effect on the appearance of the new flower spike (Figure 3B). In orchids, many studies reported that BAP induced floral bud [3–6], and also being influenced by ambient temperature [13]. The position of the nodes far away from the leaves as a source of photosynthate and roots as a source of water caused a greater chance of flower spike appearance than the Keiki.



**Fig. 3.** Keiki was developed from a secondary flower spike that emerged at the 5<sup>th</sup> node from the flower stalk of *Phalaenopsis* spp. (A) and secondary flower spike was developed from the 4<sup>th</sup> node from flower stalk (B)

Arrow  $\rightarrow$  Keiki FS: Flower stalk

## 4 Conclusions

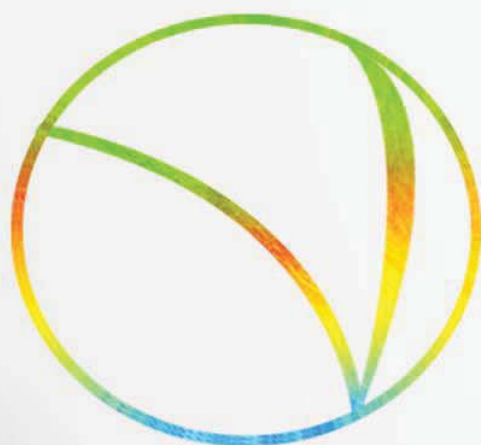
The application of BAP cytokinin (2 000 mg L<sup>-1</sup> to 6 000 mg L<sup>-1</sup>) could stimulate Keiki or a new flower spike depending on node position from the flower spike base. The Keiki is raised from the second and third nodes of the basal flower stalk while the flower spike is raised far away from the basal flower stalk. Treated 6 000 mg L<sup>-1</sup> of BAP on nodes of flower stalk was the best for stimulating Keiki or new flower spike.

This research was funded by *Hibah Program Pengembangan Usaha Produk Intelektual Kampus* (PPUPIK) – Grant for the Campus Intellectual Product Business Development Program Kemenristekdikti BRIN 2020 with contract 007/SPP-PPM/LPPM-02/DRPM/FTB/III/2020 (on behalf of Dr.rer.nat. Sulistyono Emantoko Dwi Putra). All experiments were conducted in the Faculty of Biotechnology University of Surabaya, East Java, Indonesia. The authors would like to thank laboratory assistants and students for the intensive help to support this research.

## References

1. E. Semiarti. AIP Conf. Proc. **2002**,1:02022(2018).  
<https://doi.org/10.1063/1.5050118>
2. R. Lopez, E. Runkle, Y.T. Wang, M. Blanchard. *The orchid grower* (3<sup>rd</sup> article). *Greenhouse grower* (2005) p. 96–100.  
[https://scholar.google.com/scholar?hl=id&as\\_sdt=0%2C5&q=The+orchid+grower&btnG=](https://scholar.google.com/scholar?hl=id&as_sdt=0%2C5&q=The+orchid+grower&btnG=)
3. N. Nambiar, T.C. Siang, M. Mahmood. *Aust. J. Crop Sci.* **6**,2:225–231(2012).  
[https://scholar.google.com/scholar?hl=id&as\\_sdt=0%2C5&q=Effect+of+6-Benzylaminopurine+on+flowering+of+a+Dendrobium+orchid&btnG=](https://scholar.google.com/scholar?hl=id&as_sdt=0%2C5&q=Effect+of+6-Benzylaminopurine+on+flowering+of+a+Dendrobium+orchid&btnG=)
4. L. Erfa, D. Maulida, Ferziana, R.N. Sesanti, Yuriansyah. *Flowering induction of Phalaenopsis orchids with a combination of BAP and temperature condition*. In:Proceeding of 2<sup>nd</sup> International Conference on Food and Agriculture. **2**:258–263(2019).  
[https://scholar.google.com/scholar?hl=id&as\\_sdt=0%2C5&q=Flowering+induction+of+Phalaenopsis+orchids+with+a+combination+of+BAP+and+temperature+condition&btnG=](https://scholar.google.com/scholar?hl=id&as_sdt=0%2C5&q=Flowering+induction+of+Phalaenopsis+orchids+with+a+combination+of+BAP+and+temperature+condition&btnG=)
5. P.H. Wu, D.C.N. Chang. *Afr. J. Biotechnol.* **11**,7:1592–1596(2012).  
<https://doi.org/10.5897/AJB11.2472>
6. G. Mishra, S.K. Palai, N.R. Nath. *J. Pharm. Innov.* **7**,7:441–446(2018).  
[https://scholar.google.com/scholar?hl=id&as\\_sdt=0%2C5&q=Studies+on+induction+of+early+flowering+in+orchids+%28Phalaenopsis++hybrid%29+cv.+Fuller%E2%80%99s++Sunset&btnG=](https://scholar.google.com/scholar?hl=id&as_sdt=0%2C5&q=Studies+on+induction+of+early+flowering+in+orchids+%28Phalaenopsis++hybrid%29+cv.+Fuller%E2%80%99s++Sunset&btnG=)
7. P.H. Hardjo, W.D. Savitri, I.B.M Artadana, S.E.D. Putra, E.P. Parac, and A. Jan. *Jordan J.Biol Sci.* **14**,5:933–937(2021).  
<https://jjbs.hu.edu.jo/files/vol14/n5/Binder14n5.pdf>
8. P.H. Hardjo and W.D. Savitri. *KnE Life Sci.* **3**,5:175(2017).  
<https://doi.org/10.18502/kl.v3i5.990>
9. P.H. Hardjo, D.P.D. Susanto, W.D. Savitri, M.G.M. Purwanto. *Nusantara Bioscience.* **11**,2:123–127. <https://doi.org/10.13057/nusbiosci/n110202>
10. G. Farag, M. Khattab, A.E. Naggar. *Alex. J. Agric. Sci.* **63**,1:29–40(2018).  
<https://doi.org/10.21608/ALEXJA.2018.30051>
11. M. Agustina, M. Maisura, R.S. Handayani. *J. Trop. Hort.* **3**,1:1–5(2020).  
<http://dx.doi.org/10.33089/jthort.v3i1.37>
12. N.L.S. Suryaningsih, L. Hisa, A.A. Limbongan. *Indian J. Public Health Res. Dev.*

14. **9**,4:216–220(2018).  
<https://doi.org/10.5958/0976-5506.2018.00286.3>
15. M.G. Blanchard, E.S. Runkle. J. Exp. Bot. **57**,15:4043–4049(2006).  
<https://doi.org/10.1093/jxb/erl176>



**NRLS** | INTERNATIONAL CONFERENCE  
ON NATURAL RESOURCES  
AND LIFE SCIENCES

**FACULTY OF BIOTECHNOLOGY, UNIVERSITY OF SURABAYA  
SURABAYA, 23<sup>RD</sup> - 24<sup>TH</sup> SEPTEMBER 2020**





## Scientific and Editorial Board

- Abubakar Yaro, Strathclyde Institute of Pharmacy & Biomedical Sciences (SIPBS), University of Strathclyde, Scotland (GBR).
- Afrida Rizka Farzana, IPB University, and *Rumah Paper Kita* (Our House of Papers), RP Editing & Proofreading Servives (IDN).
- Andoniana Rakoto Malala, *Centre de Formation et d'Application du Machinisme Agricole – CFAMA* (MDG).
- Asma Nisar, Nazar College of Pharmacy, DAKSON Institue of Health Sciences, Islamabad (PAK).
- Bayu Prabowo, Renewable Energy Development Research, Research and Technology Center – PT Pertamina, Jakarta (IDN).
- Fahma Alfian, Merdeka University of Madiun, and RP Editing & Proofreading Servives (IDN).
- Haryo Wibowo, Institute for Thermal Power Engineering – Zhejiang University of China (CHN).
- Ivar Zekker, Institute of Chemistry, University of Tartu, Tartu, (EST).
- Karina Stankeviča, Department of Environmental Science, University of Latvia (LVA).
- Mohammad Syaifudin Zuhri, Merdeka University of Madiun, and RP Editing & Proofreading Servives (IDN).
- Muhammad Danang Birowosuto, CNRS International NTU Thales Research Alliance – Nanyang Technological University (SGP).
- Muhammad Zahoor, Department of Biochemistry, University of Malakand, Khyber Pakhtunkhwa, Peshawar (PAK).
- Noor Illi Mohamad Puad, Department of Biotechnology Engineering, Kulliyyah of Engineering, International Islamic University Malaysia (MYS).
- Praptiningsih Gamawati Adinurani, Department of Agrotechnology – Merdeka University of Madiun, and RP Editing & Proofreading Servives (IDN).
- Rangga Kala Mahaswa, Universitas Gadjah Mada, and RP Editing & Proofreading Servives (IDN).
- Roy Hendroko Setyobudi, Department of Agriculture Science, Postgraduate Program, University of Muhammadiyah Malang, and RP Editing & Proofreading Servives (IDN).
- Trias Agung Pakarti, University of Brawijaya, and RP Editing & Proofreading Servives (IDN).
- Tsitsino Turkadze, Department of Chemical and Environmental Technologies, Akaki Tsereteli State University, Kutaisi (GEO).
- Yahya Jani, Division of Sustainable Environment and Construction, School of Business Society and Engineering, Mälardalen University (SWE).
- Yusilawati Ahmad Nor, Department of Biochemical-Biotechnology Engineering, Kuliyyah of Engineering, International Islamic University Malaysia (MYS).



[All issues](#) ▶ Volume 374 (2023)

[◀ Previous issue](#)

[Table of Contents](#)

[Next issue ▶](#)

[Free Access](#) to the whole issue

## E3S Web of Conferences

Volume 374 (2023)

### The 3<sup>rd</sup> International Conference on Natural Resources and Life Sciences (NRLS) 2020

Virtual, September 23-24, 2020

R.H. Setyobudi, A. Yaro, I. Zekker, M. Zahoor and T. Turkadze (Eds.)

Export the citation of the selected articles [Export](#)

[Select all](#)

[Open Access](#)

#### About the conference

Published online: 21 March 2023

PDF (1.66 MB)

---

[Open Access](#)

#### Statement of Peer review

Published online: 21 March 2023

PDF (216 KB)

[Open Access](#)

The Taste of Arabica Coffee in Several Altitude and Shading Condition 00001

Adriani Saurinda Asiana Siahaan, Erwin Masrul Harahap, Chairani Hanum, Abubakar Karim and Zane Vinceviča-Gaile

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400001>

PDF (1.910 MB) | [References](#) | [NASA ADS Abstract Service](#)

---

Open Access

**Study of Biodiversity in Submontana of Kamojang Nature Reserve, West Java, Indonesia 00002**

Afrisal Isfan Abdillah, Silva Eka Putra Utama and Nguyen Van Minh

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400002>

PDF (3.913 MB) | [References](#) | [NASA ADS Abstract Service](#)

---

Open Access

**Improving the Capability of Corn Processing into Tortillas by Family Welfare Programme, In Gedong, Ngadirojo, Wonogiri Regency, Central Java, Indonesia 00003**

Afriyanti Afriyanti, Novian Wely Asmoro, Retno Widyastuti, Catur Budi Handayani, Ira Liana Sari, Rahayu Relawati and Peeyush Soni

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400003>

PDF (5.133 MB) | [References](#) | [NASA ADS Abstract Service](#)

---

Open Access

**The Awareness of Intellectual Property Rights (IPRs) Regimes on Small and Medium Enterprises (SMEs) of Agricultural Products Processing at Malang Area, East Java Province, Indonesia 00004**

Aris Winaya, Maftuchah Maftuchah, Sofyan Arif, Leila Neimane and Ida Ekawati

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400004>

PDF (4.153 MB) | [References](#) | [NASA ADS Abstract Service](#)

---

Open Access

**Buyer Decisions on Hydroponic Vegetable Products 00005**

Asgami Putri, Jabal Tarik Ibrahim, Adi Sutanto, Syafrani Syafrani, Bambang Yudi Ariadi, Istis Baroh, Rahayu Relawati, Juris Burlakovs, Erni Hawayanti, Sri Utami Lestari et al. (6 more)

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400005>

PDF (4.188 MB) | [References](#) | [NASA ADS Abstract Service](#)

---

Open Access

**Utilization of Green Tea Extract on Anti-aging Cream with Butylated Hydroxytoluene (BHT) and Tertiary Butylhydroquinone (TBHQ): Physical Stability Aspect 00006**

Cynthia Marisca Muntu, Yulianita Yuwono, Christina Avanti and Manar Fayiz Mousa Atoum

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/2023337400006>

PDF (5.577 MB) | [References](#) | [NASA ADS Abstract Service](#)

---

Open Access

**The Effect of Pod Storage on Chemical and Microbiological Characteristics of Organic and Non-organic Balinese Cacao Pulps 00007**

Christina Mumpuni Erawati, Ruth Chrisnasari and Peeyush Soni

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/2023337400007>

PDF (4.176 MB) | [References](#) | [NASA ADS Abstract Service](#)

---

Open Access

**Characterization Properties of Banana Peel as a Promising Alternative for Bioplastic 00008**

Dina Maria Abel, Juvencio de Castro Ruas, Adilson de Castro Ruas and Tjie Kok

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/2023337400008>

PDF (3.790 MB) | [References](#) | [NASA ADS Abstract Service](#)

---

Open Access

**Assessment of *Aegle marmelos* Fruit Extracts as Organic Insecticide for *Spodoptera exigua* on *Allium ascolanicum* 00009**

Dyah Roeswitawati, Teuku Ramzy, Praptiningsih Gamawati Adinurani, Roy Hendroko Setyobudi, Zahid Hussain, Irum Iqrar and Nguyen Ngoc Huu

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/2023337400009>

PDF (4.830 MB) | [References](#) | [NASA ADS Abstract Service](#)

---

Open Access

**Sterilization of Ready to Serve Product for Special Needs of Hajj and Umrah: Skipjack Tuna in A Retort Pouch Package 00010**

Elsa Azhari, Muhamad Subroto Aliredjo, Agus Heri Purnomo, Damat Damat, Maizirwan Mel, Satriyo Krido Wahono, Suherman Suherman and Erkata Yandri

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400010>

PDF (4.496 MB) | [References](#) | [NASA ADS Abstract Service](#)

---

Open Access

### Production and Nutrient Value of Elephant Grass in Agroforestry Systems in Indonesia 00011

Endang Dwi Purbajanti, Didik Wisnu Widjajanto, Praptiningsih Gamawati Adinurani, Zahid Hussain and Ida Ekawati

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400011>

PDF (3.940 MB) | [References](#) | [NASA ADS Abstract Service](#)

---

Open Access

### Quality Assessment on Honey Produced from Six Months Old *Acacia crassicarpa* 00012

Eni Suhesti, Lili Zalizar, Joko Triwanto, Ervayendri Ervayendri, Roy Hendroko Setyobudi, Nugroho Tri Waskitho, Jabal Tarik Ibrahim, Maftuchah Maftuchah, Hadinoto Hadinoto, Zane Vincēviča-Gaile et al. (5 more)

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400012>

PDF (4.880 MB) | [References](#) | [NASA ADS Abstract Service](#)

---

Open Access

### Incentive Strategy for Energy Efficiency Programs in Industries Consuming 6 000 TOE/year with Sustainable Energy Performance 00013

Satryo Martoyoedo, Priyadi Priyadi, Dewanto Fajrie, Ratna Ariati, Erkata Yandri, Roy Hendroko Setyobudi, Suherman Suherman, Juris Burlakovs, Maizirwan Mel, Satriyo Krido Wahono et al. (4 more)

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400013>

PDF (4.577 MB) | [References](#) | [NASA ADS Abstract Service](#)

---

Open Access

### Bird Diversity, Abundance, and Evenness Rates in Ecotone Area of Sutan Syarif Hasyim Forest Park, Riau, Indonesia 00014

Hadinoto Hadinoto, Lili Zalizar, Joko Triwanto, Ervayenri Ervayenri, Roy Hendroko Setyobudi, Muhammad Chanan, Nugroho Tri Waskitho, Jabal Tarik Ibrahim, Eni Suhesti, Nguyen Van Minh et al. (3 more)

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400014>



Open Access

The Length-Weight Relationships and Condition Factors of *Potamocorbula faba* Hinds., 1843 in the Permisan Bay, East Java, Indonesia 00015

Hariyadi Hariyadi, Aris Winaya, Muhammad Zainuri, Norma Afiati, Lachmudin Sya'rani and Olga Anne

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400015>

PDF (5.818 MB) | References | NASA ADS Abstract Service

---

Open Access

Biodiesel Industrial Waste based on *Jatropha curcas* as a Fungicide to Control *Fusarium oxysporum* and *Alternaria solani* 00016

Henik Sukorini, Dyah Erni Widyastuti, Dini Kurniawati, Sawita Suwannarat, Maizirwan Mel and Roy Hendroko Setyobudi

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400016>

PDF (6.054 MB) | References | NASA ADS Abstract Service

---

Open Access

Population Development and Disease Incidence of Virus Disease Transmitted by Brown Planthopper on the Paddy Field Applied with Biofertilizers and Biopesticides 00017

I. Nyoman Widiarta, Ety Pratiwi, I. Putu Wardana and Oky Dwi Purwanto

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400017>

PDF (5.254 MB) | References | NASA ADS Abstract Service

---

Open Access

*Moringa oleifera* L. Microgreens and their Antioxidant Activity 00018

Ida Bagus Made Artadana and Edward Pandji

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400018>

PDF (4.458 MB) | References | NASA ADS Abstract Service

---

Open Access

The Effect of Elisitor on Growth and Ginsenoside Level in Hairy Root Culture of *Panax ginseng* Cultivated in Shake Flasks 00019

Johan Sukweenadhi, Stefan Pratama Chandra, Leonardo Satriono Putra, Yoanes Maria Vianney,

Theresia Liliani, Merlyn Wongso, Melisa Widjaja, Sari Pramadiyanti, Pissa Christanti, Kim-Jong Hak et al. (2 more)

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400019>

PDF (5.146 MB) | [References](#) | [NASA ADS Abstract Service](#)

---

Open Access

**Zeolite-microfragmenting Media: A Potential Strategy to Accelerate Coral Growth** 00020

Khaulah Mujahidah, Aolia Ramadan, Veryl Hasan, Sahri Yanti, Izzul Islam and Irum Iqrar

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400020>

PDF (7.021 MB) | [References](#) | [NASA ADS Abstract Service](#)

---

Open Access

**Prevalence of Gastrointestinal Helminthiasis in Beef Cattle During Dry Season in Bangkalan Regency, Madura, Indonesia** 00021

Lili Zalizar, Aris Winaya, Yusuf Ridwan, Eka Arif Hardiansyah and Ravindran Jaganathan

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400021>

PDF (4.045 MB) | [References](#) | [NASA ADS Abstract Service](#)

---

Open Access

**The Effect of Mangosteen Varieties as Dyes and ZnO Nanostructures Mixture to DSSC - Dye-sensitized Solar Cell Characteristics** 00022

Lizda Johar Mawarani, Ratna Puspitasari, Doty Dewi Risanti and Luqman Ali Shah

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400022>

PDF (5.064 MB) | [References](#) | [NASA ADS Abstract Service](#)

---

Open Access

***Bidens pilosa* Linn.: Beautiful Weed for the Healthy Mouth – A Mini Review** 00023

Mariana Wahjudi, Gracelynn Meira, Hadinata Santoso and Assidiq Zidane Irwansyah

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400023>

PDF (4.719 MB) | [References](#) | [NASA ADS Abstract Service](#)

---

Open Access

**Hematological Features of Cihateup's Duck Blood that are Given Natural Isotonic in Dry Systems** 00024

Nurul Frasiska, Putri Dian Wulansari, Novia Rahayu, Abdul Razak Alimon, Wahyu Widodo and Nguyen Ngoc Huu

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400024>

PDF (4.248 MB) | [References](#) | [NASA ADS Abstract Service](#)

---

Open Access

**Influence of *Hibiscus tilliaceus* Extract and Suspension on *Echerichia coli* and *Staphylococcus aureus* Growth** 00025

Oktavina Kartika Putri, Lina Oktavia Rahayu, Gardiani Febri Hadiwibowo, Yuly Kusumawati and Asma Nisar

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400025>

PDF (4.960 MB) | [References](#) | [NASA ADS Abstract Service](#)

---

Open Access

**Keiki induction by cytokinin on *Phalaenopsis* spp.** 00026

Popy Hartatie Hardjo, Ida Bagus Made Artadana, Sulistyo Emantoko Dwi Putra and Asad Jan

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400026>

PDF (4.351 MB) | [References](#) | [NASA ADS Abstract Service](#)

---

Open Access

**The Pro-Environmental Producer Behavior on Food Small and Medium Enterprises in Malang, Indonesia** 00027

Rahayu Relawati, Bambang Yudi Ariadi, Harpowo Harpowo, Bambang Hadi Prabowo, Leila Neimane and Ida Ekawati

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400027>

PDF (3.858 MB) | [References](#) | [NASA ADS Abstract Service](#)

---

Open Access

**Antioxidant Activity Between Defatted and Different Solvent Temperature in Rice Bran var. IR-64 Extract** 00028

Retno Widyastuti, Rahmat Dwi Irwanto, Enny Purwati Nurlaili, Sri Hartati and Irum Iqrar

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400028>

PDF (4.346 MB) | [References](#) | [NASA ADS Abstract Service](#)

---

Open Access



Inhibition of Carica Solid Soap to the Growth of *Staphylococcus epidermidis*  
Bacteria 00029

Roisatul Ainiyah, Cahyaning Riniutami and Muhannad Illayan Massadeh

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400029>

PDF (4.435 MB) | [References](#) | [NASA ADS Abstract Service](#)

---

Open Access

Pest Control using Bark Pesticide Applicator (BPA) in Citrus Plants 00030

Rudi Cahyo Wicaksono, Otto Endato, Susi Wuryantini and Zahid Hussain

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400030>

PDF (5.466 MB) | [References](#) | [NASA ADS Abstract Service](#)

---

Open Access

Food Waste Product for Overcoming Heat Stress in Broilers 00031

Rusli Tonda, Manar Fayiz Mousa Atoum, Roy Hendroko Setyobudi, Lili Zalizar, Wahyu Widodo, Mohammad Zahoor, David Hermawan, Damat Damat, Ahmad Fauzi, Asgami Putri et al. (12 more)

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400031>

PDF (5.053 MB) | [References](#) | [NASA ADS Abstract Service](#)

---

Open Access

Thermostable Chitinase Producing Bacterium from Ijen Hot Spring – Indonesia: Isolation, Identification, and Characterization 00032

Ruth Chrisnasari, Liony Priscilla Sutanto, Dian Paulina, Alicia Wahjudi and Tjandra Pantjajani

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400032>

PDF (5.407 MB) | [References](#) | [NASA ADS Abstract Service](#)

---

Open Access

Infestation of *Dendrophthoe pentandra* (L.) Miq. on Various Canopy Shading and Plants Diversity in Purwodadi Botanic Garden, Indonesia: A study on *Cassia fistula* L. 00033

Solikin Solikin, Melisnawati Hamza Angio, Tri Handayani and Nguyen Van Minh

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400033>

PDF (6.480 MB) | [References](#) | [NASA ADS Abstract Service](#)

---

Open Access

The Impact of Madden - Julian Oscillation and Sea Surface Temperature Process Interaction on Rainfall Variability During Rainy Season: A Case Study in East Nusa Tenggara, Indonesia 00034

Sudirman Sudirman, Amir Mustofa Irawan, Dzikrullah Akbar, Peeyush Soni and Leila Neimane

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400034>

PDF (6.653 MB) | [References](#) | [NASA ADS Abstract Service](#)

---

Open Access

Bioelectrochemical System Application for Pesticides Removal: A mini-review 00035

Theresia Desy Askitosari and Amanda Larasati

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400035>

PDF (4.084 MB) | [References](#) | [NASA ADS Abstract Service](#)

---

Open Access

Mini-Review: Extraction of Patchouli Oil from *Pogostemon cablin* Benth. Leaves 00036

Tjie Kok, Natasha Florenika, Mangihot Tua Gultom, Popy Hartatie Hardjo and Muhannad Illayan Massadeh

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400036>

PDF (4.277 MB) | [References](#) | [NASA ADS Abstract Service](#)

---

Open Access

Herbs as A Feed Additive in the Broilers for the Sustainability of Local Products 00037

Wahyu Widodo, Adi Sutanto, Imbang Dwi Rahayu, Apriliana Devi Anggraini, Trisakti Handayani, Roy Hendroko Setyobudi, Maizirwan Mel and Nguyen Ngoc Huu

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400037>

PDF (3.889 MB) | [References](#) | [NASA ADS Abstract Service](#)

---

Open Access

Bioremediation in the Marine Environment: Challenges and Prospective Methods for Enhancement 00038

Watumesa Agustina Tan, Gabrielle Celina and Stephanie Pranawijaya

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400038>

Open Access

Characterization of Endophytic Bacteria Isolated from *Avicennia marina*'s Leaf Tissue Collected from Ekowisata Mangrove Wonorejo Surabaya, Indonesia 00039

Wina Dian Savitri, Marvel Lewi Santoso, Yulanda Antonius, Popy Hartatie Hardjo and Asad Jan

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400039>

[PDF \(5.900 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

---

Open Access

Identification of DNA G–quadruplex Forming Sequence in Shrimp White Spot Syndrome Virus (WSSV) 00040

Yoanes Maria Vianney, Priscilla Kandinata, Klaus Weisz and Maria Goretti Marianti Purwanto

Published online: 21 March 2023

DOI: <https://doi.org/10.1051/e3sconf/202337400040>

[PDF \(4.973 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

---

## E3S Web of Conferences

eISSN: 2267-1242



[Mentions légales](#)

[Contacts](#)

[Privacy policy](#)

## E3S Web of Conferences

### COUNTRY

France



Universities and research institutions in France



Media Ranking in France

### SUBJECT AREA AND CATEGORY

Earth and Planetary Sciences  
Earth and Planetary Sciences (miscellaneous)

Energy  
Energy (miscellaneous)

Environmental Science  
Environmental Science (miscellaneous)

### PUBLISHER

EDP Sciences


### H-INDEX

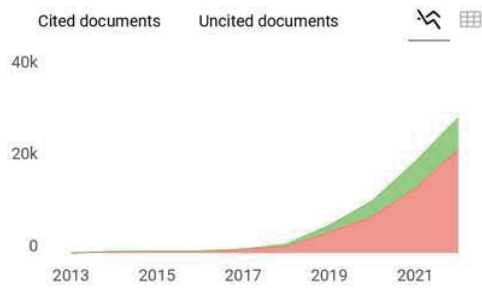
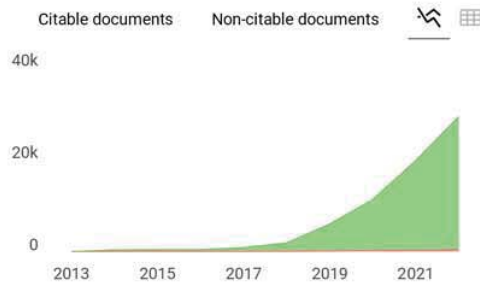
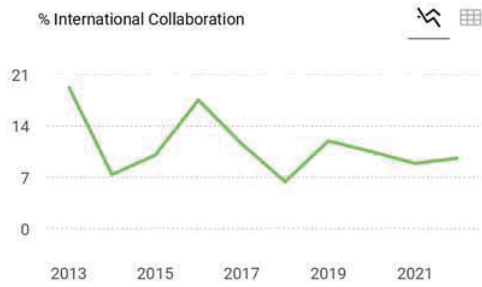
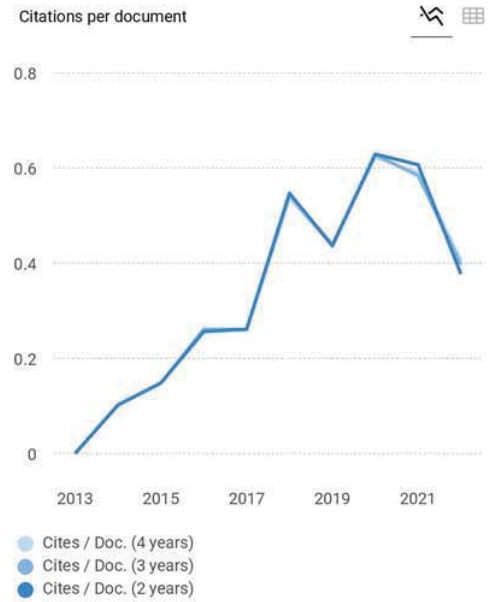
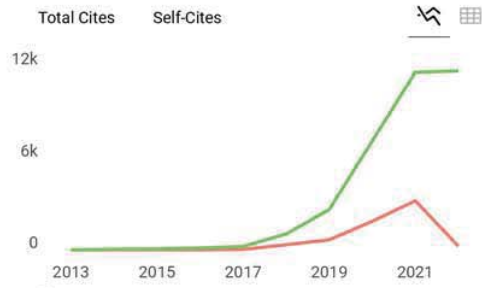
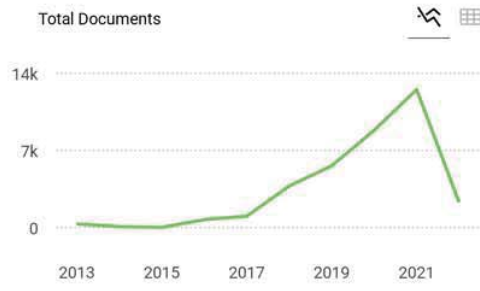
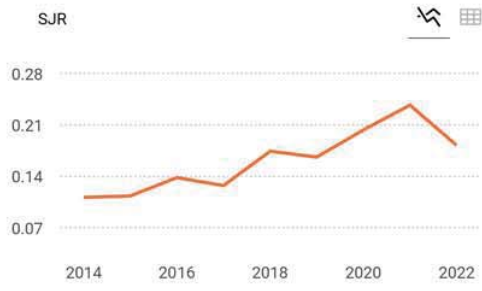
**33**

PUBLICATION TYPE	ISSN	COVERAGE	INFORMATION
Conferences and Proceedings	22671242	2013-2021	<a href="#">Homepage</a> <a href="#">How to publish in this journal</a> <a href="#">Contact</a>

#### SCOPE

E3S Web of Conferences is an Open Access publication series dedicated to archiving conference proceedings in all areas related to Environment, Energy and Earth Sciences. The journal covers the technological and scientific aspects as well as social and economic matters. Major disciplines include: soil sciences, hydrology, oceanography, climatology, geology, geography, energy engineering (production, distribution and storage), renewable energy, sustainable development, natural resources management... E3S Web of Conferences offers a wide range of services from the organization of the submission of conference proceedings to the worldwide dissemination of the conference papers. It provides an efficient archiving solution, ensuring maximum exposure and wide indexing of scientific conference proceedings. E3S Web of Conferences offers a wide range of services from the organization of the submission of conference proceedings to the worldwide dissemination of the conference papers. It provides an efficient archiving solution, ensuring maximum exposure and wide indexing of scientific conference proceedings. Proceedings are published under the scientific responsibility of the conference editors.

 Join the conversation about this journal



**E3S Web of Conferences** ← Show this widget in your own website

Not yet assigned quartile

**SJR 2022**  
0.18

powered by scimagojr.com

Just copy the code below and paste within your html code:

```
<a href="https://www.scimagojr.com" style="display: inline-block; width: 100px; height: 15px; background-color: #f0f0f0; border: 1px solid #ccc;">
```

**SCImago Graphica**

Explore, visually communicate and make sense of data with our [new data visualization tool](#).





T **Timur** 2 months ago

Hello! It is mentioned above that the COVERAGE is for the period 2013-2021. Does it mean that the coverage was discontinued in 2022?

reply



**Melanie Ortiz** 2 months ago

SCImago Team

Dear Timur,

Thank you very much for your comment.

All the metadata have been provided by Scopus /Elsevier in their last update sent to SCImago, including the Coverage's period data. The SJR for 2022 was released on 1st May 2023. We suggest you consult the Scopus database directly to see the current index status as SJR is a static image of Scopus, which is changing every day.

The Scopus' update list can also be consulted here:

<https://www.elsevier.com/solutions/scopus/how-scopus-works/content>

Best Regards, SCImago Team

A **Ali TARRAQ** 1 year ago

This conference proceeding contains a collection of high quality papers.

Why not reconsidering it by SCOPUS ?

reply



**Melanie Ortiz** 1 year ago

SCImago Team

Dear Ali,

thank you very much for your comment, unfortunately we cannot help you with your request. We suggest you contact Scopus support: <https://service.elsevier.com>

[/app/answers/detail/a\\_id/14883/kw/scimago/supporthub/scopus/](#)

Best Regards, SCImago Team

E **Elisa Julianti** 1 year ago

Hello,

This Conference Proceeding is having more number of quality manuscript and many more funded article.

Please consider it for scopus.

reply





**Melanie Ortiz** 1 year ago

SCImago Team

Dear Elisa, thanks for your participation! Best Regards, SCImago Team



**Nurhadi** 2 years ago

Dear Scimago Team.

Is it possible for me to submit my articles in the E3S Web of Conferences to a journal with the index Q1/Q2/Q3/Q4, and does it not violate plagiarism? Thank you.

reply

**S Sarah Pham** 1 year ago

Dear Nurhadi,

I have the same question as yours. My paper was published in e3s in 2020 when it was still schopus listed (Q3). Now it has been out listed. SO I WANT to find another Schopus listed papers to submit my e3s paper. I wonder what the answer you received from E3S or other related authorities? Thanks



**Melanie Ortiz** 2 years ago

SCImago Team

Dear Nurhadi,

thank you very much for your comment.

We suggest you contact E3S Web of Conferences editorial staff so they could inform you more deeply concerning the copyright. Besides, you'll need to check the editorial policy of the journal you'll choose and inform the editorial staff.

Best Regards, SCImago Team

**T TheHung** 3 years ago

Dear SCImago Team

Could you tell me the E3S Web of Conferences belongs to the blacklist journals or not? Because I got some information from my college. Please advise

Thank you very much

reply



**Melanie Ortiz** 3 years ago

SCImago Team

Dear TheHung,

Thank you for contacting us.

SJR is a portal with scientometric indicators of journals indexed in Scopus. All the data have been provided by Scopus /Elsevier and SCImago doesn't have the authority over this data. For more information about predatory journals or publishers, you can check the link below:

<https://beallslit.weebly.com/>

Best regards, SCImago Team

A **Antonietta Ianniello** 3 years ago

Dear SCImago Team

Could you please advise whether E3S Web of Conferences has an impact factor? Because in internet I saw that this journal has 0.52 IF. Please advise

Thank you very much

reply



**Melanie Ortiz** 3 years ago

SCImago Team

Dear Antonietta, thank you very much for your comment. SCImago Journal and Country Rank uses Scopus data, our impact indicator is the SJR. We suggest you consult the Journal Citation Report for other indicators (like Impact Factor) with a Web of Science data source. Best Regards, SCImago Team

E **Ezhil** 3 years ago

Dear SCImago Team

E3 web of conferences journal Coverage mentioned is 2013-2020. Will it be extended.

reply



**Melanie Ortiz** 3 years ago

SCImago Team

Dear Ezhil,  
thank you very much for your comment, unfortunately we cannot help you with your request. We suggest you contact Scopus support: [https://service.elsevier.com/app/answers/detail/a\\_id/14883/kw/scimago/supporthub/scopus/](https://service.elsevier.com/app/answers/detail/a_id/14883/kw/scimago/supporthub/scopus/)  
Best Regards, SCImago Team

S **Siripen** 3 years ago

Dear SCImago Team

Could you please advise whether E3S Web of Conferences is a journal? What category it is called? Is it a conference proceedings or journal? Because in E3S Web of Conferences, it says it is a journal but in scopus, it is a conference proceedings. Please advise

Thank you very much

reply

T **Tag** 3 years ago

It's not a journal, it is Conferences Proceedings.

E **Elena** 3 years ago  
currently the quartile of this journal is 3  
  
reply



**Melanie Ortiz** 3 years ago

SCImago Team

Dear Elena,  
Thank you for contacting us. This publication type hasn't a quartile assigned. We calculate the SJR data for all the publication types, but the Quartile data are only calculated for Journal type's publications. Best regards, SCImago Team

T **Thanh Quang Khai Lam** 4 years ago  
Hi  
Is "Lecture Notes in Civil Engineering" journal in Q4?  
I don't see it in Scimago.  
Thanks  
  
reply

M **Madhuri Damaraju** 5 years ago  
Hi,  
  
Are the conference proceedings published in E3S web of conferences, scopus indexed?  
  
Thanks  
  
reply



**Elena Corera** 5 years ago

SCImago Team

Dear Madhuri, in the SCImago Journal & Country Ranks all the information that we have available of the journals in Open Access is shown, if you do not locate the journal in the search engine, Scopus / Elsevier has not provided us with your data. Best Regards,  
SCImago Team

#### Leave a comment

Name

Email

(will not be published)

[Submit](#)

The users of Scimago Journal & Country Rank have the possibility to dialogue through comments linked to a specific journal. The purpose is to have a forum in which general doubts about the processes of publication in the journal, experiences and other issues derived from the publication of papers are resolved. For topics on particular articles, maintain the dialogue through the usual channels with your editor.

---

Developed by:



Powered by:



Follow us on [@ScimagoJR](#)

Scimago Lab, Copyright 2007-2022. Data Source: Scopus®

EST MODUS IN REBUS  
Horatio (Satire 1.1.106)

[Cookie settings](#)

[Cookie policy](#)

---



# Source details

## E3S Web of Conferences

Open Access ⓘ

Scopus coverage years: from 2013 to Present

E-ISSN: 2267-1242

Subject area: Earth and Planetary Sciences: General Earth and Planetary Sciences

Environmental Science: General Environmental Science Energy: General Energy

Source type: Conference Proceeding

CiteScore 2022

1.0



SJR 2022

0.182



SNIP 2022

0.213



[View all documents >](#) [Set document alert](#) [Save to source list](#) [Source Homepage](#)

[CiteScore](#) [CiteScore rank & trend](#) [Scopus content coverage](#)

CiteScore 2022 ▼

$$1.0 = \frac{27,581 \text{ Citations } 2019 - 2022}{28,843 \text{ Documents } 2019 - 2022}$$

Calculated on 05 May, 2023

CiteScoreTracker 2023 ⓘ

$$0.9 = \frac{22,468 \text{ Citations to date}}{25,656 \text{ Documents to date}}$$

Last updated on 05 July, 2023 • Updated monthly

### CiteScore rank 2022 ⓘ

Category	Rank	Percentile
Earth and Planetary Sciences	#143/192	25th
General Earth and Planetary Sciences		
Environmental Science	#176/227	22nd
General Environmental Science		

[View CiteScore methodology >](#) [CiteScore FAQ >](#) [Add CiteScore to your site ↗](#)

---

## About Scopus

[What is Scopus](#)

[Content coverage](#)

[Scopus blog](#)

[Scopus API](#)

[Privacy matters](#)

## Language

[日本語版を表示する](#)

[查看简体中文版本](#)

[查看繁體中文版本](#)

[Просмотр версии на русском языке](#)

## Customer Service

[Help](#)

[Tutorials](#)

[Contact us](#)

---

## ELSEVIER

[Terms and conditions ↗](#) [Privacy policy ↗](#)

Copyright © Elsevier B.V. ↗. All rights reserved. Scopus® is a registered trademark of Elsevier B.V.

We use cookies to help provide and enhance our service and tailor content. By continuing, you agree to the use of cookies ↗.

